

CHEMICAL & Metallurgical ENGINEERING

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In this Issue

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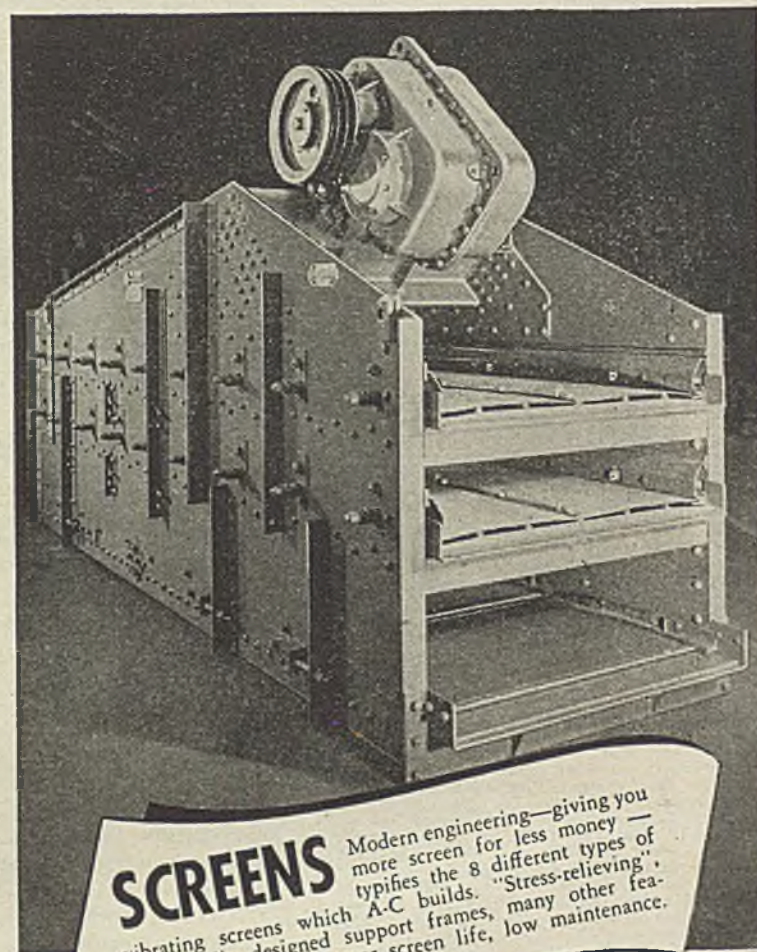
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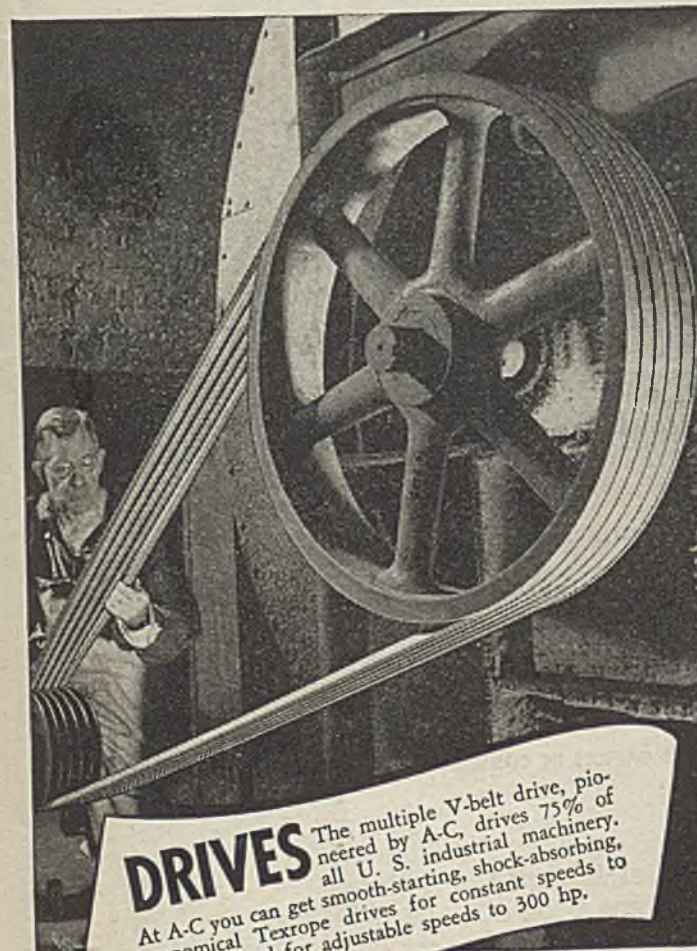


SCREENS Modern engineering—giving you more screen for less money — typifies the 8 different types of vibrating screens which A-C builds. "Stress-relieving", scientifically designed support frames, many other features contribute to longer screen life, low maintenance.

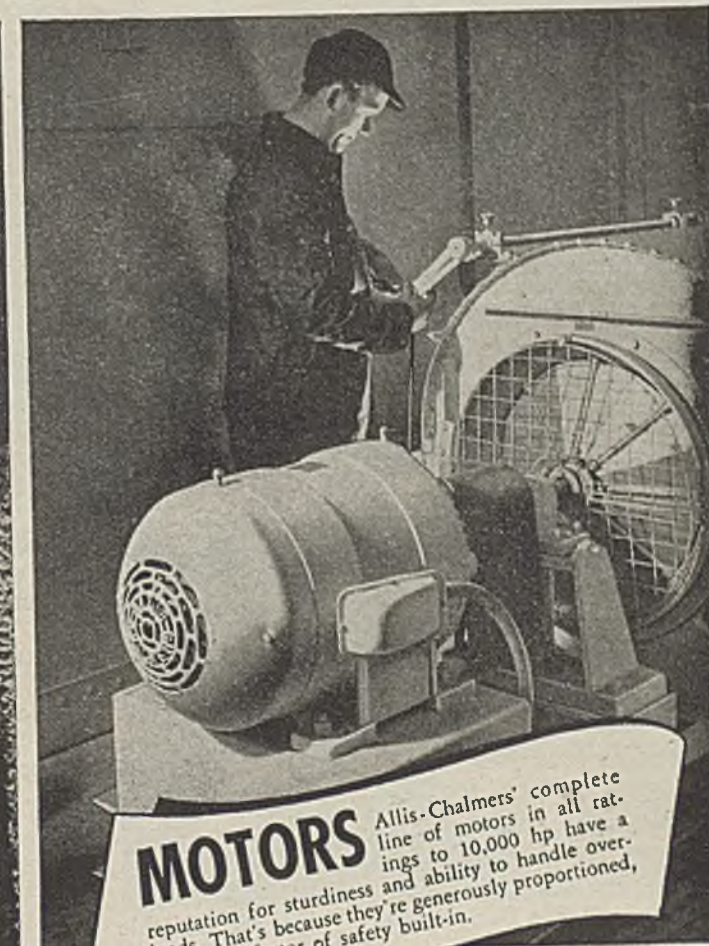
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Texrope Drives — prices, sizes of belts, sheaves, etc. Bulletin B6051F.

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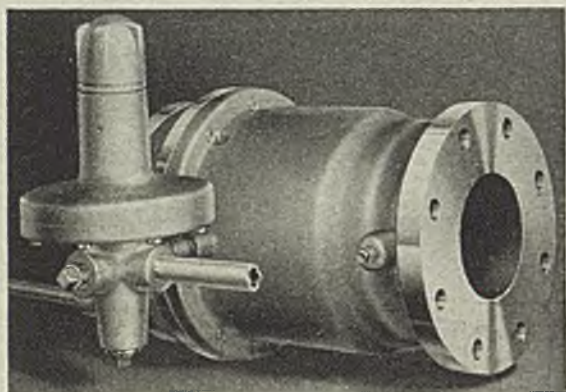
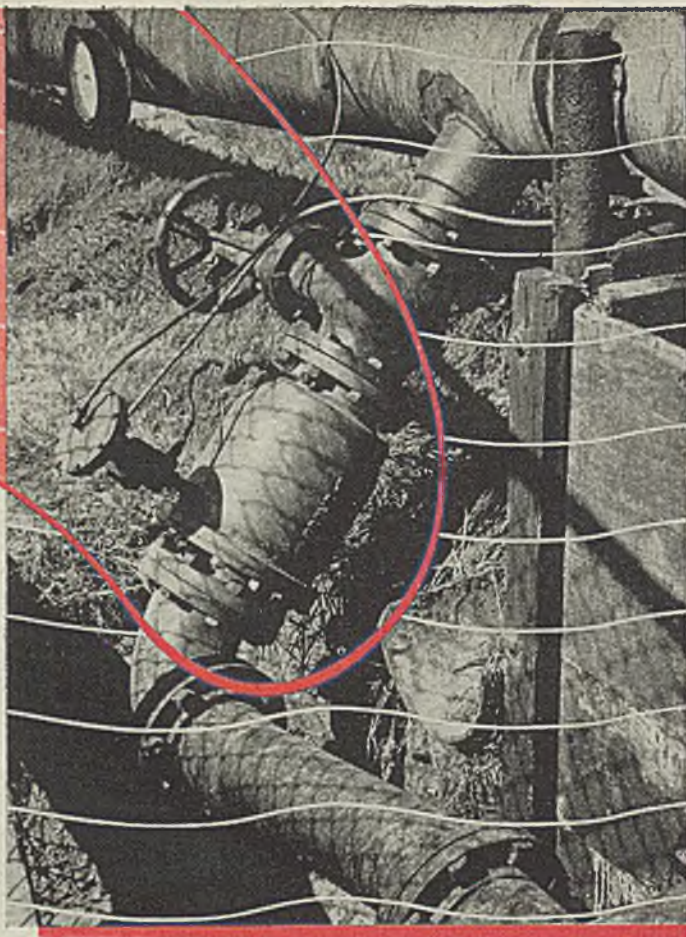
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FIXED
Fluid Level.

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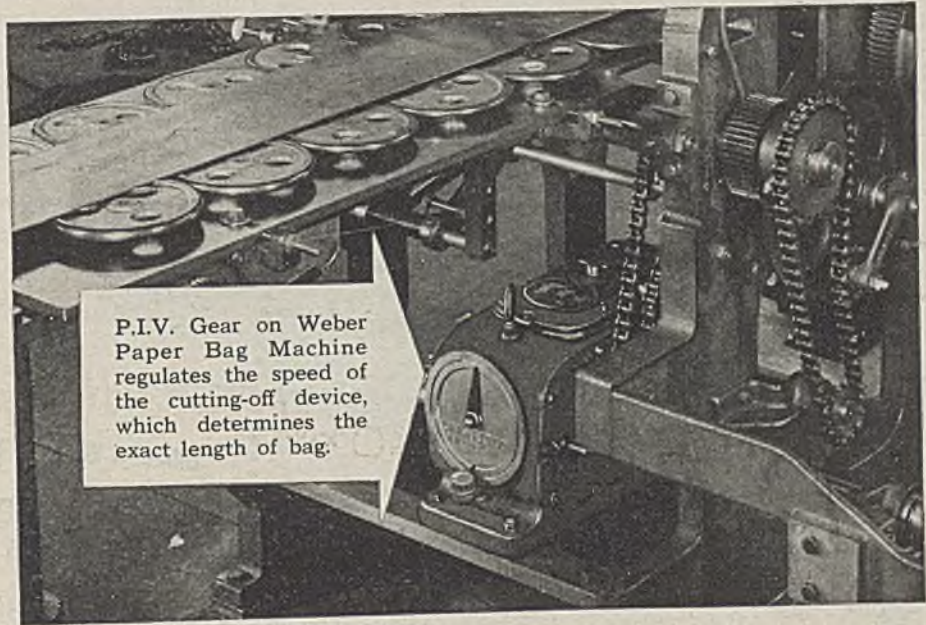
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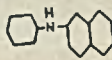
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Distilled—Available in commercial quantities

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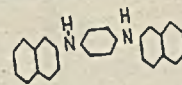
M. P. 106°
Purity 98.0%



Di B Naphthyl p Phenylene Diamine

Available in commercial quantities

M. P. 230° C
Purity 98%

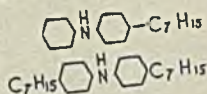


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(3.0 mm)

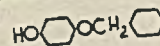
Purity 98%



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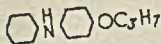
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Purity 90%



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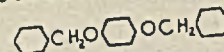
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Purity 92% min.



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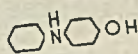
M. P. 119°
Purity 85%



p Hydroxy Diphenyl Amine

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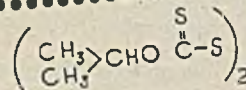
M. P. 15°
Purity 92%



Di Isopropyl Dixanthogen

Available in commercial quantities

M. P. 52°
Purity 98%



N-Nitroso Diphenyl Amine

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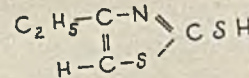
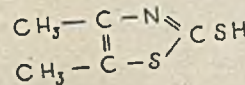
M. P. 62°
Purity 97%



Mixed Ethyl and Dimethyl Mercaptothiazoles

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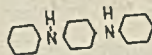
M. P. 136-153°
Purity Approximately 85% dimethyl and 15% ethyl mercaptothiazoles



Diphenyl p Phenylene Diamine

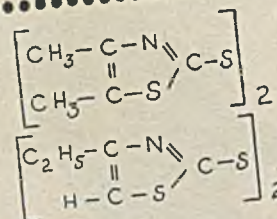
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M. P. 144°
Purity 92%



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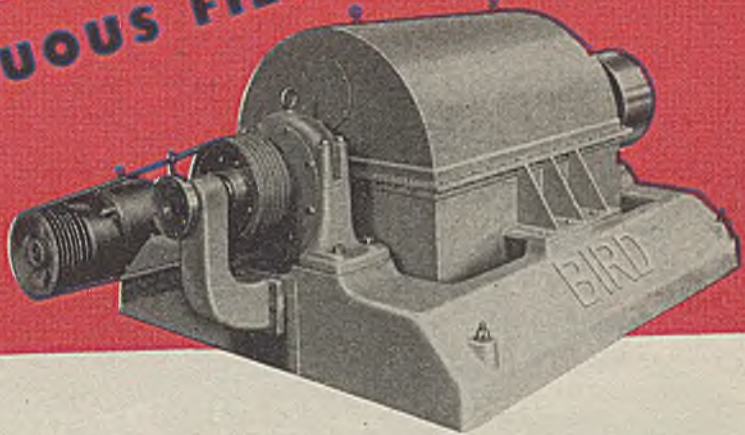
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ON OTHER
CASH STANDARD
VALVES**

Send for them

BULLETIN 965—

features the CASH STANDARD "42" Series—a complete line of balanced lever valves for handling almost anything that will flow through a pipe except some injurious chemicals. Two full pages show 16 installations with descriptions.

BULLETIN 963—

features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers—various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.

BULLETIN 956—

features the CASH STANDARD Type 4030 Back Pressure Valve—designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

BULLETIN 967—

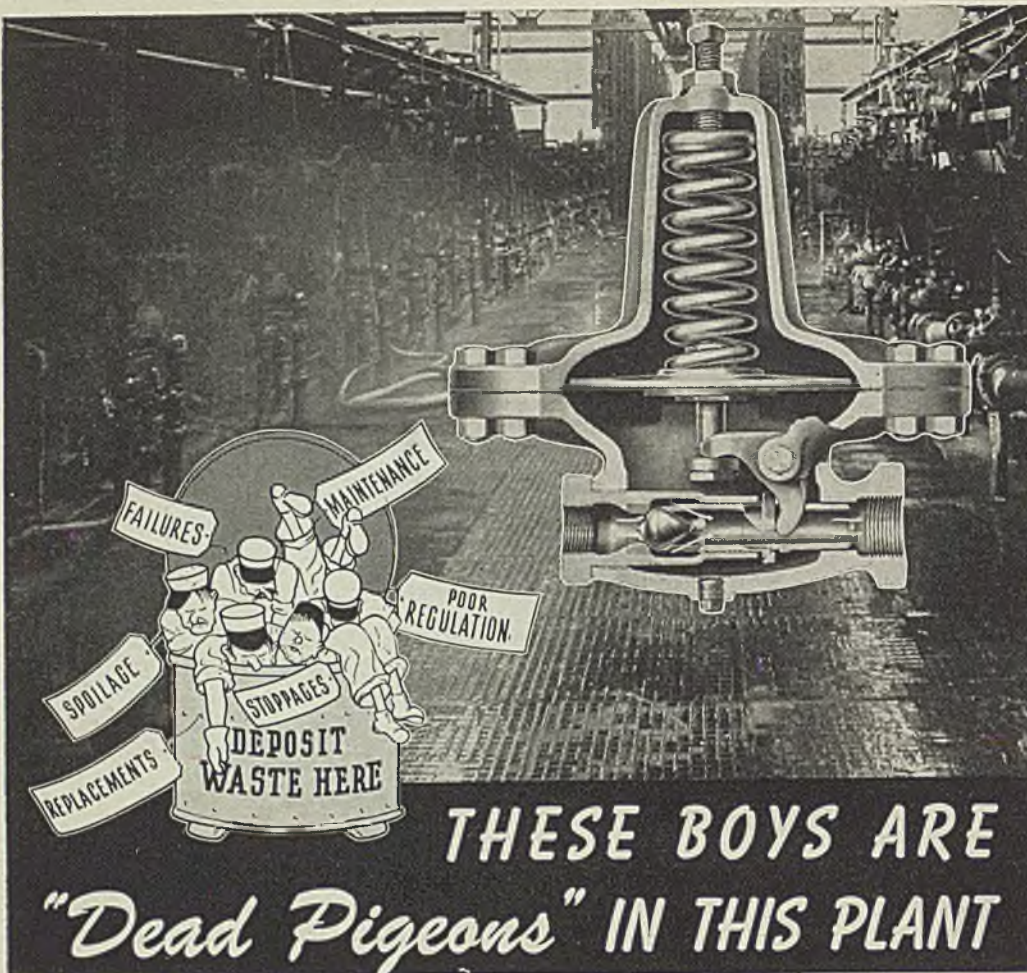
features the CASH STANDARD Type 11 Condenser Water Regulator—self-contained—pilot-operated, for controlling the flow of cooling water to condenser coils. Used with water or air—with any gas or oil that is non-corrosive—and with all refrigerating fluids. Capacity charts are shown.

BULLETIN 968—

features the CASH STANDARD Type 34 Pressure Reducing Valve—direct-operated—direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.

BULLETIN 969—

features the CASH STANDARD Series 35 Constant Pressure Pump Governors—direct-operated and pilot-operated which automatically control steam-driven pumps to maintain a constant pump discharge pressure (or constant vacuum on vacuum pumps). Tells about their use with reciprocating pumps, turbine-driven pumps and compressors; including compressors for refrigeration use. Has two pages of typical installations.



1. Maximum Capacity when needed most
2. Accurate Pressure Control under toughest working conditions
3. Trouble-free Service
4. Smooth Operation
5. Tight Closure
6. Accurate Regulation
7. Speedier Production Results
8. Elimination of Failures
9. Constant Delivery Pressure
10. Cost Saving Operation
11. No Spoilage
12. Practically zero in maintenance costs

Here's the Reason

CASH STANDARD
Streamlined TYPE 1000
PRESSURE

REDUCING VALVE

Installation of this CASH STANDARD "1000" is a blow that knocks these trouble makers and cost raisers stiff and cold . . . permanently. When the CASH STANDARD "1000" goes to work you immediately get good streamlined valve performance with good cost savings . . . for years.

➔ *Send for a copy of Bulletin 962*

You can read about the "straight line flow" and other features of the "1000" that make valve troubles disappear from your plant in our Bulletin 962. You'll see why it is easily possible for you to enjoy all 12 points listed on this page through the simple installation of the CASH STANDARD Streamlined Pressure Reducing Valve.



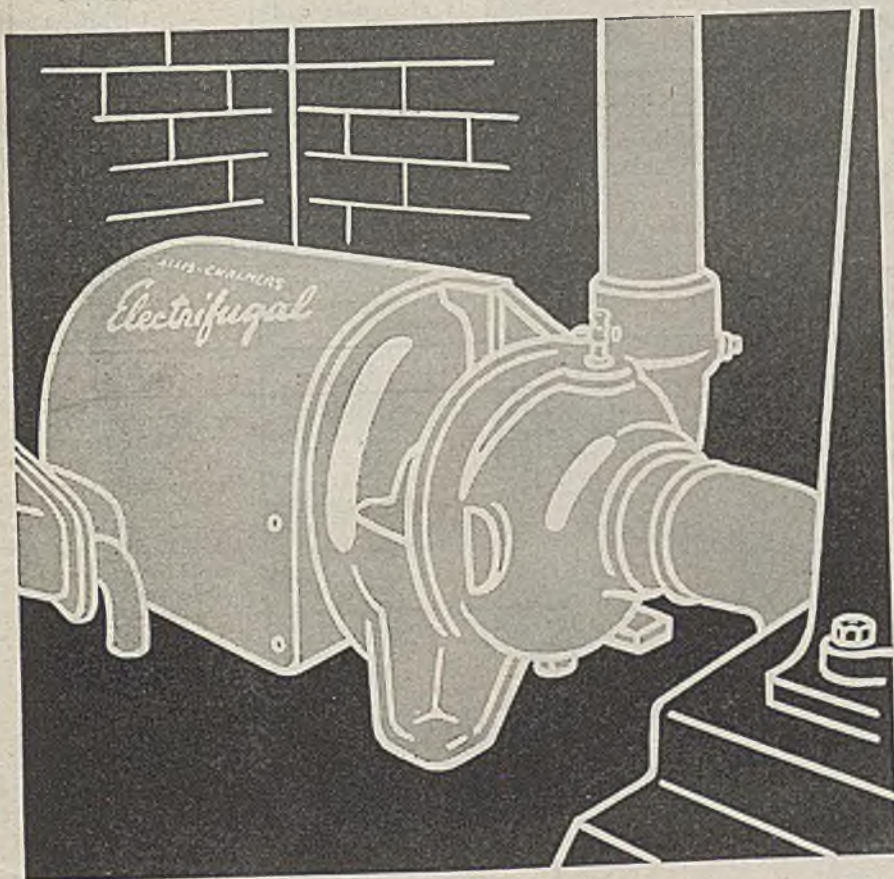
CASH STANDARD
CONTROLS..
VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

Economical "Package" Pump Saves SPACE and MONEY

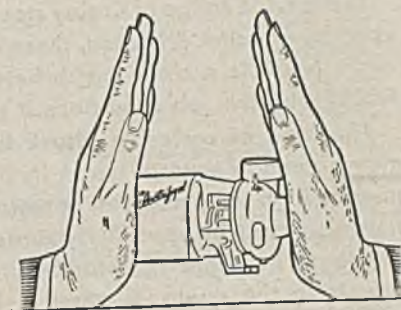
By combining pump and motor into one compact unit, Allis-Chalmers engineers created the "Electrifugal" pump — that requires *one-third less space*. But . . . more than that . . . it costs you *less to buy* — *less to install* — *less to operate* — and has a wide range of applications.

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TIGHT SQUEEZE! — But this "Electrifugal" pump was built for close quarters. Allis-Chalmers engineers have developed and perfected the close-coupled pump through 20 years of experience. Built in stock sizes from $\frac{3}{4}$ to 25 h.p.

A 2037



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MORE QUICKLY SERVICED

Easy to get at rotor, impeller, packing and all moving parts. Take it apart and put it together fast. Down time reduced to a minimum.

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UNDIVIDED RESPONSIBILITY

Allis-Chalmers builds both pumps and motors — backs them up with unsurpassed experience and reputation in both fields. Call your A-C office or dealer for help on any pumping problem . . . or write for bulletin No. B6018. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

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One of the Big 3 in Electric Power Equipment—
Biggest of All in Range of Industrial Products

Electrifugal
PUMPS



FOR TUBING TO MATCH EACH CORROSIVE ATTACK

In the wide range of Croloy steel alloys developed by Babcock & Wilcox, there are types that make possible a close match between refinery tubing and the job conditions it must face.

The kind of corrosive attack to be resisted may be one of several types. Its primary cause may be high temperatures, in which case oxidation also must be specially guarded against. It may have its origin in contaminants or corrosive agents in the crude or gases being handled. Conditions encountered in processing may be its source, with the action of catalysts setting up reactions which tend to corrode or carburize tubing.

Among the Croloys listed in the panel and others in ferritic and austenitic stainless alloy steel types—covered by the B&W Croloy stainless steels—there are materials from which the one best tubing may be selected for each of your diverse refinery needs. Data on creep strength, tensile strength, and physical properties are available to complete the background for your decision.

Further help is also at your disposal. Through long associations with many branches of the petroleum industry, B&W engineers are well qualified to recommend the grade of tubing you need. When you call on Croloy, call on their advice and assistance.

CROLOY 1 1/4	CROLOY 2 1/4	CROLOY 3 M
Economic grade good creep strength properties. Somewhat more corrosion resistant than the chromium free steels.	Exceptionally high creep strength for polymerization and high pressure cracking. Otherwise similar in properties and characteristics to Croloy 2.	Somewhat better creep properties and better resistance to corrosion and oxidation than Croloy 2.
CROLOY 5	CROLOY 7	CROLOY 9
For operating conditions where corrosion resistance is primary requirement—provides good creep strength and oxidation resistance superior to Croloy 2.	Intermediate steel between Croloys 5 and 9 for operating conditions where corrosion resistance is the primary requirement. Somewhat more oxidation resistant than Croloy 5.	For severe operating conditions where high corrosion and oxidation resistance are essential—suitable for hydrogenation processes.
CROLOY 18-8S	CROLOY 18-8S CB	CROLOY 25-20
Practically unaffected by extremely corrosive oils at high temperatures. Has high creep strength and high resistance to oxidation.	Similar in properties to CROLOY 18-8S but stabilized with columbium, making it adaptable for welding or heating in carbide range.	For extreme resistance to oxidation and corrosion, for high-pressure, high-temperature services, as in hydrogenation, polymerization, and special heat-resisting installations.



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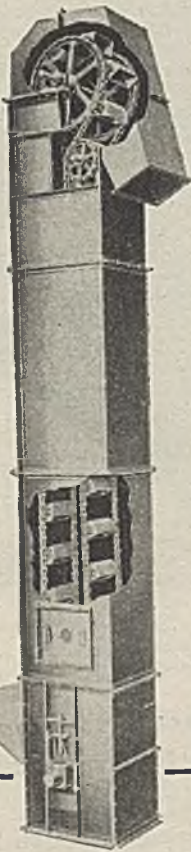
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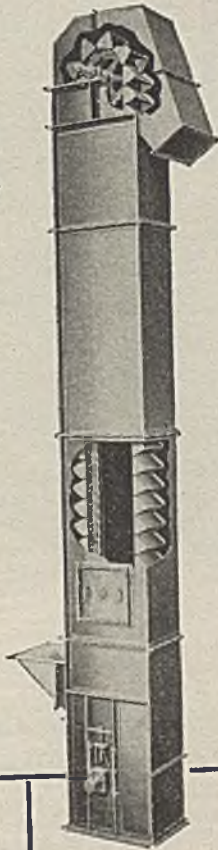
The Rotor Lift

is a Helicoid (screw) elevator which handles many products that normally can be conveyed by a horizontal screw conveyor. It consists of a vertical screw driven from either the top or bottom, operating in a solid or split casing. The material is fed to the vertical screw by screw feeder near the foot of the lift and is discharged at the top or head end.



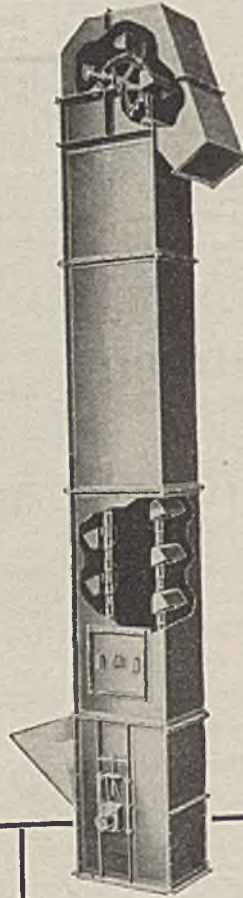
The Perfect Discharge Bucket Elevator

operates at slower speeds and is used where materials will not readily discharge at centrifugal speeds. Malleable iron or steel buckets are mounted between two strands of chain. Material is fed directly into buckets at the foot of the elevator or scooped up in the boot and discharged over a snubbed head wheel which inverts the position of the buckets over the discharge chute.



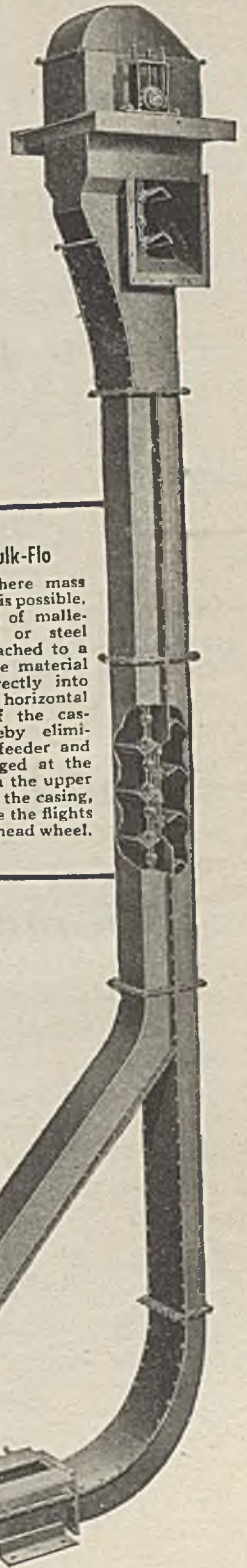
The Continuous Bucket Elevator

is used where higher capacity at slower speed is desired or where the material is friable. It consists usually of steel buckets mounted on either a chain or belt. Material is fed directly into the buckets at the foot of the elevator and discharged over a head wheel onto the preceding buckets, whose front and projecting sides form a chute, thereby directing the material into a fixed discharge spout.



The Centrifugal Discharge Bucket Elevator

is used for most products. It consists of either malleable iron or steel buckets mounted on either a chain or belt. The material is fed either directly into the buckets at the foot of the elevator or scooped up in the boot and is discharged over the head wheel by centrifugal action.



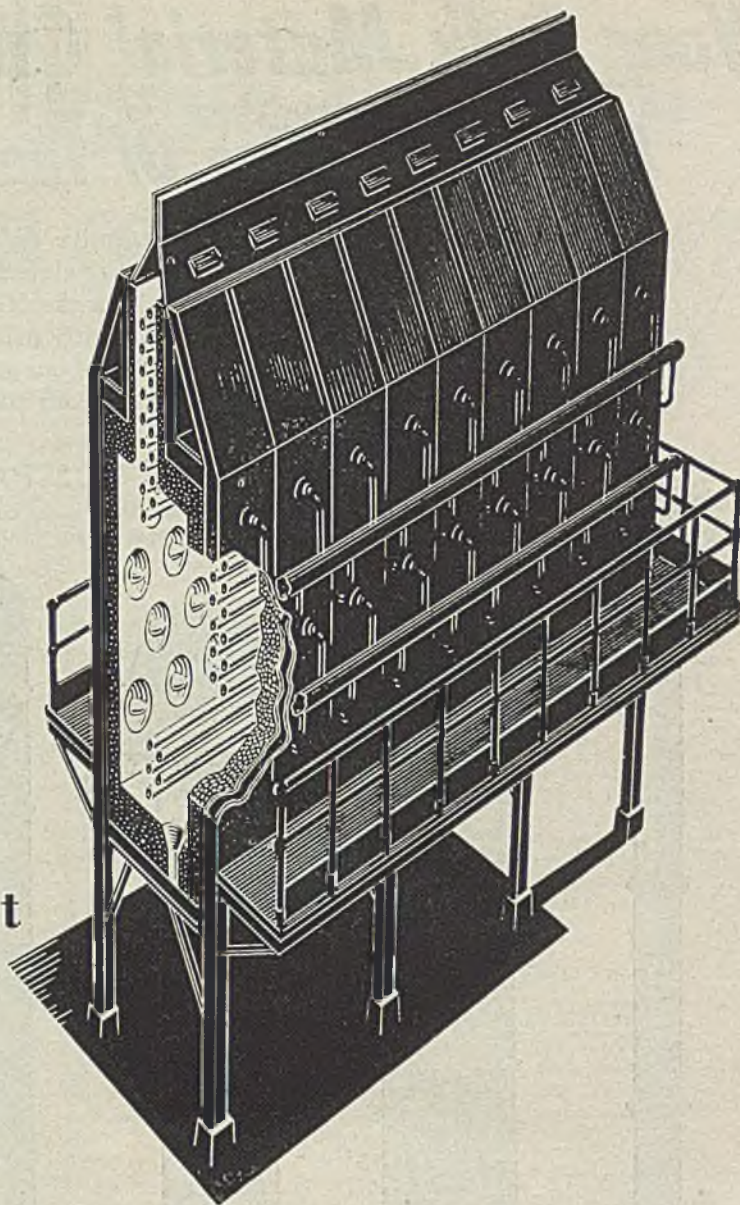
The Bulk-Flo

is used where mass conveying is possible. It consists of malleable iron or steel flights attached to a chain. The material is fed directly into the lower horizontal portion of the casing, thereby eliminating a feeder and is discharged at the opening in the upper portion of the casing, just before the flights reach the head wheel.



10,298

continuous
liquid heat-treatment
with radiant-gas firing



The flow of liquids, in process, need not be interrupted — for heat-treatment. Furthermore, that heat-treatment need not be hit-or-miss.

Consider the continuous flow of chemicals through tubing — just inches away from a source of uniform, controllable, radiant heat. Such is the method employed by Selas in a new, vest-pocket tubestill — in which two, opposed, refractory walls are studded with radiant-gas-fired burners. Heat is patterned, to fit the function — raising the standards for flow rate and heat transfer.

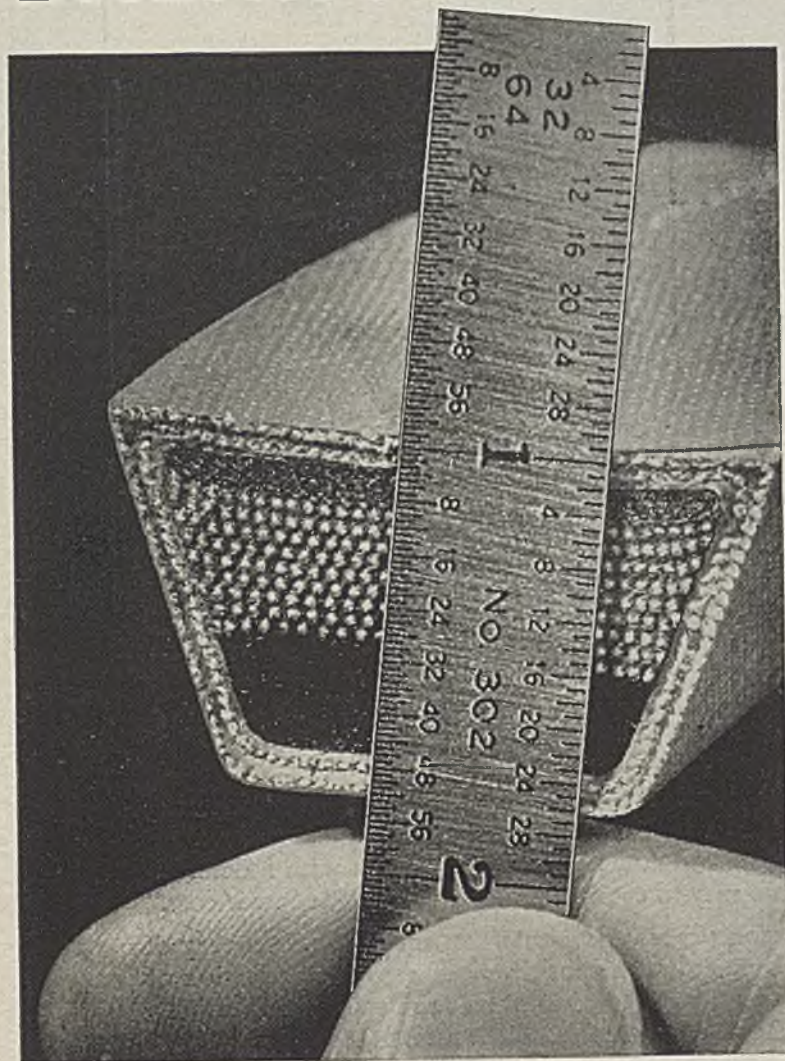
By *engineering* combustion, heat is better utilized as an instrument of production.

Improved Heat Processing



SELAS CORPORATION OF AMERICA PHILA 34 PA

BALANCED CONSTRUCTION



Makes
**TEXROPE
 V-BELTS**
 Run Cooler...
 Smoother... Longer

Look at this cross-section of a TEXROPE Super-7 V-Belt. This balance between rubber, cord and fabric — the weight of cover — position of load carrying cords — thickness of cushion — width and depth of belt — have been carefully engineered. They've been proved on the machines of American industry through 20 years of successful operation.

This long experience has developed other advantages, too: *50% Stronger Cords*, of long staple hard-twisted cotton — *Tough Duplex Cover* to take the wear, seal out dirt and grit — *Thick Cushion* of cool-running improved Buna-S to protect the cord structure from shock.

YOUR V-BELT DRIVE HEADQUARTERS

Call your Allis-Chalmers office or dealer for TEXROPE Super-7 V-Belts — for full range of standard, "Magic-Grip" and Vari-Pitch sheaves — for Speed Changers and complete V-Belt Drive engineering help. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 2034

HEAR THE BOSTON "POPS":

Every Saturday Evening, American Broadcasting Co.

WHICH TEXROPE Super-7 DO YOU NEED?

Pick the right TEXROPE Super-7 V-Belt — it'll give you the most in efficient power transmission and economy.

TEXROPE Super-7 V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by A-C.



Heat-Resisting Super-7
 Stands temperatures up to 180°. The TEXROPE V-Belt for most drives.



Oil-Resisting Super-7
 Neoprene cover protects core against moderately oily or greasy conditions.



Oil-Proof Super-7
 Made of Neoprene throughout. Use it when the belt must swim in oil.

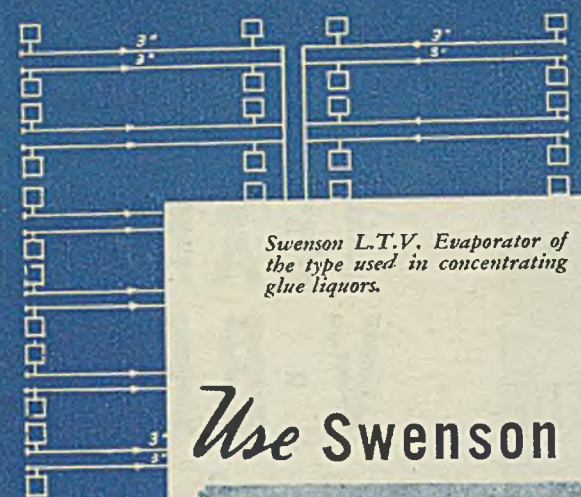


Static-Resisting Super-7
 Recommended where explosion hazard exists. Static-conducting element throughout cover won't wear off.

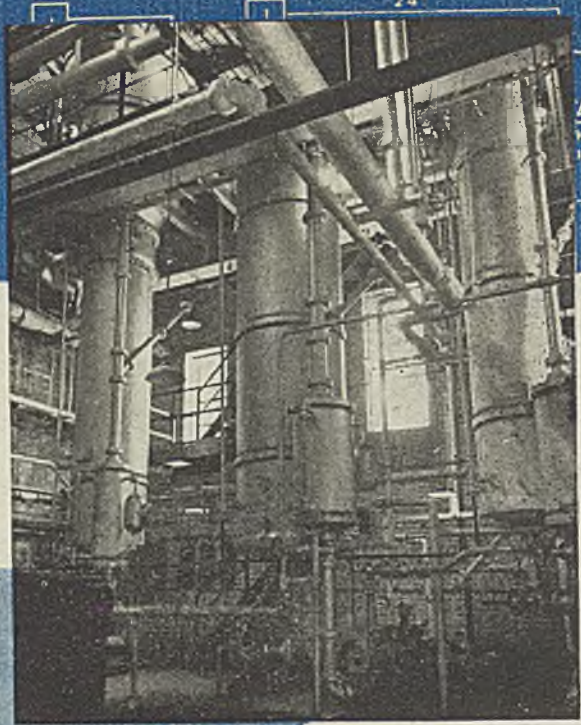


Super-7 Steel
 Twin steel cables, to pull extremely heavy loads with minimum stretch. GET THEM — through your Allis-Chalmers district office or dealer.

ALLIS CHALMERS TEXROPE V-BELT DRIVES



Swenson L.T.V. Evaporator of the type used in concentrating glue liquors.



Use Swenson Process Engineering

to Improve Products.. Reduce Costs

Consistently through more than 60 years, Swenson engineering skill has produced a wide variety of important process developments. The Swenson staff attacks each new project with a determination to find some way to secure "a better product at lower cost."

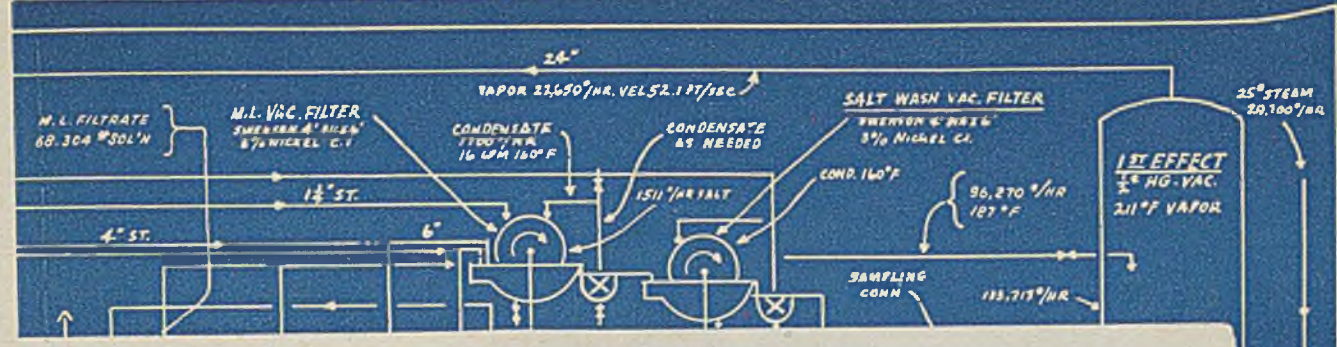
Typical Swenson process developments include: • Recovery of chemical values from natural brines or minerals; • Simplification of chemical processes; • Effecting economies in the use of heat, power, and materials; and • Disposal of chemical wastes.

Operating economy and efficiency and improved product quality are the results which the chemical industry has come to expect when it calls in Swenson for consultation. Whatever the special nature of your manufacturing processes, you can confidently look to Swenson for cost-reducing, product-improving solutions to your engineering problems.

SWENSON

EVAPORATORS • FILTERS • CRYSTALLIZERS
SPRAY DRYERS

- LEGEND**
- VALVE NORM
 - VALVE FOR P
 - VALVE NORM
 - ↑ ATMOSPHERIC
 - ⊕ AGITATOR
 - ⊕ CHECK VALVE
 - Y FUNNEL OR VISIBLE OVERFLOW
 - 6 1.11 ST-6 STEEL PIPE
 - 6 1.11K 6 NICKEL PIPE



What Swenson Process Engineering Has Done for the Glue Industry . . .

In the concentration of glue (bone and hide) liquors, a time-temperature problem arises from the necessity of maintaining original composition in order to preserve adhesive properties. Organic in nature, this material is heat-sensitive and subject to thermal decomposition which tends to reduce gel strength.

Through the application of Long Tube Vertical Evaporators, which employ a rising-film type of evaporation, Swenson engineers succeeded in designing equipment which achieved single pass operation through the tubes in each effect—thus minimizing the length of exposure time to heat while permitting

rapid evaporation at higher temperatures with complete safety. Swenson has also developed triple effect evaporation for use in the glue industry, which is rapidly displacing the long used double effect installations. Triple effect evaporation is bringing important savings in evaporator steam requirements.

With the advent of pearling in the glue industry, Swenson engineers made a further contribution in process development by designing compound evaporators to concentrate solutions to the higher densities required for pearling.

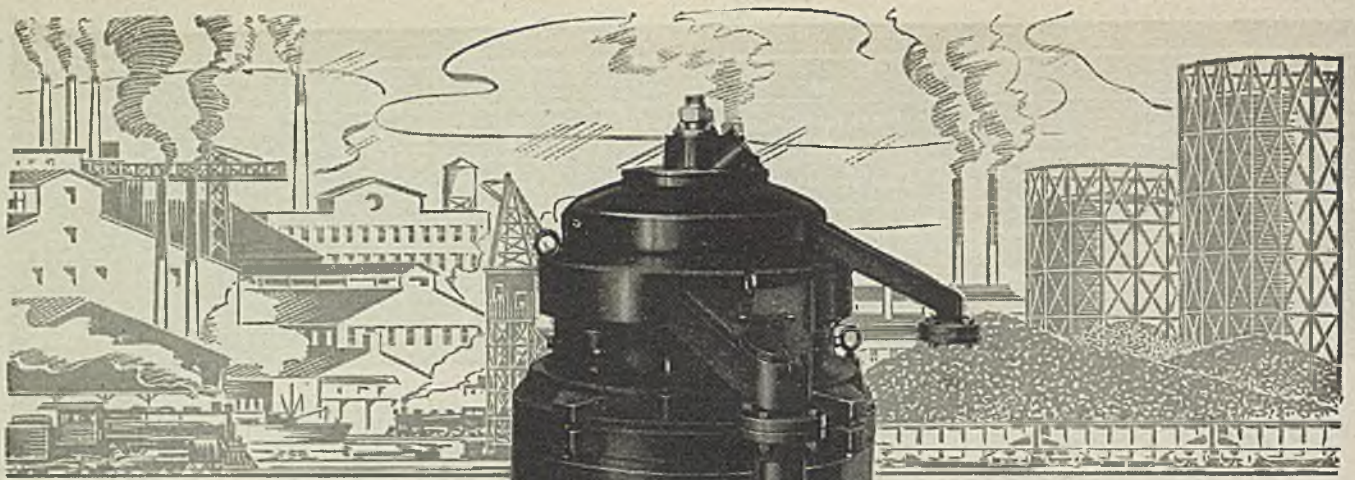
SWENSON EVAPORATOR COMPANY
15671 Lathrop Ave. Division of Whiting Corporation Harvey, Illinois



Only SWENSON PROVIDES THIS FIVE-WAY SERVICE

SWENSON EVAPORATOR CO
HARVEY, ILL., U.S.A.

Req.	Title - FLOW SHEET & MATERIAL BALANCE
Ch'd FM	Capacity
Scale 1/2" = ONE FT.	For
Appr.	U-2225
Appr	



TAR DEHYDRATION

... by Sharples

A Continuous Process

This is a complete process . . . continuous delivery of coke oven or Water Gas Tar with a moisture content of 2% or less.

Sharples Centrifugal Dehydration will assure you . . .

1. BETTER STILL OPERATION.
2. REDUCED STILL MAINTENANCE. (90% or more of the chlorides are eliminated)
3. SAVING IN SPACE . . . no settling tanks or steam stills.
4. REDUCTION IN OPERATING COST.

A Sharples Engineer is available to study your tar problems

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U.S.I. CHEMICAL NEWS

JUNE ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1946

Two Phenolic Resins Now Are Available for Immediate Shipment

100% Rosin-Free, They Provide Durability, Chemical Resistance

Arofene 700 and Arofene 775, two well-known U.S.I. pure phenolic resins, are now available for immediate shipment. Both resins are entirely free from rosin and rosin derivatives. Used principally in spar varnishes, chemical-resistant finishes, ethyl cellulose finishes, and in varnishes for fortifying alkyls, they impart excellent durability and remarkable resistance to salt water, acids, strong alkali, and other corrosive substances. Products made with these resins exhibit good color and drying properties.

Arofene 700

Arofene 700 is a heat-hardening, heat-reactive 100% phenolic resin which, in combination with drying oils, gives hard durable finishes. It provides outstanding resistance to chemical reagents in a wide variety of formulations, and produces varnishes of maximum durability. Varnishes made with this resin are unusually pale and exhibit far less after-yellowing than is normally expected from a pure phenolic. They possess good gloss, and with tung or oiticica oils, the inclusion of small amounts of linseed oil produces high-gloss.

To obtain the best results, Arofene 700 should be processed with a preponderance of "hard oils," such as tung or oiticica. Varnishes with oil contents composed largely of "soft oils," such as linseed or dehydrated castor, are practical, but are much slower drying.

The addition of Arofene 700 to other resins in varnish formulations, reduces the cooking cycle of the varnish, or enables the manufacturer to acquire high varnish viscosities which otherwise would be impossible. Its incorporation in this manner, also adds to the durability and resistance of the varnish.

Manufacturers have found Arofene 700 ideal for super spar varnishes, alkali-resistant

(Continued on next page)

Improved Thyroid Product Prepared by New Process

To minimize many of the objectionable physiological effects of thyroid preparations used to combat excess weight, a new brominated thyroid compound has recently been invented. This compound is reported to lessen the increased pulse rate, palpitations, emotional upsets, and muscle tremors which sometimes follow thyroid injections.

According to the patent, the brominated product is prepared by treating a commercial powdered thyroid with ethyl alcohol and bromine at room temperatures. After standing over night, the mixture is filtered, and the solid material is allowed to dry at room temperature. The final product is stated to be no different from the original desiccated glandular material, except that it contains 0.2% to 1.5% added bromine.

U.S.I. Opens New Laboratory To Evaluate Wide Range of Products

Installs Complete Facilities For Evaluation Of Chemicals and Insecticides at Baltimore, Maryland

As one of the first steps in its broad program of expansion, U.S.I. has organized an unusually complete laboratory for the evaluation of a wide range of products. The new laboratory, located at Baltimore, Maryland, occupies

more than 9000 square feet of floor space and is equipped with the last word in chemical, physical, and entomological testing facilities.

Four major fields of activity are now being investigated in the laboratory: the study of solvents and plasticizers; the testing of anti-freeze compounds and other automotive products; technical service for customers; and evaluation, compounding, and development work on insecticides and insectifuges.

Proceeding on the belief that the success of any new-product program depends in large measure on the accurate evaluation of the commercial performance of new products, U.S.I. has assembled an exceptionally fine staff of chemists, biologists, and entomologists to carry on this work. Activities of the new Technical Development Laboratory will be closely integrated with those of the company's research groups at Stamford, Conn., Baltimore, Md., Newark, N. J., and with the Dodge and Olcott laboratory at Bayonne, N. J.

THE MONTH IN INSECTICIDES

Coats for seeds, containing built-in insecticides, fungicides, fertilizers, and hormones may have far-reaching effects . . . Benzene hexachloride is reported to be seven times more effective against flies than DDT . . . The effectiveness of rotenone oil sprays in combating California red scale is said to be increased by the addition of butyl phthalate . . . Methyl bromide is used to control the pineapple mealybug . . . The Army's smoke apparatus is now being used to deliver superheated oil vapors for treating vegetation . . . A rapid field method for assessing the spreading power of antimalarial oils is developed . . . Cyclopentylamines are identified as a new group of insecticides . . . Another effective insecticide for house flies is made from Sabidilla seeds . . . A series of new insecticides are used for chicken louse control.

Rats' Cancer Killed By Alcohol Extract

An alcoholic extract which destroys tumors and cancers and sets up immunity against their growth in inbred albino rats has been announced in a technical paper published recently. The extract has been tested successfully on rats, but is not ready for use on humans, the authors said. They stated further that theirs were the first successful experiments of this type.



This ingenious distillation set-up provides accurate analyses of organic solvents quickly.



The Administrative Group of U.S.I.'s Technical Development Laboratory maps out the tests which will determine the performance-value of a new product. Left to right: N. C. Schultze, Assistant Director of the Laboratory, W. E. Dove, Director of the Entomological Division, D. G. Zink, Director of the Technical Development Department, N. C. McAlister, Jr., Assistant to Dr. Dove, and W. L. Johnston, Director of the Laboratory. (Continued on next page)

Makes Alcohol Solutions Of Hydrogen Peroxide

A recently-issued patent describes a method by which strong alcohol solutions of hydrogen peroxide can be prepared. These solutions are reported to be useful in many industrial organic processes in which the aqueous hydrogen peroxide of commerce has been found unsuitable. Hydrogen peroxide is of particular value as a catalytic reagent in many polymerization reactions, and as an oxidizing agent for use in oxidizing and decolorizing certain types of compounds.

The process of preparing the solution consists, basically, of treating the boron ester of an alcohol with commercial aqueous hydrogen peroxide. Boron hydroxide precipitates, leaving a nonaqueous solution of the peroxide. Ethyl, butyl, and amyl alcohol are stated to produce satisfactory solutions.

Phenolic Resins

(Continued from preceding page)

varnishes, and ethyl cellulose finishes. It has also been used widely as a fortifying resin to increase the alkali and moisture resistance of alkyds and other resins.

Arofene 775

Manufactured to meet U. S. Navy Specification 52R11, Arofene 775 is an oil-soluble, 100% phenolic resin of the type which is non-reactive with oils. As the sole resin component in the manufacture of varnishes, it insures excellent chemical resistance and durability, as well as good color and drying properties. As a fortifier in modified resin varnishes, it improves the durability and resistance of the original product.

Arofene 775 can be used with all the usual varnish oils, although it should not be used with straight tung oil. All tung oil varnishes should contain 20% or more of an oil such as linseed. Since this resin is readily soluble and "non-reactive" with oils, relatively simple cooking procedures can be employed with excellent results.

Outstanding spar varnishes and marine paint vehicles are produced using Arofene 775. This phenolic has also been employed widely in the manufacture of finishes resistant to boiling water, salt-spray, alkali, organic solvents, and acids. In addition Arofene 775 has been used advantageously in fortifying a wide variety of varnish formulations.

Specifications and samples of both resins are available on request.

New Laboratory

(Continued from preceding page)

Two of the many tests which are necessary for the proper evaluation of an anti-freeze are being conducted here. On the left, the laboratory worker is determining the effectiveness of anti-freeze corrosion inhibitors. The technician on the right is measuring the foaming tendency of an experimental anti-freeze by means of a set-up that simulates the worst possible foaming conditions encountered in an automobile.



All known insecticides and insectifuges and many experimental products run the gamut of tests in the Entomological Laboratory. The jars shown here contain all stages of the common species of cockroaches. Results of tests performed on these insects help guide researchers in the development of tomorrow's insecticides.



One section of U.S.I.'s Baltimore Laboratory is devoted to the product-evaluation of all types of plasticizers. The technician shown here is testing a plasticizer in the "creep box."

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

To cure troublesome foaming, a new compound is marketed which is said to be effective in concentrations as low as 1 part per million. It is described as a viscous, tasteless, colorless, chemically inert, and non-volatile organic material. (No. 073)

USI

To impart crispness to fabrics, a new textile-treating resin is offered which is claimed to eliminate the necessity of starch. It is said to perform satisfactorily on such cotton garments as shirts, children's playclothes and women's house dresses, and to be permanent. (No. 074)

USI

A new multi-purpose plasticizer, which the manufacturer claims can be used as a softener, and as an impregnant for waterproof and grease-proof paper coating as well, is described as a viscous, clear-amber, resinous oil. (No. 075)

USI

To remove paint and enamels is the purpose of a new compound which is stated to be non-inflammable. It is claimed that this compound can penetrate, loosen, and remove 8 coats of paint in approximately 30 minutes. (No. 076)

USI

A new wool dye is said to be equally fast to washing, sea water, and sea water spotting. It is described as a metallized dye, recommended for men's and women's wear, tropical suitings, bathing and sweating yarns, and upholstery fabrics. (No. 077)

USI

A self-curing neoprene putty for patching parts of goods molded from Neoprene, Buna S, Hycar, and rubber, and for use as a caulking and gasket cement, is now available. It is stated to have good water, oil, acid, alkali, and flame resistance. (No. 078)

USI

A weatherproof and waterproof glue, claimed to be inexpensive and to have superior binding strength, is claimed to last longer than the pieces of plywood which it bonds. It is stated to have passed the 3-hour boiling test with surplus strength. (No. 079)

USI

A resilient floor covering is claimed to have the cushioning feel of an expensive deep-pile rug, and yet be washable and tough enough to withstand the heavy traffic of offices and lobbies. It is described as being composed of a durable plastic surface on an 8-inch layer of sponge. (No. 080)

USI

A new textile preservative, claimed to be the most versatile, efficient, and long-lasting textile preservative thus far known, is said to afford durable protection against fungi, soil-inhabiting organisms, and jungle rot. It is described as being unaffected by water sprays, weather exposure, sunlight, and laundering, and to be compatible with water-repellent and fire-retardant finishes. (No. 081)

U.S.I. INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., NEW YORK 17, N. Y.

U.S.I.

BRANCHES IN ALL PRINCIPAL CITIES

ALCOHOLS

Amyl Alcohol
Butanol (Normal Butyl Alcohol)
Fusel Oil—Refined

Ethanol (Ethyl Alcohol)

Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96%

Absolute
*Super Pyro Anti-freeze
*Solox Proprietary Solvent

*ANSOLS

Ansol M
Ansol PR

ACETIC ESTERS

Amyl Acetate
Butyl Acetate
Ethyl Acetate

OXALIC ESTERS

Dibutyl Oxalate
Diethyl Oxalate

PHTHALIC ESTERS

Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS

Diatol
Diethyl Carbonate
Ethyl Chloroformate
Ethyl Formate

INTERMEDIATES

Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chloranilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloranilide
Alpha-acetylbutyrolactone
5-Chloro-2-pentanone
5-Diethylamino-2-pentanone
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Alpha-Oxalpropionate
Ethyl Sodium Oxalacetate
Methyl Cyclopropyl Ketone

ETHERS

Ethyl Ether
Ethyl Ether Absolute—A.C.S.

FEED CONCENTRATES

*Curbay 8-G
*Curbay Special Liquid
*Vacatone 40

ACETONE

*Chemically Pure

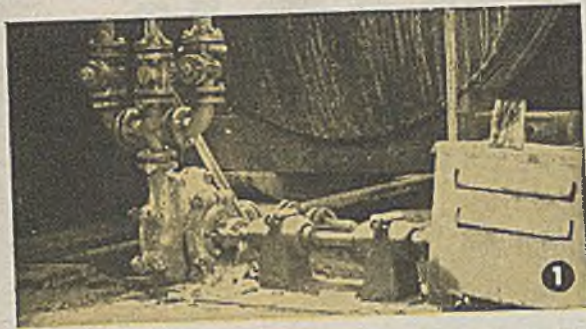
RESINS

Ester Gums—all types
Congo Gums—raw, fused & esterified
*Aroplaz—alkyds and allied materials
*Arofene—pure phenolics
*Arochem—modified types
*Natural Resins—all standard grades

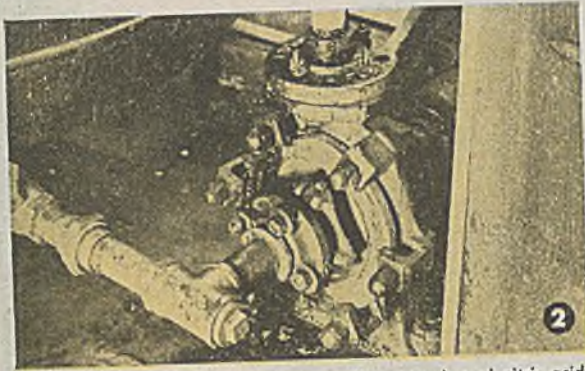
OTHER PRODUCTS

Collodions
Ethylene Glycol
Nitrocellulose Solutions

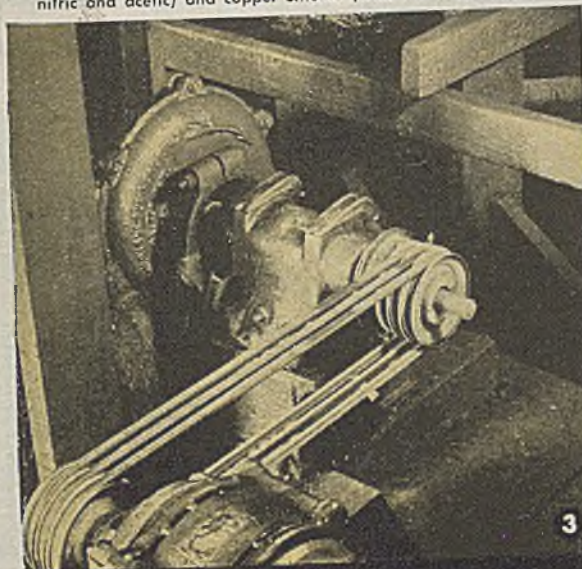
Ethylene
Urethan



ACID THAT EATS ORDINARY



1. Durco pumps, valves and pipes handling arsenic and nitric acid.
2. Durco pump handling 22° Be. Hydrochloric Acid in a Beet Sugar Refinery.
3. Durco fan exhausting fumes at end of condensing and absorbing system of nitric acid plant.
4. Pump handling slurries of calcium or lead arsenates (with free nitric and acetic) and copper silicate (with free sulphuric).



THE DURIRON COMPANY, Inc.



METAL

Can't get its teeth into
this *corrosion-resistant equipment*

You can't see the acid on the inside trying to chew its way out, but you can see the acid muck, sludge, char, oxides, chlorides on the outside giving evidence of unusually severe operating conditions.

None of the equipment shown here is of modern design. In fact, some of the equipment became obsolete twenty-five years ago. These old units are testimonials of the service life you get from Durco acid handling units, even under adverse operating conditions. The jobs they have done demonstrate that Durco pumps, valves and pipe successfully withstands the action of acid, wear, difficult maintenance conditions, and time.

Do you have a corrosive handling problem? Call or write us for information on the best alloy and the latest design in equipment to meet it. We shall be glad to supply complete information and engineering data, without obligation.

General Catalog "G" is yours for the asking.

DC-6



DAYTON 1, OHIO, U.S.A.

DURCO ALLOYS

Duriron and Durichlor—high-silicon irons
Durimet—a special, sulfuric acid-resisting stainless steel
Durco Stainless Steels—(chrome-nickel series)

DURCO EQUIPMENT

Centrifugal Pumps
Valves

} From all the above alloys, also Monel, Inconel, Nickel, Ni-Resist, Steel

Pipe and Fittings (Flanged and Bell and Spigot)
Exhaust Fans
Heat Exchangers
Steam Jets
Tank Outlets
Ejectors
Kettles

} Duriron, Durichlor

"MAGIC-GRIP"

SHEAVE

GOES ON EASY

There's plenty of clearance in the bushing of the patented "Magic-Grip" sheave. It slips easily on even oversize shafts . . . never requires filing, reaming or hammering. Think of the time and money *that* can save!

Sheave and bushing come completely assembled . . . one precision-made unit ready to mount. Slide it on the shaft to exact alignment. Then — tighten three cap screws with the handy wrench furnished. That's all! Any one can do the job—quickly, easily, accurately.

— GRIPS TIGHT

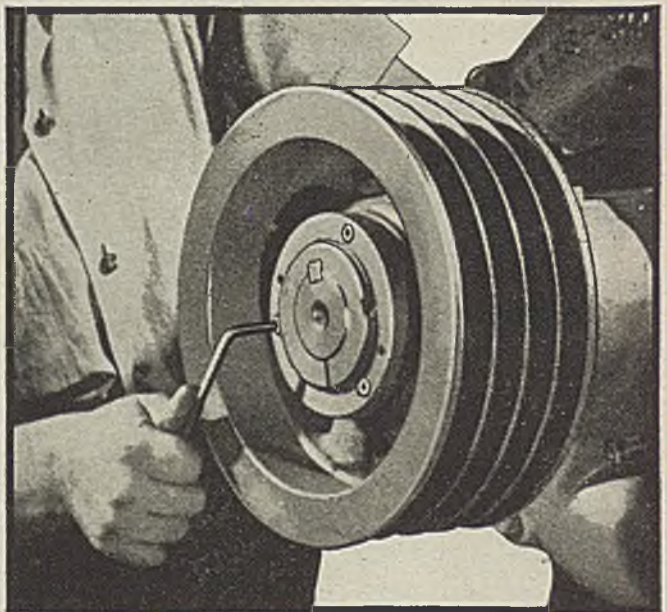
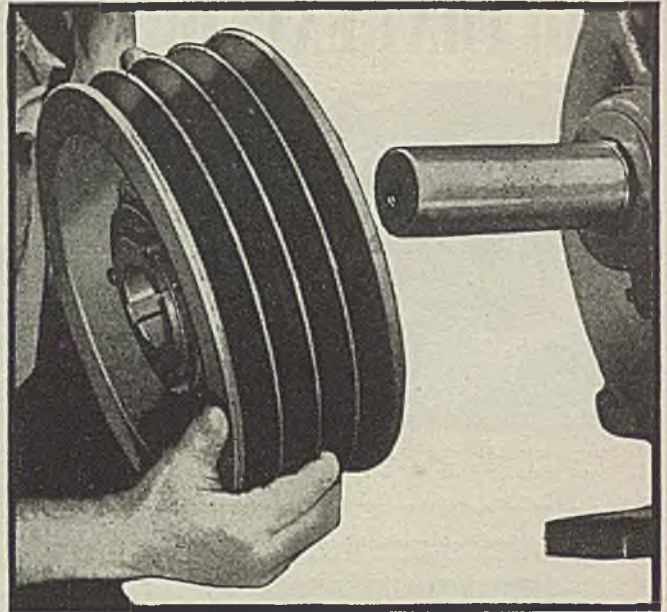
The sheave is locked on the shaft with the powerful grip of a vise. No slip, no backlash or wobble. Yet it can be removed as easily as it goes on.

"Magic-Grip" sheaves save time and money the first time they are installed . . . are indispensable for applications requiring frequent sheave changes. Yet they cost no more than standard sheaves of comparable heavy-duty construction.

YOUR V-BELT DRIVE HEADQUARTERS

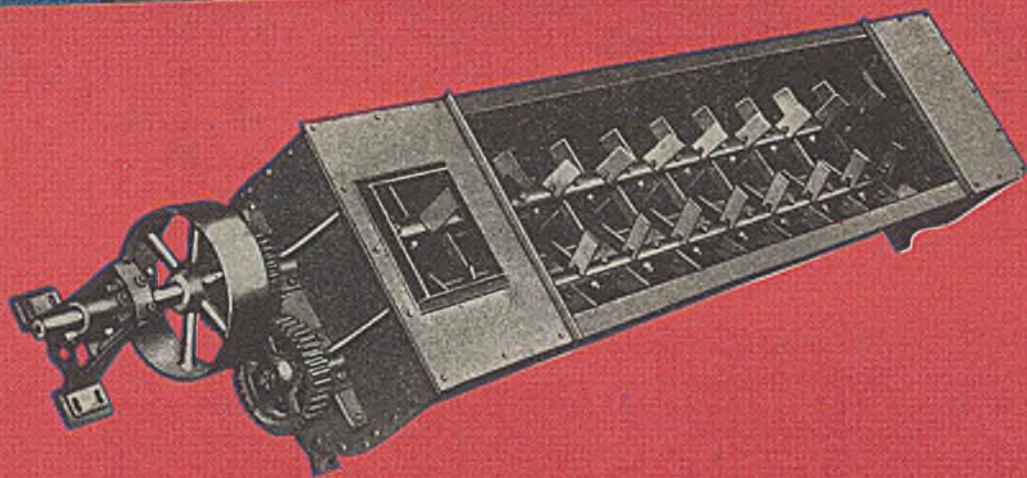
Call your nearest Allis-Chalmers office or dealer for TEXROPE "Magic-Grip" sheaves, Texsteel, Texdrive and Vari-Pitch sheaves, Speed Changers and famous TEXROPE Super-7 V-Belts. Full range of types and sizes. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 2035



ALLIS  CHALMERS
TEXROPE V-BELT DRIVES

HEAR THE BOSTON "POPS": Every Saturday Evening, American Broadcasting Co.



MIXING

There are many different types of mixers, but there is only ONE machine best suited to your mixing requirements. Make sure that you have the mixer that will give you the best results at the lowest cost. Talk with your Sprout-Waldron representative . . . backed by Sprout-Waldron's eighty years of experience in handling all kinds of mixing problems, he is equipped to recommend the installation that will do the job for you most efficiently and economically.

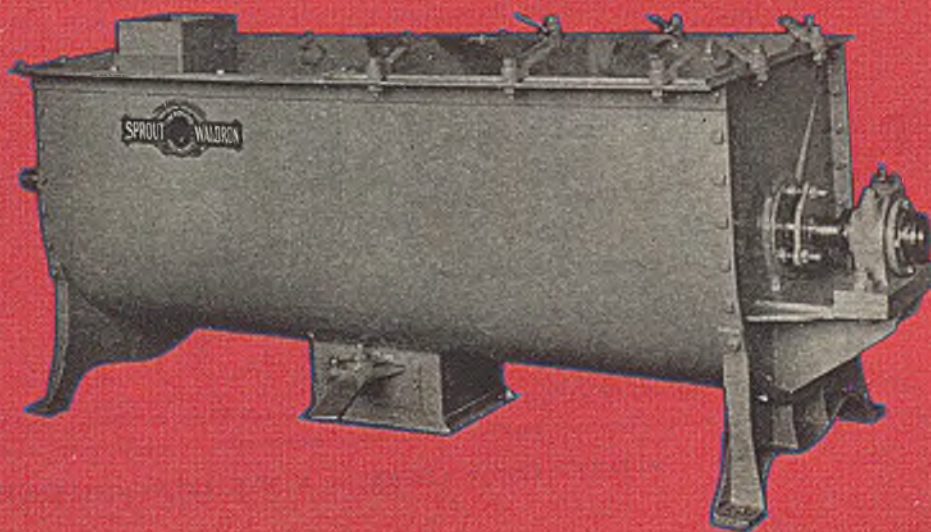
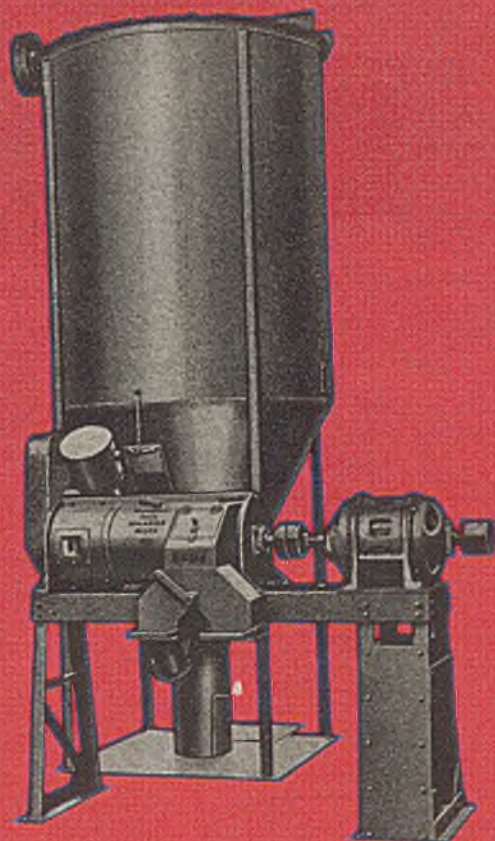
Take advantage of Sprout-Waldron's valuable experience. Look at Sprout-Waldron's complete line of machines . . . machines expertly designed and manufactured to meet your requirements.

SPROUT - WALDRON & COMPANY

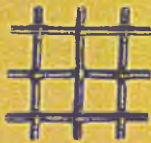
Manufacturing Engineers

MUNCY

PENNSYLVANIA



Hy-lo Crimp



Flat Top Crimp



Double Crimp



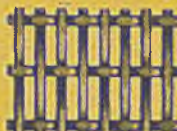
Intermediate Crimp



Oblong Mesh



Oblong Mesh



Dutch Weave
Filter Cloth



"Jersey" Stranded
Filter Cloth



From **ROEBLING'S** Wide Range of Woven Wire Fabrics...

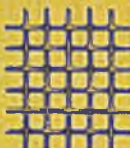
Backing Wire Cloth



2 1/2 mesh
.1055 in. Dia. Wire
Galvanized (After Weaving)



4 mesh
.0625 in. Dia. Wire
Galvanized (After Weaving)



How to get **BETTER RESULTS** from your Wire Cloth!

It's primarily a matter of using the *right* screen for the job. Be sure it's right when you order it, by covering these 5 points:

1. Material to be processed

—is it light or heavy, abrasive or corrosive, liquid or solid, fine or coarse? Whatever the material, Roebling makes the screen that will handle it most economically.

2. Make, type and size of equipment

—on which screen is to be used. Perhaps it's exactly suited to a standard Roebling screen from stock... meaning quicker delivery, lower cost.

3. Size of opening desired

must be the same as that of the largest piece to go through the screen. In Roebling screens, these openings remain uniformly accurate throughout their long life.

4. Kind of metal

depends on the characteristics of the material to be screened. Roebling supplies wire cloth in steel, stainless steel, copper, brass, bronze, phosphor bronze, monel, nickel, nichrome, aluminum and alloys — whatever is best for your purpose.

5. Wire diameter

is usually related directly to weight of material handled. A heavier wire with same size opening means longer wear but less tonnage screened, while lighter wire allows more open area and therefore more production. At Roebling, wire-drawing is an art based on 105 years' experience.

You can rely on a Roebling engineer to combine these factors to best advantage for your job... in terms of lower over-all processing costs. He'll gladly serve you. Call our nearest branch office.

Woven Wire Fabrics Division

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

ROEBLING

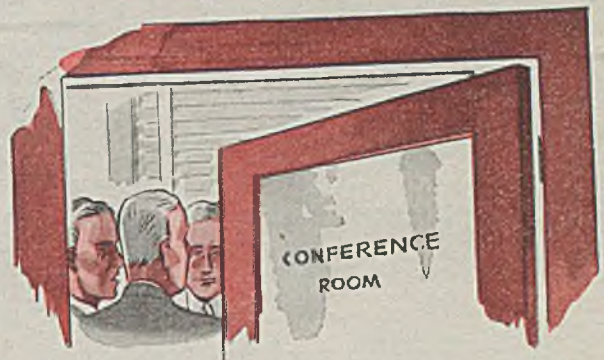
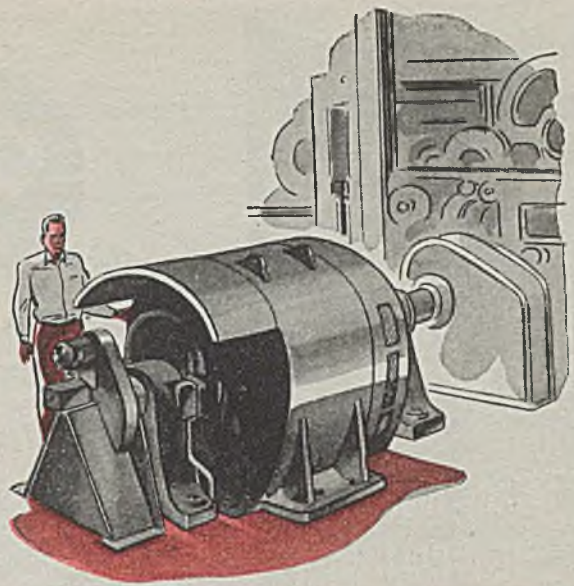
PACEMAKER IN WIRE PRODUCTS



Wire Rope and Strand • Fittings • Slings • Round and Shaped Wire • Wire Cloth and Netting • Aerial Wire Rope Systems • Cold Rolled Strip • Suspension Bridges and Cables • Electrical Wires and Cables • High and Low Carbon Acid and Basic Open Hearth Steels • Aircord, Swaged Terminals and Assemblies

"What! STOP A 30" CALENDER ROLL IN LESS THAN 14" OF ROLL TRAVEL!"

"Right! And besides that emergency stop, give us 10 to 1 speed range on the motor and hold speed close. The torque characteristic of our calender requires that the motor have high overload capacity at low speeds without overheating. And because of operating conditions, we want sparkless commutation too!"



B-b-u-t-t... "No buts" said Mr. Rubber Mill Man, "that's exactly what we need. You see, we're experimenting with new materials on our rolls, and since we can't pre-determine best roll speeds for them, we must have a drive that'll give us complete range of speeds, and at the same time, complete protection for our workers".

"In A Nutshell, you and the control engineers must design a calender drive system that'll give us higher and lower calender speeds, closer speed regulation and sudden emergency stopping — all three!" Well, we set up meetings between the control and motor designers to plan a coordinated design that would meet the needs.



An Automatic Speed Control incorporating both our m-g set and "Regulex" exciter was designed to hold selected speed within close limits. And, after a careful analysis of required load characteristics, we designed a 400 hp d-c motor of low inertia for quick stopping . . . and which also provided speed range from 25 to 250 rpm.

Remember That 14" Stop? After the system went in, we stopped the rolls first at 18" . . . easy. Then at 14" . . . at 12" . . . at 9"! And we probably would have stopped 'em even shorter but for possible danger of too sudden stops to the calender gear system. And commutation? After 6 months, the operators say it's perfect. A 2048



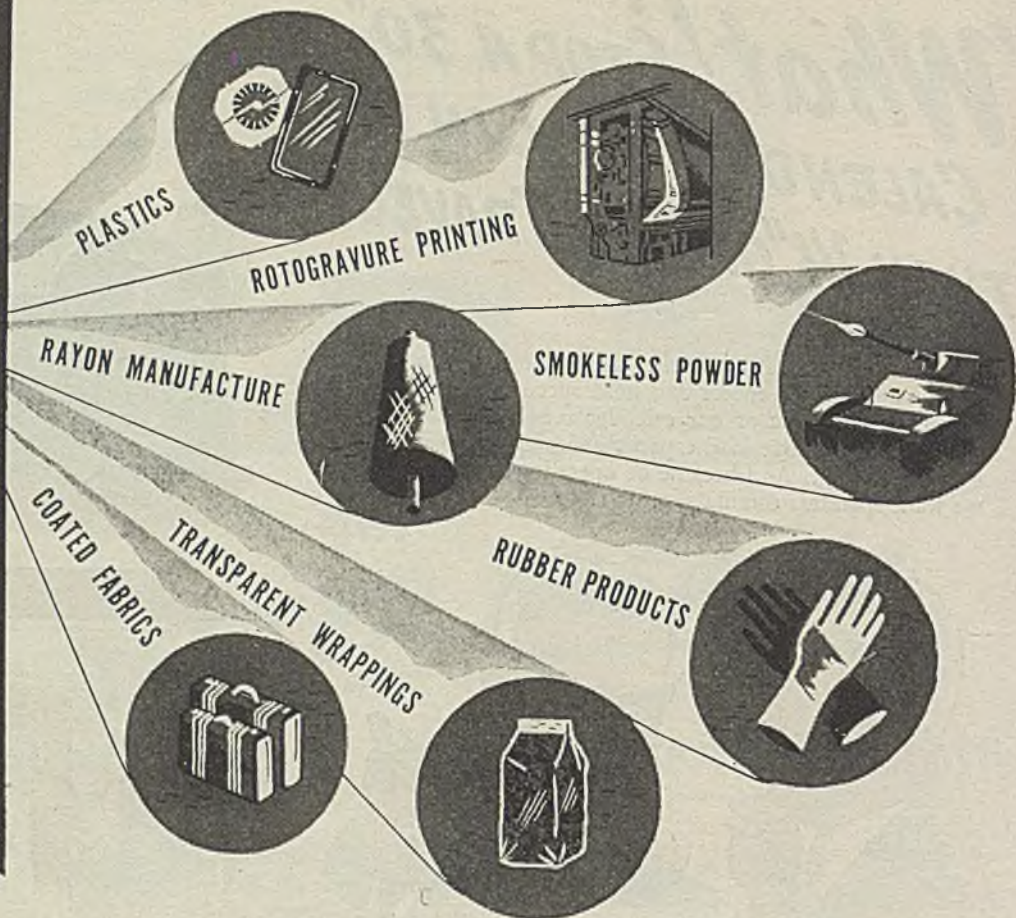
Moral: Every time Allis-Chalmers discovers new ways of solving special motor problems, like this one, it also learns how to build better standard motors for you! Watch for these new and better motors from A-C. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

Wait 'til you see the NEW

ALLIS-CHALMERS MOTORS!

TO SAVE MONEY

Many Industries
Use COLUMBIA
Activated Carbon
to Recover
Solvents



ALL TYPES OF VAPORIZED SOLVENTS CAN BE RECOVERED — alone or in combination, in very low concentrations, and in the presence of water vapor.

RECOVERY IS EFFICIENT — often better than 99 per cent of all solvent passed through the adsorbers is recovered.

THE COST IS VERY LOW — initial investment is moderate and the plants quickly pay for themselves. Solvent is usually recovered at a cost of less than one cent per pound.

A COMPLETE SOLVENT-RECOVERY PLANT to meet the specific requirements of your process can be designed and supplied by Carbide and Carbon Chemicals Corporation. The equipment may be completely automatic in operation.

For further information write for the booklet
"Solvent Recovery" (Form 4410).

CARBIDE AND CARBON CHEMICALS CORPORATION
Unit of Union Carbide and Carbon Corporation



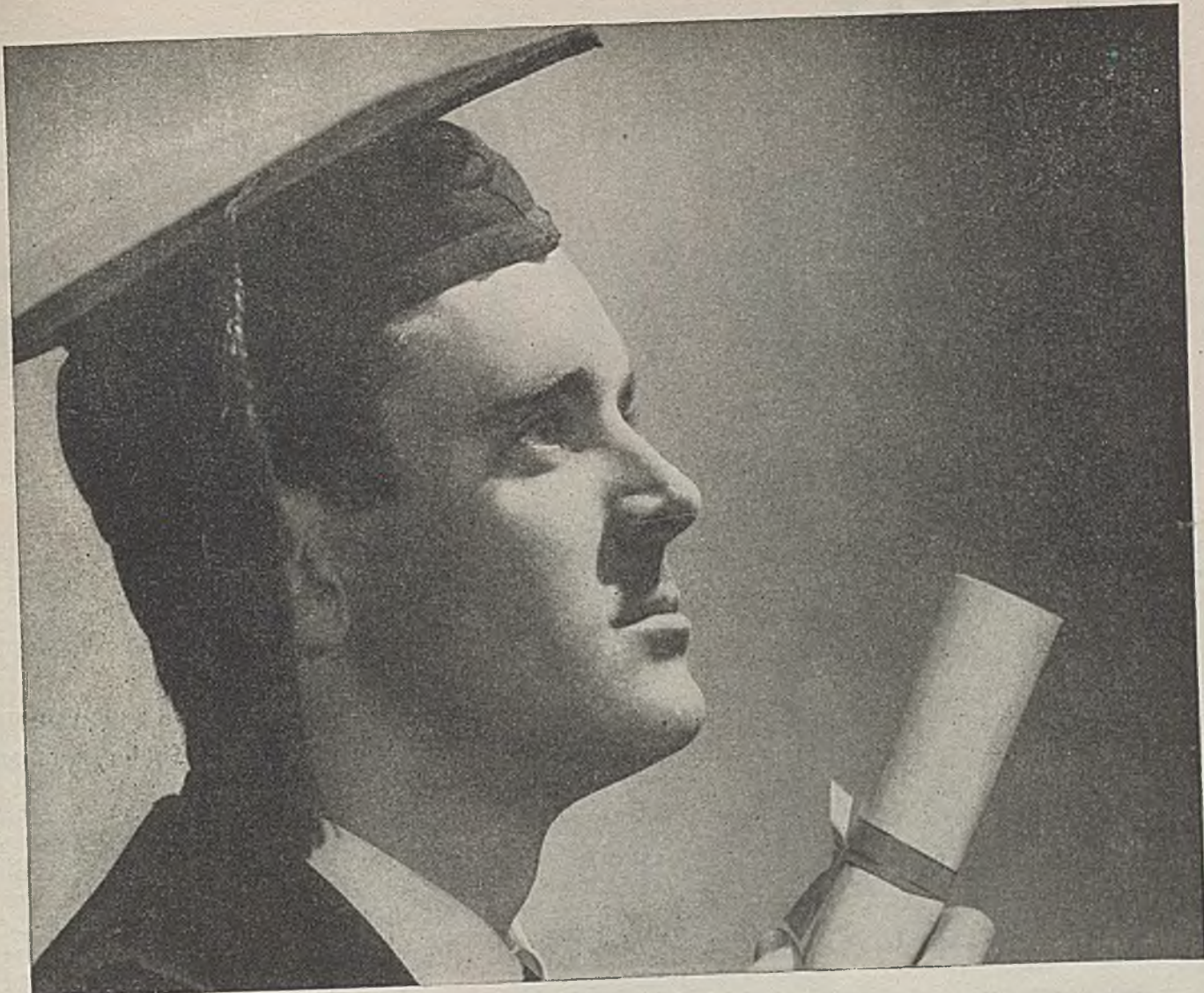
30 East 42nd Street, New York 17, N. Y.

COLUMBIA
TRADE-MARK

*Activated
Carbon*

Life-Saver for Men and Materials

SOLVENT RECOVERY • CATALYSIS • GAS AND AIR PURIFICATION



ONLY THE BEGINNING...

Successful completion of his academic career marks only the beginning of an S-A engineer's education. Still to come is the practical knowledge—the "horse sense," if you will—that isn't found in text books.

When you work with an S-A bulk material handling engineer, you work with a man who combines technical training with the broad and varied background that comes only after years of working under actual field conditions. You work with a man who has rubbed elbows with the industry's most progressive group of con-

veyor engineers and who has handled materials under many conditions. You work with a man who has unrestricted choice from a complete line of conveyors and accessories, designed and built by the company that for 45 years has led the field with new units and new methods. You work with a man who can help you convey the *right* volume to the *right* place, at the *lowest* cost per ton . . . over the long term.

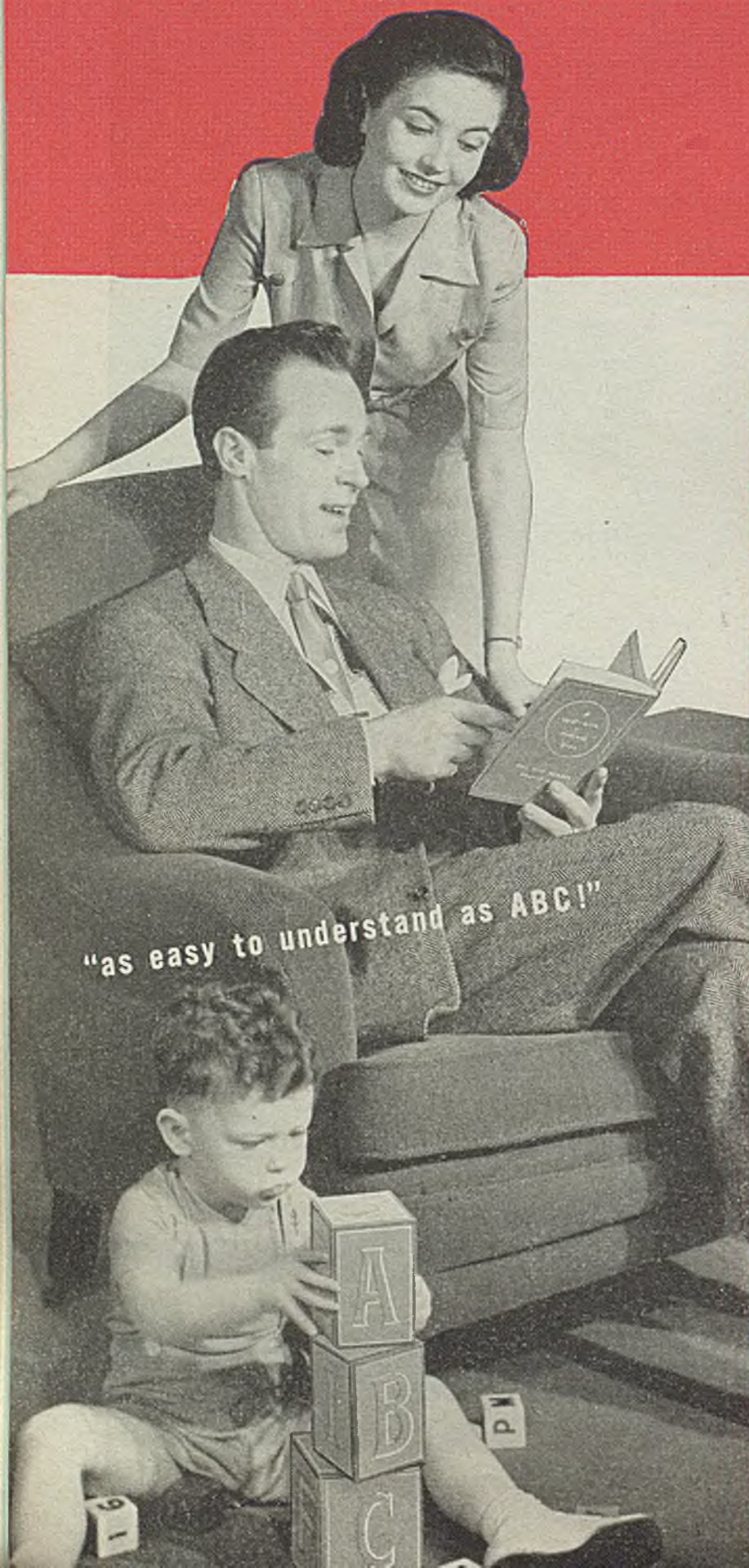
If you want the man to whom technical training is only the beginning, talk to an S-A engineer.



STEPHENS - A D A M S O N
MFG. CO. LOS ANGELES, CALIF. • BELLEVILLE, ONT.
3 RIDGEWAY AVENUE, AURORA, ILLINOIS

Designers and Manufacturers of All Types of
BULK MATERIAL HANDLING EQUIPMENT

HOW EMPLOYERS MUTUALS OF WAUSAU make Insurance Understandable



"as easy to understand as ABC!"

Why

Employers Mutuals of Wausau Make Insurance Understandable

Without understanding, the buyer of insurance has no way of knowing which risks might result in financial loss, nor how great that loss might be. With understanding, he can judge whether he is fully covered by his insurance, or may even discover that he is carrying more insurance, at higher cost, than is actually necessary.

The informed buyer, moreover, becomes a preferred risk for the insurance company. And the more preferred risks a company insures, the fewer losses it must pay—which automatically lowers the cost of insurance.

Employers Mutuals are interested in lower insurance costs, because Employers Mutuals are wholly owned by policyholders and operated for the benefit of the policyholders.

For these reasons, Employers Mutuals of Wausau believe that extending their effort to make insurance understandable will benefit themselves, the buyer of insurance, and the entire insurance field.

WHAT EMPLOYERS MUTUALS OF WAUSAU WRITE:

Public Liability . . . Automobile . . . Plate Glass . . . Burglary . . . Workmen's Compensation . . . Fidelity Bonds . . . Group Health, Accident, Hospitalization . . . and other casualty insurance . . . Fire . . . Tornado . . . Extended Coverage . . . Inland Marine . . . and allied lines of insurance. All policies are nonassessable.

Branch offices in principal cities throughout the country. Consult your telephone directory.

Employers Mutuals of Wausau, like most buyers of insurance, have always recognized the importance of understanding insurance because of the serious financial loss that may arise from lack of understanding.

Many of Employers Mutuals activities and much of the time of their representatives are devoted to an effort to make insurance understandable. To further this effort, Employers Mutuals are now embarking on a new and broader program through their advertising and through the publication of an Insurance Dictionary.

The first step in understanding any subject is knowing the exact meaning

of terms used to explain that subject. For the first time in the history of insurance, over 200 insurance terms have been brought together in one book. Legal phraseology, required to make the contract legally binding, is replaced by an explanation in simple, concise English, as easy to understand as A B C. The definition is followed by an example of a specific use of the term in insurance.

To spread the understanding of insurance even more widely, Employers Mutuals are preparing a series of advertisements, to appear in this magazine, which will feature definitions taken from the new Dictionary.

For Example, WHAT IS A "COMPREHENSIVE POLICY"?

Here is the definition from the new Dictionary of Insurance Terms:

Comprehensive Policy: An insurance policy which covers, under one insuring agreement, all hazards within the general scope of the policy, except those specifically excluded.

Example: A standard basic Automobile Liability Policy covers you against loss resulting from the use of certain specified automobiles. A "Comprehensive" Automobile Liability Policy covers you against claims which may result from the ownership, maintenance, or use of any automobile.

Perhaps, on the basis of this definition, it would pay you to look over your policies once more to see if you have the "comprehensive" coverage you should have.

The Employers Mutuals representative can give you a complete analysis of your present coverage. Such an analysis often reveals risks that are not covered. Many times it shows duplicate coverage that entails needless expense.

Take advantage of this free service—it will not obligate you in any way.



Free!

A Dictionary of Insurance Terms

How to Understand Insurance and Buy It Intelligently

If you need the protection of insurance, you need to understand insurance in order to buy it intelligently. Here, for the first time in the history of insurance, is a clear, concise explanation of insurance terms in simple English as easy to understand as A B C. No legal phraseology. No "technical" language. Examples demonstrate the application of the terms to specific cases.

It is yours—FREE! Write today for the new "Dictionary of Insurance Terms." Your copy will be sent as soon as it is off the press. Address: Insurance Information Bureau, Employers Mutuals of Wausau, Wausau, Wisconsin.



EMPLOYERS
MUTUALS OF
WAUSAU

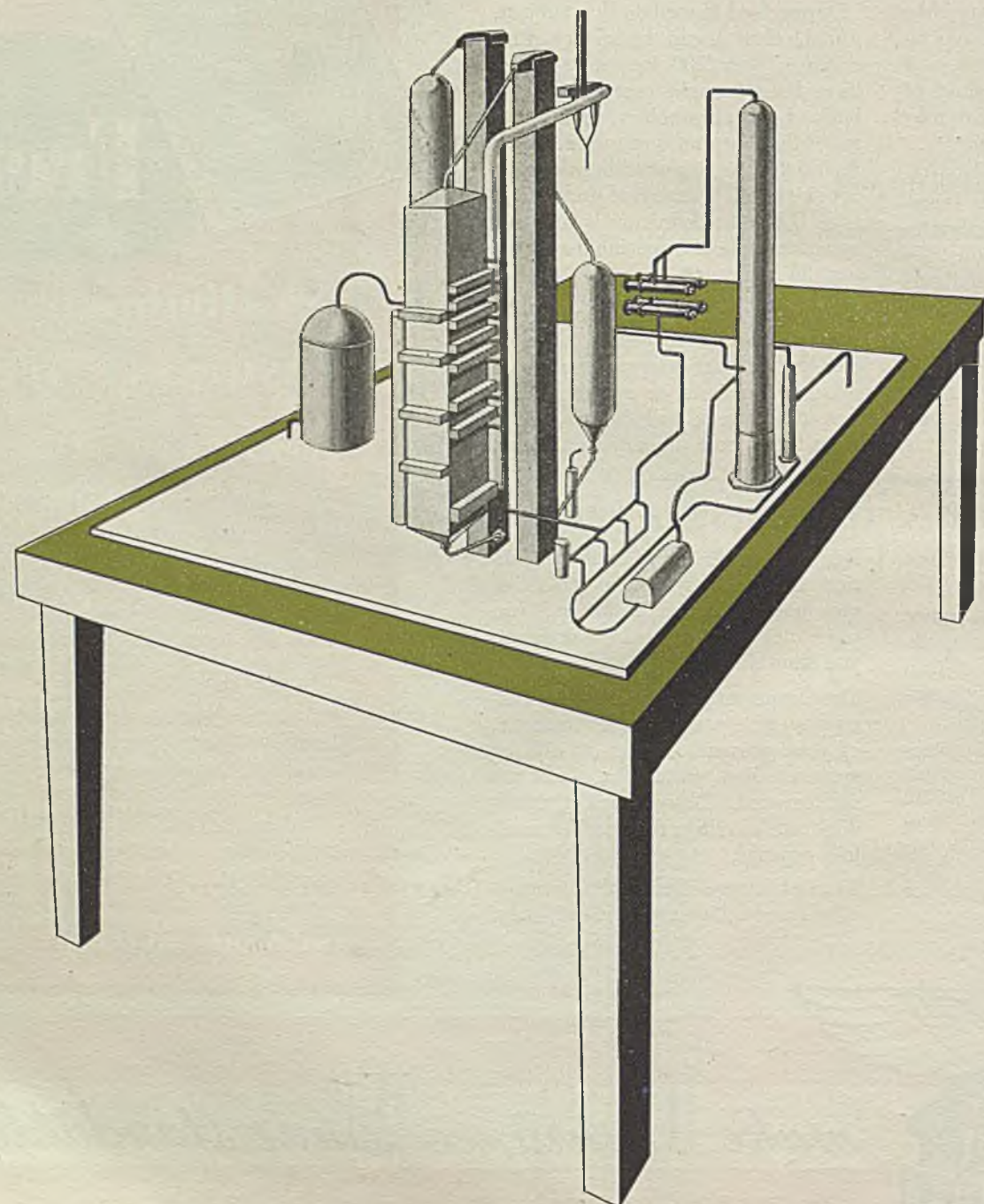
make Insurance Understandable

EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN

EMPLOYERS MUTUAL FIRE INSURANCE COMPANY

Home Office: WAUSAU, WISCONSIN

...How will it work



when it grows up?



Transition from pilot plant to commercial operation can be critical. Pilot-plant results can furnish accurate information on reactions, yield and quality; but they may still fail to establish many of the design factors required for engineering full-scale equipment.

It is economical insurance against expensive pitfalls and delays to utilize the assistance of competent engineering and construction specialists experienced in large-scale unit and plant design for widely diversified process industries.

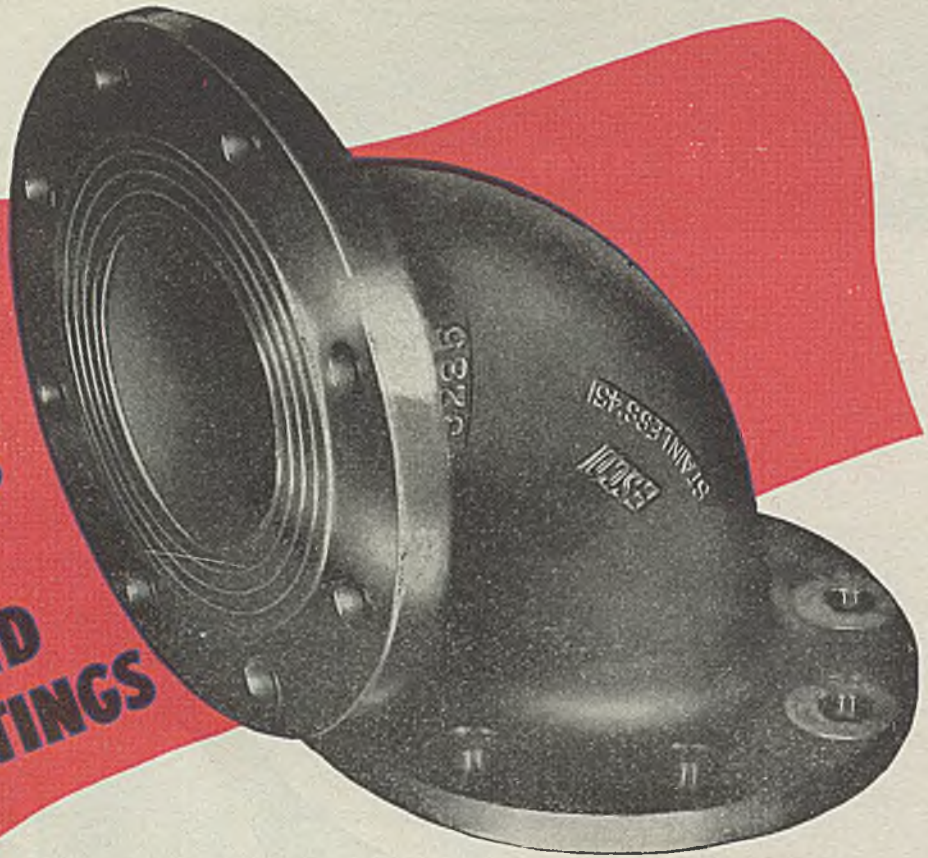
Consider Badger. In its length and breadth of experience, integrated facilities, and record for expanding pilot processes into successful plants, this progressive organization should commend itself to you.

E. B. **Badger** & SONS CO. Est. 1841

BOSTON 14 • New York • San Francisco • London

PROCESS ENGINEERS AND CONSTRUCTORS FOR THE
CHEMICAL, PETRO-CHEMICAL AND PETROLEUM INDUSTRIES

ESCO STAINLESS STEEL FLANGED PIPE FITTINGS



A "Must" for Low Maintenance Costs

LONG LIFE and low maintenance costs — *ultimate economy* — are the natural results of installing Esco stainless steel pipe and fittings. This is due to three basic facts:

1. Esco pipe and fittings are cast from stainless steel (Esco alloy 45) the proved corrosion-resisting metal.
2. They are made by experienced technicians, have walls of generous thickness for extra strength and longer, trouble-free service.
3. They are accurately finished and rigidly inspected.

Esco flanged fittings are available in 45- and 90-degree elbows, tee, long radius ell, cross, 45-degree lateral, and reducer. Sizes range from 1/2" to 10".

Ask for New Stainless Steel Catalog

Other products of Esco "know-how" which result from years of experience in the chemical industry, are stainless steel valves, screwed and socket-weld pipe fittings, Spuncast and fabricated stainless steel pipe. These are described in the new stainless steel Catalog number 157. We have a copy for you. Ask your nearest Esco representative for it, or write us direct.

ELECTRIC STEEL FOUNDRY

2141 N. W. 25th Avenue, Portland 10, Oregon

STAINLESS STEEL FOR ULTIMATE ECONOMY



Long radius
flanged ell



Flanged tee



45 degree flanged
lateral

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2724 First Ave. S.
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Phone 6486

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SAN FRANCISCO, 7
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Douglas 8346

SPOKANE, 8
121 S. Monroe St.
Main 5530

LOS ANGELES, 11
4600 Pacific Blvd.
Lucas 7251

CHICAGO, 1
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Dearborn 2284

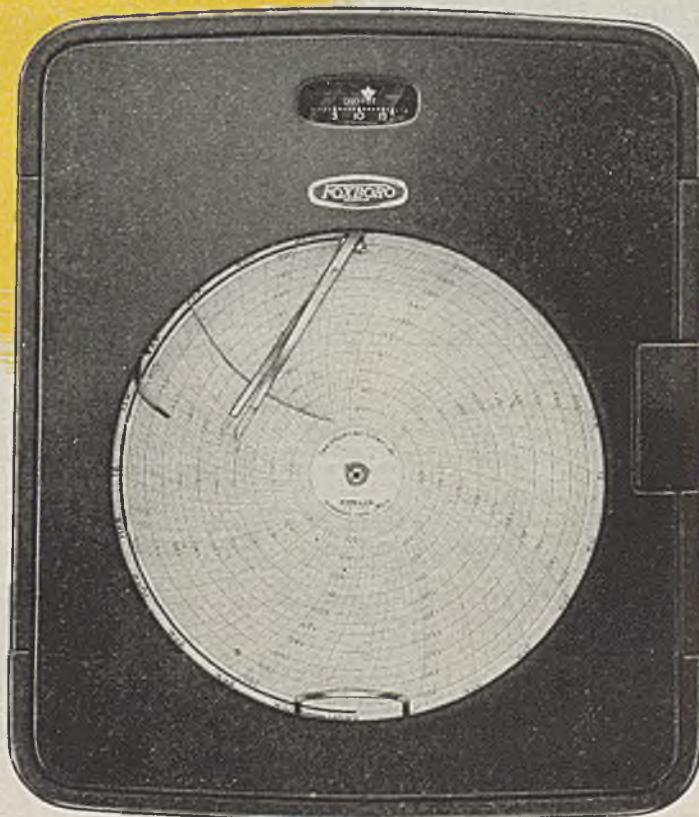
EUGENE, ORE.
1991 Sixth Ave., W. • Phone 5012

IN CANADA—ESCO LIMITED, 1084 Homer St., Vancouver, B.C. Telephone Marine 2343



Every known requirement of leading industries, every proved scientific advance in pneumatic control, every advantage of unmatched research and experience, has guided the design of the new Foxboro Model 40 Stabilog Controller. The results are simpler and more rugged construction, easier and more stable adjustments, unequalled performance.

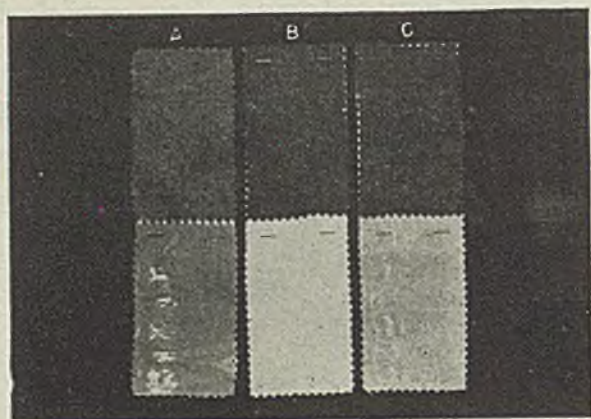
Foxboro **M-40**
STABILOG* CONTROLLER



Write for complete explanation in Bulletin 381. The Foxboro Company, 16 Neponset Avenue, Foxboro, Mass., U.S.A.

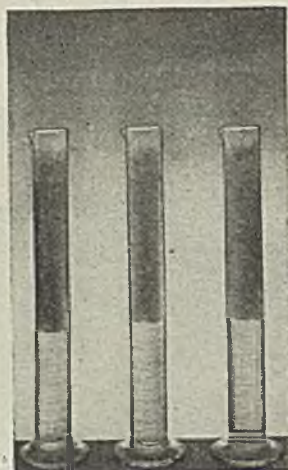
* Reg. U. S. Pat. Off.

LIFE... ON THE



(Above) COLOR FIXATION of a direct color is illustrated here with samples of yellow spun rayon fabric treated after dyeing at a ratio of 1 lb. of cloth to 30 lbs. of water for 10 minutes at 110° F. in a bath containing AEROSOL C-61. A shows untreated fabric, B treated with 2 lbs. of AEROSOL C-61 per 100 gal. of bath, and C, 0.8 lb. per 100 gal. of bath.

(Right) SOLUBILITY AND FOAMING POWER of AEROSOL C-61 is shown here with 0.1% of this agent in 5, 10, and 20% H₂SO₄. It is also soluble in concentrated sulfuric acid and chemically stable at temperatures up to 100° C. AEROSOL C-61 is not salted out from solutions containing high concentrations of acetic, sulfuric, hydrochloric, and other acids. The surface tension of 0.1% AEROSOL C-61 in hydrochloric acid at 30° C. is 32.0 in 5% Conc., 31.5 in 10, and 31.1 in 20%; in sulfuric acid, 31.7 in 5, 32.0 in 10, 33.4 in 20, and 40.2 in 80 and 98%.



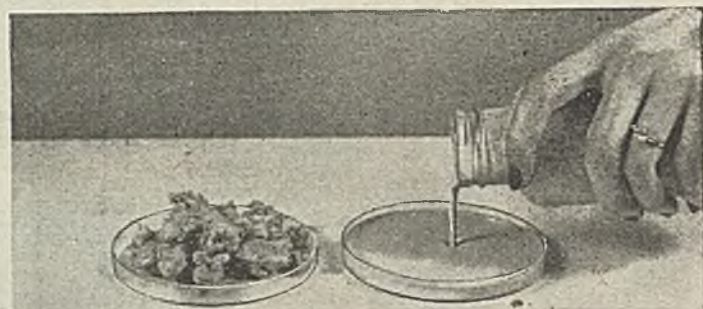
AEROSOL* C-61 CATIONIC SURFACE ACTIVE AGENT OFFERS MANY POSSIBILITIES AS AN AID TO ESTABLISHED PROCESSES

AEROSOL C-61, a newly developed cationic surface active agent, is an ethanolated alkyl guanidine-amine complex of high molecular weight. It is a new product, but already has shown great promise along a wide variety of lines.

Effective in acid, neutral, or alkaline solutions, AEROSOL C-61 possesses, among other characteristics, good detergent, pigment dispersing, softening, dye mordanting, and dye fixing properties.

AEROSOL C-61 is stable in solution at all working temperatures up to the boil. Although slowly dispersible in water at 86° F., it may be dissolved to best advantage by mixing 1 part with 3 parts of water at 140° F. and pouring the resulting solution into the operating bath held at the desired temperature. If the bath temperature is 120° F. or more, it may be added directly to the bath without prior dilution. It is not decomposed by acids or alkalis.

Characteristics, physical properties, and uses of AEROSOL C-61 are given here. Additional information will gladly be supplied by Cyanamid.



(Above) PIGMENT DISPERSING POWER of AEROSOL C-61 is demonstrated by its effect on a 30% press cake of Benzidine yellow pigment. The press cake, consisting originally of solid lumps, is being poured from a bottle after the addition of 10% AEROSOL C-61 on the weight of the pigment. Such dispersing properties may be utilized in the preparation of highly concentrated pigmented pastes.

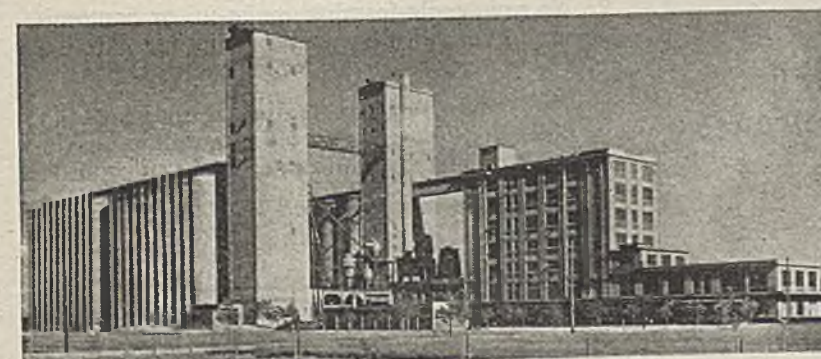
CHEMICAL NEWSFRONT



(Left) CYANAMID'S BEETLE* PLASTIC, so often chosen by manufacturers for its color and beauty, has now been adopted for a new product that specializes in beauty. This device, the Beautiator, is an electrical manicurist, made by the Abar Manufacturing Company of Cleveland, Ohio, and powered by a 1/200-hp. air-cooled motor. The construction and operation of the Beautiator are interesting since they are somewhat revolutionary.

A study was made of the biological growth and health of fingernails, and upon the basis of these facts, it was decided that the perfect manicure or pedicure should include the following operations: disc filing, cuticle rolling, cuticle whisking, nail buffing, and oil massaging. Various attachments perform these operations.

Factory tests indicate that the new manicuring machine will give trouble-free performance under normal conditions for at least 20 years. An essential feature of the Beautiator's attractive appearance and assured long life, is the smart, sanitary, colorful housing of BEETLE plastic, molded by the International Plastics Company.



(Above) TODAY'S "MILL STREAM", the course pursued by flour during its processing within the mill, is always subject to insect infestation. Periodic fumigation with Cyanamid's Liquid HCN rids mills of insect pests just as Cyanamid's CYANOGAS* Fumigant applied to grain eliminates infestations in grain elevators. Where general mill fumigations are not possible, or to maintain a low level of infestation between fumigations, another Cyanamid product, ACRYLON**, is an effective local or "spot" fumigant. The high toxicity of ACRYLON assures a thorough kill of all mill insects and their larvae. Dosages for different machines and units are provided.

(Above) ACRYLON, made up of equal parts of acrylonitrile and carbon tetrachloride, can be poured directly into boot, sifter, or conveyor, which act as fumigation chambers. It vaporizes and effects 100% kill in from 16 to 24 hours without harmful effect on the flour. ACRYLON leaves no odor, color, residue, or caked material in the machines.

*Reg. U. S. Pat. Off. **Trade-Mark

AEROSOL C-61

CATIONIC SURFACE ACTIVE AGENT

USES

- Pigment dispersing
- Aiding coagulation and speeding settling of certain dry colors during manufacture
- Mordant for certain types of dyes, particularly wool colors
- Voltage builder in electroplating baths
- Reducing bleeding of fugitive colors
- Controlling crystal growth
- Aiding sedimentation processes
- Increasing absorbency of paper towels
- Cationic detergent
- Inhibiting gas fading tendencies of acetate colors
- Fixing agent for certain dyes and colors
- Wetting agent in acid fluxes
- Frothing agent in acid solutions
- Altering adhesive characteristics of resins to glass
- Aid in parchmentizing paper

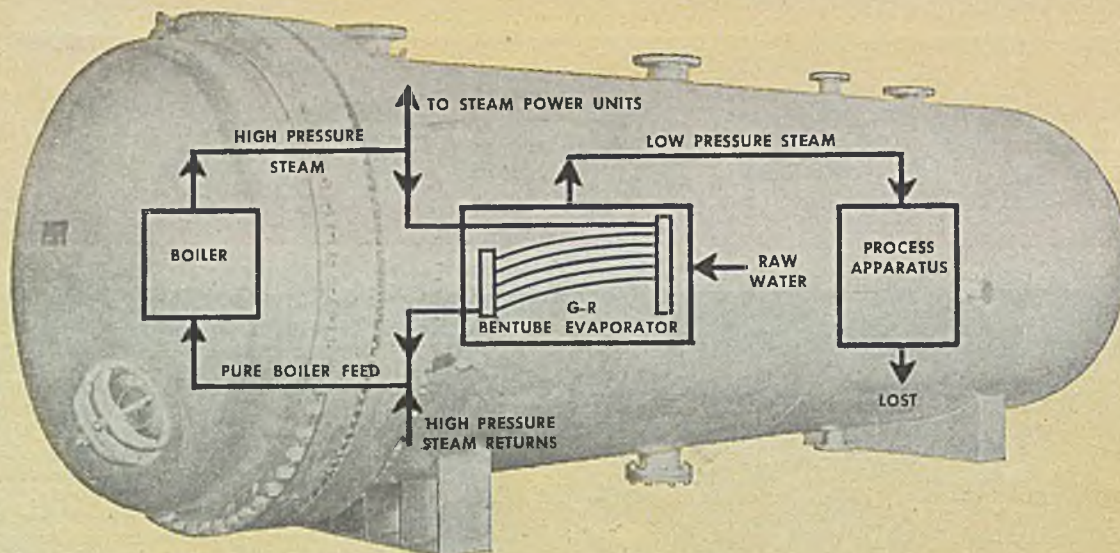
PHYSICAL PROPERTIES

- Appearance brown fluid to brown paste
- Solidifying point varies 15° to 30°C.
- Solids approximately 80%
- Solubility in water 2 to 3% disperses in water at 30°C. Yields turbid dispersions up to 10%. Gels above 10%
- Solubility in dilute acids infinite
- Stability to storage excellent
- Weight per gallon approx. 8.5 lbs.
- pH 9.0 to 11.0 for 1% solution
- Calcium tolerance excellent
- Salt tolerance 2-3% NaCl
- Acid and alkali stability excellent
- Odor ammoniacal
- Du Nouy surface tension (25°C.) at 0.1% 32.8 (after 2 minutes aging time)

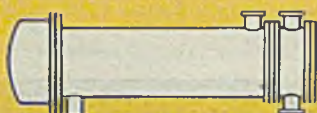
American Cyanamid & Chemical Corporation

(A Unit of American Cyanamid Company)

30 ROCKEFELLER PLAZA • NEW YORK 20, N. Y.



**ONLY G-R BUILDS
THIS WIDE VARIETY
OF HEAT TRANSFER
APPARATUS**



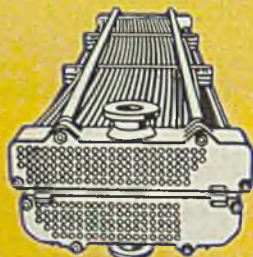
SHELL and BARE TUBE
Heaters, Coolers, Condensers,
Heat Exchangers



G-FIN
Longitudinal-finned elements
for greater heat conductivity



K-FIN
Helical-finned elements
for vapors and gases



BENTUBE EVAPORATOR
Scale-shedding Elements



TUBEFLO SECTIONS
Non-clogging design for
residuum and other dirty fluids

Investigate This Efficient THERMAL REDUCING VALVE If You Use Process Steam

The above simplified flow chart shows how a G-R Bentube Evaporator can serve to produce large quantities of low-pressure steam for process work. The advantages:

1. The high-pressure steam used to operate the evaporator is all returned to the boiler, after use, in the form of condensate.
2. No raw, scale-forming make-up or contaminated condensed process steam is fed to the boiler, thus reducing boiler maintenance.
3. The scale-shedding heating elements of the G-R Bentube Evaporator maintain rated heat transfer without requiring hand scaling.
4. The evaporator is practically 100% thermally efficient.
5. Ideal plant heat balance can be arranged.

THE G-R BENTUBE EVAPORATOR

Many millions of pounds per hour of process steam are now being produced in highly successful G-R Bentube Reducing-Valve Evaporator plants. For more complete details, write for free copy of our Bulletin 364.

THE GRISCOM-RUSSELL CO.
285 Madison Ave. New York 17, N. Y.



GRISCOM-RUSSELL

Pioneers in Heat Transfer Apparatus



It's easy to follow Standard...

Coded Lubrication

It's easy as ABC to install and follow Standard Coded Lubrication. With it, all lubricants are applied by number. There are no brand names or grades for the oiler to remember. There are no records to keep up or other clerical help needed. The four steps at right show just how easy it is.

The results you get with Coded Lubrication are well worth while. It reduces breakdowns resulting from the application of wrong lubricants. It prevents applying costly lubricants where ordinary lubricants can be used. It simplifies training of oilers and crews and eliminates the need for oilers to remember a multitude of brand names.

A Standard Oil Lubrication Engineer will fully explain Coded Lubrication and its application to your plant. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Here's how easy it is to apply:

STEP 1

Each lubricant used in your plant is assigned a number. These numbers are recorded on a Lubrication Chart—this is the only record making that is ever needed—and copies are kept in the oil room, purchasing department files, or wherever else they may be useful.

STEP 2

The lubricant in each storage container—barrel, drum, dispenser—is identified by the number assigned to it. Numbered decals, in only two color combinations, are used for this purpose—another example of the simplicity of the system.

STEP 3

All points to be lubricated in your plant are also marked with a numbered decal indicating *what* lubricant is to be used and *where* it is needed.

STEP 4

Your oilers fill lubricant dispensers from storage by number and apply lubricants to machines by number.

STANDARD OIL COMPANY (INDIANA)

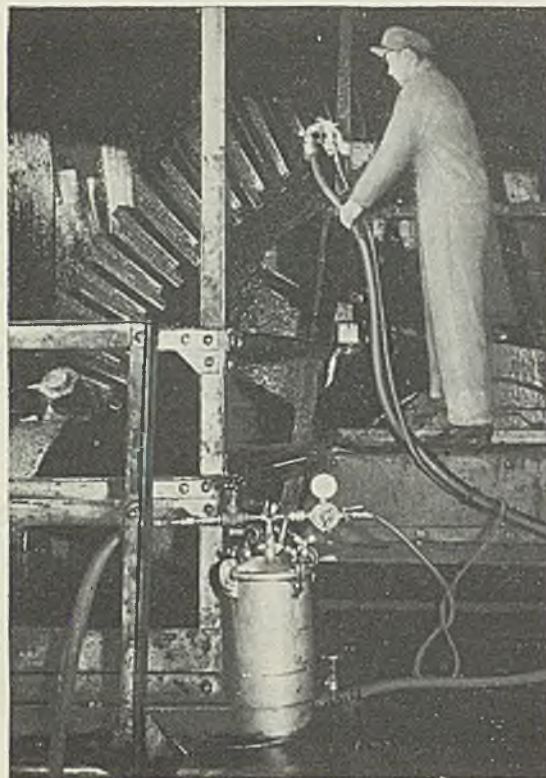
**STANDARD
SERVICE**

An improved gear lubricant that can be sprayed on gears...

CALUMET Viscous Lubricant

Calumet Viscous Lubricant is not the old type of gear shield usually made from residual products of petroleum. It is a true grease, manufactured from selected soaps and oils plus additives to secure the qualities most needed in a gear shield. In addition, a range of grades is provided, to meet all plant conditions under which gears operate.

That is why Calumet Viscous Lubricant gives the advantages listed above. Because all grades can be applied without heating, and all except the heaviest grade can be sprayed, it cuts application time to the minimum. Spraying also gives a smooth, even coating of lubricant, eliminating



One method of spraying gears is pictured above. Grease under pressure in the tank is carried to the spray gun in the large hose. A separate air hose to the gun provides pressure to break up the grease into a fine spray.

- Saves time in application
- Gives smooth, even film
- Reduces frequency of application
- Reduces throw-off

bare spots or excessive deposits which may drop off before the lubricant is worked into the gears.

An additive in the lubricant gives it improved wetting ability—that's the ability to adhere closely to the metal—so as to give better resistance to water and heat.

Let this wear-reducing lubricant protect your plant gears. A Standard Oil Lubrication Engineer will survey your plant and help you determine the grades you need and the most economical methods of application.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA)

**STANDARD
SERVICE**

**THIS PUMP WEIGHS ONLY
...BUT SEE WHAT IT DOES**

6 OZS.

If small size, light weight and low cost are important factors in your pump applications calling for low-capacity, low-pressure handling of oils, gasoline, alcohol, and certain mildly corrosive liquids, investigate McIntyre Series 1200 Pumps. You'll find that they actually cost less than larger, heavier pumps made to less-exacting specifications.

McINTYRE PRECISION

Because McIntyre machining methods are capable of making surfaces flat to one light band . . . and holding vital dimensions to tolerances of tenths and split tenths, the close fit of gears, center plates and sides of McIntyre Pumps assures high volumetric efficiency. That is the plus the McIntyre light-band trade-mark promises.

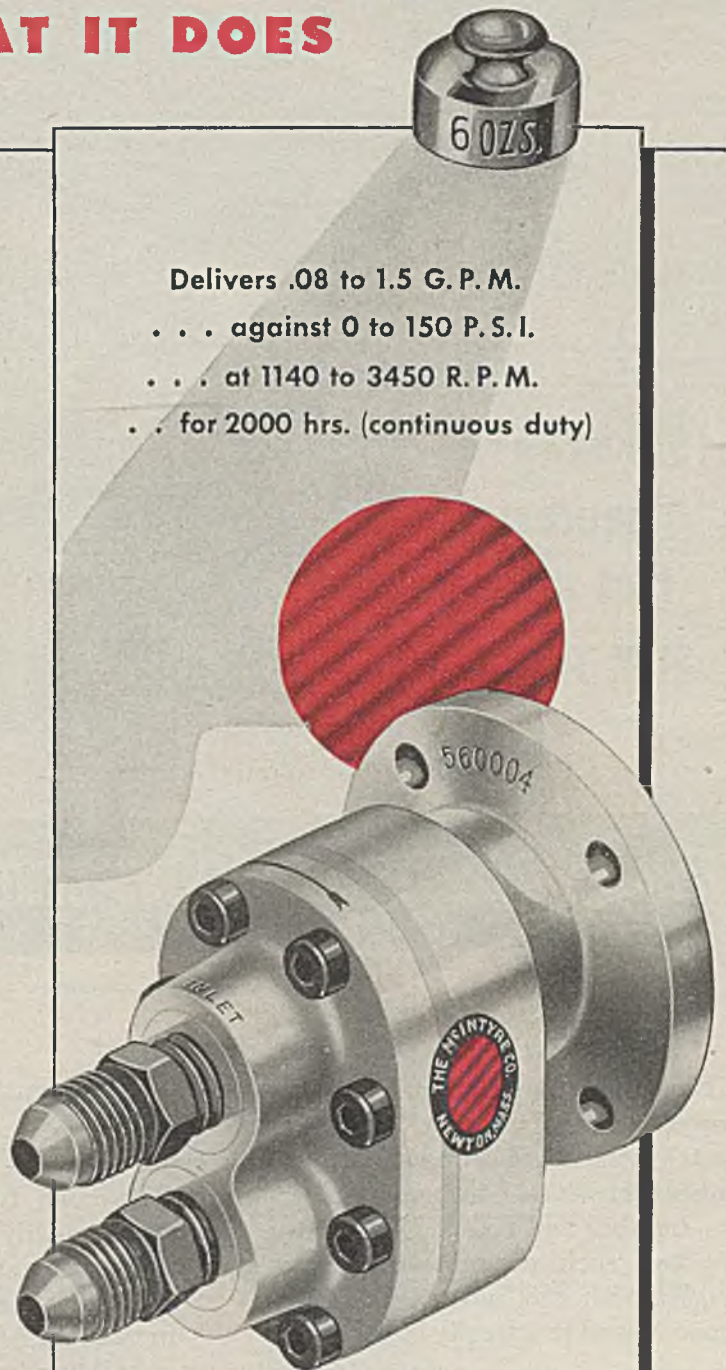
WRITE FOR DATA

Whether you're interested in pressure lubrication of high-speed machinery, fluid handling in aircraft at high altitudes, or other possible applications, write for information about McIntyre Series 1200 Pumps, today. The McIntyre Company, 600 Riverdale Ave., Newton 58, Massachusetts . . .

*also makers of precision spur gears
to your specifications.*

Delivers .08 to 1.5 G. P. M.

- . . . against 0 to 150 P. S. I.**
- . . . at 1140 to 3450 R. P. M.**
- . . . for 2000 hrs. (continuous duty)**



SCALE: ACTUAL SIZE
Available with 10,000 R.P.M. 1/20 H.P. Motor

THE McINTYRE co.
(FORMERLY ZENITH ASSOCIATES)
PUMPS AND FLUID MOTORS

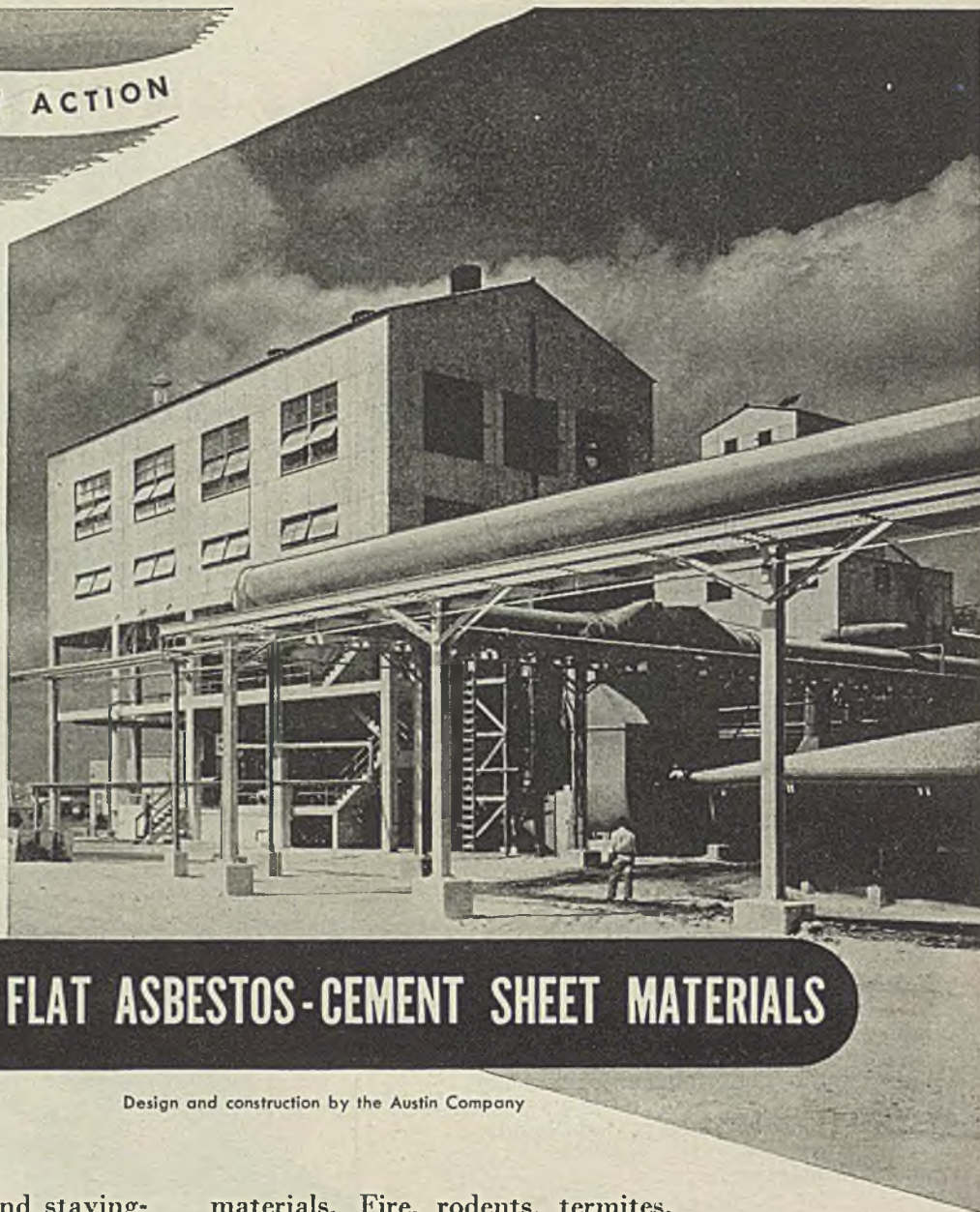
THE ULTIMATE IN PRECISION



IDENTIFIED BY THE LIGHT BAND

ASBESTOS IN ACTION

Structural
materials
that always
stay young...



K&M "Century" FLAT ASBESTOS-CEMENT SHEET MATERIALS

Design and construction by the Austin Company

• For rugged strength and staying-power, K&M "Century" Flat Asbestos-Cement Sheet materials are unbeatable. K&M Standard Asbestos Lumber and K&M Monobestos are two such products that grow *tougher* with age, never need maintenance, and practically last forever.

The most recent addition to the "Century" Flat Asbestos Sheet family is K&M "Century" APAC — a sturdy, light-weight material that's highly resistant to the common enemies of most building

materials. Fire, rodents, termites, weather, rot . . . APAC withstands them all, and seems to stay eternally young. Its 4' x 8' sheets are ideal for many types of industrial construction, such as walls, partitions, ceilings, elevator shaft linings — in fact APAC has as many uses as a building has surfaces.

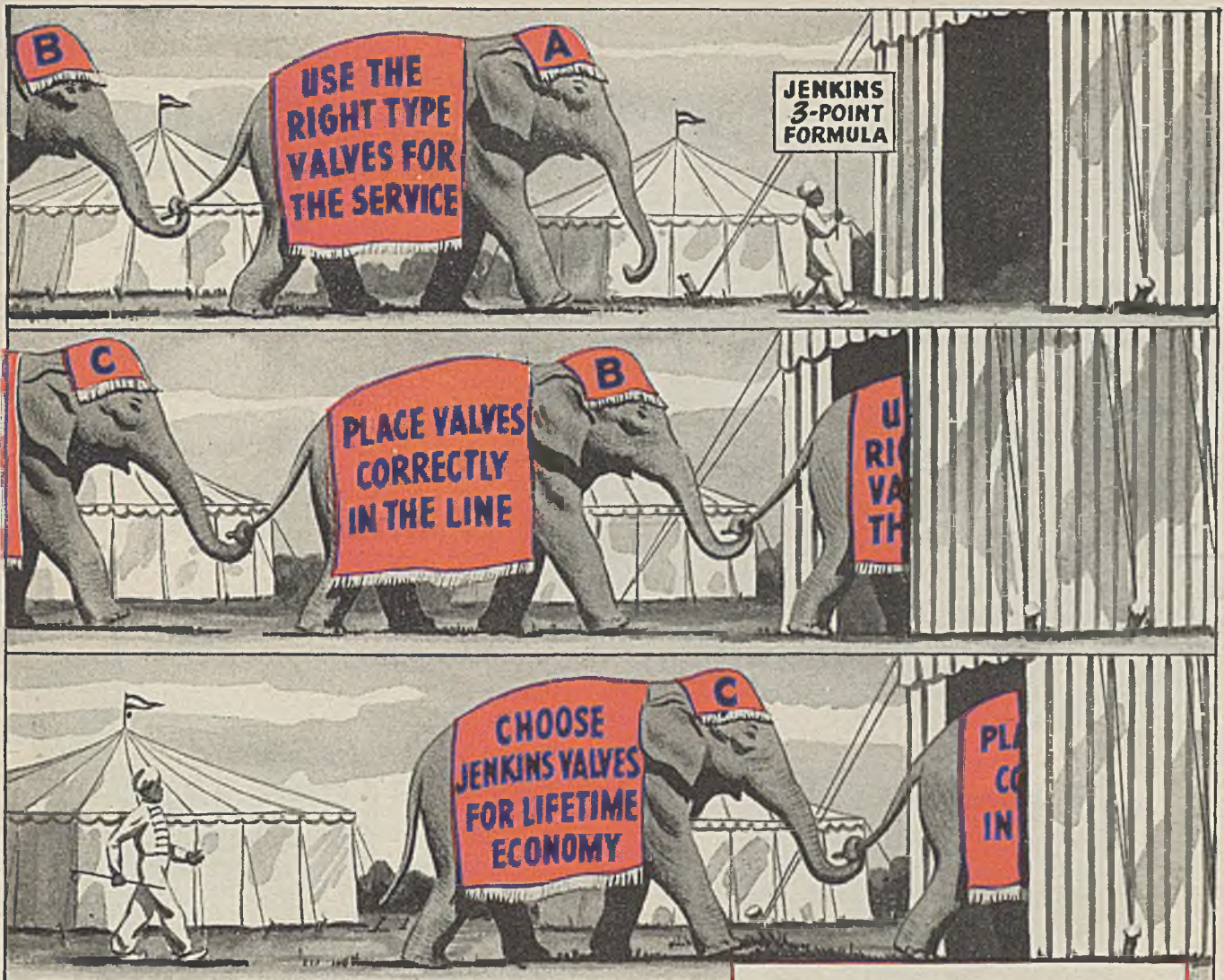
K&M "Century" Flat Asbestos Sheet Materials hold the right answer to many construction problems. Write to us for full information on what they can do for YOU.



*Nature
Made Asbestos...*
Keasbey & Mattison
has been making it serve
mankind since 1873

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COMPANY • AMBLER • PENNSYLVANIA



A Good "Lead" to Lower Valve Costs

By choosing Jenkins Valves, you not only get valves made with *extra* endurance that means *extra* economy.

You also get the experienced advice of top-rated valve specialists, Jenkins Engineers, on any question of selection or placement. Write for Booklet No. 944 on installation.

Base your valve buying on the 3-Point Formula, and make sure of the *extra* value that means *lowest cost in the long run*.

Jenkins Bros., 80 White Street, New York 13; Bridgeport; Atlanta; Boston; Philadelphia; Chicago. Jenkins Bros., Ltd., Montreal; London, England.

Jenkins U-Bolt Gate Valve



Its Patented Bonnet Saver Bushing, Heavy Duty Body and Bonnet, and Easy Accessibility are three of sixteen advanced features that reduce care and guard against wear. Compare it, feature for feature, and you'll agree it's tops in its class!

Sizes 1/4" to 3". Working Pressure up to 125 lbs. steam or 175 lbs. O.W.C. Bronze Mounted or All Iron - Screwed or Flanged.

ONE OF OVER 600 EXTRA VALUE VALVES MADE BY JENKINS VALVE SPECIALISTS

JENKINS



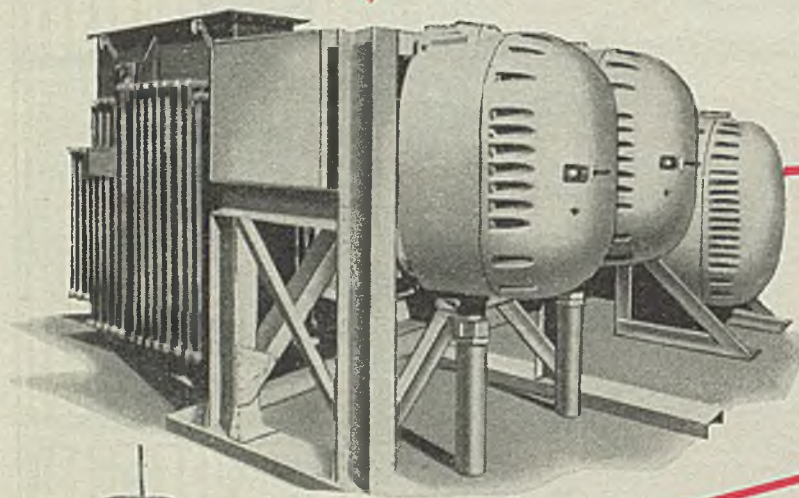
VALVES

LOOK FOR THIS FAMOUS DIAMOND MARK

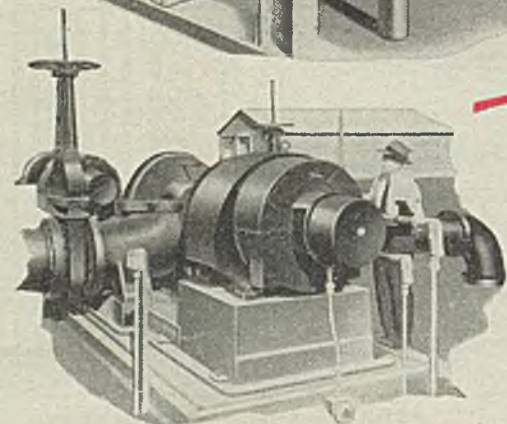
SINCE 1864 • THE MARK OF TRUSTWORTHY VALVES

BRONZE • IRON • STEEL • CORROSION-RESISTING ALLOYS . . . 125 TO 600 LBS. PRESSURE . . . OVER 600 PATTERNS FOR EVERY INDUSTRIAL, ENGINEERING, MARINE, PLUMBING-HEATING SERVICE.

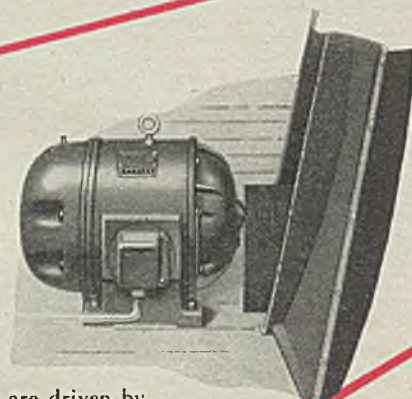
HOW THEY *Stymied* Power Failures



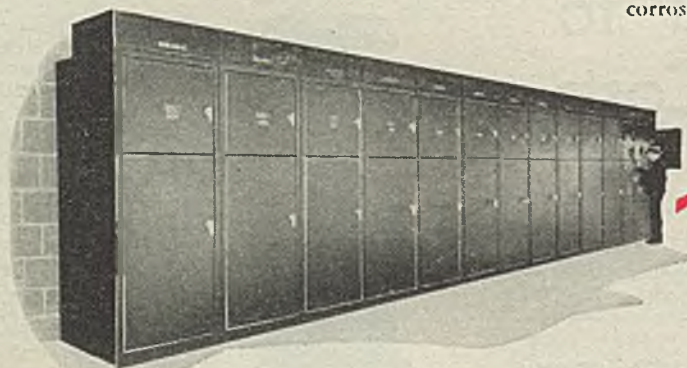
Load-center unit substations equipped with circuit breakers, are located near the Tidewater Avon cracking units. Oil-cooled transformer is shown in the background.



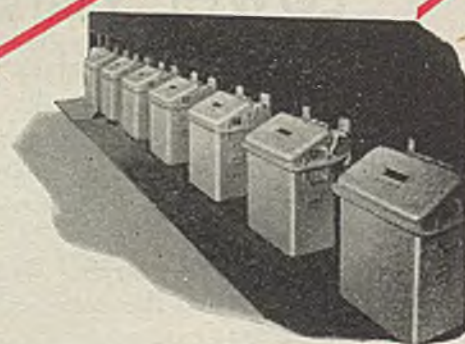
These 450-hp, 900 rpm synchronous circulating pump motors are made with splashproof enclosures, permitting them to be installed outdoors in this mild climate without any special housings.



Cooling tower fans are driven by G-E 50-hp totally enclosed, fan-cooled induction motors. Features include superior insulation and corrosion-resisting paint.



This smooth, dead-front bank of 14 G-E Limitamp combination motor starters is housed in a separate switch house. Contactors are oil-immersed and fuses are housed in individual steel cubicles.

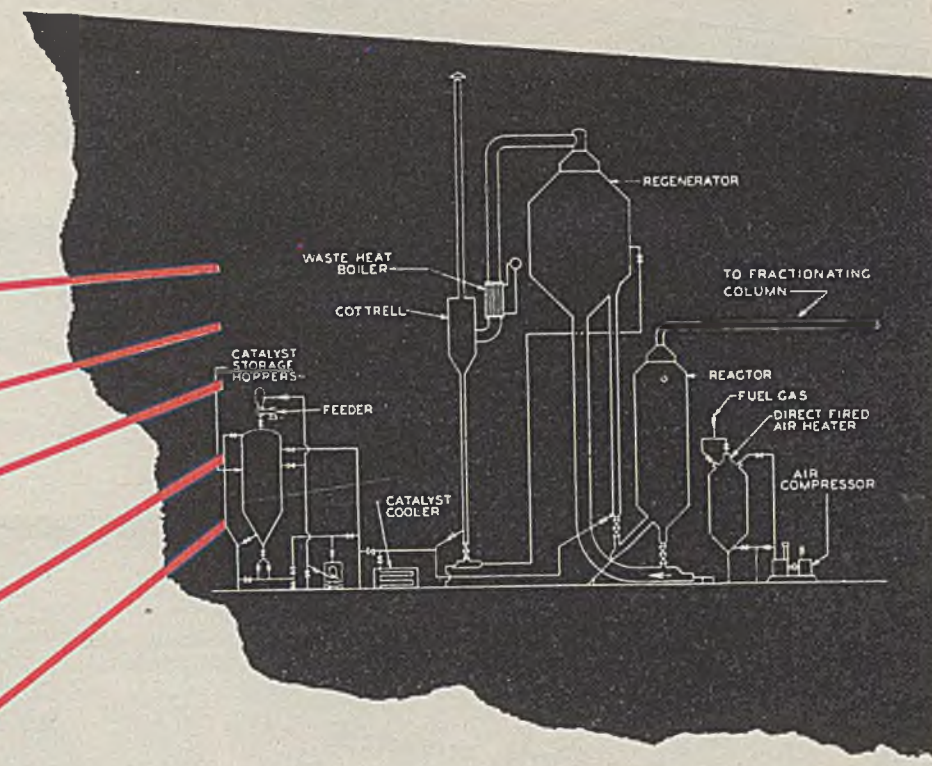


This rack assembly of G-E oil-immersed combination starters controls low-voltage motors. Starters are installed as a complete control group. Maintenance is also simplified.



POWER SYSTEMS *for Chemical Plant Service*

at Avon!



Designers of the electric power system in this new Tide Water cracking plant made *continuity of service* their chief objective — and G-E equipment helped them achieve it!

In the new cracking plant of the Tide Water Associated Oil Co. at Avon, Calif., the continuous nature of the fluid-catalytic process makes even occasional power interruptions intolerable. Failures have to be "squashed" before they start!

Avon's designers asked General Electric to provide power transmission equipment, motors, and controls which would stay on the job with a minimum of maintenance. Specifications were met to the letter *without* installing costly "custom made" equipment. We were able to supply standard equipment with all the construction "extras" required.

The result is a power system which points up G-E's ability to meet the exacting electrical requirements of all refinery processes, whether in general use or still in the pilot-plant stage. Here's a quick description of the Avon system:

POWER DISTRIBUTION — Power at 12,000 volts from a nearby utility is carried into the plant over two independent circuits. Should one circuit fail, the load is automatically transferred by high-capacity G-E oil circuit breakers. This arrangement also eliminates service interruptions for maintaining breakers. Six feeder circuits, all controlled and protected by G-E circuit breakers, distribute the power to utilization points. Full-rated performance of motors and lighting fixtures is assured by G-E load-center unit substations, designed

for operation in semi-hazardous areas, close to the load. Both high- and low-voltage circuits are buried underground out of harm's way.

CONTROLS — Induction motors for driving tank mixers, precipitators, and other equipment are controlled by G-E Limitamp combination starters. The current-limiting fuses are rated for short-circuit kva up to 150,000 at 2300 volts, 250,000 at 4160 volts. Low-voltage starters for the smaller motors, also of adequate interrupting capacity, are conveniently racked for fast inspection and easy servicing.

MOTORS — Standard G-E synchronous motors in splashproof enclosures are used. Special housings to protect outdoor pump and fan motors were not needed. Electric heaters keep moisture out of the windings during shut-down periods. All induction motors feature G-E's totally enclosed, fan-cooled construction.

G.E. makes the electrical industry's most complete line of equipment specially designed for chemical plant service. This fact is welcomed by many chemical engineers for the freedom it gives them in matching power distribution and utilization systems to continuous processes. Your nearest G-E office will be glad to discuss any electrical problem with you. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL  **ELECTRIC**

CHEMICAL & METALLURGICAL ENGINEERING • JUNE 1946 •

HOMESTEAD LEVER-SEALD VALVES OFFER ALL THESE ADVANTAGES

Instant
Stick-proof operation

•
Quarter-turn fully opens
or closes.

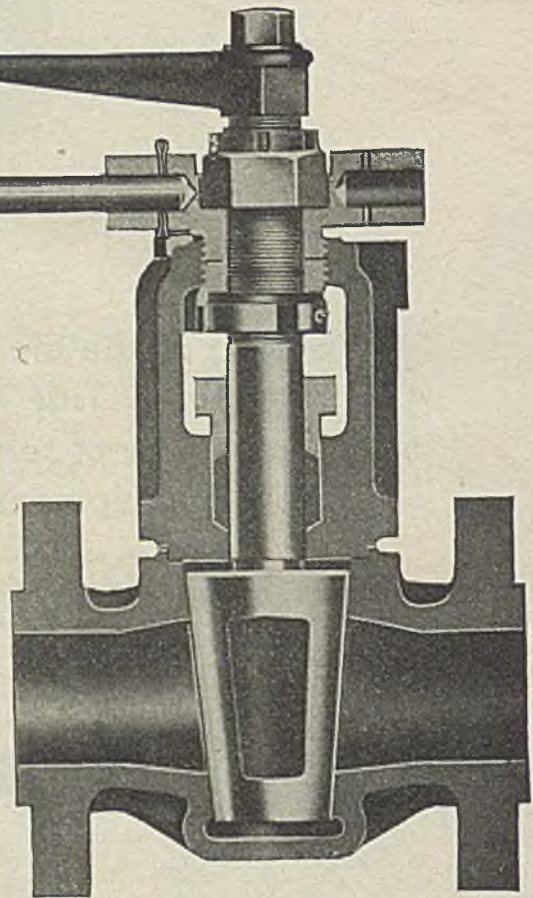
•
Positive seal without lubrication.

•
Seating surfaces always pro-
tected in both open and closed
positions. Corrosion practically
eliminated.

•
Unobstructed
straight-line
fluid flow.

•
All operating parts protected
from damaging effects of service
conditions and weather.

and they're
STICK-PROOF
too



That is why for 15 years, they have been first choice in difficult services where extremes of temperature or pressure or the corrosive action of line fluids would cause ordinary valves to "stick" or "seize."

Due to their exclusive "Lever-Seald" construction, they render instant, **Stick-Proof** service at all times and under all conditions. They operate *faster, too—16 to 28 times faster than screw-stem-type valves.*

Because all operating parts are protected from the damaging effects of line fluids, service conditions and weather, long life, low maintenance cost and trouble-free service are assured.

Homestead Lever-Seald Valves are made in metals and alloys to meet service requirements; sizes $1\frac{1}{2}$ " to 12", for pressures from vacuum to 1500 pounds. Write for detailed information and copy of Valve Reference Book No. 38.

Operation of a Homestead Lever-Seald Valve is simple and easy. Seating pressure is first relieved (with the lower lever) just enough to overcome friction and free the plug. Then a *quarter-turn* of the upper lever fully opens or closes the valve. Full seating pressure is again applied with the lower lever to make a positive, leakless seal. This *stick-proof* construction is only one of many Homestead Lever-Seald Valve features assuring long, economical, trouble-free service.

HOMESTEAD VALVE MFG. CO.

P. O. BOX NO. 13


CORAOPOLIS, PA.



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THAT MEANS BETTER CASTING PERFORMANCE

Whatever requirements you establish for your castings, you are assured *consistent conformance* in Sivyer steel castings. For by carefully sampling each job, Sivyer makes sure they measure up to your requirements—that they are castings worthy of bearing the Sivyer diamond —the mark worth looking for.

Sivyer castings are inherently better castings because nearly 30 years of experience enable us to make them this way. All through production—from planning to finished product—scientific testing and control work hand in hand with this skill to the end of providing castings that meet every requirement for longer, trouble-free service.

Consult with Sivyer on your next castings.

SIVYER STEEL
CASTING COMPANY
MILWAUKEE  CHICAGO 



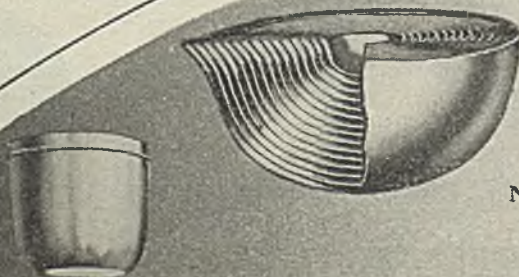
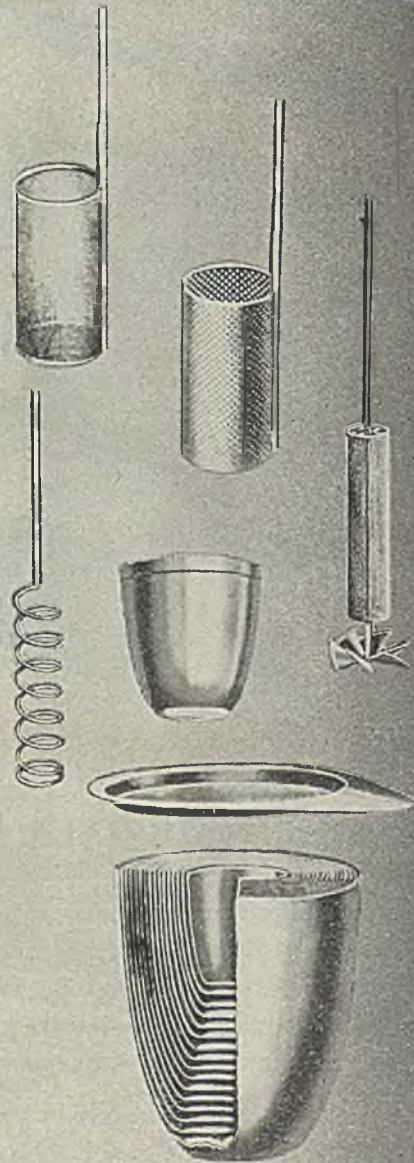
SIVYER STEEL CASTINGS

A DECADE OF UNUSUAL PERFORMANCE BAKER PLATINUM LABORATORY WARE

It was ten years ago that we first introduced our improved platinum laboratory ware. At that time, our research laboratories had completed development of a new metallurgical process whereby the cause of most of the cracking that occurs in crucibles, during use, can be eliminated and by this means we have been able greatly to prolong the useful life of Baker Crucibles.

Since that time, we have had no complaints of rupture or cracking from this cause.

Send for the new edition of *Data Concerning Platinum*. It contains up to date information about platinum laboratory ware together with revised tables that will be very useful to you.



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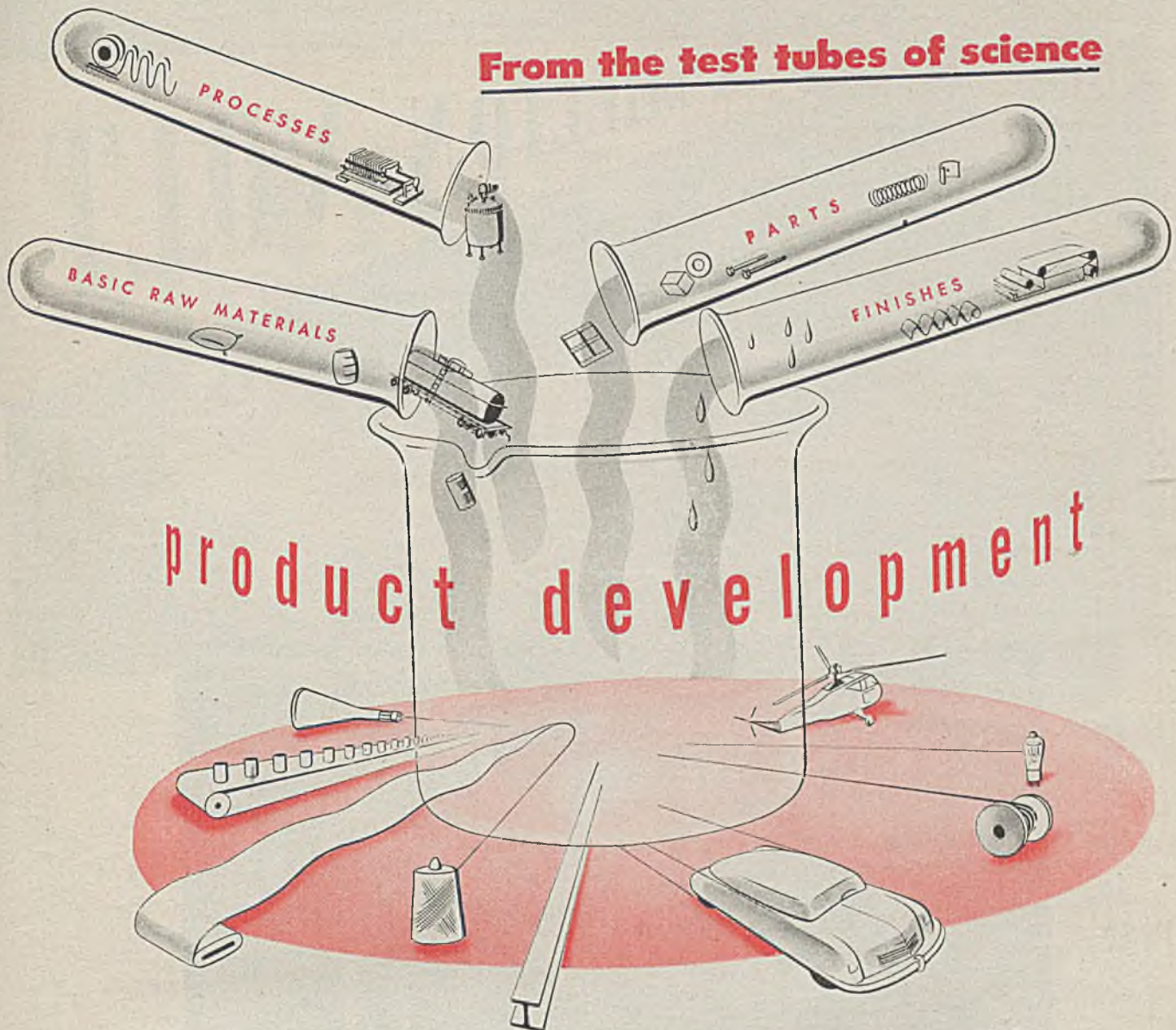
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From the test tubes of science



When your new product development or new process calls for the use of alkalis, SOLVAY, the largest makers of alkalis in America, is a source you can trust. The quality of Solvay products—backed by intensive research and extensive experience—has resulted in 65 years of continuous leadership in our field.

This extensive knowledge of the abilities and possibilities of alkalis worked out by the SOLVAY Technical Staff is at your

service to help you in new product development. We will welcome the opportunity to work on your chemical problems, in strict confidence, or co-operate with your own research staff.

We are working at the limit of our capacity trying to keep abreast of orders... determined that as always in our long history the quality of every product shall be of the finest. To be sure of quality, be sure to specify SOLVAY.

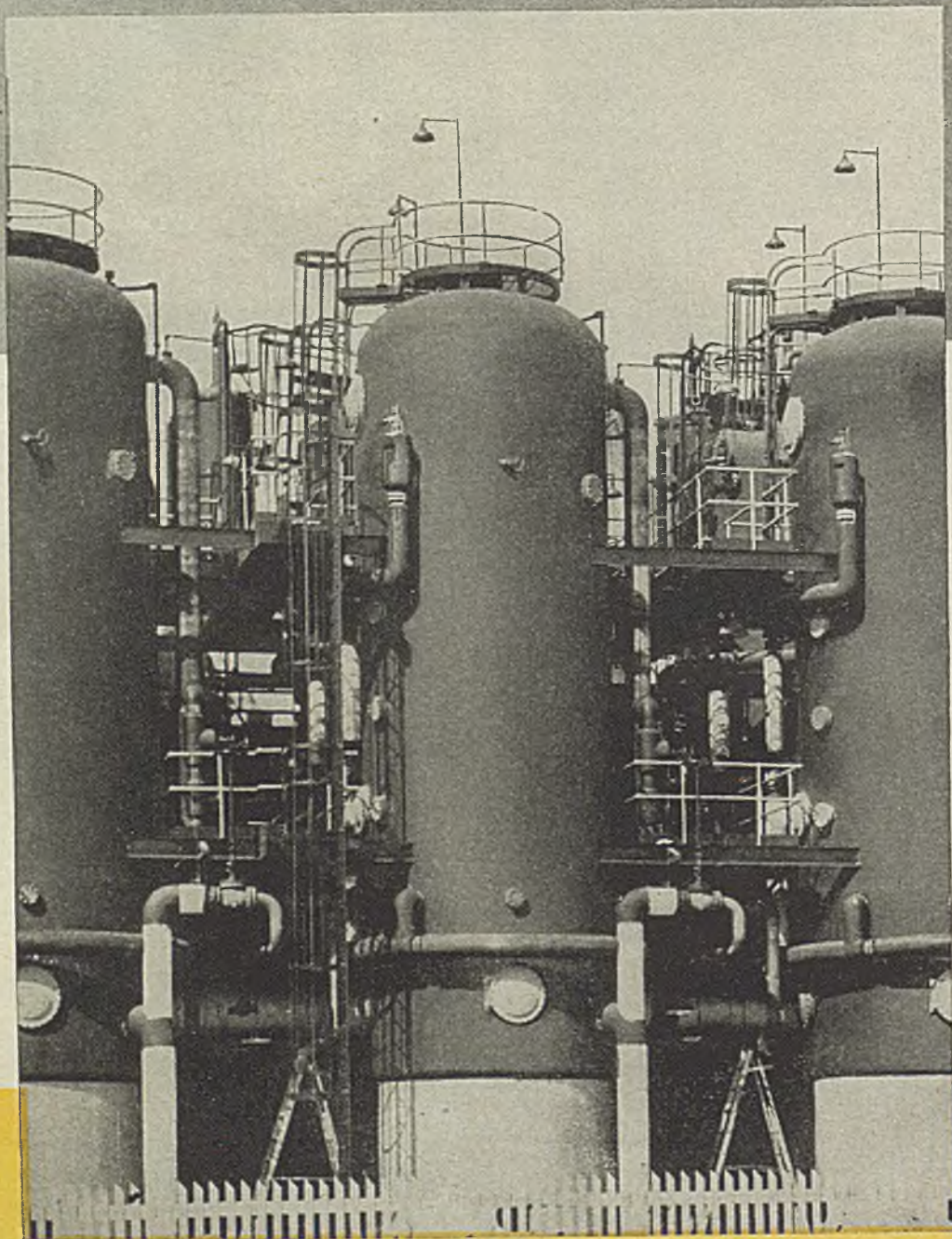
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Alkalis and Chemical Products Manufactured by The Solvay Process Company
40 Rector Street **New York 6, N. Y.**
BRANCH SALES OFFICES:

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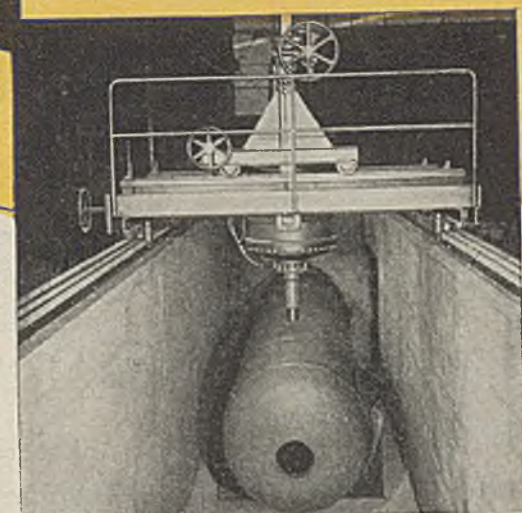
**Industry's source
for quality alkalis**

A MILLION-VOLT



SEARCH

LEADS TO
SAFER
PRESSURE
VESSELS



First 1,000,000-volt X-ray machine for inspecting welds in pressure vessels was installed by B&W. It will reveal defects in welded plates up to 8 inches thick, a great advantage in building safe and sound pressure vessels.

A TREMENDOUS stride forward in building pressure vessels capable of safely withstanding the high pressures and temperatures of modern chemical and refining processes was the application, for weld inspection, of the million-volt X-ray's penetrating eye. First to use this powerful machine for this purpose was B&W. Every inch of main welds on every B&W-built pressure vessel is thoroughly explored for possible defects.

This meticulous X-ray examination is typical of the uncompromising care and advanced techniques that go into every B&W manufacturing step to assure the ultimate in safe and sound process equipment. Forming, machining, welding, stress-relieving—every production operation from start to finish of B&W pressure vessels—is performed on equipment specifically and scientifically designed for each purpose. Much of the equipment and types of construction are original B&W developments.

Because of its extensive facilities, scientific methods and diversified experience, B&W is exceptionally well prepared to supply pressure vessels of any type . . . of simple or complicated design, of carbon, alloy or clad steels. So see B&W first for the last word in pressure vessel requirements for modern chemical and refinery processes.



Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

**BABCOCK
& WILCOX**

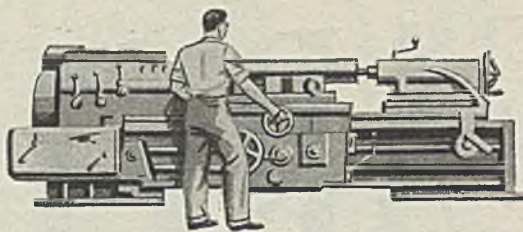
THE BABCOCK & WILCOX CO.
85 LIBERTY STREET, NEW YORK 6, N.Y.

5-67

Gulf Quality Lubricants



help machines



gain

an edge in performance—improve

production — reduce costs



HERE'S a way to put your plant in better shape for the period of keen competition just ahead: Call in a Gulf Lubrication Service Engineer and let him work with your plant men to improve lubrication practice.

From Gulf's complete line, the Gulf Service Engineer will recommend a quality lubricant of the proper type and grade for each machine and moving part. In many cases, he will also suggest improved methods of application. Result: The kind of lubrication practice that will help you speed up your machines to maximum production and at the same time reduce maintenance costs.

The Gulf Service Engineer can also demonstrate in your machine shop the advantages of Gulf quality cutting oils. In almost every case, the proper Gulf Cutting Oil for the job improves production and tool life — reduces machining costs—helps meet requirements for a better finish on the work!

The helpful counsel of a Gulf Lubrication Service Engineer—and the Gulf line of more than 400 quality petroleum products—are available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation • Gulf Refining Company

Division Sales Offices:

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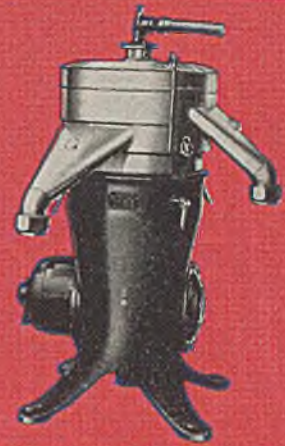
helps make machines
produce more at lower cost

FOR QUICKER and BETTER PRODUCTION

Continuous

...SEPARATION

The De Laval Industrial Separator is used wherever the problem is one of continuously separating two liquids of different specific gravities which are not soluble in each other, with a simultaneous removal of a small quantity of solids. This type of machine is usually used when the sediment content is under 0.5 per cent, as in the purification of different types of oil, or various pharmaceuticals.



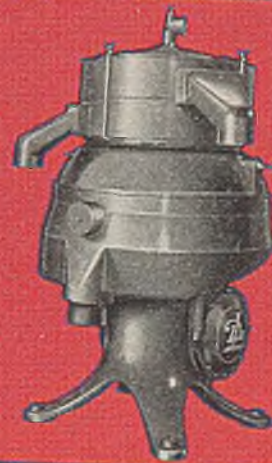
...CLARIFICATION

The De Laval Multiple Clarifier is used for removing solid impurities from a liquid. Solids are retained in the bowl which, owing to its double-chambered construction, has large sediment-holding space together with constant high efficiency. The Clarifier is best adapted to use when the sediment content does not exceed 1 per cent by volume.



...DISCHARGE OF SOLIDS

The De Laval "Nozzle-Matic" Separator continuously separates and discharges two liquids of different specific gravities, and simultaneously removes and continuously discharges impurities. Its capacity range is wide—from 400 to 6,000 or even more gallons per hour, depending on the nature of the liquids being separated and the amount of solid impurities present in them. Also obtainable as a clarifier.

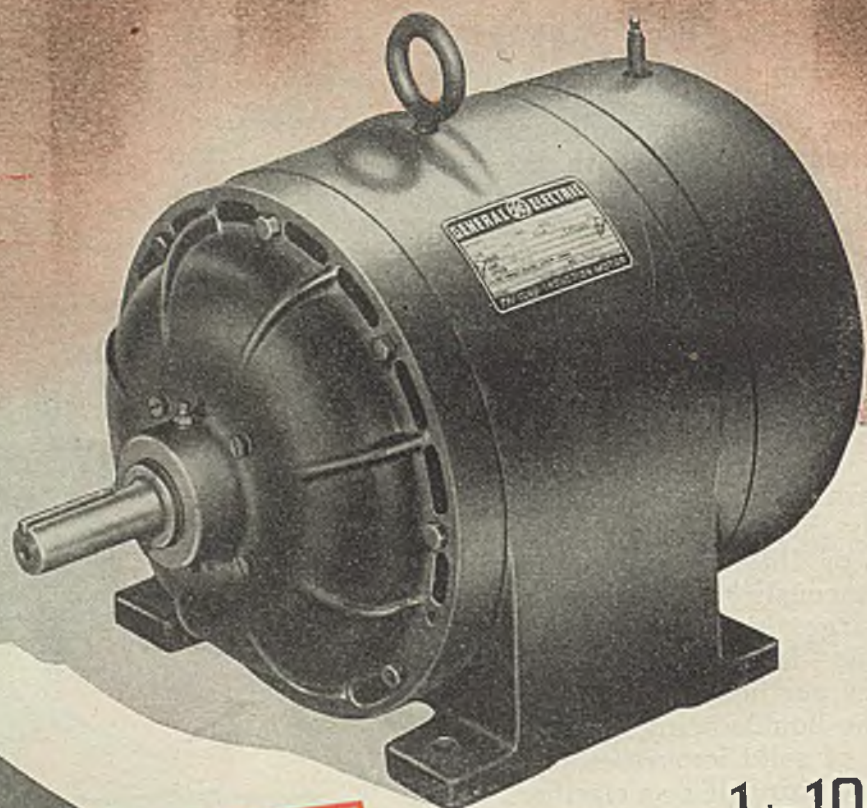


DE LAVAL

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 19
THE DE LAVAL COMPANY, Limited
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CENTRIFUGAL PROCESSING SYSTEMS

GENERAL ELECTRIC Announces



1 to 1000 hp

COMPLETE ENCLOSURE
FOR PROTECTION
AGAINST DIRT, DUST,
AND WEATHER

NEW *Totally Enclosed* TRI-CLAD MOTORS

In 1940, G.E. introduced the Tri-Clad open motor—with emphasis on the feature that industry wanted most in a motor, *protection*. Since then, more Tri-Clads have gone into service than any other integral-horse-power motor.

Today, we are ready with a new line of Tri-Clad motors—*totally enclosed, fan-cooled motors*—built on Tri-Clad design principles in both standard and explosion-proof types.

We believe that these are industry's most dependable motors. They are designed specifically for use in many adverse atmospheres—in iron dust, outdoors, in hazardous areas, and chemical atmospheres. Their scope of application is as wide as the field of industrial motor use. Safeguarded against most sources of motor damage, their longer life and lower maintenance will make them economical motors for use on almost every job. *General Electric Company, Schenectady 5, New York.*

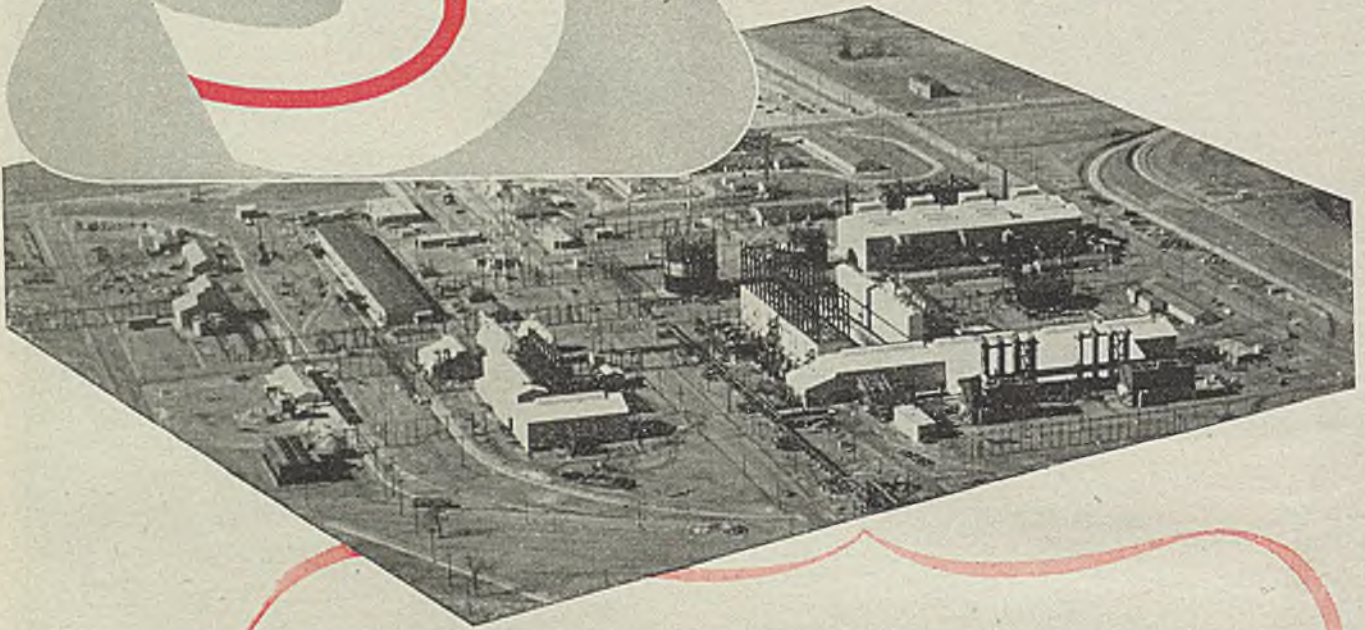
GENERAL  ELECTRIC



Spencer

YOUR NEW SOURCE OF VITAL CHEMICALS

*Spencer Chemical Company works at
Pittsburg, Kans., where tremendous quan-
tities of chemicals were produced for war—
now stands ready to serve Industry
and Agriculture.*



Serving Industry and Agriculture

From the heart of the agricultural Mid-West—where corn, wheat and cotton meet—Spencer Chemical Company is prepared to supply industry and agriculture with vital chemicals. To help America produce more food for a starving world and still maintain our own high standard of living, Spencer will have available for sale during the 1946-1947 fertilizer season *Anhydrous Ammonia* and fertilizer *Ammonium Nitrate*. Our Pittsburg, Kansas, works is currently producing at the rate of 174,000 tons per year of fertilizer Ammonium Nitrate, together with substantial quantities of Anhydrous Ammonia.

Soon, Spencer will also be an easily available source of ammoniating solutions, methanol, liquid carbon dioxide, dry ice, industrial nitric acid and allied chemicals serving American Industry and Agriculture.

Spencer Chemical

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WORKS: PITTSBURG, KANSAS



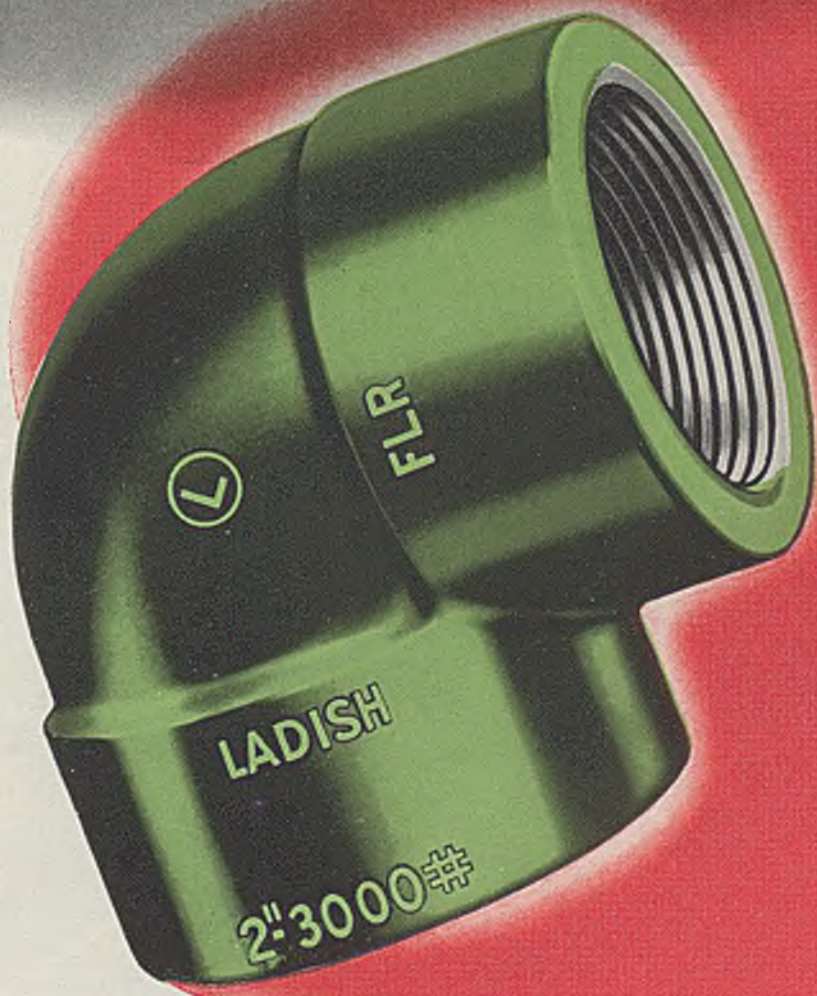
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Stop This Waste

for
GREATER FREEDOM
FROM LEAKS
INSTALL **LADISH**,
Forged Steel Fittings

Drop Forged fittings provide longer life and increased endurance. Greater metal soundness, finer grain structure and increased strength result from the high impact pressures inherent in the Drop Forging process.

Added resistance to the shocks, strains and stresses . . . imposed by pressure, temperature, vibration, expansion and contraction . . . is obtained by using forged steel fittings. Ladish Controlled Quality Forged Steel Fittings provide additional advantages of thorough metallurgical control and close inspection of physical dimensions.



TO MARK PROGRESS

Controlled Quality

FITTINGS DIVISION

LADISH DROP FORGE CO.

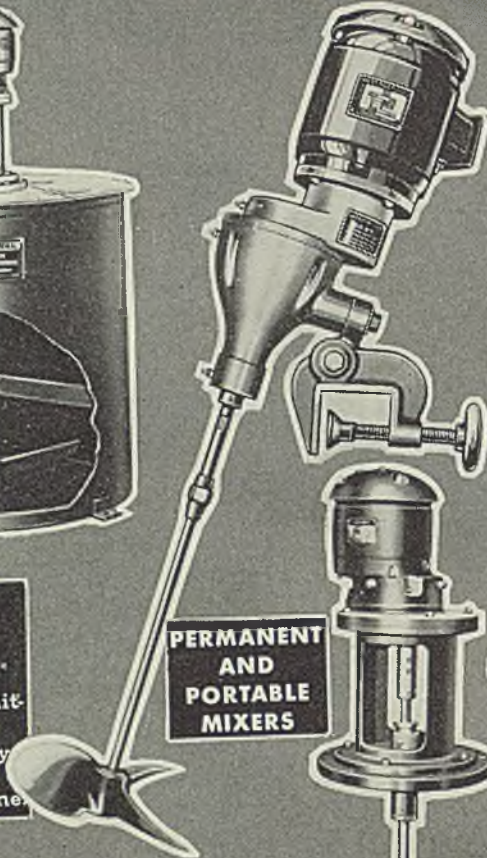
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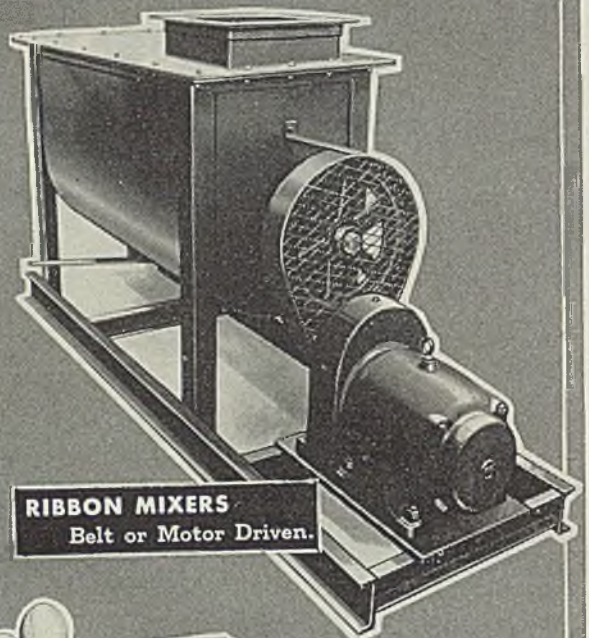
International



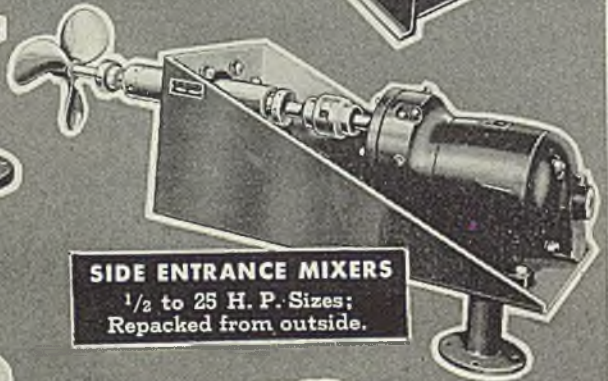
MIXERS AND KETTLES
Complete with Tank and Drive Unit in various types and sizes, with any style stirrers, propellers or turbine.



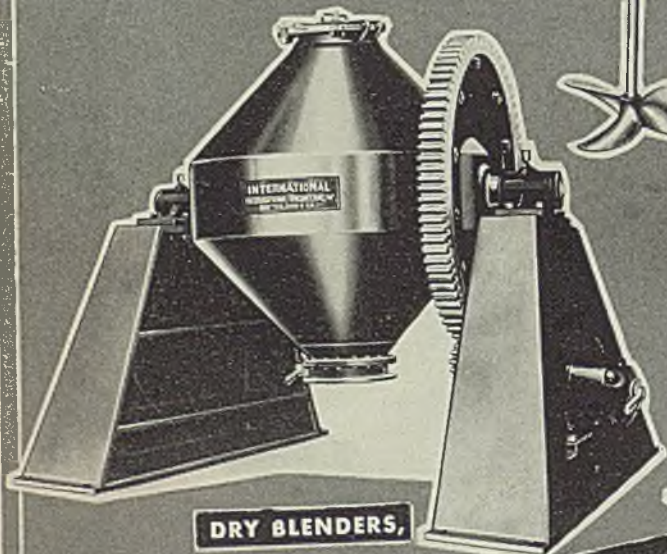
PERMANENT AND PORTABLE MIXERS



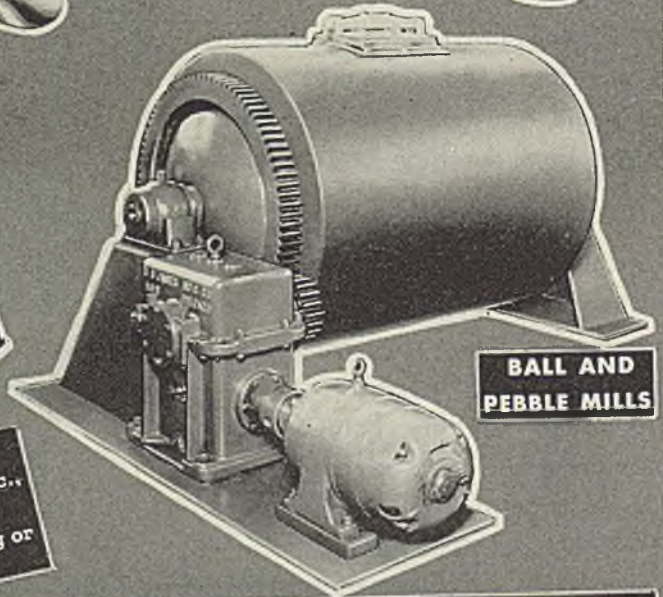
RIBBON MIXERS
Belt or Motor Driven.



SIDE ENTRANCE MIXERS
1/2 to 25 H. P. Sizes; Repacked from outside.



DRY BLENDERS,



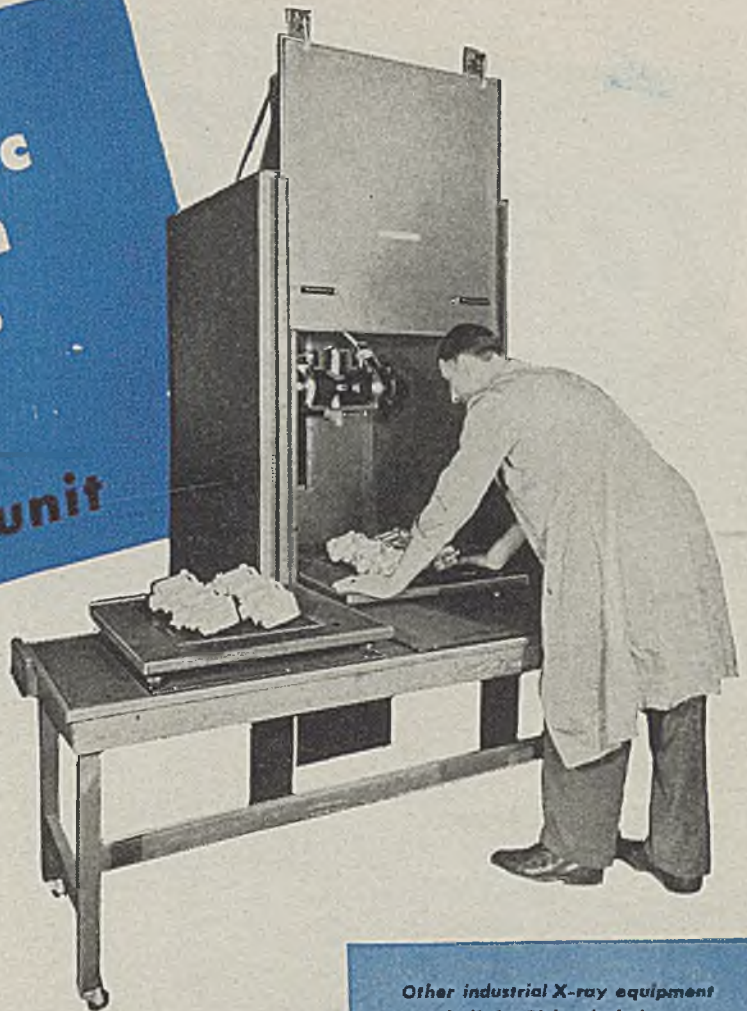
BALL AND PEBBLE MILLS

CATALOG
On Mixers, Agitators, Blenders, Ribbon Mixers, etc., No. 110. Now ready.
CATALOG No. 85 on BALL MILLS—Either catalog or both sent on request.

INTERNATIONAL ENGINEERING, Inc., DAYTON, OHIO
NEW YORK—15 Park Row CHICAGO—407 S. Dearborn St.

**complete
radiographic
inspection
facilities
in a
single
versatile unit**

For quantity examination a shuttle bench permits loading of new parts and unloading of already radiographed parts while exposure of still others is going on inside the ray-proof exposure cabinet.



Are you denying yourself the proven benefits of x-ray inspection because of a mistaken idea that its installation is costly; its operation technically difficult?

Evidence to the contrary is this Picker Simplex Exposure Cabinet which provides compact, completely self-contained facilities for research, control, spot-check, or quantity production inspection. The unit is shockproof and rayproof (eliminating the need for construction of a lead-lined room) and is simplicity itself in operation.

In the extreme compactness, safety, and operational flexibility of the Picker Simplex Unit, you may find the right answer to your inspection problems. Or it may perhaps best be solved by other apparatus among the varied types of industrial x-ray equipment offered by Picker. In any case it will cost you nothing to find out . . . Call in your local Picker representative for an analytical survey of your inspection setup and recommendations for the most efficient and economical application of x-ray to it. Or send for Picker Bulletin No. 2544. Branches in principal cities of U.S.A. and Canada.

Other industrial X-ray equipment built by Picker includes:

**X-ray Diffraction Apparatus
5 to 50 KV low voltage Units**

150 KV Mobile Unit

150 KV Stationary Unit

250 KV Mobile Unit

250 KV Stationary

Jib Crane Unit

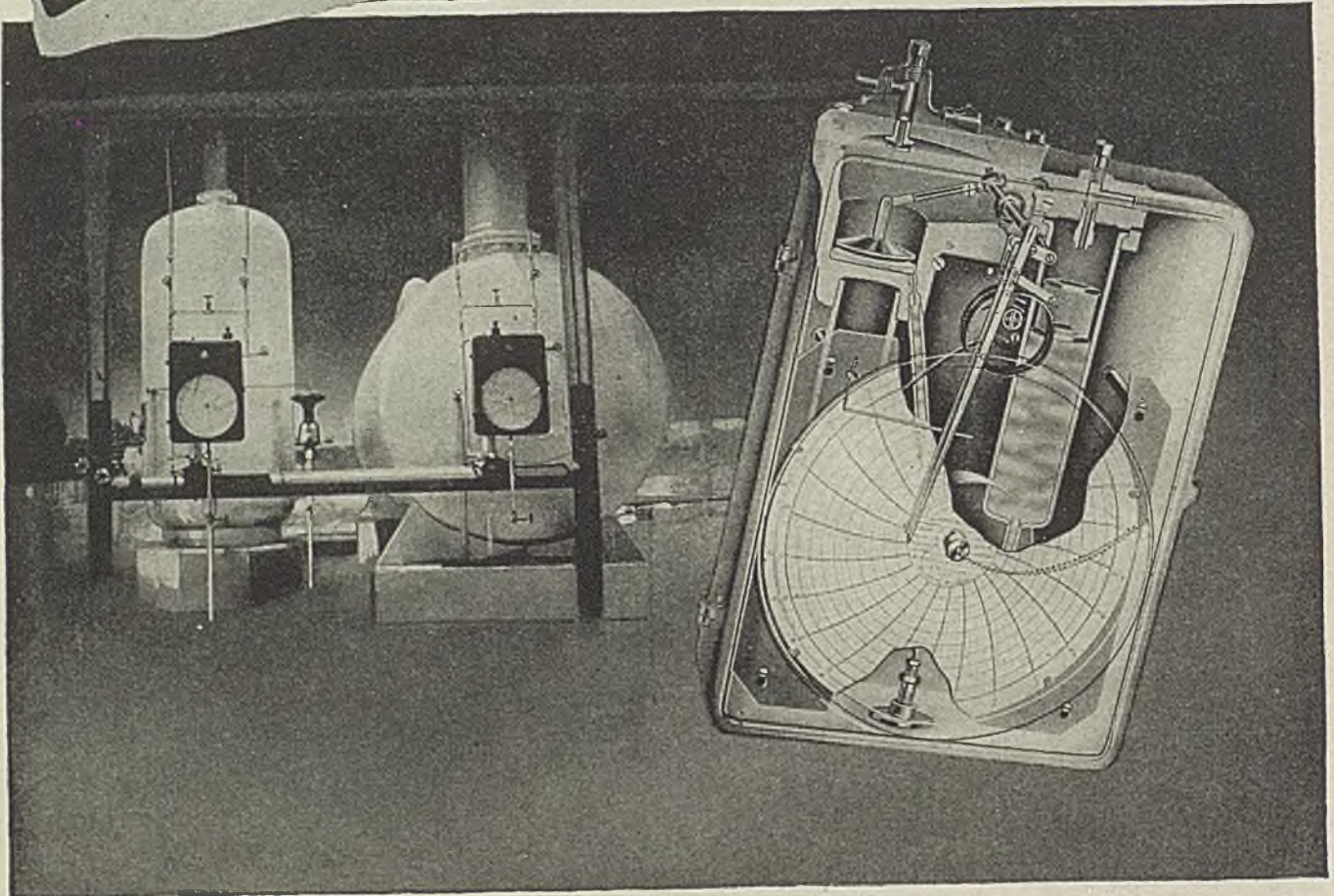
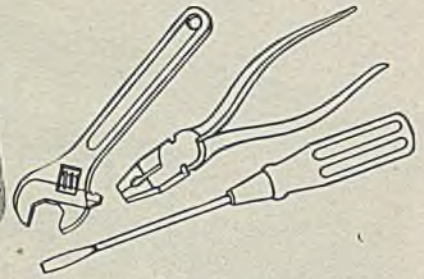
**Combination radiographic
and fluoroscopic production-
flow Inspection Units**

PICKER X-RAY CORPORATION
300 Fourth Ave., New York 10, N. Y.
WAITE MFG DIVISION, CLEVELAND, O.



Picker sets the pace in x-ray

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OUT IN THE FIELD



LET'S SEE HOW EASY it is to adjust an **AMERICAN** Orifice Meter! The door of the dust-and-moistureproof aluminum case merely is swung open... exposing pressure spring, clock, chart, and recording mechanism. Or, by speedily removing the low-pressure chamber cover of the forged-steel differential gage body, the entire interior is accessible... without loosening a single connection that affects accuracy. Adjustments do not interfere with any of the working parts... few in number and simple in design, despite their many features and refinements.

Comprehensive literature describes the expense-saving **AMERICAN** Orifice Meters and Flowmeters... clearly defines their applications. Specifications on the popular Round Case Indicating Flowmeters also will be mailed on request.

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METER COMPANY
INCORPORATED ESTABLISHED 1936

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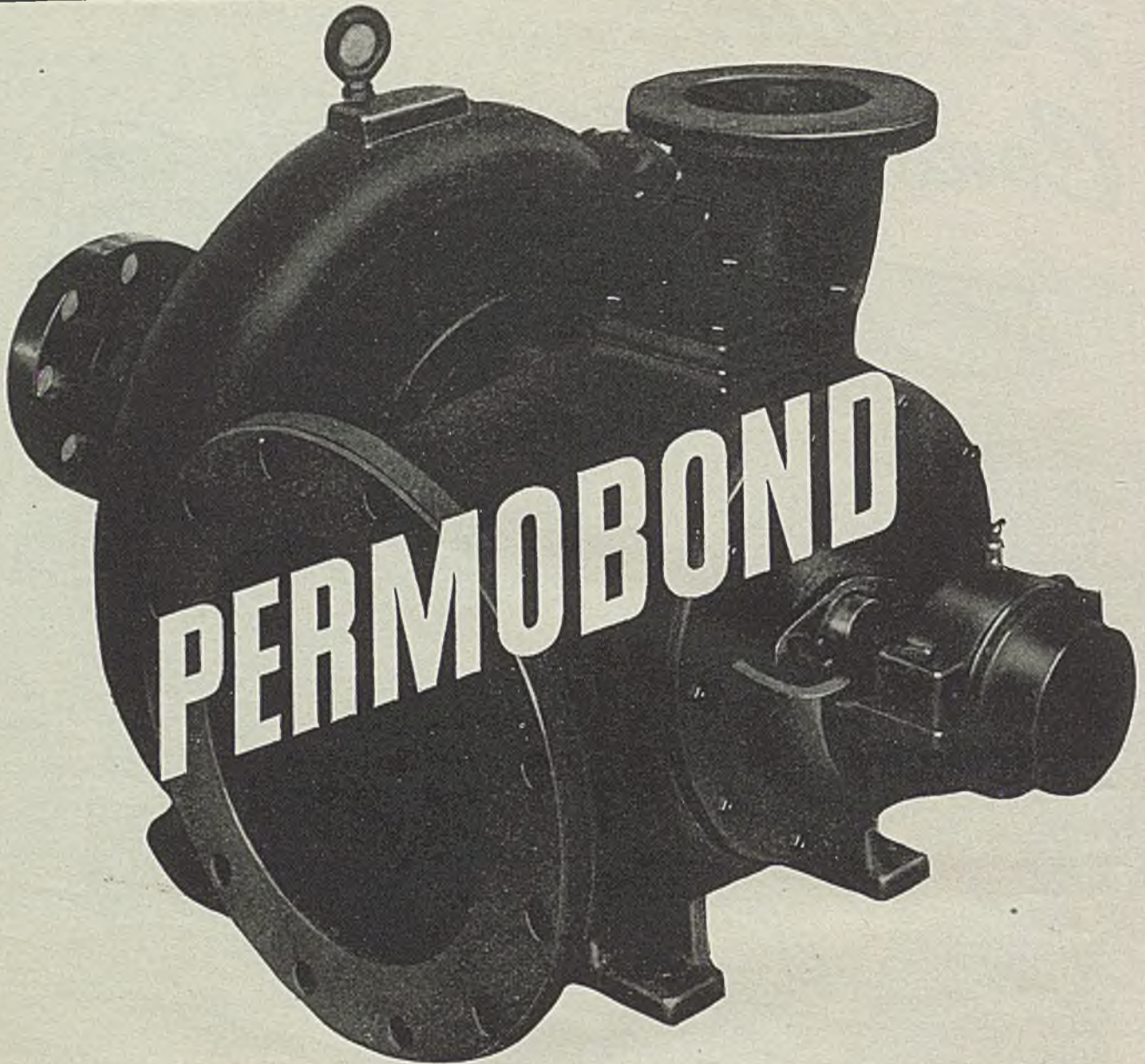
*For your
Construction Program*



*Engineers • Manufacturers
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Stearns-Roger
 THE STEARNS-ROGER MFG. CO. DENVER COLORADO

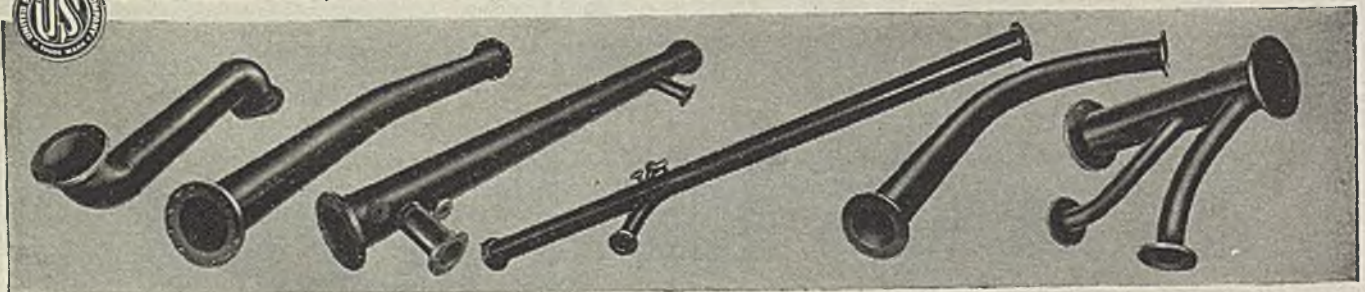
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Engineered rubber furnishes the answer to a troublesome industrial problem. U.S. Permabond Rubber Linings can be applied to highly complex fabricated piping systems. These linings resist destructive corrosive action and protect the materials handled

against metallic contamination. Today U.S. Permabond Linings are being successfully used in the making of such "susceptible" products as rayon, paper, food products, etc. For complete information, write us.



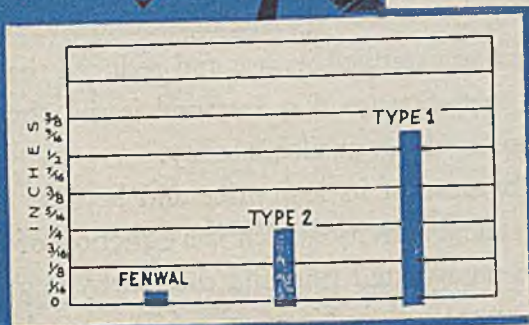
UNITED STATES RUBBER COMPANY

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DIRECT RESPONSE TO TEMPERATURE CHANGE*

A thermostat should have a short heat transfer path — to provide direct and rapid temperature control. The temperature-sensitive outer shell of FENWAL Thermoswitch expands and contracts with changes in temperature, directly actuating the switch element within. The Thermoswitch does not require heat penetration of an outside barrier, as is common in other types of thermostats.

Chart shows the short heat flow path of the FENWAL Thermoswitch compared to Type 1 and Type 2 thermostats. This means minimal heat gradient effects reducing warming-up and cooling-off time of the thermostat unit.



Short heat transfer path and all the other FENWAL features make the Thermoswitch the ideal thermostat for all applications. Study the *Thermotechnics Booklet* — which includes the Fourteen Facts in Fenwal's Favor. Send for your copy today.



HEX HEAD TYPE THERMOSWITCH

FOURTEEN FACTS IN FENWAL'S FAVOR

- 1.—Fast reaction time
- 2.—Large heat sensitive area, small heat storage
- 3.—Short heat transfer path
- 4.—Small temperature differential
- 5.—Built-in temperature anticipation
- 6.—Enclosed assembly
- 7.—Minimal vibration effect
- 8.—Directly responsive to radiant heat
- 9.—Rugged construction
- 10.—Adjustable over wide temperature range
- 11.—Minimum size
- 12.—Tamper-proof and sealed
- 13.—Uniform sensitivity over adjustable temperature range
- 14.—Readily installed

*#3 of the "Fourteen Facts in Fenwal's Favor".

FENWAL INCORPORATED
53 PLEASANT STREET
ASHLAND MASSACHUSETTS

THERMOTECHNICS FOR COMPLETE TEMPERATURE REGULATION



©1946

Furfural - on the THRESHOLD OF CHEMICAL PROGRESS...



To the chemist of today Furfural and the other available Furans offer the same opportunity for chemical discovery as did benzene seventy years ago. For many years chemical industry has neglected Furfural and its derivatives, primarily because they frequently did not behave in the manner which would have been predicted from consideration of the ring substituent. Chemists are now beginning to realize that this unorthodox behavior might open up interesting and valuable developments. In the meantime the physical properties of

Furfural, such as its preferential solvent action on unsaturated compounds, its effectiveness as a dispersant, as a wetting agent and bactericide have so extended its use and reduced the cost of manufacture that Furfural is the cheapest pure aldehyde available today.

Because of its low price and because of its chemical activity which is a function of both the unsaturated ring and the aldehyde group, chemists will find it worth while to work with Furfural. Samples of Furfural will be furnished when requested on your business letterhead.

3 Bulletins in a series on the Furans are also available to those interested. They contain interesting and informative data as indicated by the titles:



Bulletin 201
General Information About Furfural.

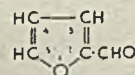
Bulletin 202
Introduction to the Chemistry of the Furans.

Bulletin 203
Physical Data on Furfural.

Bulletin 201 is of general interest to all users of chemicals. Bulletins 202 and 203 contain information of interest primarily to the research worker.

PROPERTIES OF QUAKER FURFURAL (Furfuraldehyde, C₅H₄O-CHO)

Amber-colored liquid of high stability and unusual purity



Molecular Weight.....	96.08	leum hydrocarbons and glycerol,	
Freezing Point, °C.....	-37	8.13% by wt. in water at 20°C.	
Boiling Range (99%)°C..	157 to 167	Analysis:	
Specific Gravity (20/20°C)....	1.161	Furfural, minimum %.....	*99.5
Flash Point (open cup)°C.....	56	Water, maximum %.....	0.2
Refractive Index (20/D).....	1.5261	Organic Acidity, Maximum	
Surface Tension at 20°C (dynes/cm)	49	equiv/l.....	0.023
Viscosity at 38°C (centipoises)...	1.35	Ash, maximum %.....	0.006
Solubility: Completely miscible with		Mineral Acidity.....	None
ethyl alcohol, ether, acetone, benzol,		Sulfates.....	None
butyl acetate, china wood oil and		Ketones.....	None
most organic solvents except petro-		*As determined by A.O.A.C. method,	

Standard Containers: 9, 45, 90, and 520 lb. Drums
 †Carload of Drums 80 to 88...41,600 to 45,760 lbs.
 Tank car 8,000 gal.....,78,000 lbs.
 Tank car 10,000 gal.....,98,000 lbs.

†ODT requires maximum loading
Drums non-returnable

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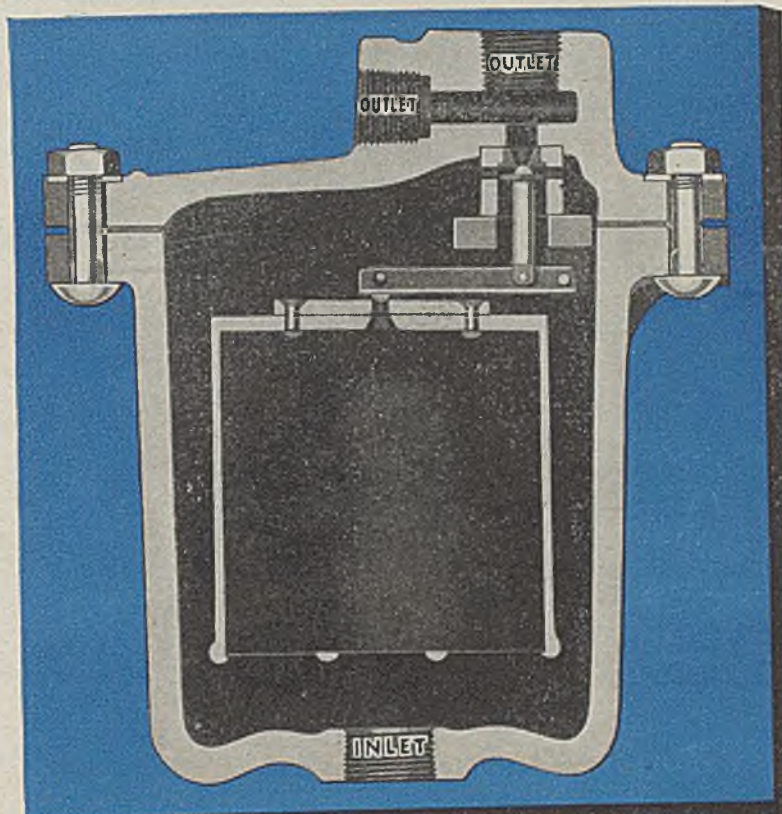
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FURFURAL • FURFURYL ALCOHOL • FUROIC ACID • TETRAHYDROFURFURYL ALCOHOL

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Wherever you use steam, air or gas, Clark Fluid Controls will save money by increasing the efficiency of equipment and prolonging equipment life!

That's a *promise* backed by *performance* . . . by **37 Years** of performance during which Fluid Controls designed, manufactured and backed by Clark have always kept every promise made for them.



The popular CLARK SERIES 80 Inverted Bucket Type Steam Traps with Clark Patented Bucket Venting Device and other exclusive Clark features. Available in 6 sizes, 1/2" to 2 1/2", for pressures up to 250 P.S.I. and temperatures to 450° F. Write for free catalog for complete specifications and applications of the wide line of Clark Fluid Controls.

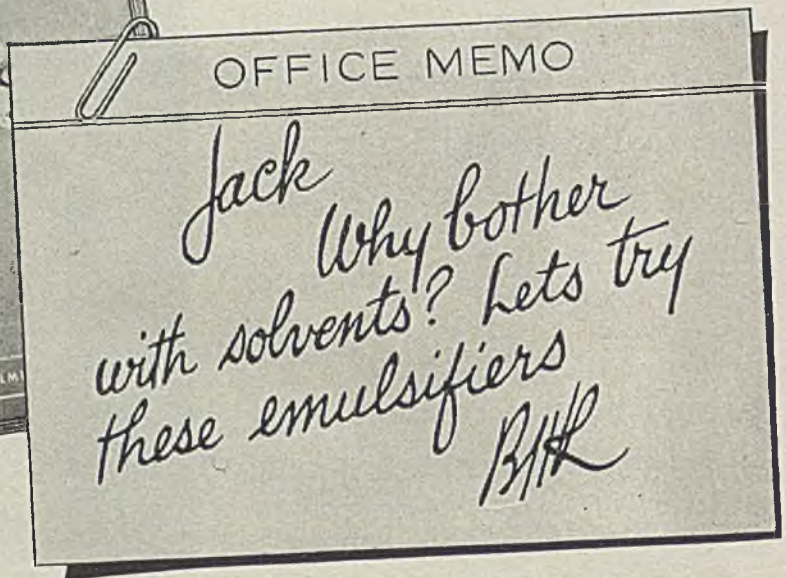
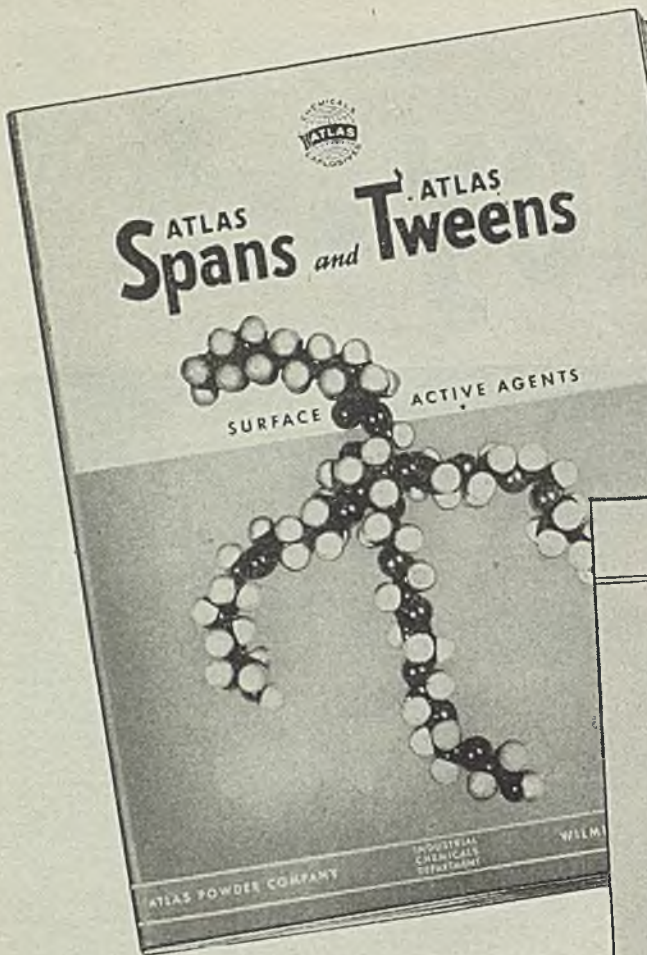
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FLUID CONTROLS

THE CLARK MANUFACTURING COMPANY • DEPT. D • CLEVELAND 14, OHIO

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STEAM AND FLUID TRAPS STRAINERS PRESSURE REGULATORS
VACUUM AND LIFTING TRAPS VALVES REDUCING VALVES

CHEMICAL & METALLURGICAL ENGINEERING • JUNE 1946 •



ATLAS Spans and Tweens have been used in many new formulations where solvents were formerly considered necessary. They may help to solve such a problem for you also—even where other types of emulsifiers have not been successful.

Atlas Spans and Tweens are extremely versatile, non-ionic emulsifiers — ranging from complete oil-solubility to complete water-solubility. What's more, they are compatible with each other and with most other surface active agents. They also display remarkable solvent or blending properties for waxes, oils and flavors, so that

mutual solvents may not be necessary.

Would you like to know more about these amazing new emulsifiers? Send for the free booklet illustrated below.

ATLAS SPANS AND TWEENS

Atlas Spans constitute a series of technical long chain fatty acid partial esters of hexitol anhydrides. The hexitol anhydrides include sorbitans and sorbides, mannitans and mannides.

Atlas Tweens comprise a series of polyoxyalkylene derivatives of hexitol anhydride partial long chain fatty acid esters.



Spans and Tweens: Reg. U. S. Pat. Off.

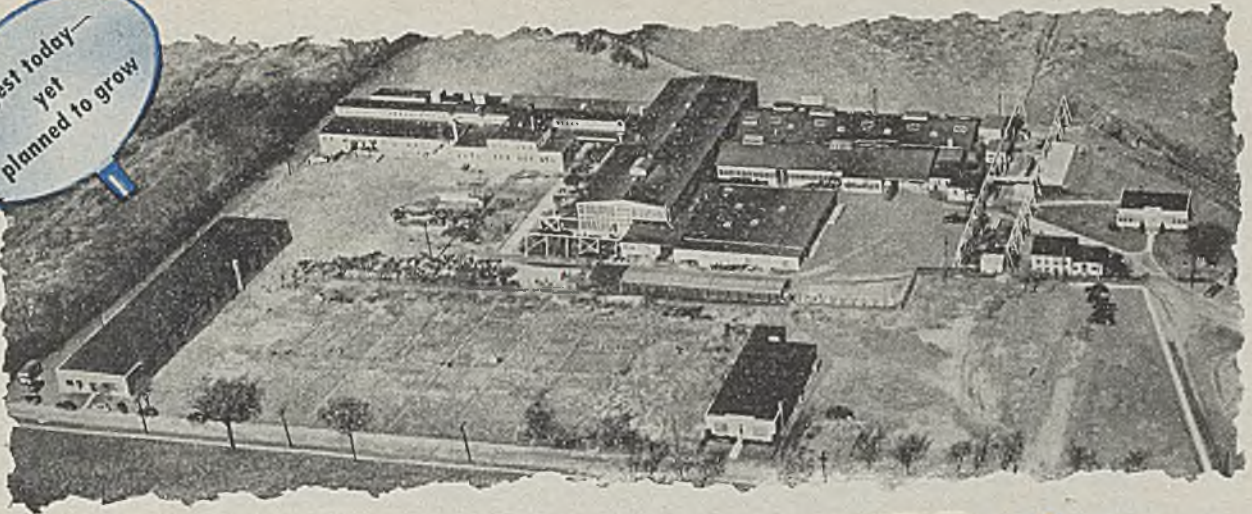
ATLAS

INDUSTRIAL
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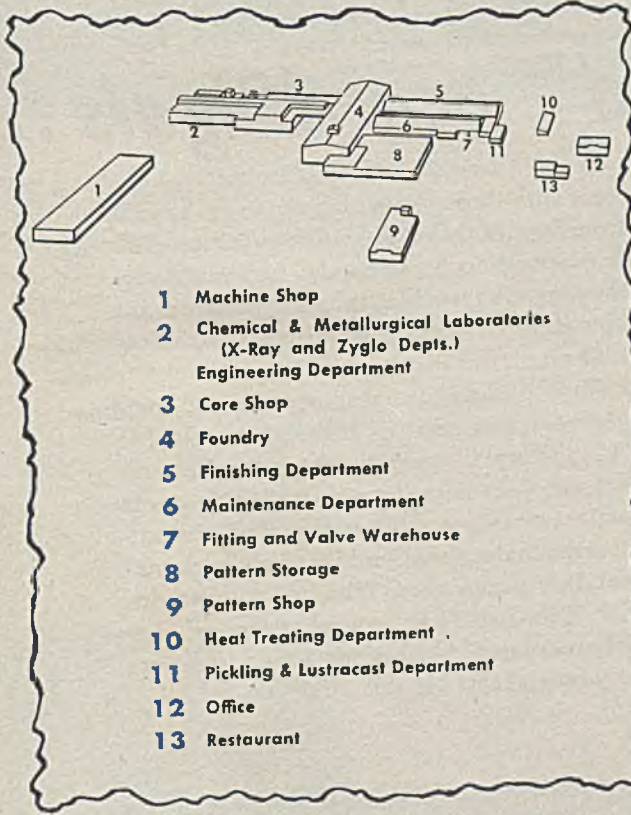


ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

largest today—
yet
planned to grow



UNDER COOPER'S "ROOFED ACRES" are produced the finest in stainless steel castings



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- 8 Pattern Storage
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- 10 Heat Treating Department .
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Space — ample, usable space — is necessary to the proper operation of any foundry, but only Cooper has *three acres* of roofed plant facilities devoted exclusively to the production of stainless steel castings.

Vast as this area is, every square foot has a functional duty in the Cooper operation — and there are seven additional acres, as yet unimproved, available for further expansion.

To you, as a user of stainless steel castings, Cooper's unparalleled facilities mean a sounder product and more reliable delivery — and you benefit by all the latest developments in foundry equipment and procedure. You will benefit, too, because the entire Cooper organization — from laboratory to foundry — is large enough to provide *all* the specialized knowledge required to give you superior castings — as well as the best advice as to their application.

Whenever you need stainless steel castings — get in touch with Cooper.

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145 Bloy Street, Hillside, N. J.

THE *Cooper* ALLOY FOUNDRY CO.
STAINLESS • MONEL • NICKEL

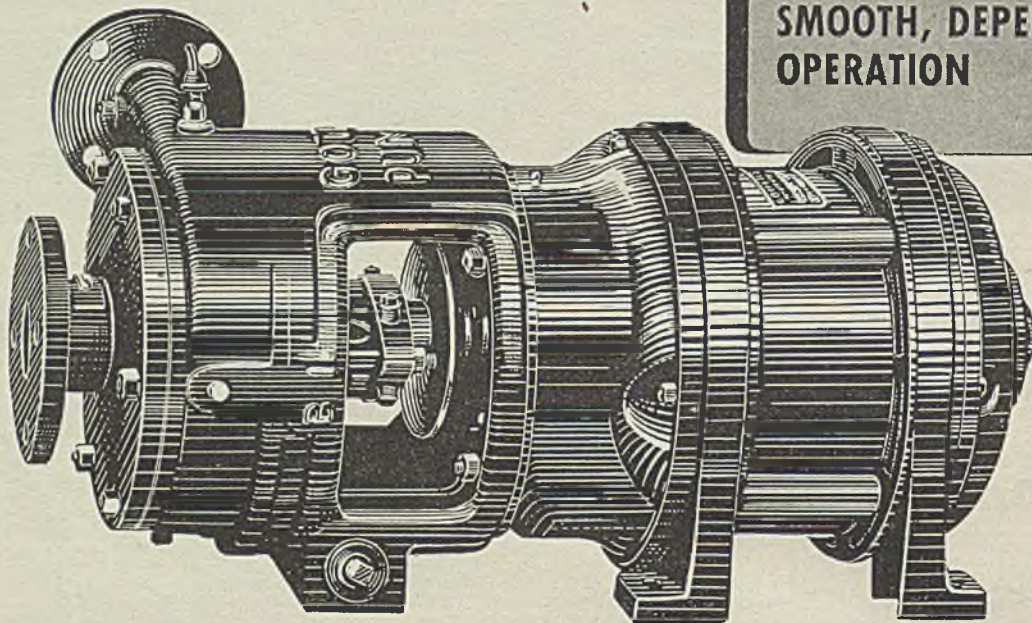
ADAPTABILITY +

LOW INITIAL COST

COMPACTNESS

EASY INSTALLATION

SMOOTH, DEPENDABLE
OPERATION



Goulds "Close-Cupld" Centrifugals ...

Every modern feature of centrifugal pump design is embodied in Goulds "Close-Cupld" *single* and *two-stage* enclosed impeller pumps. They are built in twenty

sizes with three types of mountings, handle from 5 to 1600 G.P.M. with heads up to 525 ft., depending on capacity. Consequently, they are adaptable to widely divergent operating conditions in all types of industrial plants.

On the basis of cost, performance, compactness and ease of installation, Goulds "Close-Cupld" pumps are without equal. Note the six important operating features indicated below. This is the kind of engineering that makes Goulds pumps such outstanding performers. Whether you require a "Close-Cupld" or any other type of centrifugal pump, contact Pump Headquarters or your nearest Goulds office.

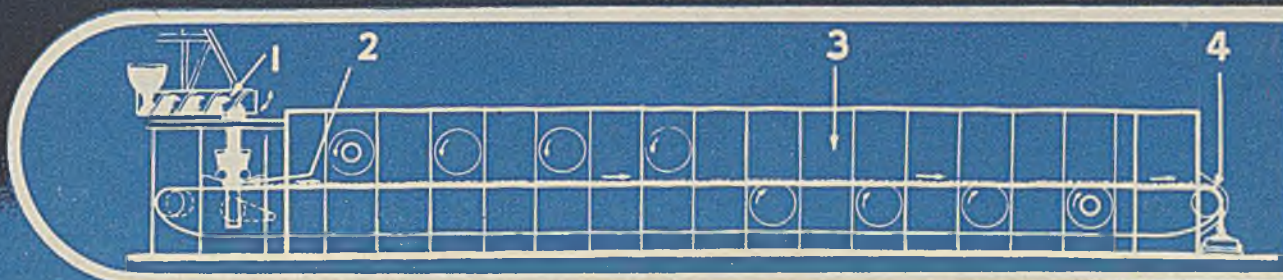
6 IMPORTANT "CLOSE-CUPLD" FEATURES

1. Eccentric design of suction nozzle avoids formation of air pockets . . . keeps pump at full capacity.
2. Shaft sleeve extends through stuffing box, impeller hub and past end of motor shaft and is effectively sealed against leakage between shaft and sleeve. Full protection for motor shaft means longer life.
3. Shaft sleeve is free to expand at gland end, an exclusive feature and important when handling liquids of varying temperatures.
4. Deep stuffing box (2/4 times shaft sleeve diameter minimum) assures tight seal, an important safety factor on volatile liquids.
5. Motor shafts tested for running balance at all speeds, important for life of all running parts.
6. Renewable wearing parts, such as casing wearing rings and shaft sleeves, lengthens life of pump unit.

Goulds PUMPS, INC.
the PUMP FOR the JOB SENECA FALLS, N. Y.

**TOP QUALITY PIGMENT DRIED
AT RATE OF 1,820 POUNDS PER HOUR**

PROCTOR CONTINUOUS CONVEYOR SYSTEM



Combining a Proctor "pre-forming" feed with a continuous conveyor dryer has been the answer to large scale production, without sacrifice in the quality of finished pigments. By pre-forming the pigment, in its wet-solid state, into small shapes that permit the circulation of heated air through the bed of material on a constantly moving conveyor, production is materially increased. Drying the pigment in the form of small shapes permits the heated air to penetrate *all the way through to the center* of each of the particles on the conveyor. On top of this, the speed of the conveyor, temperatures within the drying enclosure and humidity in the dryer are all accurately controlled.

These factors all add up to your assurance that case-hardening or surface baking is absolutely prevented. The systems recommended vary in some details with the particular pigment to be handled. The continuous system illustrated dries pigment from



Small extrusions, about 1/4" in diameter are formed by the rolling extruder feed of the system illustrated. Heated air quickly penetrates bed of extrusions on conveyor, promoting rapid, thorough drying.

a moisture content of 94.5% (bone dry weight basis) to a moisture content of 0.25% (bone dry weight basis) at the rate of 1,820 pounds per hour. If you have a pigment drying problem, don't hesitate, write today, giving as much information as possible about your problem.

- **1.** Material comes from filter with moisture content of 94.5% (B.D.W.B.*) and is distributed into hopper of rolling extruder feed by means of an oscillating screw conveyor.
- **2.** Wet material is formed into extrusions by automatic rolling extruder feed and loaded to depth 2"-2 1/2" on moving conveyor.
- **3.** Conveyed through an 8 unit single conveyor dryer, air circulation penetrates through bed of material to assure speedy, thorough, uniform drying. Drying temperatures average 300°F.
- **4.** Material is dried to moisture content of 0.25% (B.D.W.B.) at the rate of 1,820 lbs. (C.D.W.†) per hour.

*Bone Dry Weight Basis.

†Commercial Dry Weight.

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P&S



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PYROTECHNICS

... MADE RIGHT WHEN MADE WITH

PENN SALT

POTASSIUM CHLORATE

In products where quality is important, Penn Salt Potassium Chlorate finds wide acceptance. Every step in the production of Potassium Chlorate from raw material to the finished product is carefully inspected.

**YOU GET POTASSIUM CHLORATE OF A UNIFORMLY
HIGH QUALITY WHEN YOU BUY FROM PENN SALT!**

Besides playing an important part in the manufacture of matches, explosives and pyrotechnics, Potassium Chlorate is essential in the making of paper, dyes and disinfectants. It is extremely active... reacts rapidly and completely with other ingredients to produce an excellent fusion.

Write us for further information about Penn Salt Potassium Chlorate

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals



PHILADELPHIA 7, PA. • TACOMA, WASH.

This is **FALK**

**...its Greatest Asset
is the Morale of its
People**



*To personnel directors and executives only, who will request it on their business stationery, we will be pleased to send a copy of "This is Falk"—a booklet prepared for new employees which contains a brief outline of the Falk philosophy.

**We suggest that executives and engineers write us for the book, "The Story of 'A Good Name in Industry'"—an interesting history of Falk and Falk progress for over fifty years.

OUTSTANDING achievement and leadership in manufacturing gears, motor reducers, couplings and a host of other items mean much to many industries in higher efficiency and lower production costs.

These accomplishments would never have been possible without the continued loyalty and active interest of the men who are Falk.

It is the men who work at furnace and lathe, with welding torch, in a crane, or at a desk; for they make it possible to apply in such full measure all Falk experience and skill in metallurgy, in design, and in manufacture. It is the morale of these men that makes "Falk a good name in industry."

For fifty-four years Falk people have been working with Falk management. This has been expressed in the loyalty of its people and the keen interest in their work that have become a tradition at Falk.

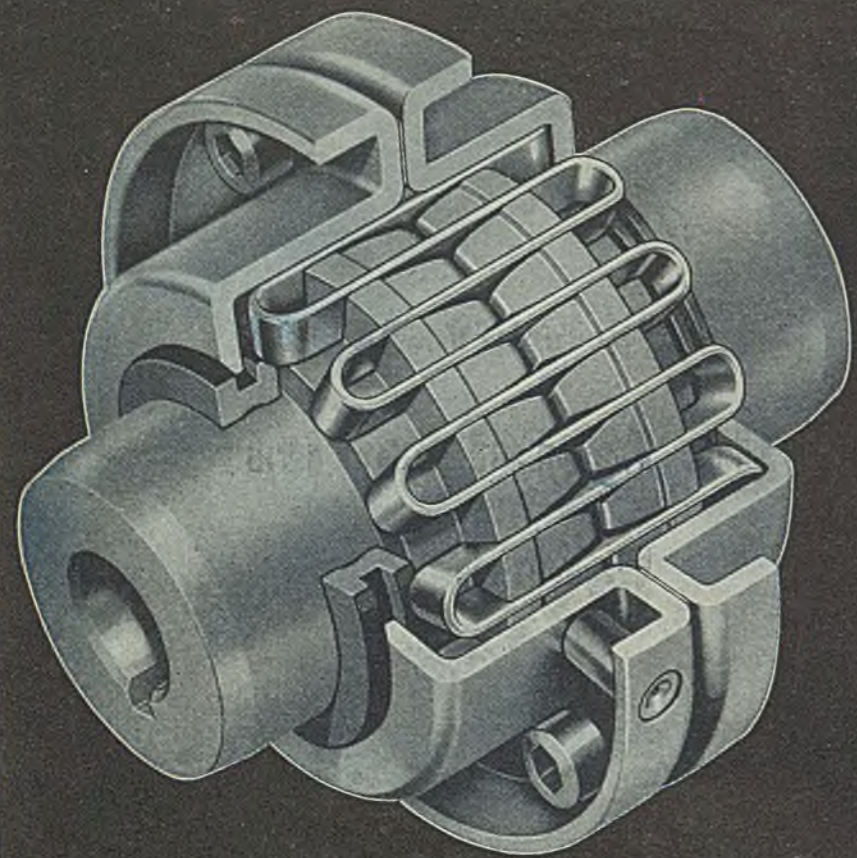
This attitude is directly traceable to the loyalty of Falk management to its people, and to the sympathetic understanding of people and their problems by Falk management.

This mutual loyalty and respect have made Falk products what they are today. That is why "It always pays to consult Falk."

It always pays to consult...

FALK

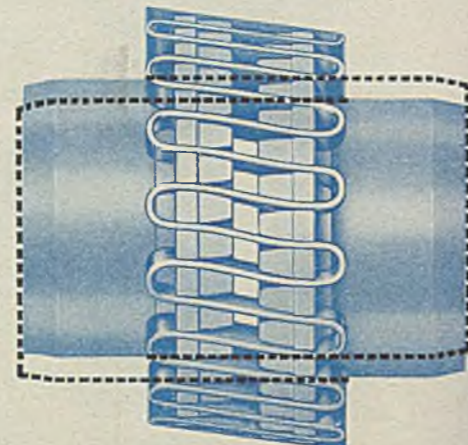
...a good name in industry



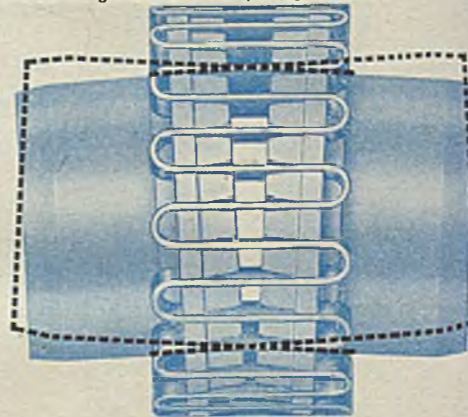
New Type F Falk Steelflex Coupling

A Checklist

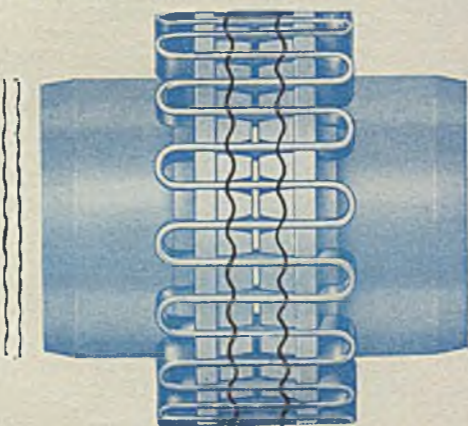
for Skeptical Coupling Buyers...



Parallel Misalignment. When parallel misalignment is involved, the grid-groove combination comes into full play. The movement of the grid in the lubricated grooves accommodates the misalignment, while still permitting full functioning of the grid-groove action of the coupling in absorbing shock and dampening vibration.



Angular Misalignment. Under angular misalignment the design of the Falk Steelflex Coupling permits a rocking and sliding action of lubricated grid and hubs that allows the greatest freedom of accommodation to angular misalignment, while at the same time transmitting the power through the resilient grid.



Free End Float. Because the grid member slides freely in the lubricated grooves, the Steelflex coupling permits unrestrained end float for the shafts of both the driving and driven members, or of either one. If it is desired that end float be restricted, provision can be made to limit it to any required amount.

✓ <i>Flexibility</i>	✓ <i>Torsional Resilience</i>	✓ <i>All Steel Construction</i>	✓ <i>One type fits 90% of all Applications</i>
-------------------------	----------------------------------	------------------------------------	---

The new improved type F Falk Steelflex Coupling offers even greater evidence to convince the intelligently skeptical buyer. It offers one type of coupling that fits 90% of all installations, horizontal or vertical. It offers new ease of alignment . . . misalignment flexibility . . . floating cover sealed with wider Neoprene seal rings to afford even better protection against loss of lubricant . . . identical cover

halves . . . identical hubs, each of which can be bored and key seated for various shaft diameters.

In addition to the standard type F coupling Falk offers a line of large Steelflex Couplings and couplings featuring the Steelflex principle but used for special service and dual-purpose applications. For specific information and

recommendations, call the nearest Falk representative distributor.

A new Falk Coupling Bulletin contains full information of the design of this new coupling, a simplified method of selection, load classification, service factors, and dimensions. Send for your copy.

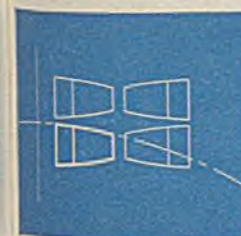


Fig. I

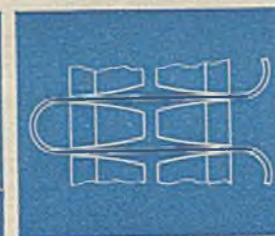


Fig. II

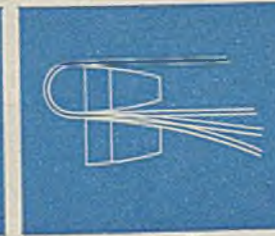


Fig. III



Fig. IV



Fig. V



Fig. VI

Fig. I. Grooves, in a precise arc, and with a radius and length proportional to the capacity of the coupling, are cut into two identical hubs of moderately high carbon steel—forged of Falk alloy cast steel . . . Fig. II. These grooves provide a slot for a grid member made of chrome alloy steel with an elastic limit of 180,000 pounds per square inch and an ultimate strength of 220,000 pounds per square inch . . . Fig. III. This grid fits snugly into the curved grooves

cut into the hubs of the coupling. The grooves provide a scientifically cut bearing surface for the grid. This bearing surface extends from the outer to the inner edge of the grooves. The grid bears on the grooves in proportion to the load . . . Fig. IV. Under light loads, the grid bears only at the outer edges of the grooves. This permits a long, free, elastic span between the outer edges of both hubs. Power is transmitted through almost the entire length of the grid

run . . . Fig. V. Under normal loads, the grid bears on larger area of the grid grooves and the span of the grid run is shortened. It transmits more power and maintains capacity to absorb shocks and dampen vibration . . . Fig. VI. Under peak loads, the grid rings bear over almost all of the curved surfaces of the grooves. The span of the grid run becomes very short. Under the impact of shock load the grid flexes and continues to transmit power smoothly

THE FALK CORPORATION MILWAUKEE 8 WISCONSIN

For over fifty years precision manufacturers of Speed Reducers . . . Motoreducers . . . Flexible Couplings . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Steel Castings . . . Contract Welding and Machine Work. District Offices, Representatives, or Distributors in principal cities.

It always pays to consult...

FALK

...a good name in industry

Only the **FALK** Steelflex Coupling Provides all the advantages of the **GRID-GROOVE** design

Falk Steelflex Couplings are notable for their grid-groove design. The grid-groove is the net result of long experience in gear design. This is important, because in most cases a coupling is used in conjunction with a driven machine involving the use of gears.

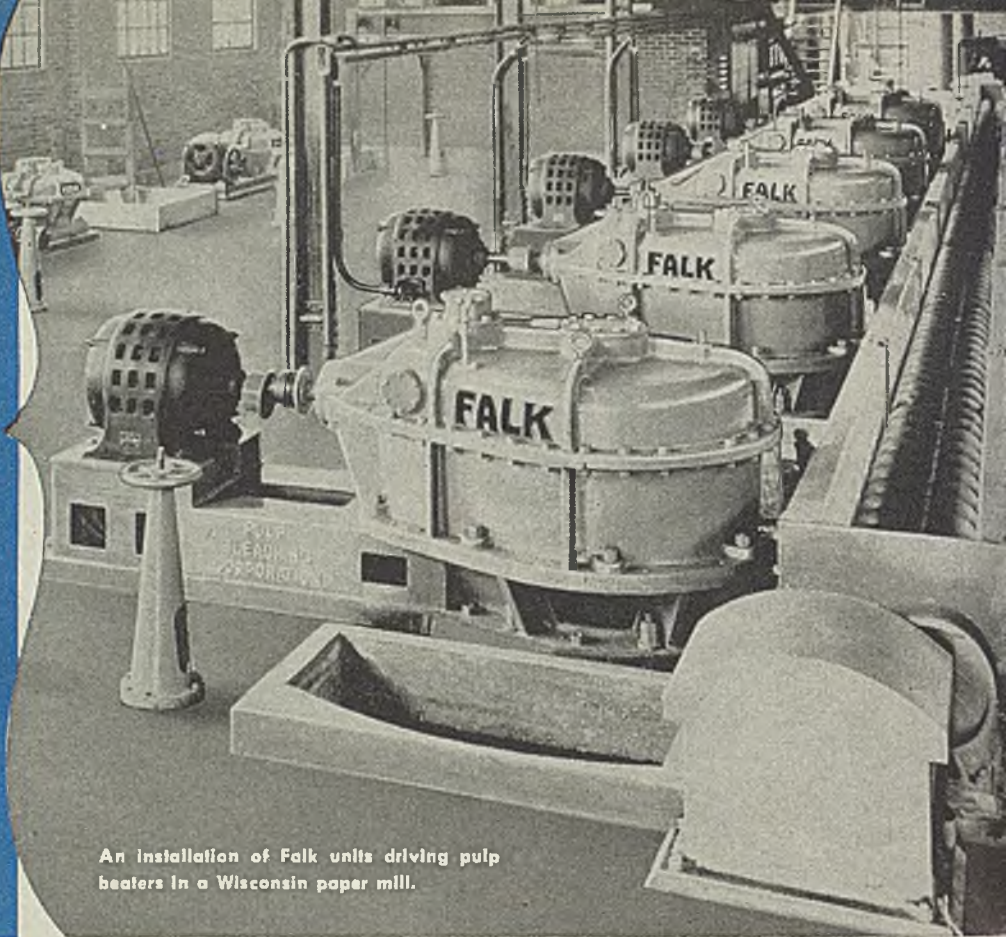
The long experience of Falk engineers in designing gears has been responsible for coupling design which not only provides the flexibility long considered essential but also provides the torsional resilience which enables Falk Steelflex

Couplings to transmit power smoothly, efficiently, with an almost total elimination of the effects of shock, to dampen vibration, and to cushion the load even under severe peaks.

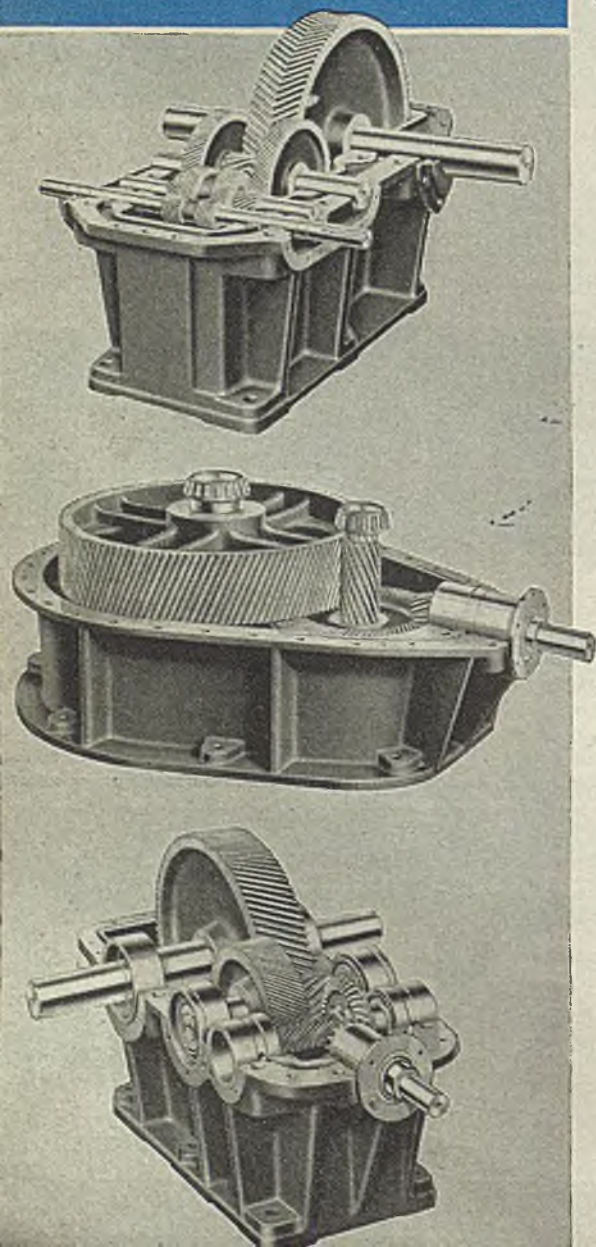
How and why only the Falk Steelflex Coupling provides all the advantages of grid-groove design is described at the right. If you are skeptical, so much the better. Then you will study this data with a greater appreciation for the unusual performance and life provided by Falk Steelflex Couplings.

FALK Speed Reducers

fully meet
**ANY service
requirements**



An installation of Falk units driving pulp beaters in a Wisconsin paper mill.



Falk Speed Reducers are available in a wide range of types; sizes from 0.13 H.P. to 2000 H.P.; and ratios from 1.5:1 to 515:1. All Falk Speed Reducers have a 100% excess capacity and minimum efficiencies from 97% to 98 1/2% depending upon the reduction. Symmetrical arrangement assures balanced performance. Patented system of lubrication and interchangeability of parts assure long life.

The life and performance of Falk Speed Reducers reflect the unusual skill acquired by Falk engineers and machinists during years of experience in the design and manufacture of herringbone and single helical gears and special high speed drives. The application of this Falk skill is the basic

reason for the continuous high efficiency and extremely long life of Falk Speed Reducers on a very wide variety of applications.

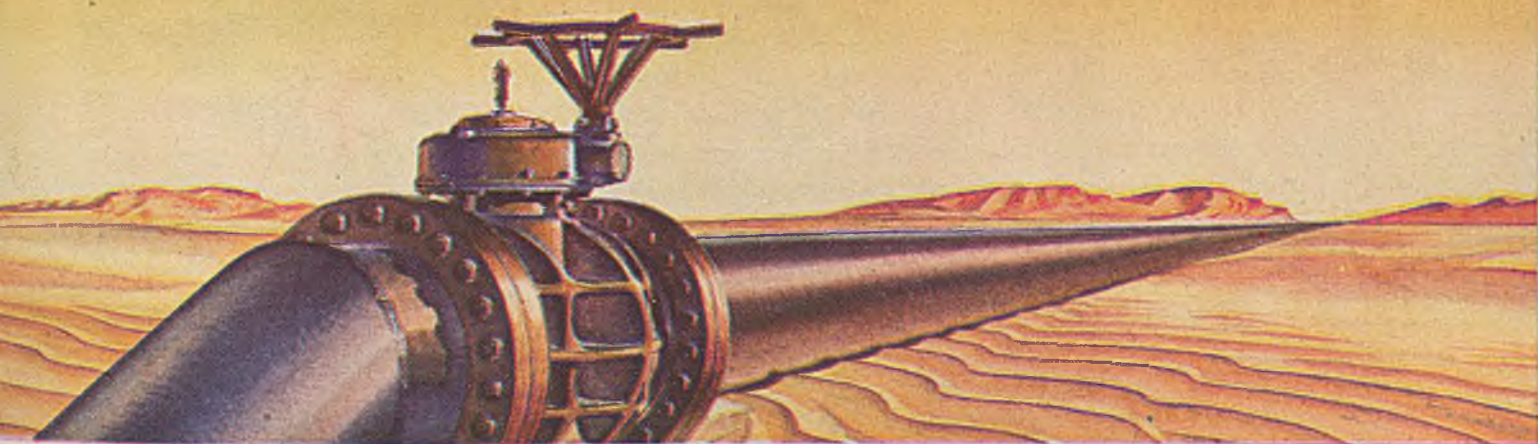
Some typical Falk Speed Reducers are shown at left: *Upper Illustration:* Parallel shaft, herringbone speed reducer. Ratios: single reduction, 1.5:1 to 10:1; double reduction, 11.5:1 to 70.2:1; triple reduction 80:1 to 300:1. *Center:* Right angle Falk Speed Reducer with vertical low speed shaft. Available in single reduction units, 1.5:1 to 5.28:1; double reduction, 5.7:1 to 43.5:1; triple reduction, 52.1:1 to 430:1. *Bottom:* Right angle speed reducer. Available in single reduction units, 1.50:1 to 5.28:1; double reduction, 5.7:1 to 52.1:1; triple reduction, 56:1 to 515:1.

It Always Pays to Consult . . .

FALK

. . . A Good Name in Industry

ALONE . . .



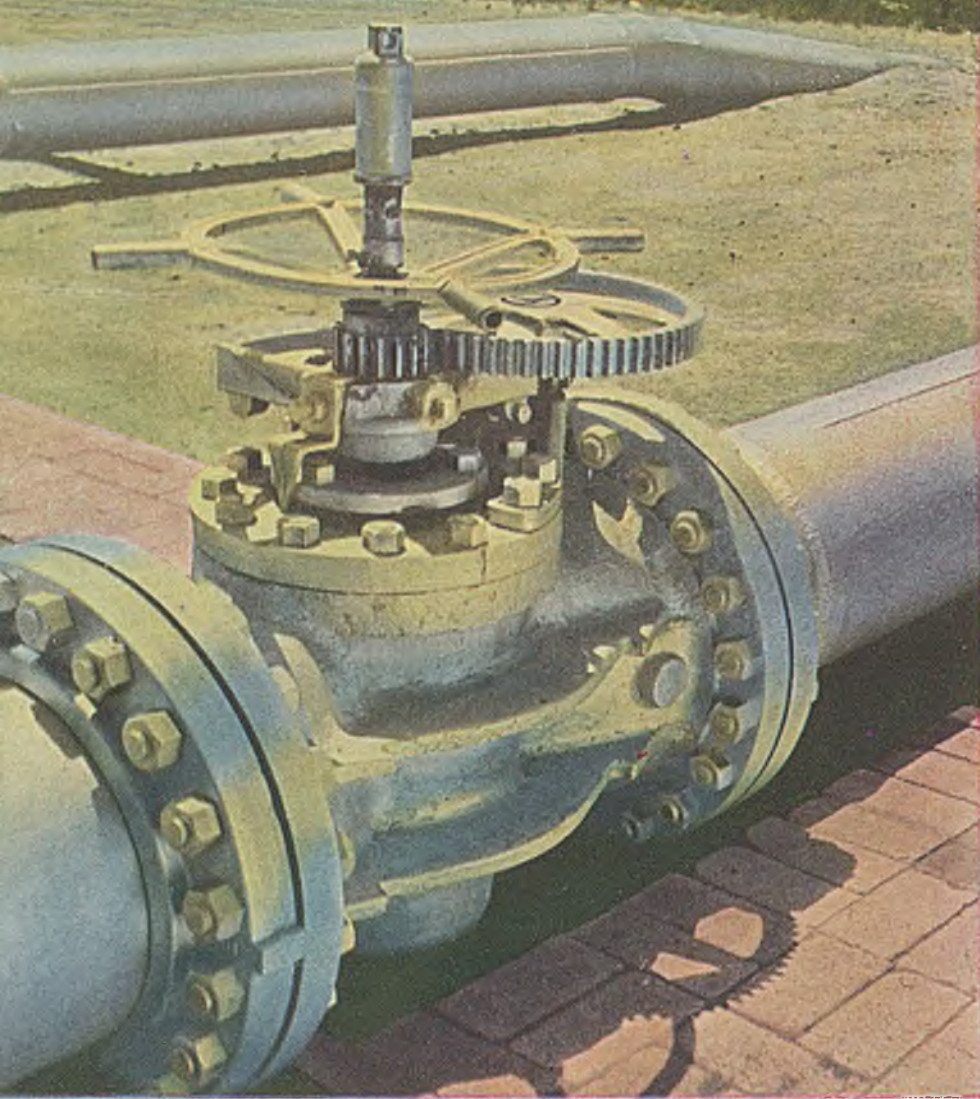
It cannot plead for help; it must stand alone; solitary sentry of the far-flung pipe line. It must not fail when emergency arises, nor deteriorate in the face of the elements. Built for rough, out-in-the-open service, the Nordstrom Valve stands as a bulwark of safety; always ready for instant operation, with no fear of sticking.

The prime credential of valve integrity is *leakproof endurance*. There is nothing so certain of seating as a lubricated, tapered-plug valve. With pressure lubrication hydraulically directed, the Nordstrom Valve brings the tapered-plug principle of leakproof closure to its fullest scope of achievement. Nordstrom builds sizes up to 30".

NORDSTROM LUBRICATED VALVES

KEEP UPKEEP DOWN

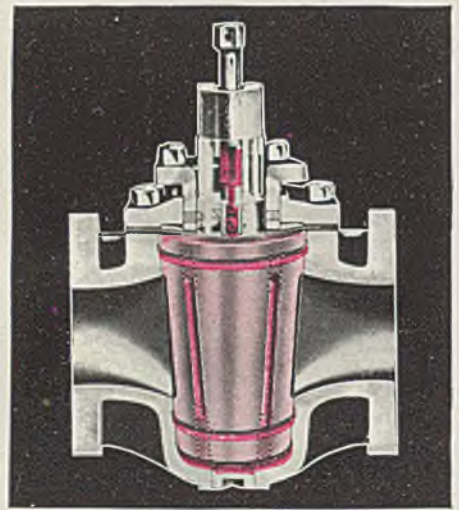




Unbeatable pipe line control

Often heard in plant and field is the expression, "They make it tough on Nordstroms." On lines where no other valves will satisfactorily operate, Nordstroms do the job. In operations where temperature, fluids, corrosion and erosion take heavy roll, count on Nordstrom to "do the trick." Everything is under control with these unbeatable valves.

Install Nordstroms on your tanks, flow lines, circulating lines, transmission lines—everywhere for safety. Made in all pressure classifications to ASA and API standards. Sizes ½" to 30". Adaptable for manual and automatic remote controls. May also be equipped with locking devices, extensions and water tight housings.



Nordstrom
LUBRICATED VALVES
 FOR ALL-PURPOSE SERVICE
Sealdport Lubrication

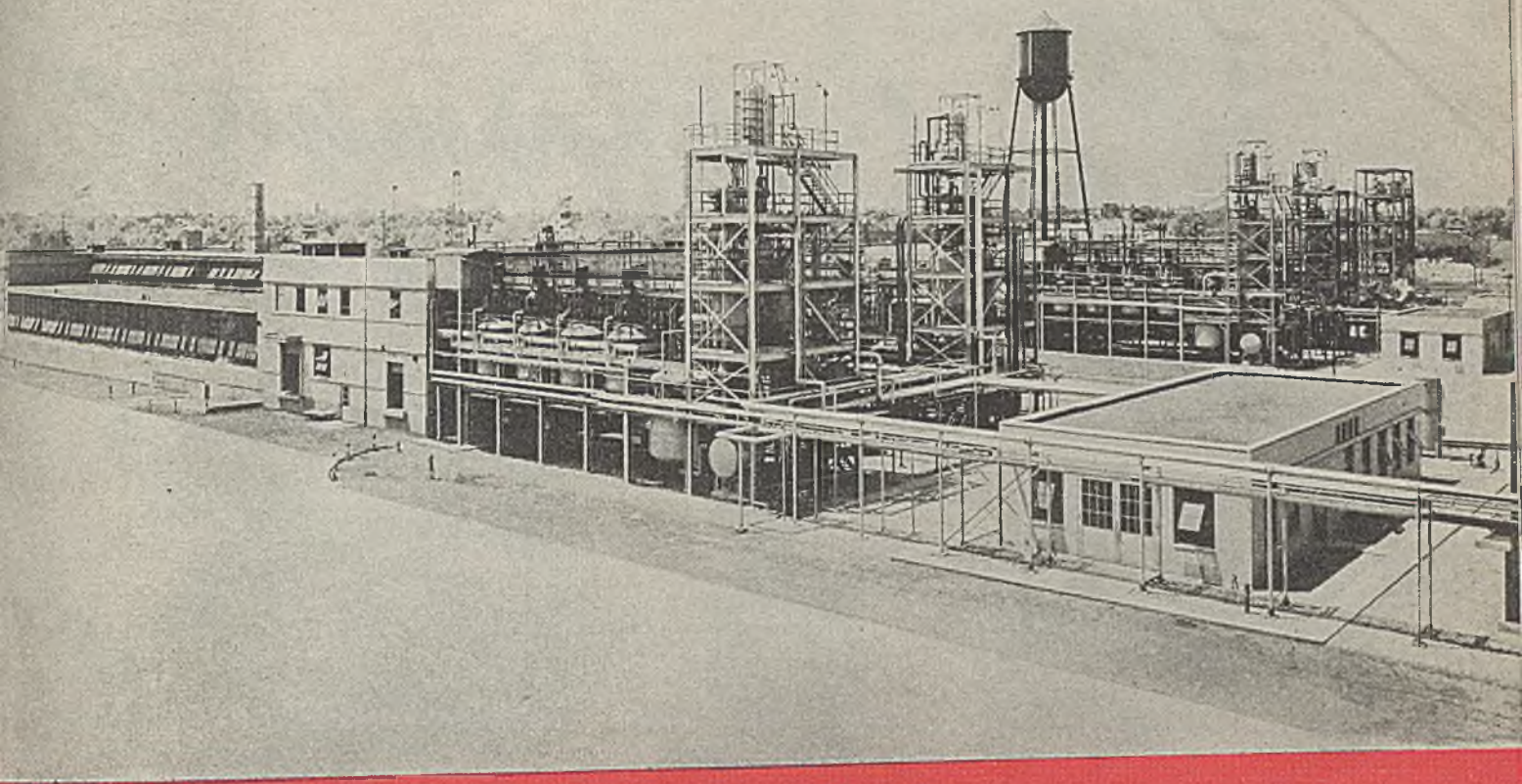
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 WORLD'S LARGEST MANUFACTURERS OF LUBRICATED PLUG VALVES

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 400 North Lexington Ave. Pittsburgh 8, Pennsylvania



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From your idea to production—from process determination and assembling of basic data to operation of the completed plant—Blaw-Knox is prepared to carry projects for the chemical process industries *through to completion.*

SERVICES OFFERED:


- 1 Preliminary design study based on available data to establish the process requirements and economics.
- 2 Selection of processing methods.
- 3 Fundamental engineering: preparation of flow sheets, layouts, sizing of units, material and utility balances, and cost estimates.
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- 5 Fabrication, procurement, expediting, and inspection of process equipment and materials.
- 6 Plan for execution of the project which includes schedules for completion of engineering, procurement, and construction.
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- 8 Initial operation, test runs, and training of operating personnel.

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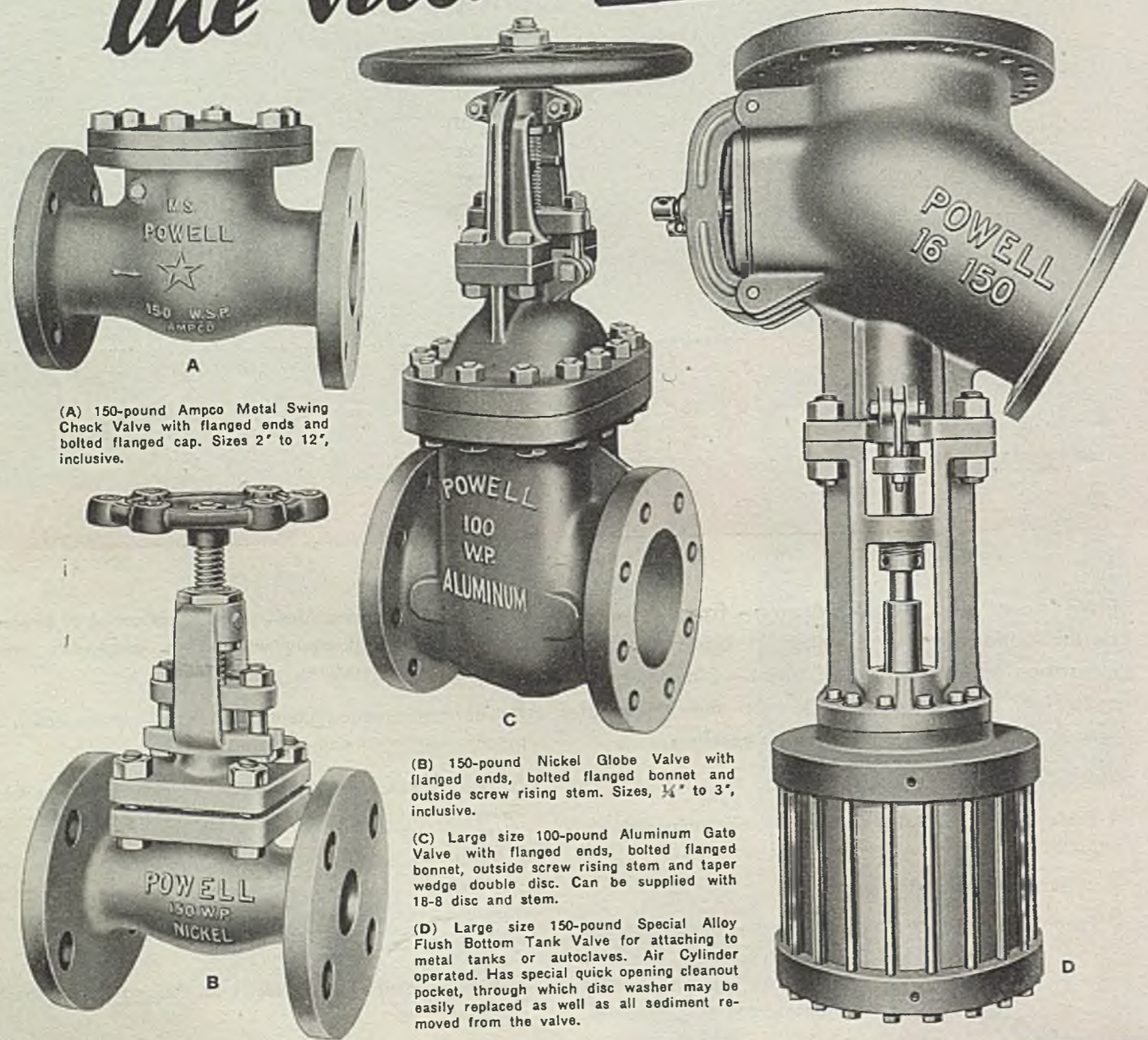


BLAW-KNOX DIVISION of Blaw-Knox Company 2090 Farmers Bank Bldg.,
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BLAW-KNOX IMPLEMENTS THE PROCESS INDUSTRIES

 Seven Blaw-Knox plants have been awarded the Army-Navy "E", and have regularly received renewal stars for continued high achievement in the production of war matériel.

For assured performance, the valve must suit



(A) 150-pound Ampco Metal Swing Check Valve with flanged ends and bolted flanged cap. Sizes 2" to 12", inclusive.

(B) 150-pound Nickel Globe Valve with flanged ends, bolted flanged bonnet and outside screw rising stem. Sizes, 1/4" to 3", inclusive.

(C) Large size 100-pound Aluminum Gate Valve with flanged ends, bolted flanged bonnet, outside screw rising stem and taper wedge double disc. Can be supplied with 18-8 disc and stem.

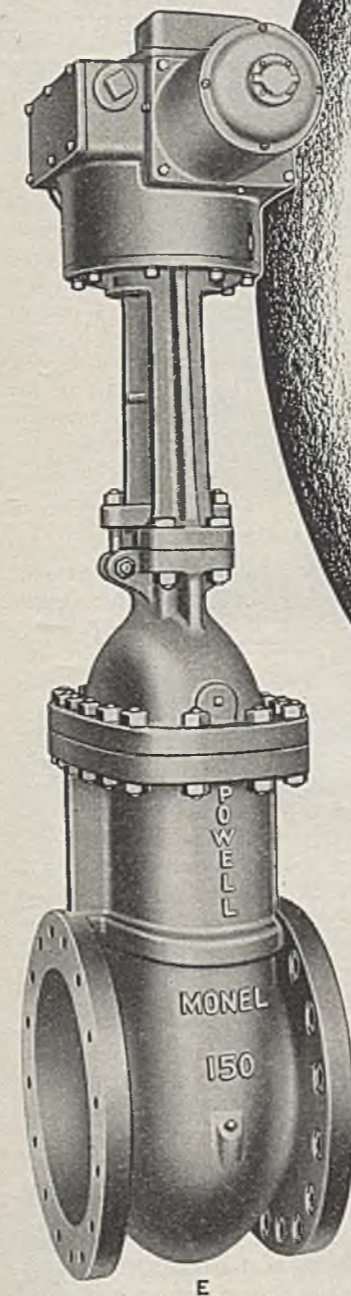
(D) Large size 150-pound Special Alloy Flush Bottom Tank Valve for attaching to metal tanks or autoclaves. Air Cylinder operated. Has special quick opening cleanout pocket, through which disc washer may be easily replaced as well as all sediment removed from the valve.

the service!

Years ago Powell pioneered in making Cast Steel Valves to handle flow control requirements for which bronze and iron valves were not fully suited.

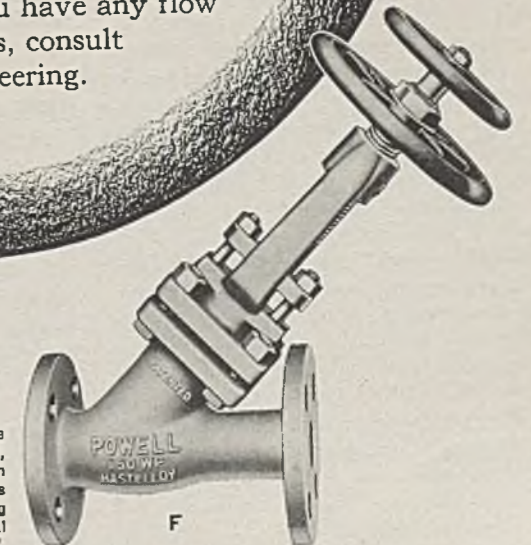
Later, the development of the chemical and process industries imposed new demands; namely, for valves to handle corrosive media. Again Powell blazed the trail and today, in addition to Bronze, Iron and Steel Valves of every required type, size and pressure, Powell offers not only the Cast Steel but also many special designs in the widest range of pure metals and special alloys ever used in making valves.

In short, Powell is prepared to supply the right valve for every service in the Chemical and Process Industries. In writing for catalogs, specify whether you are interested in Bronze and Iron; Cast Steel; or Corrosion Resistant Valves. If you have any flow control problems, consult Powell Engineering.



(E) Large size 150-pound Monel Metal Gate Valve, with flanged ends and bolted flanged bonnet. Top-mounted electric motor operator provides quick, positive opening and closing by remote control.

(F) 150-pound Hastelloy Alloy "Y" Valve with flanged ends, bolted flanged bonnet, and outside screw rising stem. Equipped with Powell Patented Seat Wiper, which clears the faces of any corrosion products or adhering materials, insuring a tight metal to metal contact between seat and disc. Sizes 1/4" to 2", inclusive.



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POWELL

VALVES

WATCHING WASHINGTON

R. S. McBRIDE, Editorial Consultant • D. D. HOGATE, Chief of McGraw-Hill Washington Bureau • J. V. HIGHTOWER, Washington Correspondent

Effects of recent strikes will be felt in chemical industry for months . . . Department of Justice investigating some chemical branches for possible anti-trust violations . . . Shortage of nitrogen will be larger than earlier estimated . . . Government ammonia plants now under private operation . . . Oil and gas division formed in Interior Department . . . Legislative action may eliminate confusion in registering trade names . . . Surplus plants may be used to build up industrially backward regions . . . Chemical Warfare Service receives report on inquiry into German mercury cell . . . Much development work on Fischer-Tropsch process is being carried out by oil companies

DUBIOUS GUARANTEES

WASHINGTON men familiar with the chemical field emphasize that any general adoption in the chemical industries of the "guaranteed wage" principles being investigated by OWMR would depend to a decisive degree on the stability of industry as a whole. In other words they do not think that wage or hour guarantees possess any workability in an economy where industries lack fair assurance of a dependable demand for their products and raw materials.

They regard this assurance as completely absent where violations of labor contracts and the occurrence of strikes that cripple many industries constantly threaten. It is pointed out, obviously enough, that where, for long periods, interferences of the flow of raw materials into a plant can develop, or the blocking out or serious curtailment of orders for finished products can take place, that plant could commit itself to any guarantees only at great risk. The action taken by Mr. Truman and a goaded Congress a short time ago in connection with the railroad strike has given hope in some quarters that these disruptive conditions will not last indefinitely.

STRIKES HIT CHEMICALS

CHEMICAL specialists of CPA regard the recent strikes in steel, nonferrous metals and coal as a heavy blow to the expected boom in chemicals and that the effects will be felt for months. Cutting down the coal movement to coke ovens has nullified earlier estimates of the availability of aromatics, ammonium sulphate, naphthalene, phenol, cresol and pyridine. The shortages of titanium, cadmium and lead are held sure to last through the year. The strike in steel and the shutdown in coal have brought about a severe shortage in tin plate.

Few chemical plants have been able to build up normal stocks of raw materials. Chemical authorities say that many plants will be subsisting for a long time on a hand-to-mouth basis. They see the whole program for chemical expansion predicted in January as having been seriously altered by the strikes and by the channeling of building materials into housing in accordance with the veterans program.

JUSTICE SLEUTHS ON TRAIL

JUSTICE DEPARTMENT'S anti-trust sleuths are on the trails of possible malefactors, however cold and indefinite the trails may be. Since defeat of the Japs and abandonment of the "legal honeymoon" with industry, over 100 investigations have been started. The list hasn't been publicized, but the department's men are busy in several chemical fields.

Here are some chemical and related lines under scrutiny. Certain companies interested in catalytic processes in the petroleum industry, one or two manufacturers of gas-line components, and certain "mitized" groups of producers of natural gas and crude oil are under the legal eye. The same is true for a segment in rubber manufacture and a sector in pharmaceuticals. Also, the investigators are sniffing oxygen and allied gases and even chlorine.

"END-USE PATTERN"

DATA gathered during the war period by WPB and other control agencies are being critically investigated by Bureau of the Census. About 250 chemicals are being so reviewed to see whether the wartime uses of these commodities can not be identified in a quantitative manner. Where the data are apparently of some significance the Bureau is issuing reports on "wartime end-use pat-

terns", giving the amounts of each chemical which were allocated for various final commodity or service purposes.

The Census specialists handling this project report that many of the commodity summaries are quite inadequate to have real significance. Nevertheless they are hoping that they can give some resumés indicating approximately the major uses of chemicals in the war period, even when such indications will be far from quantitative. But they also ask the many interested persons dealing with market analysis to be conservative in their requests. As one Bureau executive put it, "Please don't ask us for 'more'. We are publishing every fragment which we can legally give out without revealing individual company affairs unfairly."

LIMITING LABOR CLAIMS

THE Gwynne bill, which passed the House of Representatives as H. R. 2788, proposes to limit the time in which disgruntled employees may come back with claims for underpayments under the Fair Labor Standards act. As passed by the House, the time for such court claims is limited to two years. Proponents of the measure are seeking to have the Senate shorten the time for deferred claims to one year. In any event, any such bill will greatly aid in protecting against claims long accumulated.

NITROGEN SHORTAGE GROWS

A FEW months ago Combined Food Board estimated that the United States production of nitrogen chemicals for fertilizers would fall short of the needs by about 100,000 tons of contained nitrogen. It is now evident that the shortage will be much greater than this for several reasons. Importation of Chilean nitrate has fallen far short of schedule. This is partly if not largely due to the Chilean desire to sell their nitrate where they can get better price than under American OPA regulations. Output of synthetic ammonia at government-owned plants has been less than expected, slightly because of delay in government negotiations, but more largely because only limited quantity of the ammonia so made could be converted to usable form. Lack of capacity for graining of ammonium nitrate has been the principal bottleneck. On top of these shortages have been reductions in expected output of byproduct ammonium sulphate at coke works.

Early in June no one in Washington was

BETTER PROTECTION FOR PROCESS EQUIPMENT

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Acikote and Duralon coatings are applied at our factories in Akron, O., or Los Angeles, Calif., to equipment of any size or shape. Applied in liquid form by our highly specialized process, both materials, on baking, form hard, dense, glass-like, non-porous, insoluble and infusible coatings, ranging between .005" and .008" in thickness. While differing somewhat in corrosion-resistant characteristics, both coatings show excellent electrical properties, good resistance to impact, wear and abrasion, and excellent thermal shock characteristics. Both coatings are completely non-toxic and non-contaminating.

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able to guess just what the total shortage of nitrogen might be this year. But a shortage twice as great as was originally forecast by Combined Food Board seems certain.

AMMONIA PLANTS LEASED

THE FIRST of the Government Ordnance plants for ammonia synthesis was taken over actively by industrial lessees on May 13. On that date Lion Oil Co. began operation of Ozark Ordnance Works at El Dorado, Arkansas.

Much earlier completion of lease negotiations at Jayhawk Ordnance Works was accomplished by Spencer Chemical Co.; but it did not take over that plant at Baxter Springs, Kansas, until a somewhat later date than Lion Oil began its commercial operation. Both companies will make and ship anhydrous ammonia and will make and grain ammonium nitrate using old Ordnance facilities which they have leased. It is expected that shortly both plants will install new modern graining equipment, perhaps costing a million dollars at each works. It is also expected that each of these two arsenals will be partly converted to the manufacture of methanol. Thus each old arsenal becomes a three-product enterprise.

INTERIOR'S "PAP"

AS THE Petroleum Administration for War officially went into oblivion last month, a new oil body which might be regarded as the "Petroleum Administration for Peace" came into being in the Interior Department. Interior seems likely to become, according to Washington belief, the dominant agency in industry-government relationships in the petroleum industry.

This develops from President Truman's request that Krug undertake the "coordination and unification of federal policy and administration with respect to the functions and activities relating to petroleum carried on by the various departments and agencies." Behind the request was Krug's urging that, in Truman's words, "steps should be taken to assure coordination in peace time of the federal government's many interests in petroleum, petroleum products and associated hydrocarbons."

With presidential backing Krug has created the Oil and Gas Division in the Interior Department. The power of the new division is foreshadowed in Truman's desire to centralize governmental activities in petroleum. The president was greatly impressed by the record of PAW during the war and wants a comparably efficient oil agency to function in peace.

NEW OIL BODY'S TASK

DETAILS of the Interior Department's new Oil and Gas Division and its relationships with the scattered federal oil groups are still in the development stage. However,

an authority close to Ralph K. Davies, who has a hand in shaping the division, says that it will either take over entirely some functions of government groups outside the Interior Department or coordinate their work.

Primary purpose of the division, this spokesman says, is to furnish a central point where the petroleum industry and the government can get together with a minimum of friction, uncertainty and loss of time. There are a number of federal oil offices in Washington, including those in the Interior, State and Commerce Departments and the Federal Power and Tariff Commissions. Four or five agencies participate in the leasing of oil and gas lands, each with its own policies. Petroleum statistics are collected or published by most of these groups.

Krug's new division hopes to eliminate the unhappy effects of this condition. Indications are that the task will be a tedious effort of interagency diplomacy. To the extent that it succeeds it should be a great improvement from an administrative standpoint.

MORE INTERIOR CHANGES DUE

COORDINATION of the Interior Department's various petroleum sections by the Oil and Gas Division is Secretary Krug's first move to institute a "business regime" in the department. He is understood to be working out extensive changes to eliminate overlapping of functions and duplication of effort and to set up closer relationships between divisions that have drifted apart to their mutual disadvantage. Krug's record in the War Production Board was such as to convince Washington observers that he has no patience with governmental inefficiency. Krug is believed determined to make his department a model for other agencies.

CAVES FOR INDUSTRIES

THE Army and Navy Munitions Board, has begun to work out a comprehensive program for industry to go into effect if and when World War III explodes. One of the board's jobs is to make a nation-wide survey of caves and mines. Just now, says the board, its primary interest underground is the storage of government-owned machine tools and war production equipment. At the same time, studies of the caverns will be made with a view to determining the extent to which vital industries could be shielded from destruction from the sky.

The board has set up a Strategic Materials Committee, which is working on recommendations as to what commodities are to be classed as strategic and critical, and will determine kinds, amounts and specifications of these materials. Also, an Industrial Facilities Committee has the task of advising the board on plans to hook up industry with the war machine in the event of the next "emergency." Critics say the board's arrangements to synchronize the economy prior

to World War II were something less than perfect, but the board must go through the motions once more with hopes for better success.

OIL AGREEMENT SNARLS

ONE OF the neglected matters before Congress this year has been the British-American petroleum agreement. Negotiated last September in London as a revised edition of the August, 1944, agreement, the new version was framed in order to allay fears that the earlier arrangement would lead to government control or dictation of petroleum operations. Since September the revision was repeatedly scheduled for hearings in the Senate. The hearings were as regularly delayed by absences from this country of Senators Connally and Vandenberg, important members of the Senate Foreign Relations Committee.

The British government had approved the arrangement. State Department officials late in May were predicting its approval in the Senate, but looked for complications for the agreement if and when approved. They have been thinking about Mr. Stalin. Whatever the British-American decisions, whatever the willingness of foreign oil producing regions to cooperate, the Kremlin looms large. Russia could make the agreement academic to a discouraging degree.

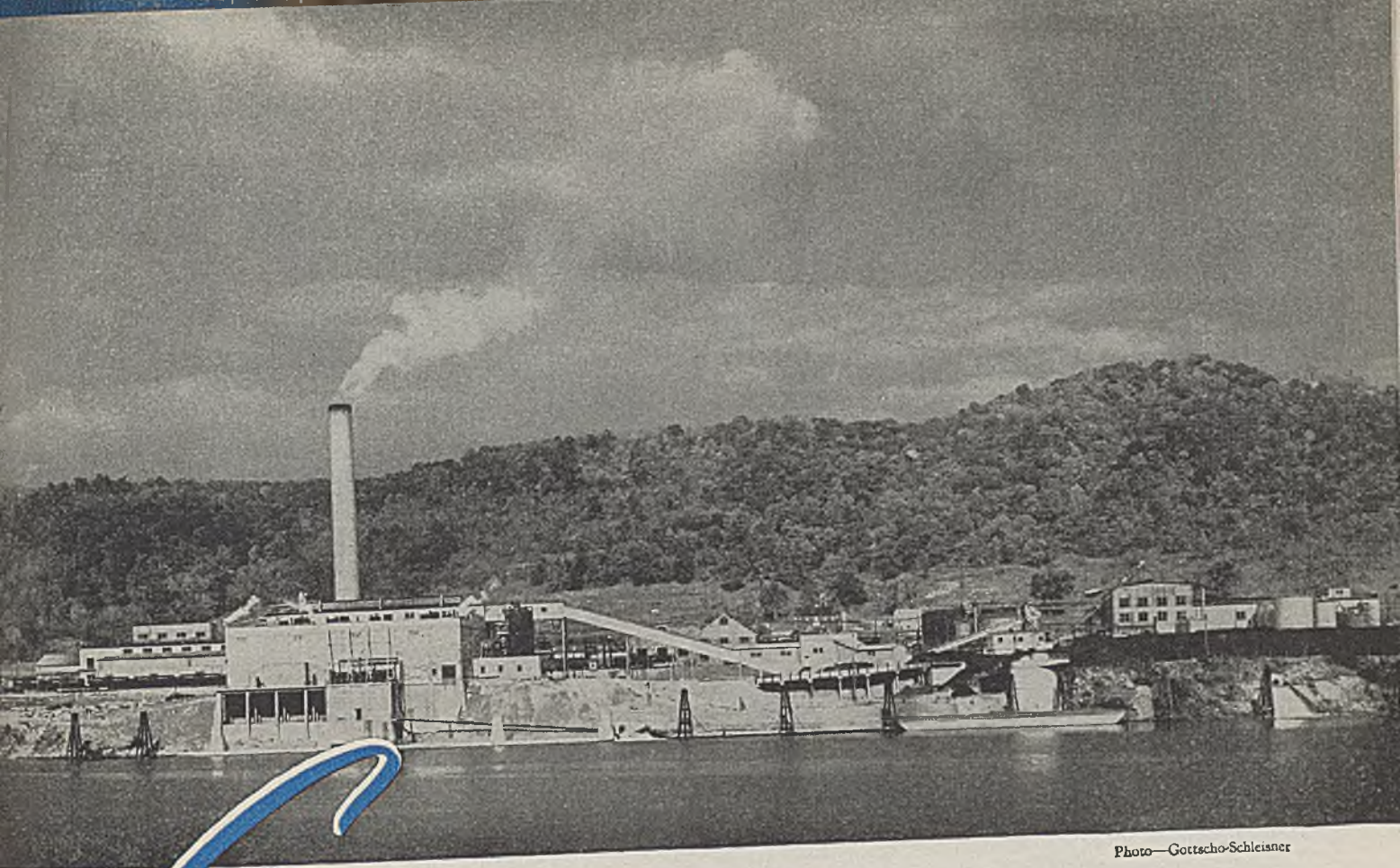
PRESSURE ON LEAD TO STAY

NO RELIEF is in sight for the lead situation. Civilian Production Administration experts take this pessimistic view after considering the heavy world demand and the dwindling of domestic production caused by strikes and depletion of reserves. CPA officials point out that the domestic production of recoverable lead, which was 457,000 tons in 1940, dropped to 453,000 tons in 1943, fell to 417,000 tons in 1944 and dropped again to 388,000 tons last year.

In words of one official, "How much of these decreases are due to depletion of reserves, and how much to other factors, such as manpower shortages and delayed development work, cannot be determined. From the long-range point of view, it is significant that no important new lead deposits have been discovered in the United States for many years, and that depletion of known deposits has reached the point where they can no longer be expected to meet the requirements of our economy." The significance of these conditions should be obvious to chemical processors of lead and lead chemical users.

TRADE MARK CONFUSION

THE term "chaotic" is applied to the registration of trade-marks by Patent Commissioner Ooms. He admits that the Patent Office's trade-mark file is far from complete, is out of date and is filled with marks that have expired. The office lacks both space



Photo—Gottscho-Schleisner

Columbia

buys Natrium, W. Va. Plant

The chlorine-caustic soda plant at Natrium, W. Va., has just been added to Columbia's facilities.

Built and operated by Columbia for the Defense Plant Corporation, the Natrium Plant bids to be a major factor in serving peacetime industry just as it was in producing gigantic quantities of chlorine and

caustic soda for critical war industries.

This important plant, added to the facilities at Barberton, Ohio, and Corpus Christi*, Texas, is a step in Columbia's expansion program planned to meet the demand of industry for these essential chemicals.

*Southern Alkali Corporation (A Columbia Affiliate)

COLUMBIA ESSENTIAL INDUSTRIAL CHEMICALS

Soda Ash • Caustic Soda • Liquid Chlorine
• Sodium Bicarbonate • Pittchlor (Calcium Hypochlorite) • Silene EF (Hydrated Calcium Silicate) • Calcium Chloride • Soda Briquettes • Caustic Ash • Phosflake • Calcene T (Precipitated Calcium Carbonate) • Modified Sodas.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
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and funds needed to remedy the situation and to set up a modern system that would guide the confused business man. The confusion is worse confounded, says Ooms, by the multiplicity of trade-mark laws and conflicts in decisions of the various state, federal and Patent Office tribunals.

Some of this confusion would be remedied by the Lanham bill (H.R. 1654), which has passed the House and been favorably reported by the Senate Patents Committee. The measure has five major objectives: (1) to put all existing trade-mark statutes into a single piece of legislation, (2) to give statutory support to our international agreements in order better to protect American traders in foreign countries, (3) to make legislation conform to legitimate modern business practice, (4) to offset undesirable judicial constructions of the present acts, and (5) to simplify trade-mark practice and discourage the use of counterfeit and imitated marks and false trade descriptions.

WAR ASSETS VIEWS WIDEN

IN RECENT weeks a disposition has grown in War Assets Administration to take "socio-economic" factors more strongly into consideration in the disposal of surplus plants. If, as believed with good reason in Washington, this tendency has received official encouragement of top ranks in WAA, future disposal actions should reflect a policy tending to shape, more than in the past, the degree of competition within industries and the development of industrially undeveloped regions. A tentative program has been floating around, with prospects that it would secure good anchorage.

WAA has expanded its corps of economists and has given the group an influential voice in council. There is conviction in WAA that extensive economic studies are necessary in the different fields of industry affected by disposal of government plants. Such studies, it is contemplated, must give more attention to such broad questions as to what degree the introduction of wartime production capacity into industries will affect the health of those industries and the concentration of their control. The intensifying of competition to the extent the traffic will bear is an objective prominent in the thinking of many in WAA.

REGIONS INTEREST WAA

CURRENT indications are that strong efforts will be made in War Assets to use surplus plants to build up industrially undeveloped regions of the country. Disposal programs for the various types of government-owned plants are being closely examined with this end in view. WAA's concern in the matter has been sharpened by the fact that the agency has a representative on the Interagency Committee on Distressed Areas which OWMR has established. WAA hopes to contribute to the committee's

thinking by coming up with a report on the potentialities of surplus plants in such areas.

CPA KEEPS HAND ON GLASS

CPA SAYS it will continue control over the production of glass containers of all varieties in an effort to stretch this year's limited glass container output as far as possible over a heavy demand. Order L-103, therefore, will remain in full force. CPA estimates that 110,000,000 gross of such containers will be manufactured in 1946, as against a requirement of 130,000,000. The coal strike has seriously aggravated the shortage by curtailing production of plants engaged in glass manufacture and making it difficult for plants to secure soda ash.

FAT AND OIL COMPETITION

Two tropical sources of vegetable oils seem to have a very great advantage over the three major domestic sources of vegetable oil when considered from the standpoint of pounds of oil produced per acre. The following are figures from the Department of Agriculture which indicate typical or average output expressed in lb. per acre, a year:

Palm and palm kernel oil.....	2500
Coconut oil: Average yield.....	700
Good plantation practice.....	1200
Peanut oil.....	350
Soybean oil.....	200
Cottonseed oil: Average yield.....	70
Good farm practice.....	140

It is evident from these figures that none of the domestic oil seed crops can give anything like as great a yield of oil per acre per year as do both of the major tropical tree crops. If aggressive and systematic plantation work were undertaken with palm and coconut plantations the output would be from 10 to 20 times as much oil per acre each season as good American practice can provide through peanut, soybean or cotton crops.

These facts appear to indicate that there is an inherent difficulty in developing domestic vegetable oils in competition with these two major imported vegetable oils.

MERCURY CELL INQUIRY

PRELIMINARY reports have been received by Chemical Warfare Service from its team of technical investigators from the alkali industry who went abroad early in the year to investigate the German types of mercury cell for caustic and chlorine. Full working drawings and operating cost data in considerable detail have been received in Washington. The final report of the committee which continued to work abroad into June was expected to be prepared by the time of their return sometime during this month.

The importance of this investigation made it undesirable in the opinion of CWS that

only routine handling for industry be followed. Hence a program of collaboration was proposed. It is expected that Manufacturing Chemists Association will underwrite the cost of reproduction commercially so that not only members of the Chlorine Institute but also other members of the chemical industry can purchase complete copies, including cost data and working drawings. Those interested in the subject will probably be able to get instructions for placing orders by addressing Manufacturing Chemists Association, Woodward Building, Washington, D. C., possibly by the time this issue of *Chem. & Met.* is in the readers' hands.

FOREIGN REPORTS SLOW

AT THE beginning of June, Office of the Publication Board had on hand a backlog of at least 12,000 reports not yet cataloged or made available for distribution. Orders placed as early as the first of March were still in many cases undelivered on the first of June. Reproduction by mimeographing has been practically abandoned and only photostats and microfilms are being offered currently. Executives of OPB admit that this is a horrible delay and an unfortunate situation, but state also that "we haven't the money to do any better."

NEW EXPORT CONTROLS

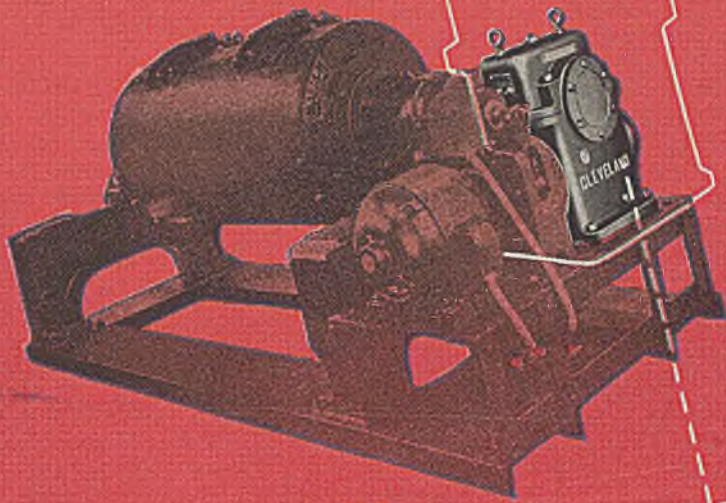
NUMEROUS potassium and ammonium compounds as well as pigments and colors were put under individual license control for export on May 14. Later in the month additional chemicals were added to the list. Very few products of process industry have been taken from the list during the past month.

Office of International Trade in the Department of Commerce states that new restrictions on export of chemicals has been made necessary to protect domestic users. They believe, it appears, that American producers of these chemicals prefer to export more than they should because of the attractive prices abroad where OPA ceilings do not apply. Some critics of the policy recently followed claim that restrictions have been imposed on some chemicals for which adequate domestic market does not exist.

DIRECT USE OF ILPO.

USERS of fertilizers on irrigated land are being asked this season to make extensive tests of phosphoric acids as a fertilizing material by putting it into the irrigation water as such. Apparently, this plan for distribution of phosphate for plants is very successful, especially on the highly alkaline soils in Western areas where irrigation is common.

Some years ago the comparable use of free ammonia dissolved in irrigation water was demonstrated successfully probably first by



As the white outline indicates, it stands up of approximately twice the horse size would be required to do the work of Speedaire.

\$170 saved on each unit with

SPEEDAIRE

THE Illinois builder of this Tumbling Barrel selected Speedaire for his drives after careful comparison with standard worm-gear units. It gave his product these advantages:

\$170 saved with each Speedaire, compared to a conventional worm-gear unit of the same capacity.

The reduction in size made possible by fan-cooling also lowers the cost of its installation.

Long, trouble-free service—as with all Cleveland worm-gear units. Speedaire is Cleveland's new fan-cooled worm-gear speed reducer. This compact right-angle drive can be installed on many applications where other types have been used in the past. Speedaire gives you more horsepower for your dollar.

Find out how much you can save with Speedaire. Catalog 300 tells you—enables you to figure quickly the proper size Speedaires for your equipment. Send for this free catalog. The Cleveland Worm & Gear Company, 3273 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers



Shell Chemical Co. It is noted that one must not put ammonia and phosphoric acid into irrigation water simultaneously. If that is done a considerable part of the acid reacts with dissolved components and the phosphate becomes "not available" for plants growing on the alkali lands.

If the new direct method of application is a success it is expected that Anaconda will very greatly increase its output of free acid by expansion of its Montana facilities.

CIVIL SERVICE TIGHTENED

VETERANS preference for jobs in the civil service of Uncle Sam for a time threatened to break down the minimum requirements for professional jobs such as those for chemical engineers, chemists and other technologic places of junior grade. Congress voted that except where necessary for satisfactory professional standing there should not be imposed on a veteran a requirement of college graduation. Promptly Civil Service Commission ruled that this preference should not permit medical men to qualify without appropriate degrees. The Commission was quite reluctant to afford similar protection for junior chemical engineer jobs and many others of equivalent rating.

Now, however, it is announced that the minimum requirements for entry into the lower professional grades of government service will not be thrown wide open under this congressional requirement. Absolute demand for college graduation will not be imposed in all cases, but will generally be required for scientific or professional places where the duties relate to research or to other advanced technical work. Appointing officers of the technical bureaus are much pleased with the restoration of such more definite requirements, as previously poorly qualified persons appeared eligible for jobs which they were very obviously ill-prepared to fill.

MANHATTAN GETS RESTIVE

A STRIKE-BEDEVEILED Congress labored its way into June with little final thought given to the highly important legislation on atomic fission. It was the lack of congressional action that led the Manhattan District to begin framing terms and conditions for releasing radioactive materials resulting from the work at Oak Ridge and Hanford. Backing the District's decision were recommendations from a science committee, which held that the physiological and engineering possibilities of atomic developments are far too important to be thwarted by continued delays in Washington.

GERMAN PATENTS "LIFTED"

PATENT Commissioner Ooms says his office will make available for inspection in the Patent Office search room some portion of about ten tons of documents taken from the German Patent Office. Originally

shipped to Wright Field, the mass of papers has been turned over by the Army to Mr. Ooms and the Office of the Publication Board for sorting and abstracting.

Ooms says the documents are patents issued in Germany since the war began. Stuff thought to be of no particular interest to American industry will be sent back to Germany. OPB is going through the list and will abstract and publish in its weekly "Bibliography of Scientific and Industrial Reports" the material which OPB regards as noteworthy. Persons wanting to do their own appraisal will have access to the sorted files in the Patent Office. Just when the files will be completed is not guaranteed.

L-353 NOT YET DYING

THE Chemicals Unit of CPA warns that the slim molasses supply will continue to be husbanded for animal feeds and essential industrial products. CPA says flatly there is no official basis whatever for rumors that Regulation L-353 will be soon amended to allow the use of imported cane spirits from molasses in the manufacture of beverages. The order will remain in force indefinitely, says CPA, which regards the molasses shortage as practically sure to subsist well into next year. Going a step farther CPA declares that even if L-353 were to be relaxed, the relaxation might not extend to alcohol brought into free zones, and in that event the only market for it would be in foreign countries.

MCA OFFERS SAFETY GUIDES

THE Manufacturing Chemists Association has released in Washington its 64-page manual on the preparation of warning labels for hazardous chemicals. Part 2 of the booklet exemplifies labels for about 200 such products. At the same time the association has published the second in its series of chemical safety sheets, this one being "Chemical Safety Data Sheet—Benzene." The manual and the sheet are available from the association at \$1 and 25c respectively.

FISCHER-TROPSCH BOOM

MUCH development work on all angles of the Fischer-Tropsch process is under way in the United States, say Bureau of Mines engineers. At least a dozen oil companies are carrying on pilot plant investigations. It is understood that work thus far performed indicates that the process based on the use of stripper coal at \$1 to \$1.50 per ton is competitive with the process starting with natural gas at 5c per M ft.

Fischer-Tropsch synthesis for the manufacture of gasoline, diesel fuel and waxes is not the sole interest of the development work. Variations in operating conditions are capable of yielding a wide range of organic chemicals. One engineering firm has devised a promising system of close control of

the neat of reaction of the synthesis, thus minimizing one of the earlier difficulties of operation.

MONEY FOR RESEARCH

REORGANIZATION of the War Department contemplates an important new "Research and Developments Division" under the command of one of the principal assistants to the Army Chief of Staff. This top rating given to research projects is a recognition by the Army, emphasized by General Eisenhower, that scientific and industrial personnel must have the greatest possible freedom in research and development work for the good of the military itself. And it appears that Congress is equally ready to support financially this type of projects. Most of the cuts in appropriations for next year appear likely to be confined to non-technical and non-research functions.

MINOR NEWS GLIMPSES

Insecticides and fungicides are generally short of demand for current crops, according to Department of Commerce figures, which indicate that among commodities in short supply are white arsenic, nicotine, rotenone, cresols and cresylic acid.

Two new paint pigments are on the Bureau of Standards set of standard samples for color and tinting strength, making 26 now available. The new ones are NBS 324, Ultramarine Blue, Federal Specification TT-U-450, and NBS 325, Iron Blue, Fed. Spec. TT-I-677.

More chemical experts have gone to Germany to study textile problems, and currently more are being sent by the chemical group of TIIB for chemical inquiries. Now emphasized in the chemical field are questions of manufacture and use of new pharmaceuticals.

Penicillin sales must be restricted to prescription merchandising. Food & Drug Administration strongly emphasizes that over-the-counter sale without a prescription of any form of oral penicillin violates the law.

Government reorganization as proposed by the President in the first three stages of his plan affect very little any activity of importance to chemical process industry. Most changes thus far recommended are definitely of importance on administrative matters rather than for their technologic significance.

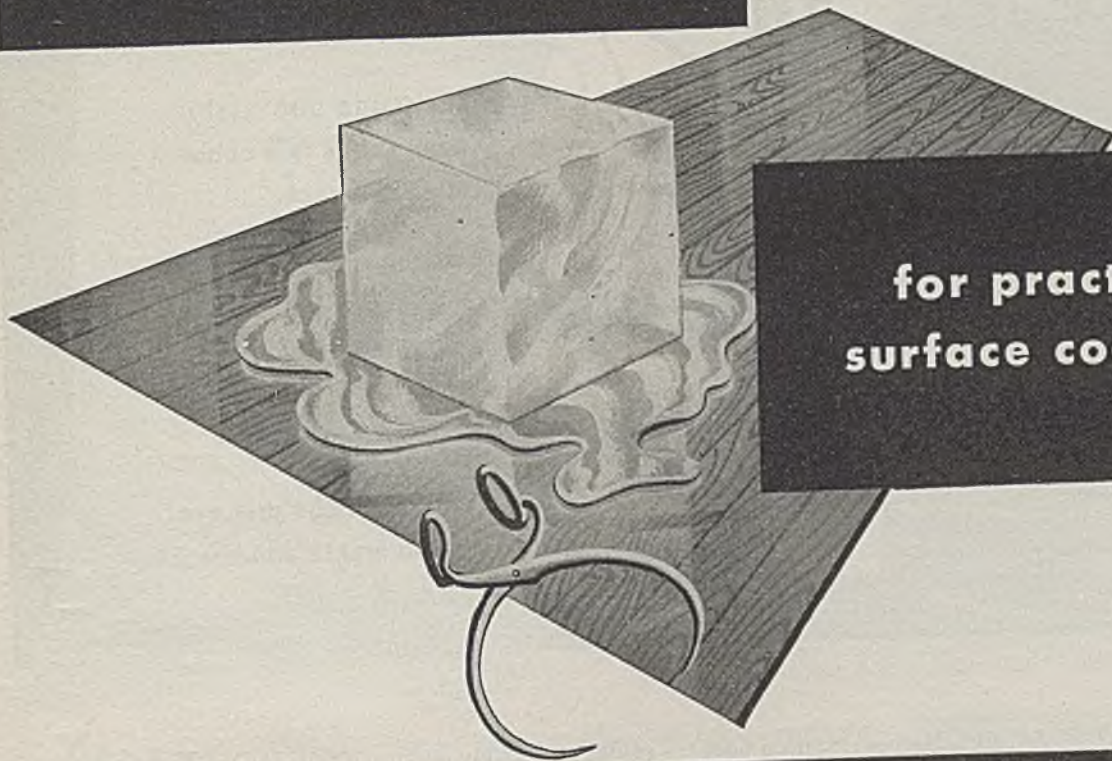
Imported molasses may not be made into cane spirits for alcohol beverage use. CPA has found it necessary repeatedly to emphasize this to prevent diversion of molasses from the more urgent uses as food, feed, and for industrial alcohol essential for such projects as synthetic rubber making.

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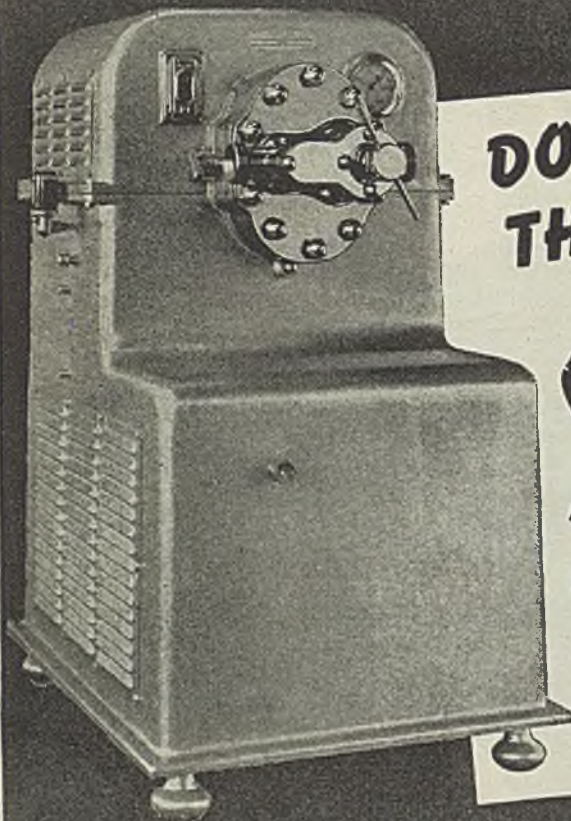
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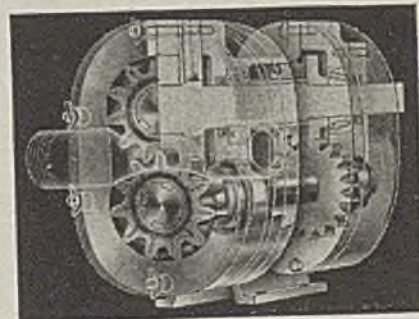
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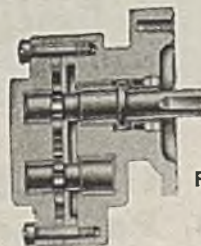
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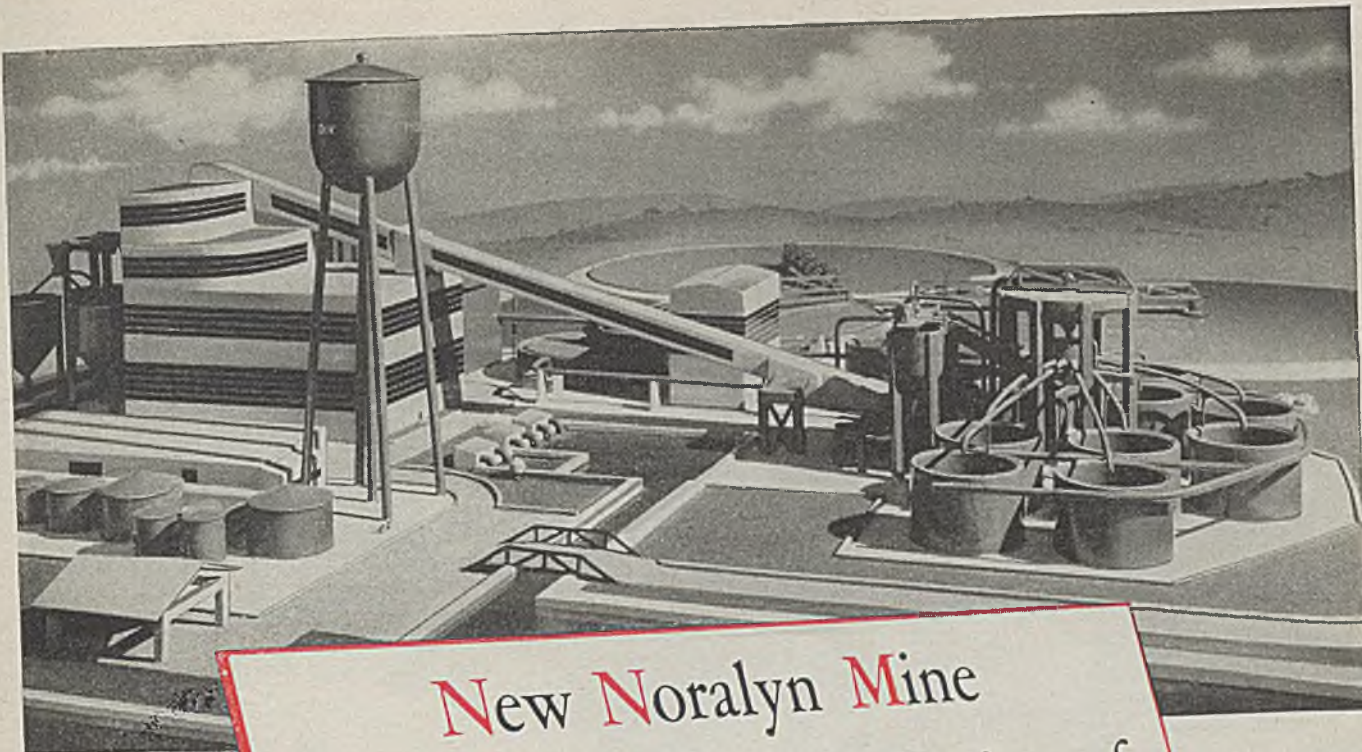
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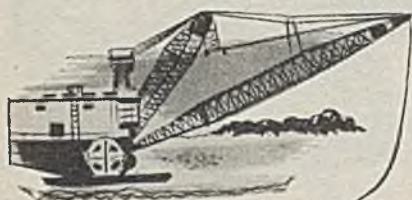
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 to expand annual production of
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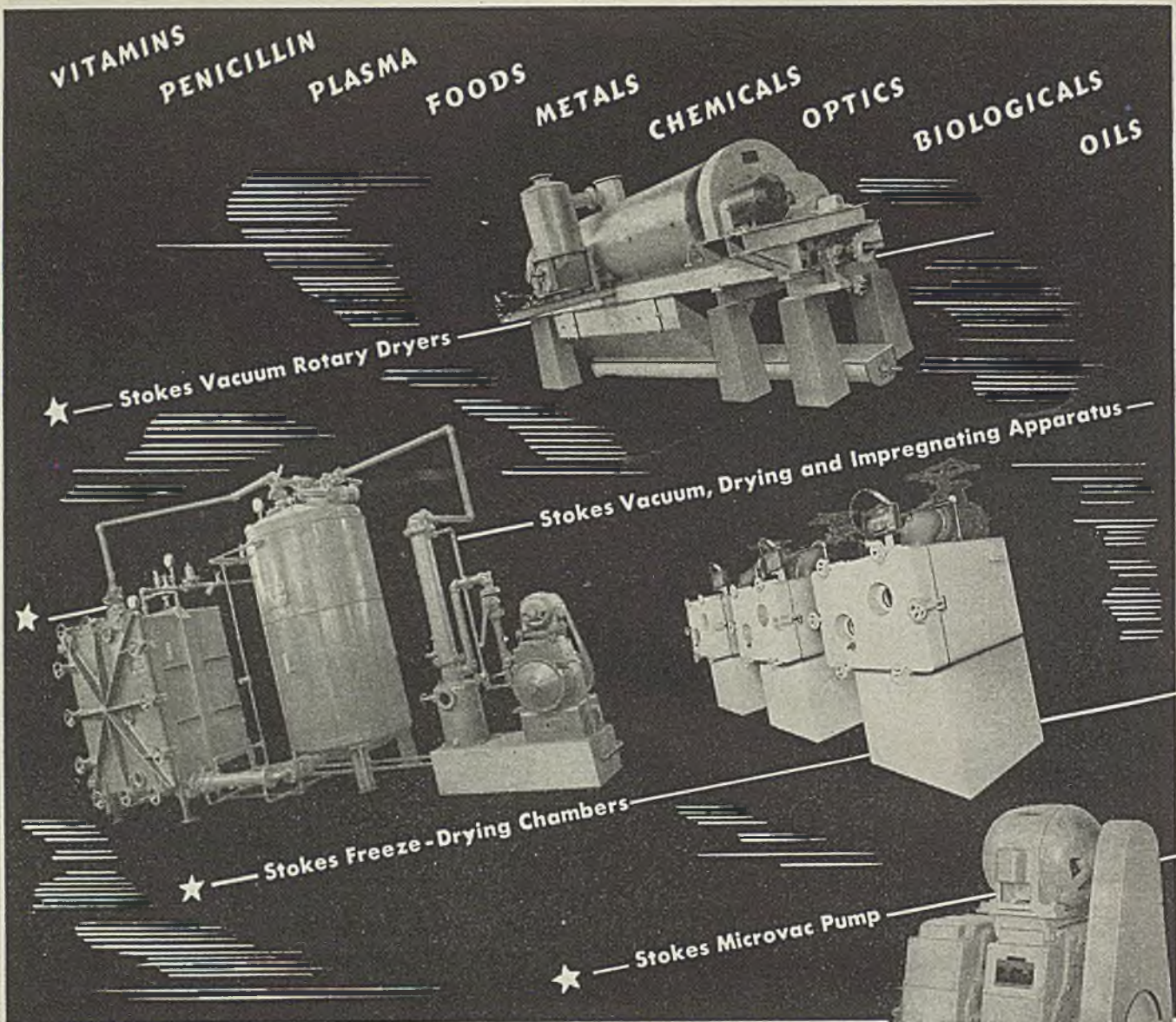
Florida Pebble Phosphate
 and
Tennessee Phosphate Rock

International

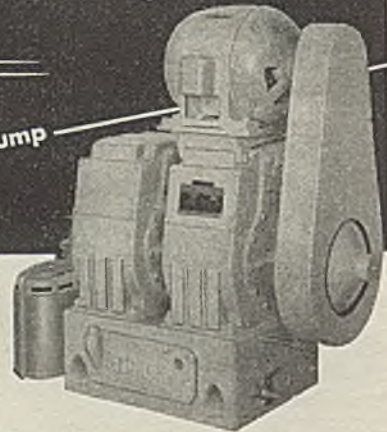
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THE LABOR CRISIS

—it's up to Congress

IT HAS remained for John L. Lewis to demonstrate conclusively that, under the sponsorship of the federal government, the power of organized labor has been built up to a point where it can be used to paralyze the economic life of the nation. Therefore, in the elemental interest of self-preservation, the first order of the day is to cut down the power of organized labor to a point where irresponsible leaders no longer have the power to use it to cut down the country.

This will prove an exceedingly complicated job. The federal government, over a dozen years, has developed and buttressed the power of organized labor by many separate steps. They are interlaced in a pattern which cannot easily be unravelled.

Cutting down the power of organized labor to proper proportions will be an operation almost as delicate as brain surgery. To be successful it must impair no basic American political or economic right. It must leave intact the right of workers to organize and bargain collectively through representatives of their own choosing. It must leave intact the right to strike. But it must disassociate from the exercise of these rights opportunities for devastating abuse of the public welfare such as those demonstrated by Mr. Lewis. A meat axe is not the instrument for this operation.

Because of the complexity and delicacy of the operation to be performed it would be helpful if it could be carried out in a tranquil atmosphere. The urgency of the problem is such, however, that no time can be lost in getting at it.

Guiding Principles

However, the dangers that haste or heat will lead to serious blunders can be largely eliminated if the process of bringing the power of organized labor back within safe and reasonable bounds is governed by principles to which all fair minded people can fully subscribe.

The most important of these principles is that it is an abuse of public authority to extend special privileges to organized labor.

When in 1935 Congress passed the Wagner Labor Relations Act, one of the great buttresses of the power of organized labor, it was upon the explicit theory that organized labor was weak and needed coddling by the federal government if it were to survive, let alone grow big and strong. In the policy

section of that act it was stated that "the inequality of bargaining power between employees who do not possess full freedom of association or actual liberty of contract, and employers who are organized in the corporate or other forms of ownership association substantially burdens and affects the flow of commerce . . ."

Regardless of whether or not that was a correct reflection of the situation in 1935, it bears no relation to the situation today. Under the continuous sponsorship of the federal government, the power and bulk of organized labor has waxed until today it is preposterous to regard it as the weak sister in its bargaining with employers. If, after being continuously demonstrated since V-J Day, the proposition that the pendulum of organized power has swung too far over on the side of organized labor needed any final and clinching demonstration, John L. Lewis provided it.

Changes in the Law

Translation of the principle that organized labor is no longer a weakling, requiring a diet of special privileges, into specific legislative enactments is a detailed technical operation beyond the scope of this statement. It is possible, however, to indicate some of the general lines it should follow. Here they are:

1. The duty to bargain collectively, now imposed upon employers by the Wagner Act, should also be imposed upon the leaders of organized labor who are now under no legal compulsion to bargain.

For well over a month Mr. Lewis made a complete mockery of the process of collective bargaining by refusing even to state his demands until the coal operators had approved "in principle" a plan for a miners' "health and welfare" fund which he fancied. In the meantime the country was plunged into an ever deepening crisis.

2. Unions, as well as employers, should be made liable to suit for damages for breaking their collective bargaining agreements.

A degree of responsibility commensurate with their age and power requires that unions be liable, to the extent of union funds but not the funds of individual members, for carrying out their agreements. To have it otherwise is to hold that a collective bargaining agreement is, by defi-

dition, a phoney agreement so far as the union is concerned. Outlaw strikes are the fruit of this lop-sided arrangement.

3. Employers should be given more discretion, in reinstating employees who have gone on strike than is now permitted by the Wagner Act.

The Wagner Act largely eliminates the risks involved in striking because of the requirements it imposes upon employers to take workers back when they have decided to return to work. These requirements make it virtually impossible for the employer to replace workers even if they are engaged in the most unjustifiable of strikes. At the least workers who have smashed up property and stirred up violence in the course of a strike should have no rights under the Wagner Act. How much further the Wagner Act strait-jacket should be loosened at this point should be carefully explored, and excesses encouraged by the Act should be removed.

4. The wedge which the National Labor Relations Board has driven into the orderly conduct of American industry by holding that foremen are covered by the Wagner Act should be eliminated.

The issue involved here is continuously mislabelled and confused as that of the right of foremen to organize. There is no question of the right of foremen to organize any kind of a legal organization they desire. That is their right as American citizens. The issue is whether or not the special privileges accorded by the Wagner Act, which in some circumstances has been so construed as even to prevent employers from talking with their workers, should be extended to foremen who, if American industry is to have a chance to do its duty effectively, must represent management with full loyalty and responsibility.

A member of John L. Lewis' United Mine Workers takes an oath which provides, in part, "that I will not reveal to any employer or boss the name of anyone a member of our union" and will "defend on all occasions and to the extent of my ability the members of our organization." Mr. Lewis insists that the coal operators contract to deal with foremen to be organized in a union where they will take that oath, and where their activities will be separated from the influence of employers by the barriers imposed by the Wagner Act. Such an arrangement undercuts orderly management of American industry.

5. The exemption of labor unions from the federal anti-trust laws, provided when organized labor was presumed to be weak, should be modified to take account of its vastly increased strength, and

the use of this strength to destroy business enterprise and create monopoly.

As matters stand unions can run employers completely out of business by secondary boycotts and run fellow workers out of jobs in the process. An Ohio manufacturer, working with a government-certified C. I. O. union, is put out of business because A. F. of L. workers refuse to handle his products. Still the government, this time in the person of the United States Supreme Court, says that actions of this sort are above the law because Congress exempted unions from the federal anti-trust laws.

To eliminate one of the most devastating forms of restraint of trade, this exemption should be cut down forthwith by subjecting unions imposing secondary boycotts to the same penalties under the federal anti-trust laws as those to which employers doing the same thing are subjected. And the question of further narrowing the obsolete exemption of unions from the federal anti-trust laws should be fully explored.

6. The levying of special sales taxes for the exclusive benefit of unions should be prohibited by law.

As a matter of good government the right to levy consumption taxes should be reserved to the public authorities and used strictly for public purposes. As a matter of good economics, payments to workers or their organizations should be included in the payroll where they can be properly counted as part of the cost of production.

Equality Before the Law

When everything that can conceivably be accomplished by legislation has been accomplished there is no reason to believe that an ideal or even a surely workable system of industrial relations will have been devised. Many of the mainsprings of such a system lie deep in the hearts of men and far beyond the reach of legislation. There is no chance, however, of having such a system, or even a defensible system of democratic government until special privileges which tip the scales of power far on the side of organized labor are withdrawn and there is some measure of equality for employers and organized labor before the law. Though it is hard to believe it at the moment the country may come to be grateful to John L. Lewis for driving that lesson home so ruthlessly.



President, McGraw-Hill Publishing Company, Inc.

CHEMICAL *& Metallurgical* ENGINEERING

ESTABLISHED 1902

JUNE 1946

SIDNEY D. KIRKPATRICK, Editor

BIKINI BOUND

THIS is being written in California as we are about to board a ship for what has been called "the greatest single experiment in all history." Certainly from all we have seen and heard of the scientific and technical preparations, there never has been a research project so carefully planned and with such exhaustive arrangements for measuring, studying and recording its results. Yet this is truly an "excursion into the unknown" for many of us. We have been warned that we might expect a few discomforts—"crowded living conditions...undoubtedly aggravated by the prevailing tropical climate...in no sense a cruise or pleasure jaunt." But there is widespread conviction among us—at least at the start—that the witnessing of this impressive experiment will more than compensate for any inconveniences that may be experienced during more than two months aboard ship.

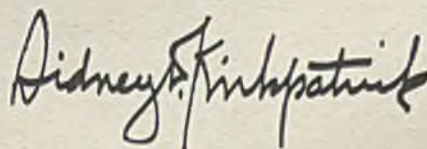
Some there are among us, judging from the published statements of the Federation of American Scientists, who "are cooperating in these tests at the request of their country's armed forces, although they do so with heavy hearts and without enthusiasm." They seem to feel that participation in the tests is itself an admission of their own defeat in their efforts to teach men that atomic warfare means an end of civilization. We admire their idealism but at this stage of the game most of us are in favor of "keeping our powder dry." A new and revolutionary weapon has been developed and it behooves us to learn as much as we can about its effects upon all our means of defense. If we don't, we take the chance of some future disaster far worse than that at Pearl Harbor—which, incidentally, is the first stop on our long journey to the Marshalls.

The primary purposes of this summer's tests, of course, are to gain information that will be helpful to the Navy in ship design, fleet tactics and the location of operating bases and repair yards. The air forces of both services

will be in a better position to judge the effects of atomic bombs on aircraft, both airborne and grounded. The medical corps will learn more of the effects of atomic bombs on living beings in order to provide-needed information on protection, diagnosis and treatment. As a necessary corollary to each of these objectives there will be accumulations of new scientific and technical information that will undoubtedly be useful in any peacetime applications of atomic energy or its radioactive byproducts. These are secondary considerations but it is already apparent that they are not going to be overlooked.

What about the costs? Before we left Washington we were told that the public's estimate of a half billion dollars is far above the actual facts of the case. That figure could only have been arrived at by counting in the original costs of all the ships, even though most of them are already scheduled for disposal as scrap or junk. On the basis of the present price of scrap and subtracting the cost of scrapping, we bring the total ship value down from over \$400,000,000 to about \$4,000,000. Other costs cannot yet be approximated but we are assured that the total operation, including transportation, food and salaries will undoubtedly be less than the cost of one new battleship. That much of the taxpayers' money may be saved many times over if the Bikini tests can teach us how to avoid investment in the wrong kind of ships in the future.

Today we are all asking a lot of questions. Within a few weeks the world will have most of the answers.



San Francisco
June 12, 1946

American Made Paper for Your CIGARETTES

Cigarette paper making was developed in the U. S. just in time to replace the imported product which before the war had been coming to this country from France. As might be expected American engineers soon developed means whereby flax fiber could be used directly as a raw material rather than in the form of old linen rags. Furthermore, they were not content to follow in the footsteps of the French paper makers but immediately set out to find ways and means for improving the process and product. Today the plant has little or no resemblance to its French ancestor.—*Editors*



Flax fiber is now used directly as raw material for cigarette paper

Up to within less than a half-dozen years ago, cigarette paper was made almost entirely from linen rags. The flax fiber, because of the ease with which it can be purified, combined with its peculiarly appropriate papermaking qualities, has long been preferred as a raw material for the manufacture of cigarette paper. However, prime quality linen rags were gradually becoming more and more difficult to obtain as the demand for cigarette paper grew, the situation having already become serious at the time of the first World War.

Harry H. Straus, who had had years of experience in the manufacture of cigarette

paper, recognized the fact that sooner or later a method would have to be developed whereby flax fiber could be used directly as a raw material rather than in the form of linen rags, and with characteristic courage and energy instituted, about 12 years ago, research on the utilization of seed flax fiber for the manufacture of fine papers. After three years of intensive work in the laboratory and in the paper mill, he succeeded in making a number of successful commercial runs about 1937. At the present time several mills are making flax papers, of which the Ecusta Paper Corp. at Pisgah Forest is the largest producer, turning out approxi-

mately 50 tons of cigarette and other fine flax papers per day.

This mill was announced in May 1938 and completed in August 1939. It started out to be a \$2,000,000 project, had expanded into a \$12,000,000 plant last year, and is now undergoing a third expansion program. It was President and Founder Straus' clear vision of what lay ahead and his keen personal interest in fine papers that made cigarette paper available during the war period in quantities large enough to manufacture cigarettes for our armed forces, and the ever-expanding civilian needs. It was almost an act of destiny that the first commercial order for this all-American flax paper should have been completed on Sept. 2, 1939, the day after war broke out in Europe.

Cigarette paper must be about the thickness of a human hair, yet elastic and strong to withstand the pull of cigarette machines. A strip having a width equivalent to the circumference of your cigarette must support a weight of eight pounds. It must fold without tearing, it must not stick to the lips, it must burn at the same rate as tobacco, it must be opaque, pure white and, above all, tasteless.

Consumption of flax fiber by the several mills in the U. S. in 1937 was about 150 tons, increasing annually by 200 percent up to 1942, when it levelled off at about 52,000 tons. A small increase took place last year. It is expected that this level will be maintained in 1946, but on the basis of expansion in the industry now planned, it is estimated at least a 6,000 ton increase will take place next year. An annual consumption of 60,000 tons of fiber is expected, which will require about 300,000 tons of straw per year. From that point onward, consumption will depend on the increase in cigarette paper consumption, and the increased use of flax fiber in other papers.

Flax for the Ecusta mill comes from Minnesota and California, the former supplying the greater percentage. The California flax supplied by California Central Fibre Corp. is decidedly lighter in color due to more sunlight and irrigation; however, this difference has no effect on the volume of chemicals consumed in the processing.

Decorticated flax straw in 150 to 160-lb.

bales arrives at the Ecusta mill in North Carolina in railroad box cars. Bales are carried from the cars by portable conveyors to storage in large warehouses having a total floor space of five acres, or directly to the pulp mill. A year's requirements must be kept on hand because of possible crop failure. Two sources of supply are also insurance against shortage of raw material due to crop failure. From the warehouses the decorticated seed flax straw is handled on 24 and 36-in. belt conveyors to the pulp mill.

On arrival in the pulp mill the wires that hold the bale together are cut and the fiber is loaded into the rotary spherical digesters. These steel digesters are 1,165 cu. ft. in volume and have a capacity of 4½ tons of flax. The cooking solution is made up in large measuring tanks and mixed in another tank. It is then pumped into digesters.

The straw is cooked for five hours in the alkaline liquor with 75-lb. steam pressure. When the cooking operation is complete pressure is relieved, spent liquor is drained off, and the flax pulp washed with hot water.

The contents of the digester are dumped into a trench, sluiced down with water and then pumped into an agitated storage chest. An open impeller pump is used. This type of pump overcame trouble previously experienced in handling the fibers.

From the chest it is pumped to a cast iron breaker beater where the raw stock receives a final washing and the fibers are cut to proper length for this phase of processing. This operation requires three hours. The washed and beaten stock is dumped from the breaker beater into a channel or trench below the floor, whence it is

pumped to a concrete storage chest. From this washed stock storage chest it is pumped to the bleaching system.

Bleaching is carried out in several stages: in the first, elemental chlorine is used; in the second, a caustic extraction is practiced; and in the third, the fiber is treated with hypochlorite. Washing is done by means of vacuum washers.

A Jeffery belt conveyor takes the stock to any one of 12 Bellmers, concrete chests with a mid-feather and agitation unit for circulation. Here the second stage of the bleaching occurs. Unlike the first, this is a batch operation and calcium hypochlorite is used as the bleaching agent. It is run at a very slow rate so as to control closely the quality of the final product.

Wet weights of pulp in the bleach plant processing are determined by means of a Toledo Chronoflo Weightometer. Essentially, this consists of continuously totalizing weight of fiber being conveyed in rubber belt conveyors. This device is operated entirely electrically. In such control of the wet weights in combination with a rapid moisture determination, the mill is able to determine accurately and quickly the dry weight of fiber being processed in the second stage batch system. The dry weight control is necessary in order to add the correct amount of bleach liquor.

Briefly, the pulp mill control consists of bringing pulp into a narrower and narrower band of variation so that a uniform product is produced. Each step of the operation progressively narrows the limits of variation so that the pulp is delivered to the paper mill in a remarkably high degree of uniformity. Direct control is extensively used. In other words, control is applied so as to anticipate rather than correct.

The bleached stock is dropped out of the Bellmer at a definite point, as determined by control tests. It goes to a chest and is fed to and washed on a vacuum washer. The washed stock is conveyed directly to pulp storage.

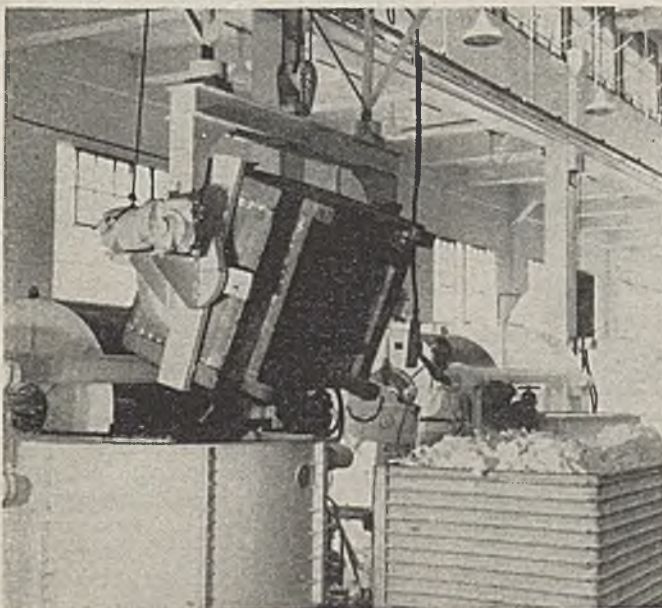
PAPER MILL

In the paper mill stock is stored in shredded lap form in galvanized iron boxes which can be easily handled by electric lift trucks. This storage does not serve any purpose other than to supply a backlog to take care of break downs and delays due to other causes in the pulp mill. Ecusta has the largest single installation in this country of Jones-Bertram beaters. They have a capacity of 1,000 lb. each, the tackle is made completely of stainless steel, the roll weighs 12 tons, and there are three bed plates. All of these beaters are tile-lined cast iron which helps in maintaining cleanliness of product and aids in circulation of stock.

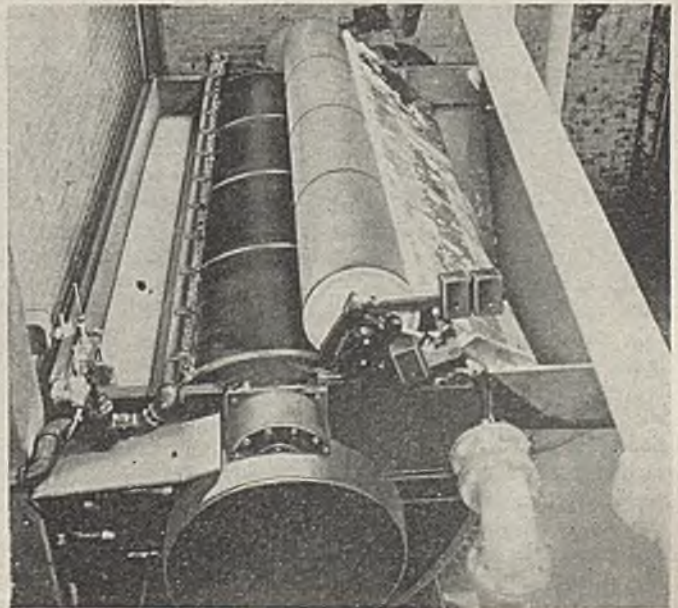
One of the unusual features of the Jones-Bertram beater is that once the stock has been handled and the proper beating action determined these operations can be reproduced by an electrically operated cam device. Each beater is equipped with a 150-hp. motor. The purpose of this beating is to cut the fiber into minute lengths and at the same time hydrate these fibers so that they will be in proper condition for forming a sheet of paper. Beating action brings out the inherent strength in the fiber. This is explained by the fact that the fibers are "frayed" which enables easy interlocking of the fibers when formed into a sheet.

When loading the beaters, the appropriate type of stock is selected and conveyed by electric truck to the aisle between the

Charging stock in shredded lap form into beaters. They have a capacity of 1,000 lb. each



Vacuum washers are used to remove unreacted chemicals from stock before it leaves the bleach plant



beaters from which an automatic crane picks up the box in its entirety, moves it into position over the particular beater to be loaded and automatically turns the box over, dumping the stock into the beater.

Great emphasis is placed in this department on control of each lot of stock being beaten. A fully equipped testing laboratory is maintained adjoining the beater room for this particular purpose.

The beaters are emptied by gravity into a machine chest where broke, filler, and water are added. The stock in this condition is constantly agitated by means of a spiral stainless steel ribbon.

Filler, precipitated calcium carbonate, is purchased to exacting specifications. The particle size and crystalline aggregates are closely controlled. Sufficient calcium carbonate is added in order to assure 22 percent in the finished paper. A carload is consumed every two days. The purpose of this filler is to enable the fibers to form a sheet of just the right tightness in order to give necessary porosity so that the paper in cigarette form will burn at the same rate as the tobacco, thus assuring desired combustion and ash.

Stock is pumped from the machine chest to an overhead stock box from which it flows by gravity through a jordan (125 h.p.). This completes the refining operation by smoothing out any irregularity or clumps of fibers. Stock flows from the jordans to a mixing box where it is diluted and mixed with white water returned from the paper machines. From here, it flows by gravity into a centrifuge where any foreign particles of a weight heavier than the pulp fibers are cast out and imbedded in a previously formed mat in the centrifuge.

Again by gravity flow, the stock passes through a series of screen plates having very small open slots. Any pulp accumulation or "fiber knots" are removed from the pulp here. The pulp fibers are now completely dispersed and flow by gravity to the machine headbox, and then onto the fourdrinier wire of the paper machines. There are eight paper machines, four have 112-in. wires, the others have 114-in. wires. They operate at 300 ft. per min.

FOURDRINIER ACTION

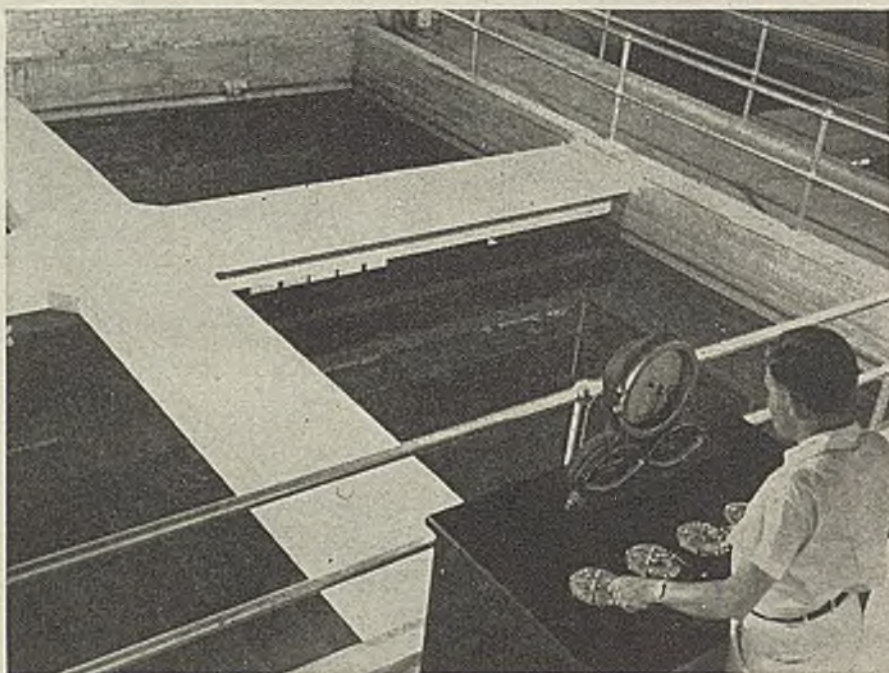
The fourdrinier wire is a finely knit mesh screen endlessly woven. The pulp suspension, which is over 99 percent water at this stage, flows over the wire, where a lateral motion called "shake" helps to interlock the fibers into an appropriately formed sheet. At the same time, the forward motion of the wire over a series of table rolls and suction boxes starts pulling out water by capillary action and vacuum, increasing the consistency of the sheet being formed so that when it leaves the wire it is sufficiently dry to be self-supporting. The wet web, as it is called, now passes onto a felt which

carries it through press rolls to increase its consistency still further. The foregoing represents the wet end of the paper machine. Water drained from the wire is the "white water" previously mentioned which is recirculated.

The paper has been dried mechanically as far as possible when it leaves the press section. The web is now carried with the aid of felts through a series of steam heated dryer cylinders with controlled surface temperature. The paper is now dry and, after passing under a series of fluorescent lights

the various offices as well as for samples.

The inspection machine previously referred to serves for further observation of the sheet over fluorescent lights where any defects that are observed can be removed. Splices are made on this machine to join broken ends caused by washing up of the paper machine which takes place at frequent and predetermined intervals. The splices also join the paper at locations where regular samples have been taken out for testing purposes. Ecusta has developed a practical method of making splices with



Papermaking requires large volumes of water, 155 gal. per lb. of paper are used at Ecusta. This filter plant has capacity of 25,000,000 gal. per day

where continuous rigid inspection is vigilantly maintained, is wound on a mandrel. When the diameter of the paper on the mandrel approximates 4 ft., it is transferred to inspection machines.

Extremely close specifications on cigarette paper make it necessary to control closely operation of the paper machine. This is done by checking the paper leaving the machine for thickness, weight, porosity, color, strength, opacity, and filler every hour, or more frequently at the discretion of the machine tender. Production samples are sent to the testing laboratory by a two-way pneumatic tube conveying system. Tests are instantly made and the findings are reported back to the operators in about three minutes. Tests numbers correspond to numbered tickets in each roll of paper from the machine. The laboratory is necessarily some distance from the paper machines so as to avoid excessive vibration and other conditions caused by the machines which would prevent accurate testing. This pneumatic conveyor is also connected with the superintendent's and main offices, and is used for correspondence between the laboratory and

an overlap of less than 0.094 in. The inspection machine cuts the machine roll into two parts. The paper is then moved by elevator and dolly to the finishing department where the big rolls are transformed into tens of thousands of narrow reels, or bobbins, by a continuous slitting machine. This is truly a precision department for the width of the bobbins—approximately one and one-eighth inches—must be exact to fit cigarette making machines. Each bobbin is 6,500 yd. in length, weighs 8 lb., and is sufficient to manufacture 85,000 cigarettes. Each bobbin is labeled in such a manner that the paper can be traced back through the entire manufacturing process, to the raw materials, the operators who handled it, and the time at which it was made. The workers are highly trained. The building is spotlessly clean. After an additional rigid inspection the paper is packed into cartons and loaded directly into waiting freight cars for shipment to cigarette manufacturers.

Not all of the output is shipped to the cigarette manufacturers for use in making packaged cigarettes on automatic machines.

Many large rolls of paper are conveyed to the adjoining plant of the Champagne Paper Corp., a subsidiary of Ecusta. Here the paper is cut in reams or made automatically into booklets for "roll-your-own" cigarettes. The average daily production in this department is 250 million cigarette leaves.

The activity at Champagne is an interesting trade barometer. When business conditions are good most smokers prefer machine-made cigarettes, and conversely, during lean years there is a great demand for roll-your-own booklets.

Two types of booklets are made. One is known as the "give away booklet" which is a loose leaf booklet containing from 12 to 24 leaves. The second type is the "5 cent booklet" containing 100 to 150 leaves. Most booklets contain a much lighter weight paper than that used for machine made cigarettes. This is necessary for ease of rolling and because the machines require a stronger paper. The entire operation is in continuous roll form from the printing to the point at which the paper is cut to size.



In spherical, revolving digesters the fiber is treated with chemicals

Ecusta is now making a line of fine flax writing and Bible papers of unusual texture and whiteness which are being offered by paper merchants throughout the United States.

Endless belts used in forming the cigarettes on cigarette machines throughout the world, except in England, are made by the Endless Belt Corp., another subsidiary of the Ecusta organization. Before the war the belts were made from linen, but cotton has now replaced the linen. After the belts are woven, they are stretched to desired length and treated with a mixture of starch, sizing, gums and oils.

Papermaking requires large volumes of water, 155 gal. of filtered water per pound of paper are used at Ecusta (the Cherokee

Indian word for rippling water). Purity and adequacy of the water supply were the determining factors in location of the plant. The Davidson River which supplies the mill has for its water shed 40 sq. mi. of the Pisgah National Park. The mill is adjacent to the park so that no one will be able to build above it on the stream. The water is very soft and contains only 25 p.p.m. of dissolved solids.

The filter plant has a designed capacity of 20 million gallons per day. By pressing, the pumps can handle 25 million gallons (enough to supply a city of 150,000 persons). Roberts filters with Wheeler bottoms are used. There are ten sand and one anthracite filters. The average life of the filter beds between back washing is 3 to 4 days. A control board can detect trouble at any point in the filter plant. Alum and lime are used for flocculation, and prechlorination and post-chlorination are regularly employed, and ammoniation when necessary. At all times, 0.2 p.p.m. of chlorine are kept in the water, and a uniform pH is maintained.

In the purchasing and in the processing of partially decorticated seed flax straw, it is necessary to know accurately the moisture content of the baled flax. This problem of getting an accurate and rapid moisture content of a bale of raw, fibrous, cellulosic material has long irked processors of straw. When this problem arose at Ecusta, a search by the research division indicated that there was not a suitable method in use in the country. The usual methods of sampling and oven-drying are far too slow when carloads of bales are being handled daily.

MOISTURE

An ideal method, as visualized by the laboratory, consisted of the application of some instrument which could be placed on the baled fiber and an instantaneous moisture content read on a meter. Thus the necessity of disturbing the bale would be eliminated, and a rapid moisture content of the shipment could be ascertained. Through the cooperation of the Moisture Register Co. of Alhambra, Calif., with the Ecusta Paper Corp., an electronic instrument, which uses dielectric leakage as its basis, was adapted to the testing of seed flax tow.

This instrument rapidly gives the moisture content of a bale of fiber by simply holding it firmly against the bale and averaging the readings at several points on the bale. The values thus obtained represent a true average moisture content of the bale contents, since the electrostatic field actually penetrates the bale.

The instrument consists of two parts: the gun, which is held against the bale of fiber, and the meter, which gives a direct moisture reading. The instrument is very rugged, requires but little maintenance, and is easily operated by unskilled help.

Among the interesting statistics about the

plant are the following: (1) 1 kw. hr. of power is required to convey 1,000 gal. of water from the river through the filtering plant to the mill; (2) In winter the mill uses 138,000 lb. of steam per hr., and in the summer season 60 percent of this amount; (3) Process steam is used at 80-lb. pressure; (4) 160,000 kw. hr. per day of 24 hours are used; (5) The mill generates 80 percent of its power and purchases the balance.

The finished product of the Ecusta mill is remarkably uniform. This means that the process depends upon close control at every step. The importance of this is emphasized by the fact that the director of inspection and control reports directly to the general manager. The 150 men and women of the physical testing laboratory and inspection department eternally strive for perfection.

RESEARCH ORGANIZATION

The management is justly proud of the research accomplishments, organization and facilities. There is one of the largest investments in research facilities for a company the size of Ecusta to be found anywhere in America. Under the able leadership of the late Dr. Fritz L. Straus, former director of research, the department was organized into fundamental research, applied research, and analytical work. And under the present direction of Milton O. Schur, the chemists and engineers are continuing to achieve outstanding results.

In view of the basic changes that have been made in raw materials and technological developments, which were underway in the domestic industry even before the war, and of the large expansion and heavy investment that have taken place in the industry, it seems probable that imports, now that the war is over, will furnish, at most, only a minor part of our domestic requirements; and they may actually be confined to relatively small quantities imported to satisfy special demands.

Most Americans have never heard of Ecusta. But every hour millions of Americans, as they light a Camel, a Chesterfield, a Philip Morris, an Old Gold, a Lucky Strike, or any one of many other brands, are handling Ecusta's product.

For this opportunity to witness the production of American cigarette paper from American raw materials with American labor, the writer wishes to express his appreciation to Harry H. Straus, president and general manager, Dr. Ward Harrison, assistant general manager, Lee M. Bauer, production supervisor and coordinator, Raymond F. Bennett, general superintendent, Milton O. Schur, director of research, R. E. Matthews, director of inspection and control, and A. M. Ream, technical superintendent.

For a pictured and diagrammatic flow-sheet of this process the reader is referred to pages 138-141.

Industrial Applications of the HEAT PUMP

DEVELOPMENTS carried on during the war have opened up vast and seemingly unlimited possibilities for the advancement and improvement of power generating and power consuming equipment in the heat-power field. In this advancement and improvement, the heat pump is qualified to play an important part, particularly in industrial heating and cooling applications, because of its inherent characteristics for efficiently converting waste or otherwise unused natural heat into a more useful form.

The heat pump cycle is not new, nor is it revolutionary. In fact it can be considered as a reversed heat engine. The heat pump absorbs power to develop heat while the heat engine absorbs heat to develop power. The same familiar temperature-entropy diagram for the Carnot cycle (Fig. 1), which represents the maximum possibilities for the conversion of heat into work for a heat engine, can also be applied to evaluate the performance of a heat pump.

Referring to Fig. 1, for a heat engine cycle, the area under the horizontal line T_h represents the heat added from an external source, and the area under the line T_c equals the heat thrown away through the exhaust. The net area of the rectangle between T_h and T_c represents the energy taken out as work from the shaft of the engine. The thermal efficiency is given by the ratio of:

$$\frac{\text{Work output}}{\text{Heat input}} = \frac{T_h - T_c}{T_h} \quad (1)$$

For a heat pump cycle, the area below the horizontal line T_c represents the heat taken in at the low temperature source, and the area below the line T_h represents the heat rejected to the high temperature receiver. The area between lines T_h and T_c represents the work required to drive the pump. When used for refrigeration, the efficiency of the cycle, usually referred to as the "Coefficient of Performance" (COP), is given by the ratio:

$$\text{COP} = \frac{\text{Refrigeration effect}}{\text{Work input}} = \frac{T_c}{T_h - T_c} \quad (2)$$

A paper presented by the authors at the recent Midwest Power Conference held in Chicago in April.
* Consulting engineer and professor of Mechanical Engineering, Columbia University, New York.

The heat pump is a reversed heat engine in which energy is applied to raise the pressure and hence the temperature of a vapor. For many years engineers have played with the idea of using the heat pump for a variety of purposes including the raising of low level heat to higher temperatures for both space heating and for process uses such as distillation and evaporation. A recent application of the idea is the Kleinschmidt evaporator used extensively by the Navy for distilling sea water (Jan. 1946, p. 129). Improvements in heat transfer surfaces and in compression equipment have given applications of this principle renewed interest and a number of possible uses.—*Editors*

The coefficient of performance of the cycle, when used as a heating machine, is given by the ratio of:

$$\text{COP} = \frac{\text{Heat delivered}}{\text{Work input}} = \frac{T_h}{T_h - T_c} \quad (3)$$

As can be seen from the temperature-entropy diagram, Fig. 1, there is no basic difference between a refrigeration cycle and a heat cycle—both are heat pumps. In the refrigeration cycle, the evaporator performs the chief function of removing heat from a space or object while, during the heating cycle, the condenser performs the chief function of supplying heat to a space or object.

It is informative to study Equation (3) for its significance. The higher the COP, the greater is the amount of heat delivered at the high temperature level for a given power input. Also, the COP increases as the difference ($T_h - T_c$) decreases. This means that the higher the temperature of the heat source and the less the spread between the two temperatures, the higher will be the coefficient of performance.

A common equipment arrangement of the heat pump, consisting of an evaporator, condenser, compressor, and expansion valve, is illustrated by Fig. 2. The pump A compresses the low-temperature, low-pressure refrigerant gas from the evaporator B and delivers it to condenser C in the form of a high-temperature, high-pressure superheated refrigerant vapor. The vapor condenses in C giving up the latent heat of vaporization, plus the work of compression, to an out-

side medium. From the condenser, the liquid refrigerant goes through the expansion valve to evaporator B where it changes from a liquid to a gas by absorbing the latent heat of vaporization from an outside medium. From surface B the low-pressure, low-temperature gas returns to the compressor suction to repeat the cycle.

As an example of the potentiality of the heat pump as a heating machine, assume that a 50 deg. F. (510 deg. F. abs.) heat source is available and the heating medium is to be supplied at 100 deg. F. (560 deg. F. abs.). By substituting in Equation (3), the $\text{COP} = 510 / (560 - 510) = 11.2$. The coefficient of performance 11.2 means that for every kilowatt-hour input (3,413 B.t.u.) as work to drive the pump, there would be $3,413 \times 11.2 = 38,225$ B.t.u. per hr. of energy delivered at the 100 deg. F. temperature level. This is far in excess of the 3,413 B.t.u. mechanical equivalent of 1 kw.-hr. which would be delivered by the direct use of electrical resistance heating elements. The difference between 38,225 and 3,413 B.t.u. per hr. represents the tremendous margin of possible saving in fuel by the application of a heat pump in those services where temperature levels are not too high.

It should be particularly noted that the coefficient of performance, represented by Equations (2) and (3), and the example given above, is the highest possible theoretical performance between two limiting temperatures. The actual coefficient of performance is always lower than the ideal by as much as 40 to 60 percent. Part of this

reduction is due to the temperature gradient necessary for heat transfer, to the losses involved in the work of compression, and to the thermodynamic cycle being polytropic instead of adiabatic, as in the ideal cases.

Even with present-day inefficiency of 40 to 60 percent, the actual coefficient of performance for the example cited (which may be from 4.5 to 6.7) is still quite attractive. As improvements and advancements are made in the design of heat transfer surfaces and compressor efficiencies, to give higher actual coefficients of performance, the heat pump will have many more practical applications as a heating machine.

As can be seen from Equation (3), the temperature level of the heat source T_s will materially affect the resulting COP. Hence, for practical applications, a heat pump will offer a high potential economy only if relatively high temperature level heat sources are available.

INDUSTRIAL APPLICATIONS

Application of the heat pump to the heating and cooling of homes, office buildings, and similar structures, has attracted considerable attention during recent years. Equal, if not greater, possibilities exist for the economical application of the heat pump in the industrial field. In many industrial plants the air temperature, humidity, circulation and cleanliness are controlled to maintain the most favorable working conditions, while in many others these factors are controlled primarily to improve the quality of the product. In the manufacturing of precision instruments, for example, uniform temperature conditions are highly desirable to maintain the close tolerances required; in spinning mills ample humidification of the air improves production by increasing the elasticity and strength of the fibers; in tobacco factories constant temperatures and humidities preserve the aroma, reduce wastage and improve both output and quality; in paper mills, printing and photographic work, temperature and humidity control aid materially in obtaining production uniformity. These and many more industrial processes where heating, cooling, humidifying and dehumidifying are required to maintain production standards offer real potentialities for the economical application of the heat pump.

The reasons for this are: First, the heat pump uses the same equipment for the heating and cooling cycle, in fact, heating and cooling can be supplied simultaneously; second, there are often several possible heat sources which will result in an exceptionally high coefficient of performance, such as water from rivers, lakes or wells, hot air saturated with steam given off during the manufacturing process, warm water used for cooling machines, and many other sources where the temperature is not high enough for direct utilization.

In addition to being used to supply both

heating and cooling, the heat pump can in many cases be used effectively to furnish heat alone. An interesting application of the heating cycle alone is the use of a heat pump to increase the efficiency of a centralized heating plant. In this cycle, illustrated by Fig. 3, the heat absorbed from the heat source by the low temperature surface (evaporator B) of the heat pump is transferred by compressor A, together with the heat equivalent of the work of compression, to the water circulating through condenser No. 1 (C). The steam passing through the turbine is condensed by the water circulating through condenser No. 2. The power generated by the steam turbine can be used to drive the heat pump directly or through an auxiliary.

The water returning from the heating system goes through condenser No. 1 where it picks up the heat supplied by the heat pump, then through condenser No. 2, where it picks up the latent heat of the steam. From condenser No. 2, it is returned to the heating system to complete the cycle. If a coefficient of performance of 4 is assumed for the heat pump, together with the other efficiencies given in Fig. 3, it is possible to get 140 percent more heat de-

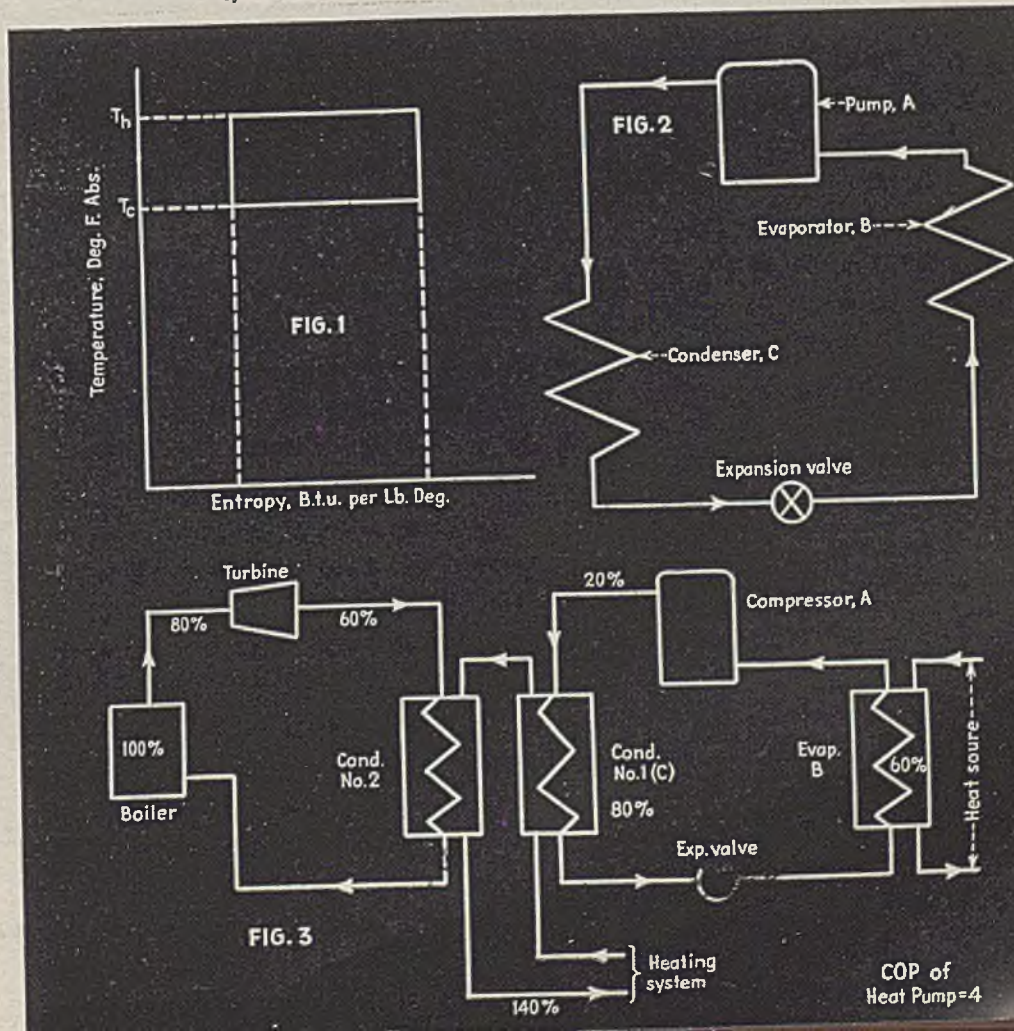
livered to the heating system than is used by the boiler. This is about 2½ times more heat than would be obtained by a conventional byproduct steam turbine heating system, and 1½ times that obtained by a low-pressure heating plant. This means for a given output the fuel consumption would be 55 to 60 percent of that for a low-pressure heating plant. Such a system is now in operation at the Swiss Federal Institute of Technology, Zurich, Switzerland, and was described in *Brown. Boveri Review*, July and August 1943.

Another important class of industrial applications where the heat pump shows great promise lies in the evaporation and distillation industries, particularly in chemical and foodstuff plants, where salts or concentrates have to be recovered from solutions while reclaiming the solvent. Since heat quantities involved in such a process are usually large and the temperature differences are small, the use of a heat pump results in a high coefficient of performance. In a typical cycle, shown by Fig. 4, the thermocompressor A compresses the vapors taken from the solution to a higher pressure and temperature, and passes them through a condenser B located in the evaporator C,

Fig. 1—Carnot cycle on the temperature-entropy plane illustrates thermal efficiency and coefficient of performance

Fig. 2—Simple heat pump cycle used for heating by reversed refrigeration

Fig. 3—Here low temperature waste heat and heat of condensation in a power cycle are combined to supply process heat



COP of Heat Pump=4

where the steam vapor condenses, giving up its latent heat of vaporization to maintain the process. The steam condensate mixture then passes on to the preheater D where sensible heat is given up to the dilute solution on its way to the evaporator. The concentrated solution is taken out at the point marked "concentrate." The pounds of water which can be evaporated per kilowatt-hour at various vapor temperatures, and at various temperature differences between the evaporator and condenser, are shown by Fig 5.³ It can be seen that 20.60 lb. of water can be evaporated per kilowatt-hour, depending on temperature of the solution in the evaporator, the nature and concentration of the substance, and the difference between the boiling point of the solution and the pure solvent.

The heat pump cycle shown schematically by Fig. 4 has great possibilities where an evaporating process is used, as in applications such as the concentration of dyes, the preparation of foodstuffs, and the concentration of unfermented fruit juices, condensed or powdered milk, table salt, and sugar.

WATER DISTILLING

Such a heat pump cycle can also be used to advantage in distillation. One practical application, which has received considerable attention, is the production of drinking water by distillation from sea water.³ Another possibility is the removal of impurities and foreign matter by distillation from the water used in manufacturing processes.

Operating results for several actual installations which employ the heat pump cycle in the evaporation and distillation field are shown in Table I. The coefficient of performance varies from 4.8 to 14.7, depending on the operating condition. The tabulation clearly shows that the higher the evaporation pressure and the smaller the temperature between the heating steam and the material to be concentrated, the higher the coefficient of performance will be.

Whether a heat pump installation will be more satisfactory and more practical than a conventional evaporator using steam from an external source, depends on a number of considerations. In using steam, it

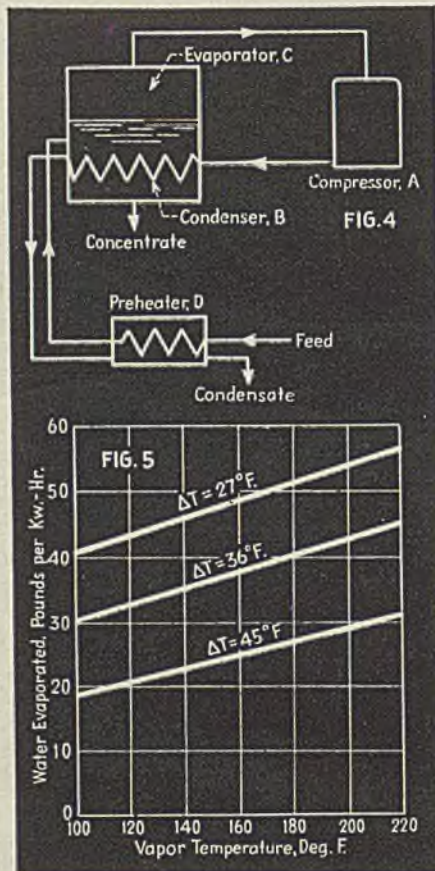


Fig. 4—Compression distillation cycle as applied in the distillation of water and in certain industrial evaporations and distillations

Fig. 5—Pounds of water evaporated per kilowatt-hour at various vapor temperatures and various temperature differences between heating steam and vapor, using a heat pump

is sometimes possible to use multiple effect evaporators, providing the maximum temperature in the evaporator is not limited. If however, it is necessary that the evaporating temperature be kept low and within narrow ranges in order to safeguard the delicate organic structure of the product, and to prevent loss of taste, aroma, flavor, and vitamin content, the multiple effect evaporator cannot be used.

Approximate capacity of single and multiple effect evaporators, per pound of heat-

Table II—Approximate Capacity of Single and Multiple-Effect Evaporators per Pound of Heating Steam Supplied⁴

Effects	—Lb. Evap. per Lb. Steam—	
	Forward Feed	Backward Feed
1	0.869	0.869
2	1.51	1.60
3	1.95	2.30
4	2.41	2.95

ing steam supplied, is shown by Table II. The larger the number of stages into which the evaporating process is divided, the smaller the steam consumption. On the other hand, the larger the number of stages, the higher the initial cost. No generally valid rule can be laid down regarding the evaporating system to be preferred, since too many factors have to be taken into consideration. The most favorable solution must be arrived at by careful investigation into the conditions prevailing in each particular case. However, it is interesting to note that for Process (1) in Table I, the amount of steam required with a single effect evaporator would be 2,531 lb. per hr., and with a four-effect evaporator, steam consumption would be 917 lb. per hr., as against 73 kw.-hr. (249,149 B.t.u.), when an electrically driven heat pump is used.

Industrial applications of the heat pump may be subject to a considerable amount of scepticism because of the prime mover drive required. Every prime mover implies a conversion efficiency of heat into work which is never better than 35 percent, even with the best and most modern power plants. A diesel engine drive in many localities is particularly weak on this score because of the additional burden imposed by the need for diesel fuel which is generally expensive compared to coal. In many cases, therefore, the diesel heat pump is uneconomical.

WHEN USE IS JUSTIFIED

There is, of course, no thought of urging the heat pump as the economic successor to all prior methods. Rather, it must be recognized that each alternate method has some advantages and some disadvantages. Under any particular local condition there is one solution which is preferable. The heat pump may fit the specifications. Consider, for example, a requirement for heat at a relatively low temperature level, where electric energy from a hydroelectric development may be available at 1 mill per kw.-hr. Examples can be found where energy is offered for sale at such a price, particularly on a secondary basis. The direct cost for this energy would be 29 cents per million B.t.u. If used in a direct electric heating operation, this would be the operating cost equivalent for fuel. This utilization might be by resistance elements, infra red lamps, induction furnaces, electric boilers, or the like. If on the other hand, a low tempera-

(Continued on page 114)

Table I—Operating Results In Evaporation and Distillation Installations*

	Energy Input, Kw.-Hr.	Evaporative Capacity, Lb. per Hr.	Water Evaporation, Lb. per Kw.-Hr.	Approx. COP	Evaporator Temperature, Deg. F.	Suction Pressure, Psi. Abs.
1. Evaporating plant handling milk products.....	73	2,200	30.1	8.9	120	.....
2. Evaporating plant handling milk products and unfermented fruit juices...	240	6,800	27.1	8.0	120	.....
3. Evaporating plant in chemical works...	94	1,540	16.3	4.8	....	0.86
4. Water evaporating plant for distillation of drinking water.....	75	2,750	36.6	10.6	212	14.65
5. Water evaporating plant for distillation of drinking water from sea water...	8.0	300	50.0	14.7	213	14.65

* Data taken from References 1, 2 and 3.

Engineering Technique Commercializes Human BLOOD FRACTIONATION

Sound engineering is as necessary for economic production of a pound of chemical drug as for a tank car of sulphuric acid. In the synthesis of chemotherapeutics, engineering techniques are contributing vital impetus to the life-saving sciences by improving quality, lowering costs and increasing output. Certainly no work is more valuable, few fields more promising to the chemical engineer. Recent applications of chemical methods in the industry have been brilliant successes; fractionation of human blood plasma is one of the latest.—Editors

DURING the war, human blood plasma became along with penicillin, sulfa drugs and other new therapeutic agents, a major factor in saving many thousands of lives on the battlefronts. Of equal importance is the

less-known fact that human blood has become the source of a number of high-molecular protein fractions for the field of therapeutics. Human blood is now a chemical raw material and blood fractionation, a chemical engineering technique that requires delicate manipulations and close control, becomes a member of our biochemical industries. The products, though small in volume, are of tremendous importance.

Human blood can be used in a number of ways, basically three: (1) As whole blood; (2) after centrifugation to remove the red and white cells, as a source of plasma to be stored in liquid form or in the dried state; (3) as the raw material, through fractional precipitation, of at least five commercial protein therapeutic agents. It is this last use that interests us the most.

THE BEGINNINGS

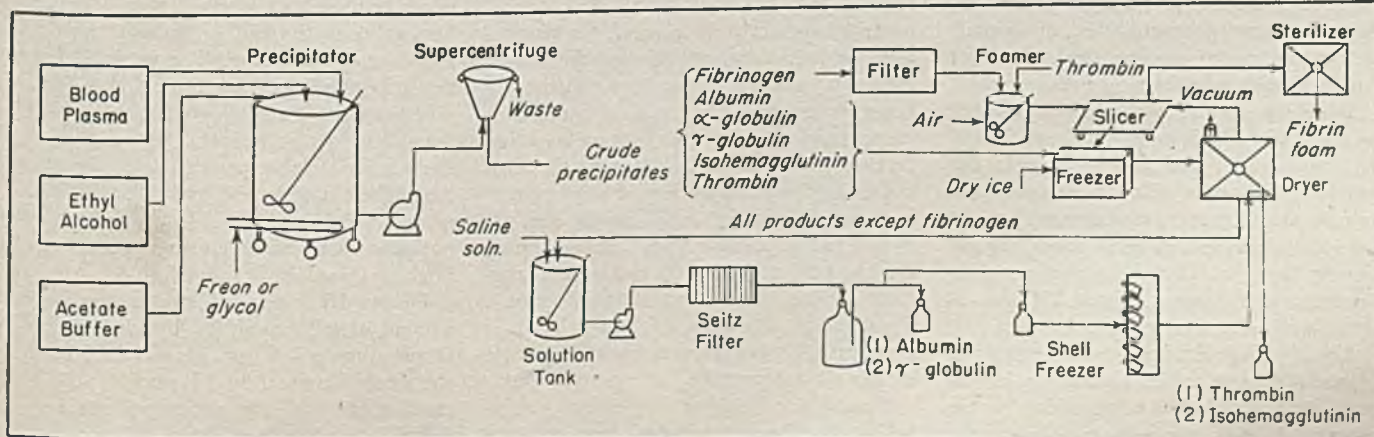
About 1935 researchers began giving serious attention to the possible use of dried plasma; liquid plasma and measles serum were then the only commercial products from human blood. Dried plasma was successfully used in 1938, then on a world-wide scale during the war.

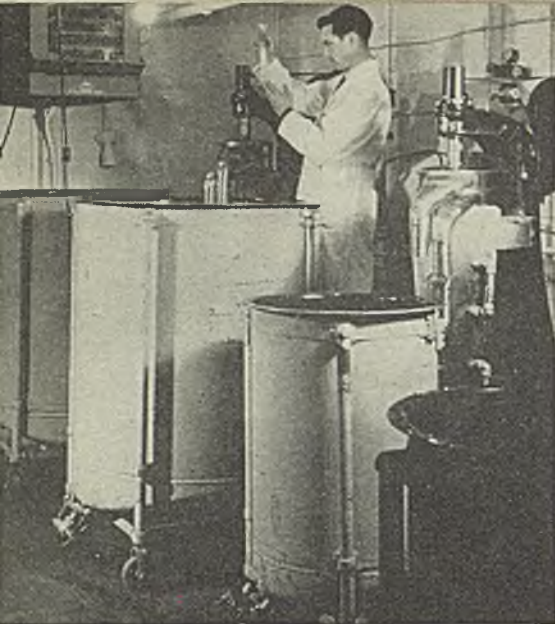
Prior to Pearl Harbor, there had been some experimentation with albumin as a

substitute for plasma in emergency treatment of shock. One of the chief researchers on this program was Dr. Edwin J. Cohn of the department of physical chemistry, Harvard Medical School. Later, working under the sponsorship of the Navy and the Office of Scientific Research and Development, Dr. Cohn and his associates worked out the present process of plasma fractionation. The method was first applied on a large scale during the summer of 1942. However, the albumin program was so urgent that little time was left for purifying other fractionation products. These crude fractions were simply stored for later purification and the pure products did not become generally available until the winter of 1944.

Originally on the albumin and blood fraction program were Eli Lilly & Co., E. R. Squibb & Sons, Sharp & Dohme, Inc., Lederle Laboratories, Cutter Laboratories and The Upjohn Co. Armour & Co. entered the program about a year later. These firms processed at the peak about 5,000 gal. of blood weekly. As the need for albumin became less urgent, the number of processors was reduced; by the end of the war only Cutter Laboratories and E. R. Squibb remained. At present, with the demands of peace only, the sole commercial firm producing albumin as well as the other plasma

Generalized flow diagram of the process used for precipitation and purification of human blood plasma fractions as applied at Cutter Laboratories, Berkeley, Calif. Cutter is the sole commercial producer of such protein therapeutic agents





Movable glass-lined and stainless steel vessels are used by Cutter in the blood fractionation process; the Supercentrifuges are stainless steel 15,000 rpm.

protein fractions is Cutter Laboratories, Berkeley, Calif.

PROCESS AND EQUIPMENT

The entire process of plasma fractionation is based on the fractional precipitation of closely related proteins from alcohol-water systems at low temperatures and with accurate pH control. Variants in the process consist of alcohol content, acidity, total salts concentration and temperature. Operations at Cutter Laboratories are carried out in a cold room at -5 deg. C.; variations from this temperature are controlled by circulating refrigerated Freon or glycol through coils in the processing vessels. Violent agitation must generally be avoided.

Since most of the precipitations occur in an acid medium, stainless steel or glass-lined equipment is most commonly used although some of the tanks are plastic-lined steel. Heavy metal contamination of the blood fluid would precipitate or discolor most of the plasma proteins. Most of the reaction tanks are on wheels and can readily be moved about. Pumps and lines for transferring the plasma liquids are of stainless steel as are the batteries of 15,000 rpm. Supercentrifuges used throughout the process to remove protein precipitates. The three Seitz filters used for sterilization of all products are of special stainless steel. They are equipped with asbestos filter pads.

Initial steps of the batch process take place in open glass-lined tanks of about 75-100 gal. capacity provided with detachable side agitators. However, dilution increases the volume as processing progresses so that vessels increase in capacity up to about 350 gal. During the war, Cutter Laboratories fractionated on an average about 750 gal. of blood weekly in five separate batches.

Alcohol used throughout the process is generally diluted to 53 percent or less to avoid heat of dilution when added to the plasma. It also prevents any large con-

taminating growths. Acidity is controlled by addition of an acid or alkaline acetate buffer salt solution.

Both technique and equipment for freezing, desiccation through sublimation, and packaging are basically the same as those for penicillin and dried blood plasma. These have been described in the literature.

FRACTIONATION TECHNIQUE

The fractionation process starts with whole blood chilled to 2-5 deg. C. This is centrifuged at 6,000-7,000 rpm. to remove the red cells, usually discarded since they can be preserved for only about ten days, as well as the white cells. The lighter layer, a mixture of proteins known as plasma, constitutes about 60 percent of the total volume of whole blood. The operating cycle of loading the centrifuge, balancing the load, centrifuging and unloading requires about 50 min.

Raw plasma, containing only 6.5 percent total proteins, has a pH of about 7.4 which must be adjusted to 7.0 with an acid acetate buffer and cooled to -2.5 deg. C. Simultaneously with chilling, ethyl alcohol is added until it reaches 8 percent by volume. Fibrinogen, representing about 7 percent of the total plasma proteins, separates out and is removed by continuous centrifugation at about 15,000 rpm. Fibrinogen removal is practically complete, and represents about 60 percent of the precipitated proteins. These molecules are fiber-like, being 20 times as long as thick.

Temperature of the supernatant liquid is lowered by refrigeration to -5 deg. C., more acid buffer added until the pH reaches 6.8 and alcohol added until it reaches 25 percent by volume. This dilution lowers the total protein content to about 3.1 percent by volume. A mixture of proteins constituting about 27 percent of all proteins in the raw plasma and designated as fraction II + III is precipitated and removed by supercentrifugation at 15,000 rpm. This fraction, which must be processed further to remove gamma-globulin, isohemagglutinin and thrombin, will be discussed later.

Acidity of supernatant liquid II + III is lowered to a pH of 5.1 while the alcohol content is raised to 40 percent; the temperature is held constant. Under these conditions a mixture of proteins constituting about 8 percent of the original proteins is precipitated. Uses for this fraction are being investigated. However, by keeping the alcohol content and temperature of the supernatant mixture constant while raising the pH to 5.8 with an alkaline acetate buffer (bringing the total salts to 0.01 molar concentration, a critical factor in this fractionation), a precipitate of alpha- and beta-globulins is obtained. This constitutes about 8 percent of the plasma proteins.

Supernatant liquid from this last precipitation has its pH adjusted with an acid

buffer to 4.8 ± 0.02 . Under this delicate condition of acidity, temperature and alcohol being held constant, a precipitate is obtained that accounts for about 49 percent of the original proteins in raw plasma. While the filtrate is discarded, the precipitate is purified by dissolving in water and warming to -2.5 deg. C and then raising the alcohol content to 10 percent while maintaining a pH of 4.8. Insoluble impurities are removed by filtration while albumin is now precipitated from the purified filtrate by chilling to -7 deg., raising the pH to 5.2 and bringing the alcohol content to 40 percent. Albumin is the fifth and last fraction to be obtained from the raw blood plasma. Largely responsible for the maintenance of blood volume, albumin is the most soluble and stable of the plasma proteins.

FRACTION II + III

Fraction II + III previously mentioned consists of a mixture of alpha-, beta- and gamma-globulins, which must be further fractionated into relatively pure gamma-globulin and mixtures of alpha- and beta-globulins in which isohemagglutinin and thrombin are concentrated. In the first step of purification, the precipitate is suspended at a temperature of -5 deg., a pH of 7.2 and an alcohol content of 20 percent and then centrifuged to give a washing effect. The wash from this can be fractionated by an alcohol and pH adjustment into a fatty material, now discarded, about which little is known.

Precipitate from the above purification treatment is adjusted to an alcohol content of 6.9 percent (the most critical factor), a temperature of -2 deg., and a pH of 5.4. The protein content is thereby brought to 1.14 percent. Precipitate III resulting from these adjustments gives rise to thrombin and isohemagglutinin concentrates while the filtrate yields gamma-globulin.

The precipitate is warmed to 0 deg., while the pH is kept at 5.4. The alcohol content is now 0.55 percent and the salt content 0.08 molar. Under these conditions one small fraction becomes soluble which, upon further fractionation, yields the isohemagglutinin-containing globulin fraction known as typing serum. The insoluble fraction is purified by raising the pH to 6.4 and precipitating out a small amount of insoluble impurities. By raising the temperature of the purified soluble portion to 22 deg. C., the highest used in the entire fractionation process, and by addition of CaCl_2 and thromboplastin made from human placentas, the product thrombin is formed.

Filtrate III is purified from a very small amount of solid impurities by adjusting the temperature to -6 deg., the pH to 5.2 and the alcohol content to 17 percent. By increasing the total salt content of the purified filtrate while keeping other factors con-

stant, relatively pure gamma-globulin can be precipitated and removed by high-speed centrifugation. This fraction contains about 60 percent of all the antibodies present in human plasma.

PRODUCTS PURIFICATION

Crude products from the fractional precipitation process outlined above must be purified and processed into a stable and convenient form for storage and shipment. All products except fibrinogen are desiccated by freezing at -30 deg. C. and volatilization of water by diffusion pumps pulling about 150-200 microns on the drying chests. The temperature gradually rises as water and alcohol vapor is removed. The desiccating process and equipment are similar to those used for penicillin. The dried products are then dissolved in a weak saline solution and passed through a Seitz filter for final sterilization. Albumin and gamma-globulin are shipped in liquid form, while thrombin and isohemagglutinin are shell-frozen after sterilization and again desiccated. The purified dried products are stable and can be stored indefinitely.

Because of its nature, fibrinogen is processed in a somewhat different manner. It is first filtered through a Seitz, then mixed with air to a froth by means of small, high-speed electric agitators. Simultaneously, a very small amount of thrombin is added as coagulating agent. Slabs of the resulting foam, frozen by placing on dry ice, are then dried by vacuum desiccation in a manner similar to the other plasma products. The dry foam is then cut into small cubes and the desiccation continued for about two hours. It is then sterilized by a heat treatment in an oven for several hours at 170 deg. C. Temperature control is important, otherwise decomposition results. This foamed fibrinogen of Cutter Laboratories is known appropriately as fibrin foam. It is always used in conjunction with thrombin to form a valuable blood-clotting agent.

Of the five commercial products now de-

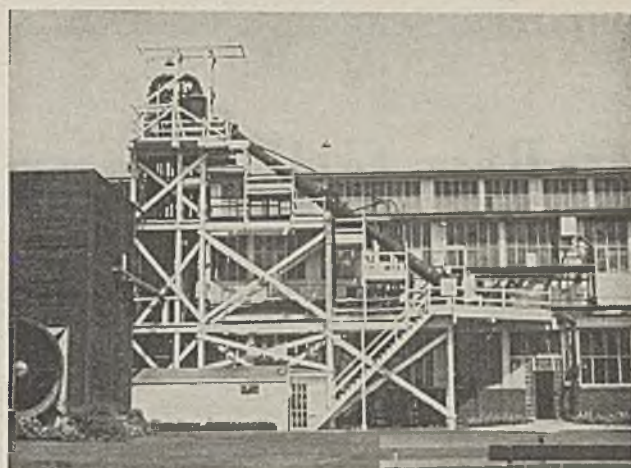
veloped from fractionation of human blood plasma, albumin alone had been prepared, and then for experimental purposes only, before the war. The remainder have been developed since mid-1942 and have become available to civilians only since September, 1945. Authorities in the field believe that more products will be developed until essentially all the constituents in human blood will find uses in the field of medicine. After all, the science of blood fractionation is young and pioneering.

Until synthetic substitutes can become competitive in price and properties to blood-derived proteins, a distant possibility because of the complexity of the protein molecules, human blood will remain the raw material for this unique and valuable biochemical industry.

Albumin—This fraction can replace plasma in treatment of shock where compact packaging is important, being approximately five times as effective on a volume basis. Not a complete substitute for plasma, it is used mostly in emergencies and in the Navy, where its small bulk is advantageous. In civilian medicine, albumin is used chiefly in the treatment of severe edema. Albumin protein is soluble in water and hence can be shipped ready for use in liquid form. Most stable of the blood proteins, it requires no refrigeration even in hot climates.

USES

Fibrinogen and Thrombin—Used together, these products form the most remarkable blood-clotting agent yet developed. Thrombin, the actual coagulating chemical, is dissolved in a saline solution, after which



This steam ejector, reportedly the world's largest, was used by Cutter during the war for drying human blood plasma

foamed fibrinogen or fibrin foam, acting as the surface on which the blood can clot, is moistened with the thrombin solution. The dampened sponge, many times more absorbent than gauze, can then be applied to an open wound and left in place to be assimilated by the body tissues. These products have been especially valuable in delicate brain surgery.

Isohemagglutinin—Fastest and most potent reagent yet found for typing blood, isohemagglutinin shows up types and subtypes within a few seconds and makes proper transfusion a certainty.

Gamma-globulin—This fraction, containing most of the antibodies in human plasma, is a concentrated passive immunizing agent and at times even a complete prophylaxis against measles. Since it is effective in very small amounts and causes no unpleasant reactions, gamma-globulin has proved especially valuable in protecting small children from the disease.

Alpha-globulin—Still in the experimental stages, this protein may some day find a use as a suspending and preserving agent for red blood cells.

Red cells—Although red cells constitute about 40 percent of the volume of whole blood, no commercial use has been found for them, primarily because of the ease with which they break down. Experimentation on stabilizing these cells is being carried forward.

Credit for supplying basic information for the preparation of this article is due Dr. Fred F. Johnson, director of chemical and pharmaceutical research at Cutter Laboratories, who has worked closely with Dr. Edwin J. Cohn of the department of physical chemistry, Harvard Medical School. It is through the courtesy of Dr. Cohn and the management of Cutter Laboratories that details of the process are here published, making this article one of the first public disclosures of the blood fractionation technique.*

* See Jour. Amer. Chem. Soc., 68, 459, 1946.

Table I—Conditions for Selective Fractionation of Human Blood Plasma¹

Step	Fraction	Conditions of Precipitation ²					Precipitate ³
		Temp., Deg. C	pH	Proteins, Percent ⁴	Total Salts ⁵	Alcohol, Percent ⁶	
1	Whole plasma.....	-2.5*	7.0	5.3	0.12	.8*	Fibrinogen
2	Supernatant from 1.....	-5.0*	6.8	3.1	0.09	.25*	Fraction II + III
3	Supernatant from 2.....	-5.0*	5.1*	1.1	0.06*	.40*	Waste
4	Supernatant from 3.....	-5.0*	5.8	0.6	0.065*	.40	Alpha- & beta-globulins
5	Supernatant from 4.....	-5.0*	4.8*	0.4	0.075*	.40	Precipitate V
6	Precipitate V.....	-2.5*	4.8*	3.0	0.01	.10	Waste
7	Soluble from 6.....	-7.0*	5.2*	2.5	0.007	.40	Albumin
8	Fraction II + III.....	-5.0	7.2	0.61	0.0032	.20	Precipitate VIII
9	Precipitate VIII.....	-2.0	5.4	1.14	0.0064*	6.9*	Precipitate IX
10	Precipitate IX.....	0.0	5.4*	2.0	0.08*	0.55	Precipitate X
11	Precipitate X.....	0.0	6.4*	0.67	0.20	0.18	Waste
12	Soluble from 11.....	22.0	6.4	0.66	0.20	0.18	Thrombin ⁶
13	Supernatant from 11.....	-5.0	6.3	1.0	0.05	.15*	Isohemagglutinin
14	Supernatant from 10.....	-6.0	5.2	0.7	0.015*	.17*	Waste
15	Filtrate from 14.....	-6.0	5.2	0.7	0.05*	.17*	Gamma-globulin

¹ At Cutter Laboratories, Berkeley, Calif. ² Most critical factors for each step are marked with an asterisk. ³ As percent by weight. ⁴ Total salts expressed as molar concentration. ⁵ Protein products are as crude precipitates and must be purified further. ⁶ After addition of thromboplastin and calcium chloride.

How to Use Metering Characteristics of STEAM JET EJECTORS

Although apparently simple devices, the characteristics of steam jet air ejectors are not well understood by many engineers, nor do most users realize that as long as an ejector is operating stably, it can be used as a metering device to determine the flow of vapor that is being drawn from an evacuated space. To do so it is only necessary to measure the suction pressure and read the discharge rate from the characteristic curve. The author shows this method in use and also explains the intricacies of characteristic curves.—*Editors*

CHEMICAL INDUSTRIES have used vacuum in production for many years. Early vacuum devices included the condenser, hand operated aspirators, water eductors and reciprocating vacuum pumps, which were a grown-up version of the aspirator. In recent years the demand has been for lower absolute pressures (higher vacuum), and more capacity. Higher vacuum has been met by development of efficient rotating vacuum pumps, diffusion pumps and steam jet ejectors. Higher capacity has been met by de-

velopment of more efficient condensers, large capacity centrifugal compressors and steam jet ejectors. It will be noted that the steam jet air ejectors aid in both the modern trends of low pressure and high capacity. This article will attempt to show why they are fitted for such services.

HOW EJECTOR WORKS

Shown in Fig. 1 is the basic ejector element in which high pressure motive steam is expanded through a de Laval type nozzle to convert pressure into velocity. The gases and vapors entering the suction diffuse into the high velocity stream. The entrained substance is accelerated while the motive stream is slowed down, the mixture (theoretically) reaching a common velocity before entering the diffuser. In the converging-diverging diffuser, the mixture velocity is reconverted to pressure, which at discharge is considerably higher than the suction pressure, but appreciably lower than the motive steam

initial pressure. The process is continuous and there are no problems of clearance or displacement, as in compressors with moving parts.

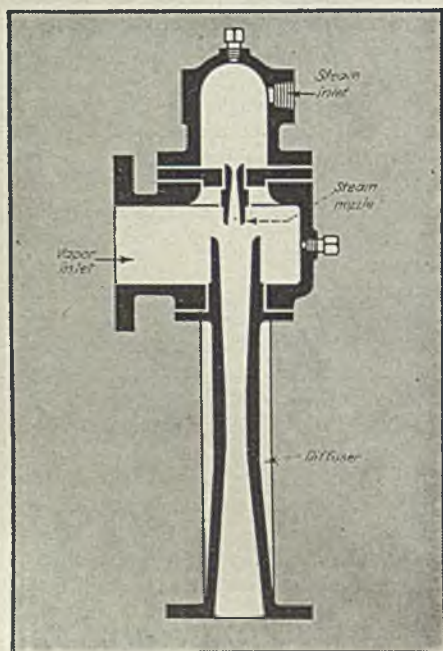
DECEPTIVE SIMPLICITY

In spite of the simple appearance of the ejector element, all parts must be carefully designed, machined and assembled. The relative position of the parts is quite critical; for example, omitting the gasket between the nozzle plate and mixing chamber, or using a thicker gasket, would seriously change the characteristic of the device.

A single ejector element works through a limited ratio of compression (discharge pressure divided by suction pressure), the economic limit being about 10:1, with the normal limit somewhat less. If greater than a 10:1 ratio is required, more than one element must be used in series. This 10:1 rule enables a simple check to be made on the minimum number of stages required to produce a given reduced pressure. Normally an ejector compresses from the reduced pressure desired to atmospheric pressure which can be assumed to be a maximum of 30.5 in. Hg abs. or in the metric system 775 mm. Hg abs. or 775,000 microns. Table I lists approximate data for maximum performance with from one to five ejector stages.

Practical considerations of operating economy usually suggest a lower compression ratio requiring more stages for the desired reduced pressure. Due to large free paths of

Fig. 1—Cross section of a typical steam jet air ejector



SOME EJECTOR DEFINITIONS

Suction condition—Physical and thermal state of entering air-vapor mixture between suction flange and point of entrainment.

Discharge condition—Physical and thermal state of mixture measured at discharge flange.

Motive steam condition—Physical and thermal state of steam at entrance to nozzle.

Stability—An ejector is stable when neither increase in steam pressure nor decrease in discharge pressure can cause

a decrease in suction pressure for a given suction vapor load.

Stable pressures — Maximum discharge pressure or minimum steam pressure for stable operation.

System pressure — Back pressure caused by external factors acting on the ejector discharge.

Break—Point at which ejector passes from stable to unstable operation.

Pickup—Point at which ejector passes from unstable to stable operation.

Fluctuation—Cyclic variation in pressure.

Bobble—Rapid variation in pressure.

molecules at extremely low pressures, the minimum values given for the five-stage machine are somewhat low although one or two experimental units have reported values of about the magnitude given.

An individual ejector element will have a characteristic curve similar to Fig. 2. The chart at the left shows percent capacity plotted against percent absolute suction pressure, and that at the right, maximum stable discharge pressure vs. suction pressure, both in percent. The significance of these curves is that as long as the actual discharge pressure is less than the maximum stable value for any given load and steam pressure,

Table I—Approximate Maximum Performance of Ejectors*

Maximum economic compression ratio...	Number of Compression Stages				
	1	2	3	4	5
Minimum reduced pressure:	10	100	1,000	10,000	100,000
In. Hg abs.....	3	0.3	0.03	0.003	0.0003
Mm. Hg abs.....	77.5	7.75	0.775	0.0775	0.00775
Microns (0.001 mm.).....	77,500	7,750	775.0	77.5	7.75

* Note: This table gives "economic limits," i.e., nearly shut-off values. Practical units at these extreme limits would normally have one more stage. In the extremely low pressure field this added stage would normally be a mercury or oil vapor operated diffusion pump.

the ejector will produce a definite absolute suction pressure such as indicated on the left hand chart. This absolute pressure-capacity relationship enables an ejector to be used as a meter. If operation is stable and at a

given steam pressure, it is merely necessary to read the suction pressure to enable the load being handled by the ejector to be read directly from the performance curve.

Fig. 3 shows the effect of steam pressure on the characteristic curve. The left hand plot is similar to that of Fig. 2 but the right hand graph shows the maximum stable discharge curves for three different steam pressures. Note that increasing the motive steam pressure enables the ejector to operate against a higher discharge pressure, while a lower motive pressure has the opposite effect. If we assume the actual discharge pressure (system pressure) corresponds to the 100 percent pressure line on the discharge pressure graph, it can be seen that the 100 percent (design) motive steam pressure curve lies to the right of the 100 percent discharge line and the ejector will operate stably regardless of the load. The 90 percent motive steam curve crosses the assumed discharge pressure line at about 40 percent of the design capacity.

If the load should drop below the 40 percent value, the capacity-suction pressure relation will no longer hold and the unit will "break," a condition marked by noise and fluctuation or "bobble" in the suction readings. At loads above 40 percent, operation will be stable. The 110 percent motive steam curve lies considerably to the right of

Fig. 2—Typical ejector performance curve for constant motive steam pressure, showing stable range and break point, for suction and discharge pressures expressed as percentage of design values

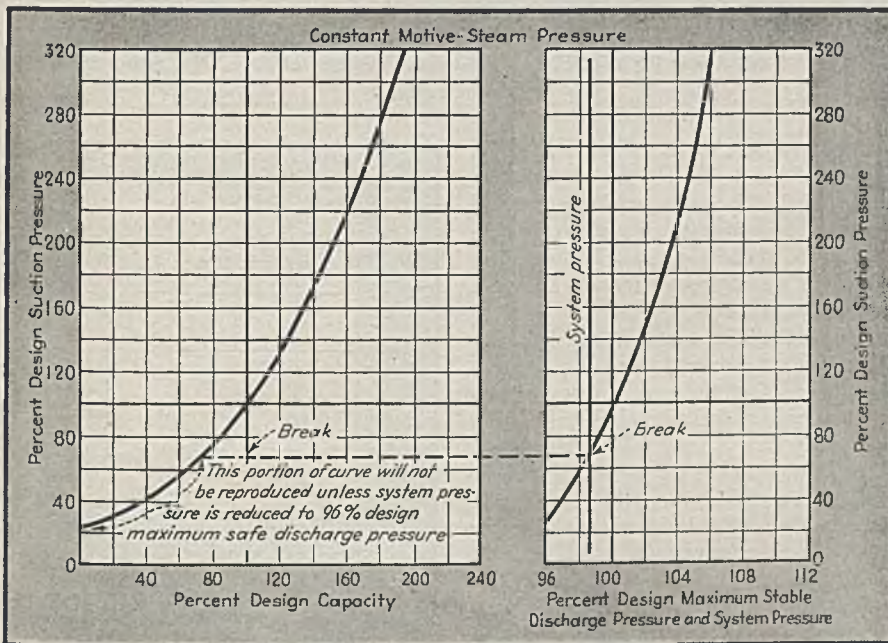


Fig. 3—Typical ejector performance curve with three different motive steam pressures showing stable range and break point, for percent suction and discharge pressures

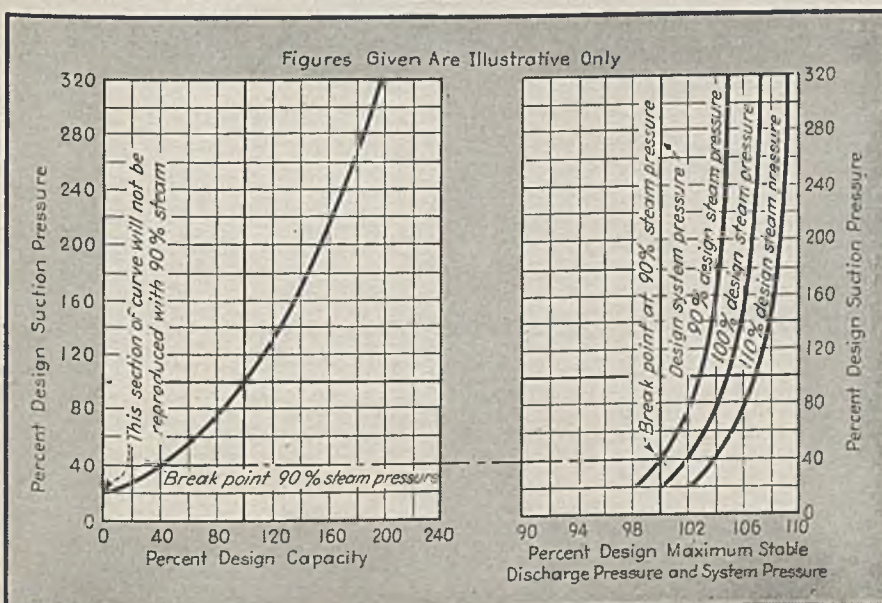
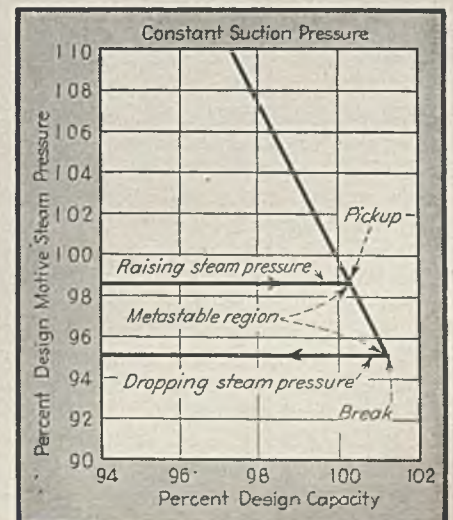


Fig. 4—Operation with steam pressure above the design value actually decreases the capacity of an ejector, while lower than design pressure causes approach to unstable operation (break point)



the assumed discharge pressure line. This means that additional resistance could be put at the ejector discharge in the form of an exchanger, heater or long length of pipe up to the limit shown on the curve for 106 percent of design system pressure. Unless this resistance is actually present there is no advantage in operating at the higher pressure. A clogged steam nozzle reduces the motive steam flow and has the same effect therefore as reducing the steam pressure.

In Fig. 3 the curve for capacity vs. absolute suction pressure shows the same value for the three motive steam pressures. Actually this is not the case although the change in capacity is small. Fig. 4 shows that as the steam pressure is increased for a given load, the absolute suction pressure decreases. Reducing the steam pressure below the design value tends to cause an improvement in suction pressure but as reduction continues a value will be reached at which the unit will break. If the motive steam pressure is again increased the absolute pressure will not re-establish itself normally at the same steam pressure at which it broke but will require a somewhat higher value known as the pickup pressure.

AVOID METASTABLE REGION

Between the break and pickup is a section on Fig. 4 that is known as the metastable region. Operation should be avoided in this region because if some local condition causes the ejector to break—a momentary drop in load for example—the unit will not re-establish the suction pressure when operation again becomes normal. The relative position of break and pickup with regards to the steam pressure is a function of the design of the ejector as well as the load on the unit. In our example of Fig. 3, the pickup pressure would be a function of the distance between the maximum stable curve and the actual discharge pressure.

A few actual examples will illustrate the use of the performance curves. Fig. 5 shows a standard ejector designed to compress 100 lb. per hour of air at a suction pressure of 8 in. Hg abs., using motive steam at 90 psi. ga. With this motive pressure the maximum stable discharge pressure is shown in the curve labeled 90 psi. ga., while other curves show the effect of 100 psi. ga. steam and 85 psi. ga. steam. The effect of this steam pressure variation on capacity is too slight to be shown.

Assume this ejector is placed on a vessel and a discharge pressure of 30.5 in. Hg abs. is read with 90 psi. ga. steam. This value is less than the maximum stable pressure so the capacity-suction pressure relationship for stable operation will hold. The suction pressure is now read and found to be 6 in. Hg abs. Referring to Fig. 5, it is found this corresponds to a load of 70 lb. per hour of dry air at 70 deg. F. If the substance being handled is near 70 deg. F. and its character-

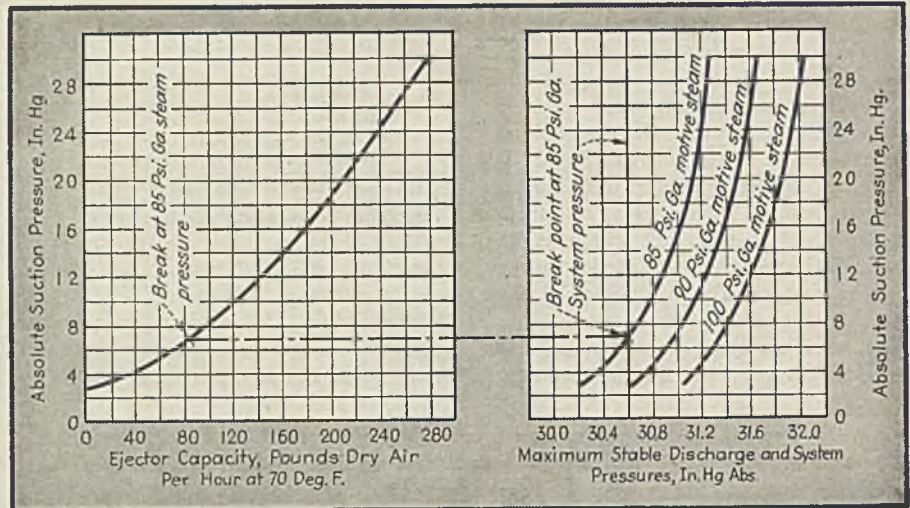


Fig. 5—Performance curve for a typical ejector having a capacity of 100 lb. per hr. of dry air at 70 deg. F., with suction pressure of 8 in. Hg, using 90 psi. ga. motive steam

istics are similar to air, the actual weight will be 70 lb. per hour. In any case, its air equivalent is 70 lb. per hour. The unit could be replaced safely with one having 70 percent of the actual capacity and steam consumption, and still maintain the desired 8 in. Hg abs. pressure.

Assume the same ejector is used on a new process and it is desired to employ the unit as a "tell tale" on the process. The first step is to determine the air in-leakage. This is done by pulling a vacuum on the system, empty and dry, until the pressure is well below the critical (i.e., below 15.5 in. Hg abs. with a 30 in. Hg barometer). Close the valve between the vacuum system and the ejector and note the rate of rise in absolute pressure. A rate of rise of 1 in. Hg per hour represents 2.5 lb. of air per hour in-leakage, or 0.55 c.f.m. of free dry air per 1,000 cu. ft. of volume. Expressed as a formula:

$$W_a = \frac{\Delta P \times V \times 0.00252}{S} = \frac{\Delta P \times V \times 0.151}{s}$$

where ΔP = rise in absolute pressure, in. Hg; V = volume of system under vacuum, cubic feet; S = time to produce ΔP , hours; s = time to produce ΔP , minutes; and W_a = free air leakage, lb. per hr. The limits of P must be below 0.53 times the barometric pressure (i.e., below the critical).

Repeat the test with the ejector shut off

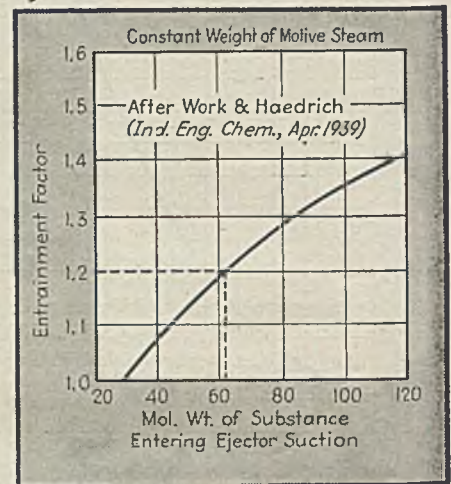


Fig. 6 — Curve showing effect of molecular weight on performance of ejectors rated in terms of air handling capacity; for example, a unit handling 100 lb. per hr. of air would have a capacity of 120 lb. per hr. of material of 61 mol. wt.

and also with it operating beyond the closed valve to eliminate the effect of leakage at this point.

After the leakage has been determined, operate the ejector on the normal process and take absolute suction and discharge pressure readings as in Table II. If the dis-

Table II—Data Recorded in Test on Release of Volatiles in a Process

Time	Motive Pressure, Psi.	In. Hg Abs.			Rate, Lb. per Hr.		Remarks
		Barometer	Suction	Dis-charge	Air Total Equiv.*	Volatile air Equiv.†	
8:30 a.m.	92	30.04	10.0	30.34	123	116.15	Process started 8:00 a.m.
8:45	92	30.04	9.12	30.34	114	107.15	Jacket steam, 40 lb. per hr.
9:00	91	30.04	8.24	30.34	106	99.15	
9:45	90	30.05	7.90	30.35	98	91.15	
10:00	91	30.05	7.75	30.35	93	88.15	Jacket steam, 60 lb. per hr.
10:30	91	30.05	7.70	30.35	92	85.15	
11:00	90	30.06	7.66	30.36	91.5	84.65	Jacket steam, 100 lb. per hr.
12:00	91	30.06	7.66	30.36	91.5	84.65	Process completed

* Air equivalent load taken from characteristic curve for various suction pressures.

† Calculated from air equivalent load by subtracting 6.85 lb. per hr. air leakage from each value.

charge pressures are less than the stable maximum, read the air equivalent load, corresponding to the existing suction pressure, from the characteristic curve. Subtracting the leakage determined from the leakage test then gives the release of volatile matter under vacuum, in terms of its air equivalent.

For example, assume the following readings are obtained using the ejector described in Fig. 5. The system volume is assumed to be 250 cu. ft. The average drop in pressure for the leakage test shows 4 in. Hg in 22 minutes. Then:

$$W_a = \frac{4 \times 250 \times 0.151}{22} = 6.85 \text{ lb. per hour}$$

The actual process shows the results recorded in Table II. The rate of release from the process is thus found for several time intervals and if rate is multiplied by the time duration for each interval a close approximation of the weight removed from the batch can be found. This weight should closely check the measured loss of batch weight during the process. If the volatile matter removed is at an elevated temperature or its characteristics are much different from air, the inventory weight loss and calculated weight loss may differ appreciably, but in the usual case there will be good agreement. An additional analysis should be made of the volatile matter to determine the percentage of condensables at the suction conditions.

SAVING WITH CONDENSERS

It should be remembered that the cheapest way to maintain vacuum is by the use of a condenser as it is much easier to pump a liquid from low absolute pressure to atmosphere than a vapor. The use of a pre-condenser either of the direct contact or surface type will usually show large operating cost savings. A direct contact condenser

using a barometric leg for water removal is usually preferred to a surface condenser as it requires less water to produce a given pressure, cools the leaving gas more efficiently and is cheaper in first cost and maintenance. A surface condenser is justified only where the condensable matter has money value, where there is insufficient height for a barometric water leg or where recovery of the heat of the motive steam and the resulting condensate is important to the plant heat balance.

The foregoing example shows that operation is stopped at a final suction pressure of 7.66 in. Hg. Reference to Fig. 5 shows that with a 30.36 in. Hg abs. discharge pressure, the unit will operate stably with 85 psi. ga. steam at this suction pressure, thus enabling steam economy to be obtained if desired. If an after-condenser were employed, it would probably add extra system pressure and operation at 100 psi. ga. pressure might be required. A quick check on the system discharge pressure would show if this higher pressure were satisfactory.

The term "air equivalent" has been used several times in this article and it may be well to define the meaning and use of this concept. Ejectors are usually tested with air as the load, as it is plentiful and easy to measure. The weight handling ability of the unit is affected by the temperature and molecular weight of the gas compressed. In general, the lower the temperature and the higher the molecular weight, the greater the weight entrained and compressed per pound of motive steam. Fig. 6 shows the effect of molecular weight. These data are predicted from experiments of Work and Haedrich (*Ind. Eng. Chem.*, Apr. 1939). In the near future it is expected that an extensive research program will be undertaken, in which various ejector manufacturers will cooperate, to secure authoritative information on the

effect of molecular weight and temperature. The data of Fig. 6 are on the ultra-conservative side. Fig. 7 shows the effect of increased temperature on the entrainment of air and water vapor. By referring to the air test of the unit and applying corrections such as shown in Figs. 6 and 7, performance with substances other than air can be predicted. It is important to note that under the same temperature conditions any given substance will be entrained by the ejector in a fixed percentage of air entrainment so that a few spot checks of actual weight balance compared with the ejector air equivalent weight will give the percentage correction.

After-condensers are often used to condense the exhaust of an ejector. The after-condenser has no effect on the steam consumption of the unit. It is used only for heat or product economy or to prevent contaminated vapor from being released to the atmosphere. Sometimes after-condensers are used to reduce the noise of operation but usually a muffler will prove cheaper and as satisfactory for this purpose.

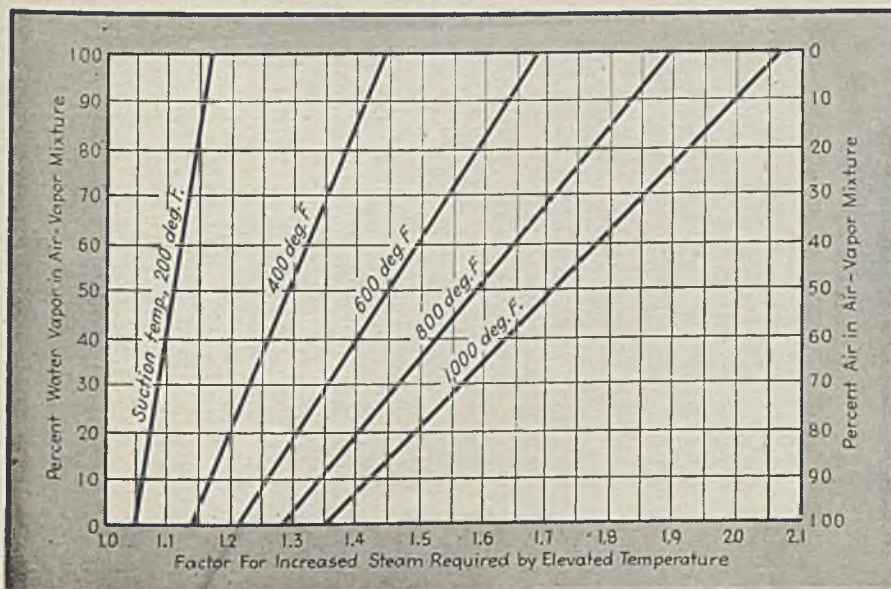
CONSTRUCTION MATERIALS

Due to the simplicity of construction of an ejector and the fact that no moving parts are employed, it is possible to use materials of construction unsuited for reciprocating or rotating machinery. For example, graphite can be used for handling corrosive vapors. Other materials such as porcelain or possibly heat resistant plastics may be used. Due to the scrubbing action of the motive steam metals that rely on protective films for chemical inertness are not satisfactory for handling corrosive vapors. Simplicity of construction makes large size ejectors fairly simple to build. Many single stage units built for refinery service take from 15,000 to 20,000 lb. of steam per hour and handle about 6 tons of air per hour at 10 in. Hg abs. The smallest practical single-stage units will use in the range from 25 to 30 lb. of steam per hour.

In general ejectors are custom built for the particular job they are to perform. The actual design involves over 14 variables so really "standard" machines are rather impractical. In order to specify a unit properly, the capacity, absolute suction and discharge pressures and the minimum steam pressure should be given. If the material handled is corrosive this fact should be noted in the specifications.

Generous sized suction and discharge lines should be used to minimize pressure drop and a steam gage should be installed close to the unit to check the operating pressure. An ejector will not work well with wet steam so a separator should be installed to eliminate moisture if necessary. A properly specified and installed ejector is light, compact and requires little attention. Its ability to meter loads is an added feature which can be used to advantage in plant control.

Fig. 7—Effect of suction temperature on steam consumption of ejectors handling mixtures of air and water vapor



Scientific and Technical Preparations for the ATOM-BOMB TESTS

Prior to taking off for next month's scheduled tests of atomic bombing, Admirals Blandy and Parsons of the Joint Army-Navy Task Force One, held press conferences in Washington to explain some of the scientific and technical features of "Operations Crossroads." Since these experiments will provide technical information and data of interest to engineers and scientists as well as to the Armed Forces, *Chem. & Met.* presents the following report of these official conferences.—*Editor*

VICE ADMIRAL W. H. P. BLANDY, U. S. N., Commander Joint Army-Navy Task Force One, announced at a press conference in Washington May 13 that the atomic bomb tests scheduled to take place at Bikini Atoll in July "are being conducted as fact-finding scientific experiments for future guidance with no interest to 'prove' or 'disprove' any present-day theories concerning military, air and naval strategy and tactics." He further assured the press that all possible facts consistent with the national security will be released promptly so that the public need have no misapprehension as to the nature of the tests nor any misconception as to their significance.

Early in the planning stages of the tests it was clearly recognized that no one test or series of tests could at the same time: (a) simulate war conditions, (b) provide the data which are desired from the purely scientific point of view, and (c) provide the data which are essential if military and naval strategists, engineers, designers and medical officers are to have the information they need in order to proceed along sound and economic lines in developing our Armed Forces.

The basic directives required that the Bikini tests provide the essential data needed by the Armed Forces. The tests are primarily planned, therefore, to determine and to measure with precision what happens at various distances when an atomic bomb is used against ships and other items of military equipment such as tanks, airplanes, radio sets, etc. Much information of value to science and technology will also be obtained, and where practicable, duplication or simulation is made of typical operating conditions.

The arrangement of the ships in the target array for the first test was reached after many factors affecting the problem were carefully analyzed by the Army and Navy and by civilian scientists. The array agreed upon is considered the best which will obtain the maximum of valuable information. It is so arranged that (a) maximum damage will be inflicted on the cluster of ships at the point of aim by one airplane dropping one bomb, and (b) a progressive decrease in damage will be inflicted on ships at increasing distances from the explosion to a point where it is intended that almost negligible damage will be encountered by ships farthest from the aiming point. A typical target array that closely approximates the exact location of the ships involved in the first test was shown by Admiral Blandy in the accompanying diagram.

In the first test about 75 targets will be exposed including more than 60 naval vessels divided approximately as follows: 5 battleships, 2 aircraft carriers, 4 cruisers, 8 submarines, 17 destroyers and 24 attack transports.

The atomic bomb which will be used in both of the tests in 1946 is the so-called "standard" type which was used at Nagasaki. According to Admiral Blandy, "It is the best type which we have available and that is the reason it is being used. There is no desire on the part of the Joint Chiefs of Staff or the personnel conducting Operations Crossroads to 'hold back' a more powerful bomb. If a more powerful bomb were now available, it would be employed."

Rear Admiral W. S. Parsons, U. S. N., Deputy Task Force Commander, in charge of technical direction, described some of the scientific aspects of the tests at an earlier conference on April 23. "Knowledge of the measurable factors of fast nuclear reactions or the phenomena connected with the explosion of atomic bombs, is limited to that secured as a result of the instrumentation at the Almagordo atomic bomb test last July and the two atomic bombs dropped by the Twentieth Army Air Force on Japanese cities last August. Naturally, in the case of the drop over in Japan, instrumentation was limited. In the tests at Bikini we are con-

Chem. & Met. and the other McGraw-Hill publications will be officially represented at the Bikini tests by Philip W. Swain, editor of POWER, who sailed on the press ship U.S.S. Appalachian from Oakland, Calif., June 12. Two other McGraw-Hill editors will see the tests but not cover it. S. D. Kirkpatrick, editor of Chem. & Met. goes as a non-participating scientific observer and Donald G. Fink, executive editor of Electronics is a member of the Navy party aboard the electronics control ship.

cerned with both the evaluation and analysis of damage to ships, equipment and material, and with every possible measurement of the phenomena incidental to the detonation of the bomb. Personnel for the staff section concerned with instrumentation have been provided by the Manhattan Engineer District and other Army and Navy agencies. In addition, civilian governmental agencies, universities and scientific institutions have contributed a number of scientists."

In so far as bomb operations are concerned, the responsibility will be that of the Los Alamos Laboratory of the Manhattan Engineer District which will deliver two bombs ready for use. The director of that laboratory is Dr. N. E. Bradbury, and the

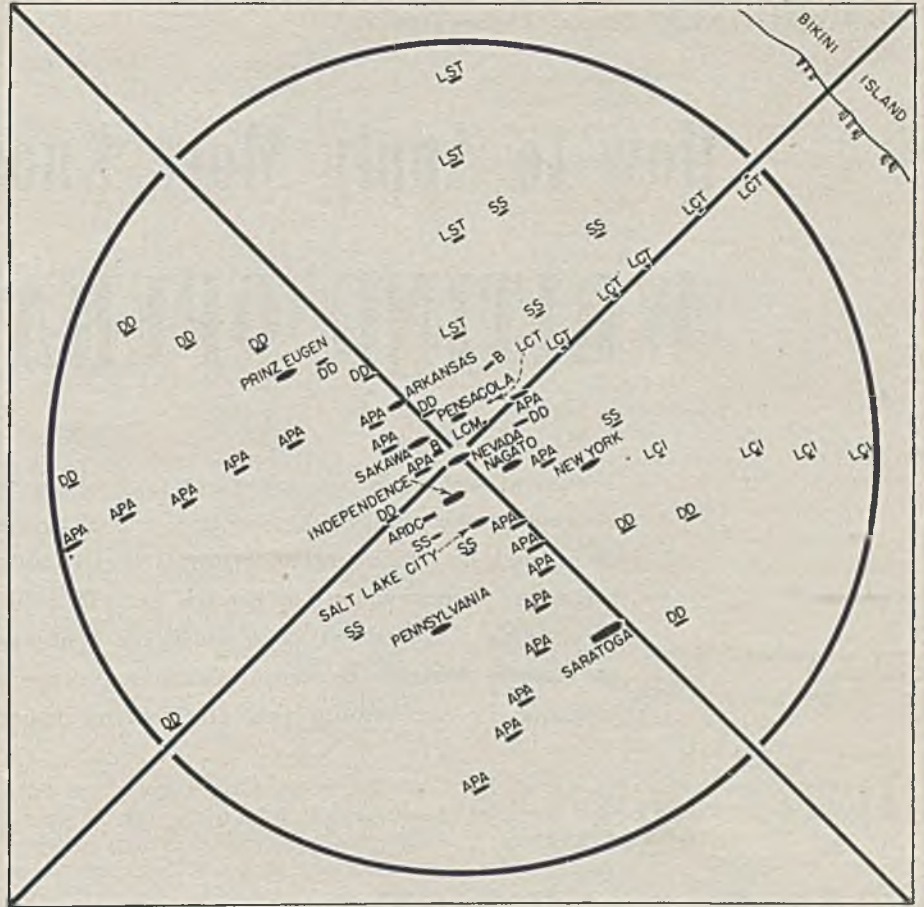
Los Alamos representative responsible for the bomb assembly is Roger Warner.

The section of the technical staff concerned with the measurement of flash, pressure and shock is composed of civilian scientists from the Los Alamos Laboratory, civilian and service personnel from the Navy Department of Ordnance and Ships, as well as a Navy drone unit from the Carrier U. S. S. Shangri-La and an Army Air Force drone unit. Instrumentation is required to measure air flash, under-water pressure, shock-wave velocity, by the Bureau of Ordnance parties who will be concerned primarily with pressure shock in free air and water (independent of ship structures) as functions of distance and time.

The most numerous instruments will be ball crusher gages and aluminum foil meters. The former measures air pressure by the deformation of a soft copper ball by a steel piston in a narrow cylinder. The latter measures air pressure by the rupture of aluminum foil. Other instruments will measure underwater pressure-time curves, peak pressures and shock-wave velocity.

Electromagnetic propagation and electronics are coordinated by Dr. E. W. Thatcher, with the work carried on by Captain C. L. Engelman of the Navy Bureau of Ships and Colonel D. F. Henry of the Army Air Forces. They will make studies of the effects of the atomic bomb explosion on the propagation of electromagnetic waves. Colonel S. L. Warren of the Manhattan Engineer District will be in charge of radiological safety. This includes the responsibility for measurement of radiological phenomena in areas to be entered by various personnel and for tracking the movement of radioactive air and water masses caused by the blast. Radiation is under the direction of Dr. M. Holloway of the Los Alamos Laboratory.

Admiral Parsons concluded his conference with this statement: "Reports prepared by the various sections of the instrumentation



DD Destroyer	LST Landing Ship Tank	LCM Landing Craft Mechanized
SS Submarine	LCI Landing Craft Infantry	ARDC Floating Drydock
APA Attack Transport	LCT Landing Craft Tank	B Barge

This is approximately how ships will be arranged in target array at Bikini

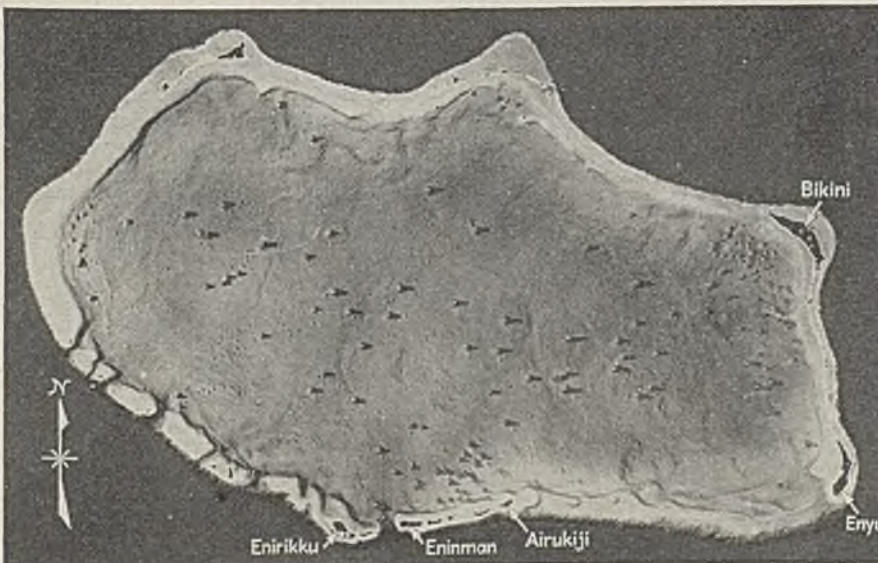
staff will be submitted through the technical director of the Task Force Commander. He in turn will make them available to the Joint Chiefs of Staff's Evaluation Board and the President's Evaluation Commission. On the judgement of these two agencies, based on observation of the tests themselves in

consideration of the scientific findings, the final evaluation of Operations Crossroads will rest. It is the responsibility of the technical staff to see that these agencies are provided with as full scientific record as possible.

It has been estimated that about 42,000 people will be involved in the Bikini tests—90 percent of whom will be Navy personnel. There will also be about 1,000 people in the groups that carry out the instrumental tests and measurements. Approximately half of these are civilian scientists and the remainder are technical officers and personnel from the Army and Navy. Both university and industrial laboratories will serve as contractors in providing specialized equipment and personnel and also in carrying out the various tests. It is estimated there will be 10,000 instruments involved.

Bikini Atoll and Lagoon in relief

Bikini Atoll is about 500 miles south of Wake Island, in the Marshalls at Lat. 11° 31' N. and Long. 165° 34' E. The atoll is 21.5 miles long and includes over 20 islands of which Bikini is the largest. The comparatively shallow lagoon, averaging about 20 fathoms depth, is studded with "coral heads," shown in the relief map, many of which have been blasted out.



How to Apply More Know-How to WRITING OPERATIONS

Technical writing is an important part of an engineer's job. Many engineers, however, tend to shy away from this phase of their work on the mistaken grounds that it isn't engineering. Quite the contrary, written reports are often the only record of a man's achievement upon which his professional progress may partly depend. Herein, the author outlines some points to consider in performing this engineering function.—*Editors*

HAVING TROUBLE with your writing? Do your reports fail to express your exact meaning? Do you feel that the chore of writing is ruining a good engineer? Then, perhaps you haven't looked at your own

manuscripts critically enough to see their more obvious flaws.

Typical faults betrayed by the writings of engineers are: (1) Insufficient exploration of reader-audience and reader interest; (2) hazy

understanding of purpose of writing each specific manuscript; (3) anxiety to start writing before all materials have been collected and sorted; (4) lack of discrimination in determining relative importance and

Table I—Reader Survey

1. Who are the readers?
 - a. Known to you?
 - b. Or unknown to you?
 - c. How many of them?
2. How well do you know them?
 - a. As individuals?
 - b. As groups?
 - c. On basis of what common interests?
3. How well do they know you?
 - a. From previous contacts?
 - b. How well do they recognize your authority?
 - c. Can you write directly toward any individual as typical of the group?
4. How much of your language do they know?
5. How much of your subject do you want them to know?
 - a. From common knowledge for information?
 - b. Of new knowledge for information?
 - c. Why is this new knowledge important to them?
6. How capable are they of understanding your important points?
 - a. What analogies will best illustrate your points?
7. Where do you meet them?
 - a. On common ground?
 - b. On their ground?
 - c. How formal must be the approach?

**Table II
Subject Evaluation**

1. Why choose this subject?
2. How urgent or timely is it?
 - a. Is your interest high or low?
 - b. Is the reader's interest high or low?
 - c. Is action pending upon completion?
 - d. Does it cover an investigation being discontinued?
 - e. Has the subject short-life or long-range interest?
3. How came you to be an authority?
 - a. Intense personal interest?
 - b. Possession of personally acquired new information?
 - c. Strong feelings demanding expression?
4. What is to be accomplished by an additional report?
 - a. Rounding out the record?
 - b. Correcting misconceptions in the record?
 - c. Informing a new and uninformed audience?
 - d. Changing established custom significantly?
 - e. Persuading to new belief?
 - f. Assuring adequacy of status quo?
 - g. Warning of serious consequences resulting from neglect?
 - h. Proposing new, important action?

pertinence of ideas; (5) overloading article with too many subsidiary thoughts that weaken attention placed on important ideas; and (6) reluctance to assume strongly critical attitudes in revising manuscripts.

These flaws are common to novice writers. However, the mechanics of good writing can be learned. Faced with the necessity for writing salable material or else, professional writers liquidate those habits that sap reader interest and assume techniques that improve their writing abilities. Engineers can acquire a similar know-how.

Many habits, hints, and helps, extracted from writers' opinions on the art of writing are shown in the following tables.

Tables I, II and III consist of three series of check-list questions. Reader survey focuses attention on reader interests and capacity to understand subject matter. Subject evaluation answers two questions: "Why write at all?" and "Why is this subject important, now or ever?" Consideration of timeliness and urgency gives the writer better perspective. Material selection aids in picking those ideas most effective in presenting the subject to the reader.

These three series of questions will help the engineer-writer to frame a better conception of why, for whom, and what material to use in a particular writing task. The process of answering before writing prepares his own mind before he attempts to influence others.

Table IV carries an outline of craft "secrets" that can be very helpful. The details are laid out in engineering terms. In fact, the actual writing process can be organized into typical engineering functions: Design, manufacture, process inspection, product inspection, and packaging.

Design covers the old familiar outline, the writer's equivalent of a set of blueprints. The importance of design cannot be over-emphasized. Scarcely any fault reveals itself in poor writing more frequently than the lack of imagination and lack of forethought in planning.

Product inspection demands the highest standards of performance. Salvage and touch-up of sound, rough forms are not merely permissible. They are essential. Even though this calls for sterner discipline than the engineer usually applies to his writing, this high quality inspection only matches his customary standards in technical work.

Habits formed by using material covered in these questions and operations will give the engineer different viewpoints on know-why and different techniques in know-how of the art of writing. Although this habit-forming practice may not make a polished fluent writer of him, it can lead the engineer to better craftsmanship, to an expansion of his creative imagination and thinking capacity, and perhaps, to greater personal advancement.

**Table III
Material Selection**

1. What new material do you have?
 - a. What part is fact?
 - b. What part is opinion?
2. How does it fit into existing common knowledge?
 - a. Confirming?
 - b. Disproving?
 - c. Supplementing?
 - d. Forming a minor contribution?
 - e. Forecasting major changes?
3. What has already been said on the subject?
 - a. Who handled it?
 - b. Before what audience?
 - c. Are all the facts recorded?
 - d. Are all significant opinions expressed?
 - e. How well has the subject been covered?
4. What remains to be said on the subject?
 - a. New facts to be disclosed?
 - b. Stated opinions to be supported or refuted?
 - c. Are these new facts or opinions worth stating?
5. How much common knowledge can be incorporated?
 - a. How much is needed to set up your points?
 - b. Is it duly credited to sources?
 - c. Have the readers any prejudice against including common knowledge?
6. What is the best approach to use?
 - a. Direct reporting?
 - b. Historical development?
 - c. Interpretation of significance?
 - d. Challenge to new thinking?

Table IV—Sequence of Operations in Manuscript Preparation

SCRIPT DESIGN

1. Group related items, ideas, and opinions.
 - a. Write each idea on a separate slip of paper.
 - b. Reduce all data to final form and list conclusions to be drawn from them.
2. Pick items for special emphasis.
3. Determine length of script.
 - a. Determine interest span of readers.
 - b. Ascertain acceptable length from typical reader.
4. Arrange items in outline form.
 - a. Put main points early, saving one strong point for end.
 - b. Juggle order to secure continuity of flow and interest.
 - c. Let naturalness and individuality guide within these limits.
 - d. Abide by known reader habits.
5. Give proposed vocabulary a quick mental inspection.
 - a. Reduce number of unfamiliar words; aim at ratio of 4:1 familiar: unfamiliar.
 - b. Eliminate prejudice-invoking words.
 - c. Substitute short, synonymous words.

SCRIPT PRODUCTION

1. Write first draft from outline.
 - a. Work at top speed.
 - b. Let it write itself.
 - c. Minimize interruptions; segregate yourself, if possible.
 - d. Mix fact and feeling.
 - e. Reach for the active, vitalizing verb.
 - f. Save rough spots for revision.

PROCESS INSPECTION

1. Quick-check first draft.
 - a. Are all ideas incorporated?
 - b. Did you say what you wanted to say?
 - c. Do you mean what you said?
 - d. How fast does it read back?
 - e. How smooth does it flow?
 - f. Has it the makings for revising?

PRODUCT INSPECTION

1. Revise, if worth revising.
 - a. Let rest a day or two, if schedule permits.
 - b. Read quickly for flow and interest.
 - c. Check order of arrangement.
 - d. Look for ideas out of order.
 - e. Check correctness of grammatical construction.
 - f. Substitute active verbs for participial phrases.
 - g. Check for consistency of tense.
 - h. Decide what parts can be trimmed to meet 10, 20, and 40 percent condensations.
 - i. Ask question: Where can it be improved?
 - j. Execute answer to that question.
 - k. Ask second question: Where else?
 - l. Execute answer to that question.
 - m. Guinea pig the revision on some relentless critic.
2. Re-revise.
 - a. Repeat cycle of operations in previous inspection.

PACKAGING

1. Have revised script copied in clean, easily read form.
2. Send promptly to intended audience.

German Process for Manufacturing ACTIVATED CHARCOAL

An interesting phase of the German chemical industry is the manufacture of activated charcoal. This article, based on the author's observations and interviews while on a military mission in Germany during August 1945, describes the important processes used by leading manufacturers.—*Editors*

MAJOR uses for activated charcoal in Germany were: military respirators, solvent recovery, and decolorizing and water purifying. Four major processes were employed to manufacture activated charcoal as follows:

Type of Activation	Activating Agent	Carbonaceous Material Generally Activated
Chemical	ZnCl ₂	Peat
Chemical	K ₂ S	Peat
Chemical	KCNS	Peat
Gas	H ₂ O	Beechwood charcoal

Variations from the above, e.g., gas activation of peat, were used also, but only to a limited extent. Some research had been carried out on the production of activated charcoal for military respirators from coal, but the results had not been satisfactory in that military specification requirements could not be met.

ZINC CHLORIDE ACTIVATION

Information on the zinc chloride activation process was obtained by inspection of the I. G. Farbenindustrie Aktiengesellschaft plant, Leverkusen, and interview with personnel there. The method had been developed prior to 1939 and, except for certain modifications in the production of respirator charcoal, was represented as having been used without change during the course of the war.

The I. G. zinc chloride process could be applied to the activation of sawdust, wood charcoal, peat, and similar carbonaceous materials. However, it was stated that carbona-

ceous materials such as sawdust and wood charcoal resulted in activated products with pores of too-large diameter for the desired adsorptive capacity of toxic gas at low partial pressures. Therefore, only peat was used for the manufacture of respirator charcoal.

RESPIRATOR CHARCOAL

Delivery to the plant is either by rail or barge. At the plant the peat was ground by passage through a Utica or similar German type hammer mill provided with a 1.5 mm. diameter mesh outlet screen. The true particle size of the material from the mill is considered to be much less than 1.5 mm. diameter, but because of a tendency to agglomeration the true size is not known with certainty. Careful control of fineness of grinding is considered by I. G. personnel to be unimportant. The ground peat is conveyed pneumatically from the mill to storage bins.

Zinc chloride is delivered to the plant in tank cars, as a 45 percent solution. Except for requiring the solution to be of somewhat less than the equivalent chloride to zinc content in order to decrease corrosion, no precise control was applied to the quality of the material used.

Either dough mixers or pug mills, made of steel, are used for mixing the ZnCl₂ solution and the peat. These materials are fed to the mixers at rates calculated to give a ratio of 70 parts of peat to 30 parts of 100 percent ZnCl₂. Certain of the original mixers are jacketed but it was found that heating was not necessary—a sufficient exothermic reaction occurring during mixing to raise the temperature of the mix to about 50 to 60 deg. C. Neither the time nor temperature of mixing are carefully controlled, the criteria for an adequate mix apparently being to run long enough to insure complete contact between the ZnCl₂ solution and the peat, and at a high enough temperature to yield a plastic product.

From the mixers the material is transferred on conveyors into vertical hydraulic multiple-orifice extrusion presses. These are in pairs, one press being loaded while the

other is being operated. The presses are built of steel, not specially designed but of a type used for the production of spaghetti. About 110 liters of mix are extruded per batch, at a pressure of 150 kg. per sq. (approximately 2100 lb. per sq. in. The diameter of the extrusion is 2.2 mm. for normal respirator purposes but might be varied with the use intended for the final product. It was stated that larger diameter extrusions would make no appreciable difference in the quality of the product as measured by the capacity for adsorbed gas, although the rate of absorption would be slower than with finer extrusions. Extruded "spaghetti" drops into the hopper of a bucket conveyor leading to the inlet of the preliminary activator.

PRIMARY ACTIVATION

Preliminary activation is conducted on a continuous basis in brick lined, countercurrent flow, direct gas fired, horizontal rotary kilns which were 20-27 m. long by 1.5-2.0 m. internal diameter. Retention time is about 2 hours. Inlet temperature of the heating gas is 900 deg. C., maximum carbon temperature 700 deg. C., with the temperature of the evolved gas about 200 deg. C. The evolved gases, essentially moisture, ZnCl₂, and HCl, are passed to multiple scrubbing towers for recovery of the ZnCl₂ and HCl. The steel recovery towers are lined with acid-resistant brick lined for scrubbing the initially hot gases, and rubber lined for the cooler gases. Recovered solution from the towers is pumped into cast iron tanks for concentration. These tanks, originally procured for concentrating sulphuric acid, are direct gas heated and are said to last 1 to 1.5 years before requiring replacement. Charcoal from the preliminary activator kiln is dropped into metal cans for cooling and transporting to the leaching section of the plant.

Leaching is conducted in acid-resistant brick lined vats, each holding about 2000 kg. of charcoal. The vats were originally provided with paddle agitators but these were discontinued and pumps provided for recirculating washing liquors through the beds

of material. The contents of each vat are first treated with hot 3 percent HCl to react with and dissolve zinc oxides. The acid solution is then drained and pumped to the ZnCl₂ recovery system. The material is then washed with hot water to remove the chlorides. Removal of zinc is considered to be easily accomplished, control on the washing operation being, rather, a test for residual HCl. A solution of CuSO₄ of concentration depending on the copper content desired in the finished product, is then added to the vat and circulated until sufficient copper had been absorbed by the granules. Addition of copper is for the purpose of improving the adsorptive properties of the charcoal for hydrocyanic acid gas. The contents of the vat are next treated with a 5 to 6 percent solution of K₂CO₃ or KOH, then washed to give a product of 2 to 3 percent alkali content on a K₂CO₃ basis. Leaching and impregnating generally requires 24 to 36 hours, after which the washed and impregnated charcoal is removed manually and dried by passage through a small direct-fired, unlined, rotary kiln at a temperature of 120 to 150 deg. C.

SECONDARY ACTIVATION

The product at this stage of the process possesses a high adsorptive capacity for gases such as CCl₄ and C₂H₆ when dry and at high relative pressures. However, it had been found that when humidified or when tested at low relative pressures of gas, its adsorptive properties were low, thus making the charcoal unsatisfactory for use in respirators. Calcination at elevated temperatures or a secondary activation with steam were found to correct these deficiencies materially, presumably through a modification in the surface complexes of the carbon. Accordingly, the production of carbon for respirator purposes was revised to include a second activation step. This second activation is conducted in a rotary kiln similar to that for the first activation, at a maximum carbon temperature of about 850 deg. C., using about 8 kg. of steam per kg. of product produced. The final product is cooled, screened, then generally sprayed in a rotary tumbler with pyridine and aqueous AgNO₃, respectively for improving the protection given against cyanogen chloride and arsine. Separate atomizers are used for each phase of this treatment.

The capacity of the unit plant described above is 2 metric tons per 24 hour day, with an overall yield of 20 to 22 percent charcoal and 2 to 3 percent fines on an air-drier peat basis. Fines from the process are sold as decolorizing carbon and not reworked, because of possible damage to the extrusion press equipment.

SOLVENT RECOVERY CARBON

Production of activated charcoal at I. G. for solvent recovery uses is similar to that for respirator charcoal. However, require-

ments for adsorptive quality, particle size, and hardness are not as critical as for respirator charcoal, permitting a considerable reduction in plant control and the use of wood, wood charcoal, and other possibly less expensive carbonaceous materials in addition to peat.

The peat and other carbonaceous materials, either separately or in mixture, are ground in the same manner as for respirator carbon, and mixed in the same type of mill with about the same ratio of zinc chloride solution. However, the precise proportion of zinc chloride is not of as great importance and is not as carefully controlled as for respirator charcoal production. The plastic mixture is dropped into continuous, horizontal, "meat-grinder" type extruders placed directly beneath the mills, and the extruded 4.5 mm. diameter strands conveyed to an activating kiln similar to that used for the primary activation of respirator charcoal. Cutting of the strands is unnecessary, sufficient breakage apparently occurring during activation. Operating conditions of the kiln are the same, and the calcined product was treated with hot 3 percent HCl and washed in the same type leaching equipment, as for respirator charcoal. Washing is generally conducted until the carbon is free from acidity, with no subsequent alkali treatment, although this might be varied if desired.

The washed granules are dried in the same manner as for respirator charcoal. Since the solvent recovery carbons are generally intended for use in relatively high partial pressures of vapor and relatively dry atmospheres, the secondary activation step is not required. The dried carbon is screened and packed for shipment. Overall yields and plant capacity are the same as with respirator charcoal.

DECOLORIZING CARBON

Peat, sawdust, and other similar raw materials, selected apparently on the basis of availability and cost, were used for producing decolorizing carbon. The ground material is mixed in a pug mill, using 1 part of peat or sawdust to 2 parts of ZnCl₂ solution. The mill is located directly above the inlet to a kiln of the same type used for the primary activation of respirator charcoal, the mud-like mixture dropping directly into the kiln. Operation of the kiln is similar to that for primary activation of respirator charcoal, and at the same temperature.

Material from the kiln is washed in the same manner as for solvent recovery carbon. After washing, the wet slurry is pumped to a ball mill and wet-ground to pass a German No. 80 (6400 mesh per sq. cm.) sieve. From the ball mill the material is passed to a rotary filter, and the filter cake then dried. Drying takes place at 100 deg. C. in a vertical disc-dryer using steam-heated discs, of the type used in Germany for drying brown coal. The dryer at Leverkusen, containing 10 discs, was built by the Benno Schilde Maschinenbau A. G., Hersfeld. It was stated that

other type dryers had been used and operated satisfactorily, but this type was preferred because of economy of operation.

K₂S AND KCNS ACTIVATION

As stated above, it had been found by the Germans that unless a second activation or calcination step was used, ZnCl₂ activated charcoal was unsatisfactory for respirators because of poor adsorptive properties in humid atmospheres and at low partial pressures of toxic gas. The secondary treatment is of some benefit, but the product is still not completely satisfactory. Means for producing a more satisfactory carbon were examined by I. G. and it was found that the use of K₂S instead of ZnCl₂ resulted in considerable improvement in the product. A process was developed for the manufacture of respirator charcoal by the K₂S activation of beechwood charcoal, coconut shell charcoal, fruit pits, and peat, and plants utilizing the K₂S process were erected at Premnitz and Langelsheim by the Deutschen Aktivkohlegesellschaft in 1942.

The Deutschen Aktivkohlegesellschaft was the controlling combine for the I. G., Degussa, and Metalgesellschaft for Germany for military gas mask charcoal business. According to the Leverkusen personnel, the KCNS process was originally developed by an independent concern as a subterfuge for using the K₂S process without infringing on the I. G. K₂S patents. Both processes involve recovery of activating agent and after passage through one activation the KCNS is converted to K₂S, after which the processes were reputed to be identical. In order to clarify the patent set-up the KCNS patents were stated to have been purchased by I. G.

The reasons for the superiority of K₂S and KCNS activated charcoals over ZnCl₂ activated material have been studied. According to the Leverkusen personnel, it is believed that ZnCl₂ activation imparts a hydrophilic surface complex to carbon which is partially converted to a hydrophobic complex by calcining or steam activation, whereas sulphur-containing activating agents are thought to yield a hydrophobic type of surface directly. The superior adsorptive properties at low partial pressures of gas are attributed to a smaller-diameter pore structure with the sulphur-containing activating processes.

SUPERIOR PRODUCT

The K₂S and KCNS processes were used primarily for producing respirator charcoal, and perhaps some solvent recovery carbon. For normal solvent recovery purposes ZnCl₂ charcoal is considered superior because of greater capacity at high relative pressures of solvent. Because of high cost as compared with other processes, and because the pores are considered too small for the adsorption of other than gas molecules, neither K₂S or KCNS activations were used for the manu-

facture of decolorizing carbons. For producing respirator carbon, the process is similar to that with $ZnCl_2$. About 0.4 parts K_2S or $KCNS$ and 0.4 part of KOH in the form of saturated solutions are used per part of peat or charcoal, and the materials mixed in a manner similar to that in $ZnCl_2$ activation. The mixture is either then directly extruded or else first partially dried at 110 deg. C. and bound with tar. The extruded product is then calcined in indirect heated, brick lined, rotary kilns. Since the material is readily ignited, the heating is very carefully controlled at temperatures just below the ignition point. The product is washed, dried, and treated with the usual impregnants, using equipment similar to that with $ZnCl_2$. No secondary activation is necessary.

STEAM ACTIVATION

Information on the steam activation process was obtained by inspection and by interviews at the Deutsches Gold-und-Silber Scheideanstalt plant, Brilonwald, Brilon. Steam activation of beechwood charcoal was operated by this company in two plants in the vicinity of Brilon. The company was engaged principally in the destructive distillation of wood for the production of gas-generating and fuel charcoal, tar, methanol, and adsorptive carbons.

RESPIRATOR AND SOLVENT RECOVERY

The base material used for the manufacture of respirator charcoal and solvent recovery carbon was the charcoal obtained from beechwood by destructive distillation at about 450 deg. C. Peat could be used but beechwood charcoal was found to process better and yield a superior adsorptive product. Care is taken to use charcoal of low volatile content for activated charcoal for respirators; for solvent recovery carbons the volatile content of the base charcoal was considered of less importance.

Charcoal is first ground in a ball or hammer mill to pass a German 80 mesh sieve. Ground charcoal is mixed with tar in Werner and Pfeiderer type mixers. Mixing takes place in batches, using 120 kg. charcoal and 95 kg. tar per batch. The tar used, obtained from the beechwood distillation, contains 20 to 30 percent fixed carbon and is of 20 to 30 deg. Engler viscosity at 60 deg. C. Other tars could be used provided suitable adjustments were made in the plant procedure. The mixers are unheated but were maintained at a temperature of 50 to 60 deg. C. by preheating the tar to 75 deg. C. and by not permitting the equipment to cool between batches. In addition to charcoal and tar, the following materials are added to each batch: 4 l. of 45 percent KOH solution; 80 g. of powdered CuO (for respirator charcoal only); 5 l. of 19 deg. B $CuSO_4$ solution (for respirator charcoal

only). KOH is used as an activating catalyst. Copper compounds are added to increase the adsorptive quality of the respirator charcoal for hydrocyanic acid gas.

Each batch is mixed for about 20 min., the mixer dumped, and the contents carried in small carts to the extruder presses. These presses are of a specially designed "spaghetti" type, operating at 220 atm. pressure. Originally the orifice plates were made of steel but, because of excessive wear, had been replaced with more durable porcelain orifice-inserts. For solvent recovery purposes a 4.5 mm. diameter extrusion is used; for respirator charcoal a 1.5 to 1.6 mm. diameter extrusion was in use and was about to be reduced to 1.0 mm. at the close of the war. No crushing equipment is used, the extruded strands apparently being reduced to about 2 mm. lengths by passage through the carbonizer and activator.

Extruded strands are carbonized in rotary kilns at 350 to 400 deg. C. The kilns are of iron, 10 m. long by 1 m. diameter, lined with firebrick. They are direct heated, using a portion of the exhaust gases from the activators for this purpose, with the remainder of these exhaust gases used for preparing steam for the activators.

The carbonizing step serves to harden and devolatilize the granules, after which they are blown by an air elevator into the activators. Activation is conducted in horizontal rotary iron kilns 13 to 16 m. long by 1.4 m. diameter, lined with fire-resistant brick. The kilns are direct gas fired. Steam for activating, gas, and carbon granules enter the kiln at the same end, with the inlet temperature maintained at 900 deg. C. and the exit temperature at 500 to 600 deg. C. Steam consumption is 80 to 150 kg. per hour for a production rate of about 1 metric ton of activated charcoal per 24 hour day. The charcoal from the kiln drops directly into a vertical pipe filled with water, to prevent ignition from contact with air, and is then fed to a Dorr-type multideck classifier for washing.

Activated charcoal direct from the kilns contains 8 to 9 percent K_2CO_3 and is washed with water until the K_2CO_3 content is reduced to 2 to 3 percent for respirator purposes, and to less than 0.5 percent for solvent recovery purposes. The granules from the classifier are dried at 140 deg. C. in a horizontal rotary dryer 6 m. long by 1 m. diameter. Carbon for solvent recovery use was screened and packed. Respirator charcoal was first passed into a revolving, wooden drum where it was sprayed with aqueous solutions of the previously mentioned impregnants. Over-all yields of activated product on a beechwood charcoal basis were claimed to be from 50 to 55 percent. The apparent density of the product ranged from 0.35 to 0.40.

Raw material for decolorizing carbon is beechwood charcoal, 2 to 8 mm. diameter, obtained by pre-screening the charcoal used for other types of activated charcoal pro-

duction. The granules are fed into a small, direct gas fired, brick lined, horizontal, rotary furnace, 1.25 m. long by 1 m. diameter. From 120 to 160 kg. are activated per batch, at a temperature of 920 to 950 deg. C., using about 70 kg. of steam per hour. The charge is activated from 1 to 4 hours depending on the quality desired, then cooled and ground, usually to pass a German 80 mesh sieve.

ELEMENTAL CARBON

"Elemental carbon" is the designation used in Germany for the material used in forming carbon electrodes for dry-cell batteries, etc. This material was made at Brilonwald from peat coke, using up to 2 mm. diameter size particles, by calcination at 1000 deg. C. for 18 hours in the presence of a small amount of steam (at most 5 kg. per hour per 100 kilo-batch). The charge was then cooled and ground to 0.1 to 0.5 mm., then sold to the electrode manufacturers.

HEAT PUMP

(Continued from page 100)

ture heat is sought, a heat pump with an actual COP of 6, which is not unusual in industrial applications, would give an operating cost of 4.8 cents per million B.t.u. This is an exceptionally low price for heat and makes it possible to justify additional investment charges for a heat pump installation over a direct heating arrangement. It is apparent that when actual cost of raw fuel is in the neighborhood of 25 to 30 cents per million B.t.u., there are many applications where heat pumps may be justified even with electric energy costing as high as 5 to 6 mills per kw. hr.

In conclusion: (1) The authors do not believe that the heat pump can be universally applied to the solution of all industrial heating problems. However, (2) It has been shown that numerous industrial heat applications can benefit from the use of the heat pump in lieu of direct thermal processes. The analysis presented here, plus experience accumulated thus far, warrants the conclusion that further investigation, developments and applications of the heat pump in the industrial heating and cooling field can be made with advantage to obtain an improved and more economical operating cycle.

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CHEM. & MET. PLANT NOTEBOOK

THEODORE R. OLIVE, Associate Editor

\$50 CASH PRIZE FOR A GOOD IDEA!

Until further notice the editors of *Chem. & Met.* will award \$50 cash each month to the author of the best short article received that month and accepted for publication in the "*Chem. & Met. Plant Notebook.*" The winner each month will be announced in the issue of the next month: e.g., the June winner will be announced in July, and his article published in August. Judges will be the editors of *Chem. & Met.* Non-winning articles submitted for this contest will be published if acceptable, in that case being paid for at space rates applying to this department. (Right is reserved, however, to make no award in months when no article received is of award status.)

Any reader of *Chem. & Met.*, other than a

McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable material must be previously unpublished and should be short, preferably not over 300 words, but illustrated if possible. Neither finished drawings nor polished writing are necessary, since only appropriateness, novelty and usefulness of the ideas presented are criteria of the judging.

Articles may deal with any sort of plant or production "kink" or shortcut that will be of interest to chemical engineers in the process industries. In addition, novel means of presenting useful data, as well as new cost-cutting ideas, are acceptable. Address entries to Plant Notebook Editor, *Chem. & Met.*, 330 West 42nd St., New York 18, N. Y.

April Contest Prize Winner

SULPHURIC ACID EQUILIBRIUM CELL DETERMINES AIR MOISTURE CONTENT CONTINUOUSLY

A. EDGAR KROLL and PHILIP G. FOUST, JR.

Department of Chemistry and Chemical Engineering
Lehigh University, Bethlehem, Pa.

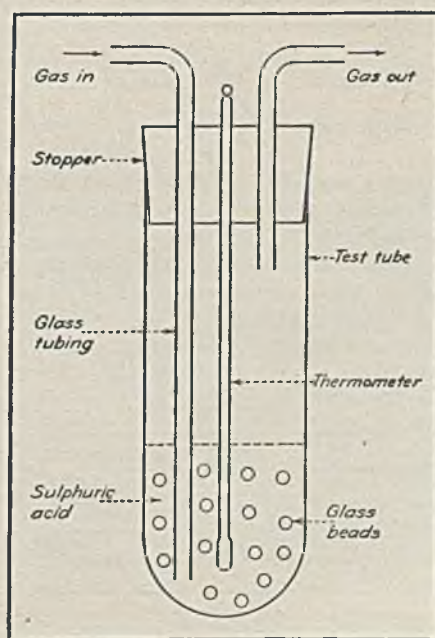
A COMMONLY USED method of determining moisture in gases is by passing a measured amount of gas through a tube containing a drying agent and then weighing the tube, but the scheme is cumbersome and time-consuming. In some cases other methods such as the dewpoint, wet-bulb, thermal-conductivity, and hair-hygrometer methods may also be used¹. A new and simple continuous method is described here.

If moisture-laden gas is passed through a sulphuric acid solution the moisture in the gas and the moisture above the solution will come to equilibrium. For example, if the gas contains more moisture than the vapor above the sulphuric acid solution, the solution will be diluted until equilibrium is reached. The time necessary to reach equilibrium will depend upon the temperature and the rate of flow of the entering gas and the initial concentration and quantity of sulphuric acid. The time required to attain equilibrium, therefore, should be determined in actual operation under the conditions of the test, since it will vary for each set-up. After equilibrium is reached, the moisture in the entering gas can be calculated from the strength of the sulphuric acid solution, the temperature of the solution and the equilibrium partial pressure data of water over sulphuric acid-water mixtures. It is not necessary to measure the gas flow rate.

In Fig. 1 a diagrammatic sketch of the apparatus is shown. A 1-in. diameter test

tube containing a 2-in. depth of glass beads is fitted with a three-hole cork stopper. Sul-

Fig. 1—Equilibrium cell made from test tube, glass beads, thermometer and sulphuric acid



MAY WINNER!

A prize of \$50 in cash
will be issued to

J. J. KRAUKLIS

Chemical Engineer
Chicago 19, Ill.

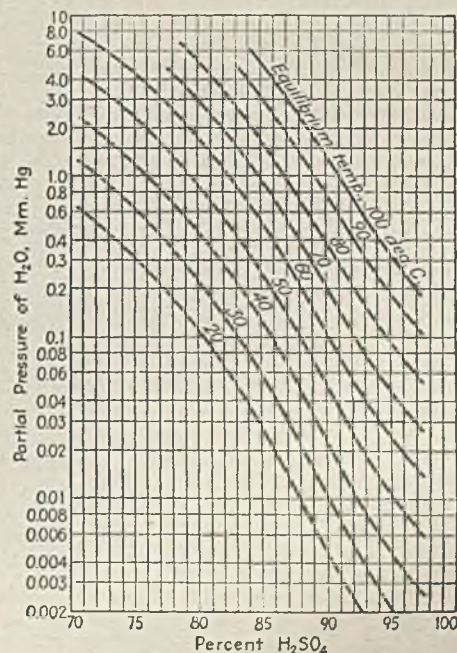
For an article dealing with a convenient arrangement for manifolding service lines to process vessels that has been judged the winner of our May contest.

This article will appear in our July issue. Watch for it!

phuric acid is added to a 2½-in. depth (about 25 cc.). Through one hole in the stopper a glass tube is placed, extending to as close to the bottom as possible. This is for the entering gas. The gas leaves through a small piece of glass tubing placed in the other hole. A thermometer is inserted in the third hole to measure solution temperature.

A chart showing the vapor pressure of water over sulphuric acid solution at various temperatures appears in Fig. 2. The curves were compiled from data in Landolt Börn-

Fig. 2—These curves show relations between temperature, acid concentration and water partial pressure



stein¹ and International Critical Tables². Use of this chart is given in the illustrative example below.

The procedure used in making a moisture determination by the proposed method is as follows. The gas to be determined is run through the sulphuric acid as shown in Fig. 1. The temperature of the sulphuric acid solution is recorded and the temperature of the gas is noted. When the temperature of the solution reaches a constant value, equilibrium conditions have been attained. This temperature should be approximately the same as the gas temperature. If the initial concentration of sulphuric acid used is near the equilibrium concentration constant conditions will be reached sooner. A method for estimating this concentration will be given in the illustrative example below. The constant value of the sulphuric acid solution temperature is recorded and the barometric pressure determined. Then a sample of the solution is removed from the test tube (about 5 cc.) for titration and the test tube replaced. The acid concentration may be determined by any one of the standard industrial titration methods. Where the concentration range is known and the change in concentration not too large, conductivity measurements may be employed, eliminating the necessity of removing a sample for titration. After the titration 5 cc. of approximately the same strength acid (so as not to disturb equilibrium conditions) is added to the test tube as make-up.

If, for example, in a test on a gas by this method, it is found that the barometric pressure is 753 mm. Hg; the sulphuric acid temperature is 40 deg. C.; and the sulphuric acid concentration at time of sampling is 85.0 percent then, from Fig. 2, the partial pressure of water is found to be 0.12 mm. Hg. Hence, $V = \text{volume fraction} = (\text{partial pressure of water}) / (\text{barometric pressure}) = 0.12 / 753$ or $V = 0.00016$ cu. ft. water per cu. ft. of gas. To convert to milligrams of water per cu. ft. of gas, multiply by $6.21 \times 10^6 / (273 + t)$, where t is in degrees C. Then $0.00016 \times 6.21 \times 10^6 / (273 + 40) = 3.17$ mg. water per cu. ft. of gas.

The initial concentration of sulphuric acid to use can be estimated, if the moisture in the gas is approximately known, by working the above example in reverse. For example, if the moisture is known to be about 5 mg. per cu. ft., the temperature of the gas 40 deg. C., and the barometric pressure 753 mm. Hg, then $5.0 \div [6.21 \times 10^6 / (273 + 40)] = 0.000252$ cu. ft. water per cu. ft. gas and the partial pressure of water = $0.000252 \times 753 = 0.19$ mm. Hg. Then from Fig. 2 the concentration of sulphuric acid at this partial pressure and a temperature of 40 deg. C. is found to be 83.5 percent. If this strength acid had been used to start the test illustrated above, the concentration would have to change from 83.5 to 85.0 percent to reach equilibrium.

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2. "International Critical Tables," 1st ed., Vol. III, p. 304, McGraw-Hill, New York (1928).
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PRESSURE DROP CHART FOR SULPHUR FLOW

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SINCE molten sulphur is often pumped today (as in sulphur burning in sulphuric acid plants) in lieu of methods of handling the sulphur in solid condition, it is valuable to have data in convenient form on the pressure drop of molten sulphur pumped through pipes of various diameters.

The accompanying chart is calculated from the Fanning equation, with the flow friction factors taken from the 3rd edition of Walker, Lewis, McAdams & Gilliland, "Principles of Chemical Engineering." The viscosity of sulphur is taken at an average of 8 centipoises for the temperature range of 250-300 deg. F. In this range the viscosity of pure sulphur has been found to vary between 10 and 6. Since data are unavailable for the viscosity of mine-run sulphur, a value of 8 is suitable and will not introduce errors larger than those already present in the Fanning equation. Sulphur density is taken at 112.5 lb. per cu. ft.

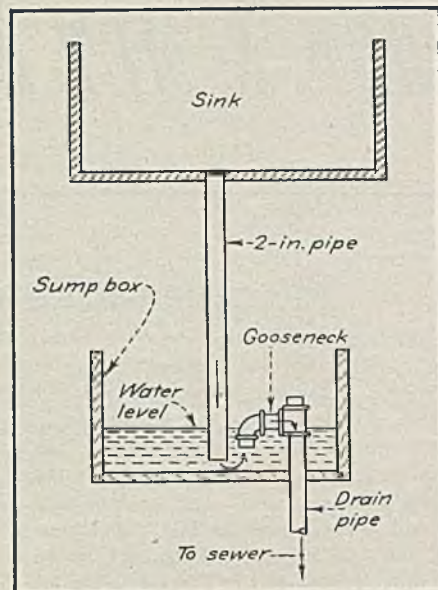
SUMP PREVENT BLOCKING DRAINAGE SYSTEM

R. D. OPPENHEIM

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IN LABORATORIES or plants where liquids containing solids go to the drainage system, trouble is often encountered with the sludge depositing and clogging the pipes. This is especially true when materials such as latex are dumped into the sink.

To alleviate this trouble with little expense, a set-up as shown in Fig. 1 was utilized with success. The sink drains into a water-tight wooden sump box through a 2-in. pipe whose open end is 2 in. from the bottom of the box. A "gooseneck" made of



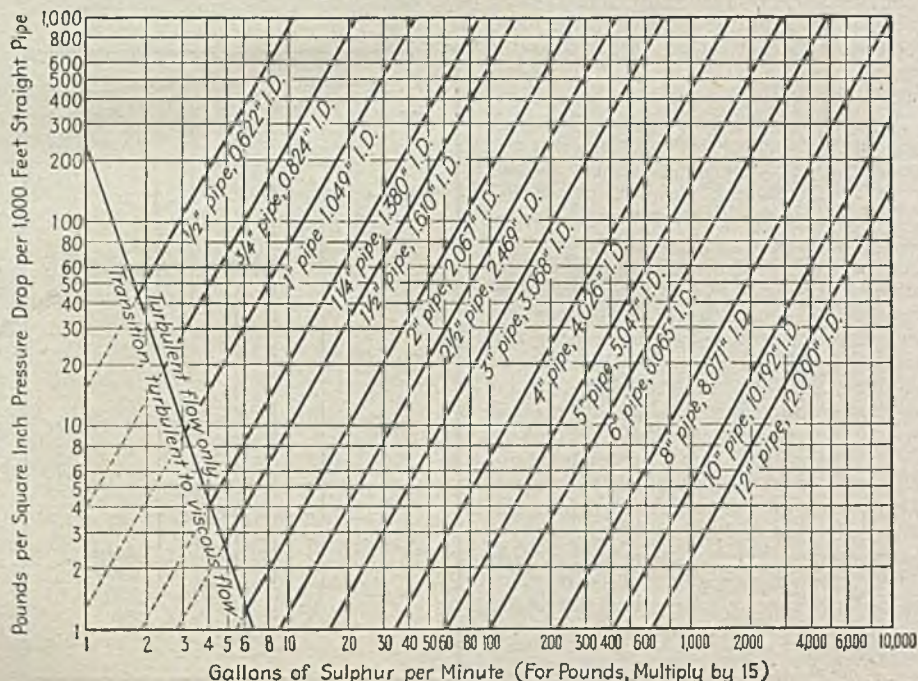
Sump below sink prevents solids from entering drainage system

2-in. pipe is set in the box with the open end about 4 in. from the bottom. The open end of the tee at the upper end of the drain pipe acts as an air vent and also as an overflow in case the inlet at the bottom should become plugged. The "gooseneck" is set in the box so that the liquid level is 6 in.

When suspended particles enter the box, those with a specific gravity greater than the liquid will deposit on the floor of the box, and those with less will float at the liquid level. This permits the clarified effluent to pass to the sewer line through the "gooseneck." Periodically sludge is removed.

When latex is being discarded it is advantageous to add a coagulant such as acetic acid to the sump. This will coagulate the latex there instead of allowing it to deposit in the pipe lines.

Chart gives pressure drop in pumping molten sulphur through standard iron pipe from 1/2 to 12 in. nominal pipe size



SAVINGS IN SHIPMENT WITH ALUMINUM PALLETS

IN OUR ISSUE of November 1945 a 12-page report gave detailed information on the advantages of handling materials on skids and pallets, and on the trend during the war years particularly toward the second of these handling methods.

The Materials Handling Division of Reynolds Metals Co., Louisville, Ky., now offers data on the savings that are possible with a design of aluminum pallet that is sponsored by Reynolds. It is pointed out that at the present time all pallets take the same freight rate as the goods they carry and that, for example, in shipping a carload of 36 pallets of canned goods from New York to Chicago the freight on the pallets one way would be \$18.50, while the charge on the same pallets would be \$51 if they carried clothing. Hence palletizing of light-weight goods that take a high freight rate involves an almost prohibitive shipping charge if heavy pallets are used.

Reynolds' standardized 40x48 in. aluminum pallets weigh 36 lb. apiece, compared with about 100 lb. for pallets of most other materials of the same size. Hence the use of aluminum results in a saving of about 64 lb. per pallet. In shipping certain palletized goods from Louisville to Detroit (about 400 miles) the freight cost runs 1c. per lb., meaning a saving of 64c. per pallet on the outgoing shipment alone. Return shipment of standard pallets of this size would be at the rate of 0.36c. per 100 lb. Since a standard box car will carry 540 pallets, such a car containing wood pallets would have a load of 54,000 lb. A car loaded with aluminum pallets, however, would be carrying only 19,400 lb. Since the minimum carload rate of 30,000 lb. would apply, shipping cost for aluminum would be \$108 per car, compared with \$194.40 for wood. There is thus a saving of 16c. per pallet on the return shipment. For the round trip the saving in favor of aluminum is 0.80c.

Assuming 13 round trips per pallet per year, the saving would amount to \$10.40 per year. If an aluminum pallet costs \$26 compared with \$3.50 for a wood unit, a difference of \$22.50, it would require a little over two years for an aluminum pallet to pay

for itself. Its yearly return would be roughly 45 percent of the added investment. Assuming a conservative life of 20 years, the saving in 20 years, over and above the added investment, would amount to \$185.50 per pallet.

It is further pointed out that still further savings are possible since aluminum pallets are claimed to need no servicing. Other advantages include the facts that they are non-sparking and non-combustible and that they are designed for eight-way entry of the truck forks to facilitate maneuvering in tight areas. Made of high-strength alloys they are said to have supported test loads up to 26,000 lb. without damage.

NOMOGRAPH GIVES LATENT HEAT OF SUBSTANCES

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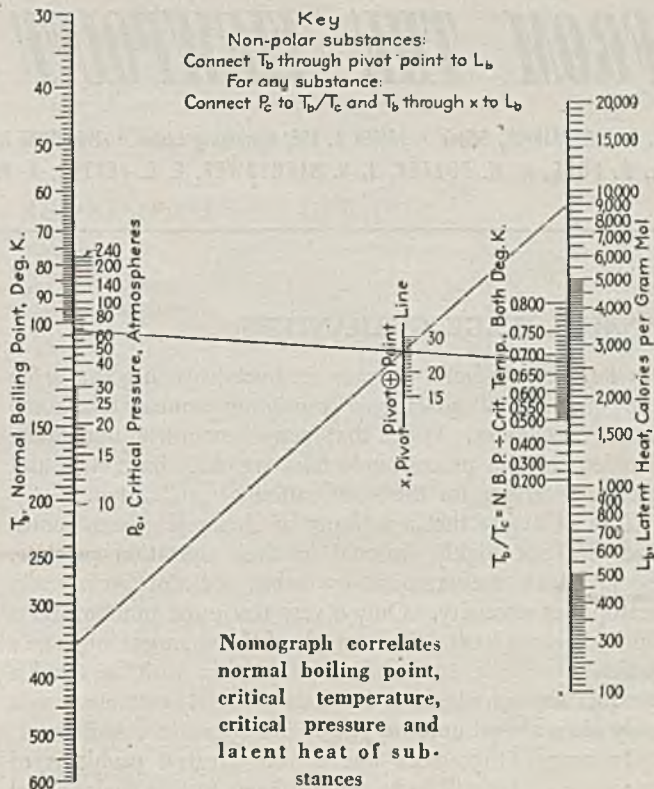
SEVERAL fundamental properties for any substance may be correlated by the equation:

$$L_b/T_b = \frac{R \ln P_c(1 - 1/P_c)}{1 - T_b/T_c}$$

where T_b = normal boiling point, deg. K.; L_b = latent heat at T_b , cal. per gram mol; R = gas constant = 1.987; P_c = Critical pressure, atm.; and T_c = Critical temperature, deg. K.

This equation¹ is a combination of the

Key
Non-polar substances:
Connect T_b through pivot point to L_b
For any substance:
Connect P_c to T_b/T_c and T_b through x to L_b



Nomograph correlates normal boiling point, critical temperature, critical pressure and latent heat of substances

Nernst equation of state for a saturated vapor, the van der Waals vapor pressure equation, and the Clapeyron equation. A small group of compounds selected at random gave calculated latent heat values within 5 per cent of the experimental values.

Use of the nomograph is shown for ethyl alcohol where: $T_b = 351.4$ deg. K., $P_c = 63.1$ atm., $T_c = 516.2$ deg. K., and $T_b/T_c = 0.68$. Connect P_c to T_b/T_c . Connect T_b through x to L_b . Read $L_b = 9,000$.

If T_c is not known, Guldberg's approximation $T_b/T_c = 0.67$, may be used. However better accuracy may be obtained by calculation of T_c from T_b by the Meissner and Redding equations for which nomographs² are available. If P_c is not known it may be obtained by the methods of Gamson and Watson or Meissner and Redding.

As a first approximation in estimating latent heats from normal boiling points for any substance, Trouton's rule may be applied, taking a value of 21 on the center scale (pivot line x). The results are not too satisfactory, especially for gases having low critical pressures, and the higher boiling liquids having high critical pressures.

For non-polar compounds the latent heat may be obtained from the normal boiling point alone by means of the Kistiakowsky equation: $L_b = T_b(8.75 + 4.571 \log_{10} T_b)$.

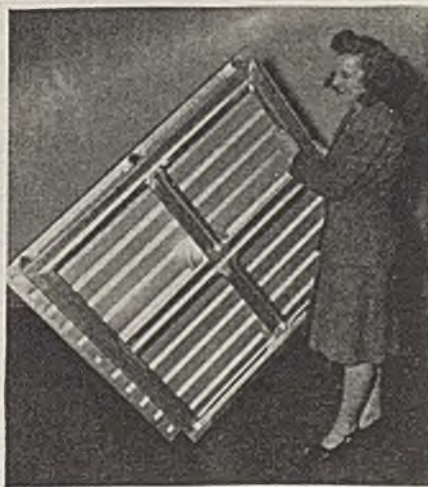
This relationship is obtained on the nomograph through the use of the pivot point.

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2. "Plant Notebook," *Chem. & Met.*, May 1946, p. 147.

Correction—In the nomograph on partial pressure of HCl on page 117 of our April issue, the right hand scale should be labeled "Weight Percent of HCl."

Aluminum pallets cut the weight of each pallet load by about 64 lb. Young lady finds aluminum pallet easy to handle; note eight-way construction



FROM THE VIEWPOINT OF THE EDITORS—

S. D. KIRKPATRICK, Editor • JAMES A. LEE, Managing Editor • THEODORE R. OLIVE, J. R. CALLAHAM, Associate Editors • HENRY M. BATTERS, Market Editor
L. B. POPE, R. W. PORTER, J. V. HIGHTOWER, E. C. FETTER, R. F. WARREN, Assistant Editors • R. S. McBRIDE, Consulting Editor

ANNUAL WAGE GUARANTEES

AN IMPORTANT factor in wage contracts is soon going to be the question of guaranteed minimum annual take-home wages for workers. When that factor becomes an immediate problem of the process industries we shall have new and greater incentive for the stabilization of production.

It is fortunate that a majority of chemical process industries are not highly seasonal in their operation practice. Some which are seasonal by habit, are not intrinsically seasonal of necessity. Only a very few must function on a limited season basis. Thus much of the chemical engineer's problem will be to stabilize production with reasonable product storage whenever he finds that net costs are lowest only when almost uniform year-round operation is had.

In many other cases one of the greatest problems of process industry will be to get customers to take their annual needs of products on a more uniform year-round basis.

Fortunately most of us are not yet confronted with this problem as an acute one. But that is no reason for ignoring it. If steps are taken now to stabilize production and sales as near as possible to the average level, then we shall be working toward the condition at which we must actually govern most of our operation in the not distant future. And certainly it is not too soon to urge customers to eliminate needless seasonal factors in their buying to the maximum extent. Perhaps we shall even find it worthwhile to offer price inducements to change some of the less regular buyers into the preferred class which takes our output uniformly the year round.

MORE PRIVATE STANDARDIZATION

AS A result of conferences among industry leaders, and between these groups and the Secretary of Commerce, private initiative has been given the green light and told to take over the formulation of voluntary standards, both for industrial and for consumer products. The vehicle for this work is the 28-year-old American Standards Association, and the significance of the decision is that more of the work of standardization is to be intrusted to interested private parties, while less of it than in the recent past will be developed under the aegis of the Department of Commerce.

To those who have been crying for less government in business, this withdrawal on the part of a Secretary who has quite consistently given evidence of wanting more governmental control should be both a signal to proceed, and a challenge to support. Admittedly, the ASA is not at present either set up, or adequately financed, to assume the bulk of the burden. Steps are being taken, however, to alter the situation, but these can be successful only if companies, trade and technical associations will throw their weight and their pocketbooks behind the effort.

NO PORK BARREL FOR SCIENCE

POLITICAL Washington seems to have been losing interest in the proposed National Science Foundation to a considerable degree for two reasons. First, the atomic bomb problems and control projects gained much greater public interest and, therefore, political glamor. Second, there seemed to be suspicious evidence of an organized campaign in support of the foundation by some rather selfish groups that expected to profit from federal aid for fundamental research.

The importance of fundamental research has not declined. It is unfortunate, therefore, that some of the over-zealous supporters have given this "pork barrel" significance to the undertaking in the minds of many congressmen. It is not likely that there were very many important groups who actually had so selfish a motive. But the very appearance of that motive did as much damage as any wrong purpose.

It is now time for those who believe in fundamental investigations by government under civilian control for national defense and for public health purposes to reemphasize these needs on a more dignified professional plane. It will be fortunate also if the more vociferous groups seeking aid for tax-supported institutions be less clamorous for their selfish ends.

CHEMURGIC PROGRESS NEEDED

IN YEARS of abundant crops the preparation for famine years is necessary. Less recognized, but no less important socially, is the need for planning to use surpluses even while scarcity still prevails. The present huge effort of farmers to produce a maximum of crops is going to create a surplus problem, possibly in the early fifties. Our excesses in supply of corn, wheat, cotton, and some other major farm products are likely to be even greater than those which Franklin Roosevelt and Henry Wallace tried to handle with a managed agriculture.

Permanent solution of such problems can come only by devising new uses through processing surplus grain into non-food products. That is chemurgy at its best. Such a program is easily stated but difficult of accomplishment. Much research as a basis for planning is needed immediately.

If industry does not do this planning and make aggressive effort to industrialize the products of agriculture one may expect that Congress sooner or later will ask the government to do so. Putting the government thus into business for the benefit of agriculture has not lost fashion in the Capital City. Even this May a large group of Senators received with enthusiasm some suggestions from the planners in the Department of Agriculture which would put Uncle Sam very deep into this business. The only sure and safe offset for such legislation as S. 1908 is evidence that industry is doing the job and that government does not have to do it.

RUBBER FUTURE PLANNED

No single policy question is more important to the American people in international affairs than the future of synthetic rubber. Failure to appreciate that fact and to make adequate arrangement for the protection of synthetic rubber could easily again put the United States in a position of complete dependence on natural rubber imports. That would be an intolerable situation; but it is not unthinkable that such may be the result if proper official programs are not put into effect.

Most important in immediate prospect appears to be the need for establishing a sound basis on which present American synthetic rubber plants may be continued in operation or in operable condition on a very large scale. The Inter-Agency Committee on rubber policy (Batt Committee) has made two important and effective recommendations to this end. It proposes that indefinitely there shall be operated in the United States at least 250,000 tons per year of synthetic all-purpose-rubber capacity, and that 350,000 tons of additional capacity be always maintained in standby condition with facilities and personnel ready to put it to work on short notice. It is to be hoped that such combination will provide indefinitely for 600,000 tons per year.

But chemical engineers know that such a program means little or nothing unless certain technologic factors are taken into account adequately. Three of these factors are so important, and get so little appreciation, that they deserve frequent repetition.

(1) No plan provides adequately for standby condition of a property that does not continuously provide an adequate technical management and staff immediately available, including a substantial number of key persons capable of directing new employees in the proper functioning of the plant if suddenly enlarged in activity.

(2) Mere operation or readiness to serve is not enough unless the operation when attempted will be on the latest and best technical basis with assurance of a product of the finest quality that science and engineering knows how to produce at any particular time. Obsolete equipment and methods, even obsolescence at its early stages, must be constantly eliminated or "readiness to serve" is a deceptive fiction, not a reality.

(3) Aggressive commercial management, not perfunctory government operation, is essential to coordinate the synthetic plants with the needs and the practices of the rubber-using industry. And since such operation is going to be inevitably at some loss, because of readiness to serve factors, there must often be a subsidy from the government to the firms as an offset to the extra cost when much of the capacity is maintained idle.

Fortunately Washington still talks about accomplishing permanent rubber preparedness through the efforts of private enterprise. It is sincerely to be hoped that such practice will follow. But the technical principles just enunciated must be recognized and the American taxpayer must be ready to bear some of the indirect burdens of commercial effort for a number of years to come. This might not be true if the natural rubber industry were solely private business. But it is not. The British and Dutch Governments own too much and dominate too fully to make it feasible for purely private U. S. companies to be successful competitors, especially in an America of very high wage rates.

It is evident that not all of the economic or political problems have yet been solved. They may prove to be even more difficult of solution than the technological ones with which chemical engineers are best acquainted. But they must be faced frankly, and soon.

RECOGNITION AND REWARD

THERE is much to commend in the recent program of the Du Pont company for its recognition of some of its promising research scientists. These men are being given special recognition as senior research associates with salary increases that are quite comparable with those of responsible management and administrative officials of the same company. This means that they get deserved reward and recognition without the necessity of diverting their energies from the fields in which they have demonstrated great capacity for service and value to their employer. It means also that an outstanding research man does not have to be made into an administrative executive simply to give him a somewhat better salary.

One wishes that there were more companies and institutions that could see this need. Nothing is more unfortunate for our profession—and the public—than to have brilliant researchers wasting their time as mediocre administrators.

TAKE OFF THE BRAKE

MORE goods at lower prices is not an empty slogan in most chemical industries. It is a working philosophy that has come to characterize our progress. Even during the stress of war production there were many chemical companies that consistently reduced their prices as improvements in volume and technology lowered their costs. Today, for the first time in almost two decades, these plants find their costs rising to the extent that profit margins are narrowing to the point of disappearance. Yet the industry as a whole has not been clamoring to OPA for price relief.

Much of our progress toward lower and lower costs has been due to the contributions of the equipment manufacturers whose engineers work closely with their customers in improving processes and developing more efficient machinery. Today these industries are also beginning to feel the pinch. Costs of certain of their components, such as gray iron and alloy steel castings and forgings, have advanced considerably yet the process equipment manufacturer must continue to operate under an Oct. 1, 1941, price ceiling that does not permit him to pass these increased costs on to his customers. As a result there has been a natural tendency to turn to more lucrative fields, meanwhile neglecting the urgent needs of the chemical companies that must bring down their costs and get their new product developments.

The greatest possible contribution to all concerned will come when it is possible for OPA to suspend all price controls over process equipment, just as it has already done for machine tools and other machinery industries. Such price increases as might result from a blanket suspension of price control would certainly not have any inflationary effect on the cost of living. Process equipment is used primarily in producing other than consumer goods where its job is to lower rather than increase the costs of production. Chemical manufacturers now need that service more than ever before. Take off the brake and we will all go ahead!



Mexico's chemical industry is located principally in the Federal District and in the States of Jalisco, Nueva Leon, and Coahuila, and to lesser extent in the States of Mexico, Guanajuato, Michoacan, Nayrit, Puebla, Tamaulipas, Veracruz, Chihuahua and Yucatan

MEXICO is experiencing an industrial boom that got underway in the late 1930's and has gained momentum each year. The 1945 industrial census shows a phenomenal growth in industry since 1940. The number of enterprises has increased from 13,513 to 28,513. There are more new automobiles, more new homes, office buildings and construction of all kinds than are to be found in the entire United States. And plans are on the drawing boards for extensive hydroelectric power development, irrigation projects, highways throughout the Republic, flood control works, additional school buildings, hospitals and other public edifices. One of the important semi-public projects is "University City" to house the National University of Mexico, one of the oldest schools of higher education on the American continent (founded 1551), which now holds its classes in several buildings scattered throughout the capital city.

This expansion was encouraged by more stable political and financial conditions in the

country, by the broader distribution of wealth, and by a new influx of foreign capital. The devaluation of the peso gave an important initial stimulus to domestic industry. The liberation of credit, a succession of good crop years and promotive measures gave further impetus.

The chemical process industries are taking part in the "evolution" as President Mañuel Avila Camacho has called this period of great industrial progress in Mexico. Although the chemical industry has been relatively small, accounting for less than 10 percent of the total manufacturing output of the country, and is loosely integrated, recent developments have expanded it considerably. Before the War Mexico produced only 3 percent of the industrial chemical products it needed, today it makes more than 10 percent.

Sosa Texcoco, S. A., a million dollar organization financed by Sociedad Mexicana de Credito Industrial, S. A., and private Mexican capital, has under construction a plant

15 miles from Mexico City. It is projected in belief that the remaining waters and dry bed of Lake Texcoco, drained many years ago, is a rich source of soda ash, caustic, salt, and potassium salts. An interesting feature is the 2,000-acre solar evaporator built like a snail shell. The Chemical Construction Corp. is supplying the technical advice for the plant.

Celanese Corp. of America has under construction two plants which will cost approximately 35 million pesos. The Viscosa Mexicana, S. A., has recently acquired a plant site at Zacapu on which will be built a viscose plant. And Celanese Mexicana, S. A., now has under construction an acetate plant at Ocotlan, about 50 miles from Guadalajara, Mexico's second largest city. The output of the two plants will be about 12 million pounds. A short time ago Celanese acquired a smaller plant at San Angel, a suburb of Mexico City which will operate when modifications are completed as Artisela Mexicana, S. A., and produce vis-

CHEMICAL INDUSTRY

To the south of us is a country whose chemical industry has been making spectacular strides during the war, both in the number of new plants and products, and in its trade with the United States. In order to get at first hand a picture of the situation in Mexico, James A. Lee, managing editor of *Chem. & Met.*, flew to that country in March of this year. He made headquarters in Mexico City and visited industrial chemical areas in several sections of the country. While there Lee met and discussed the problems of the industry with many of its leaders, in education, manufacturing, both Mexican and American, consulting, and jobbing of American chemicals, as well as government officials. He visited chemical plants, old and new, large and small, Mexican and American. The accompanying text and data tell the story of the progress of our neighbors across the Rio Grande and what it means to the American chemical industry.

cose staple fiber and continuous filament.

A new oil refinery will be built at Salamanca, State of Guanajuato, by Petroleos Mexicanos ("Pemex," government oil monopoly) and the company also will construct a pipeline from Poza Rica, Veracruz, to Salamanca, the total cost of the project being reported at more than \$7,000,000. The refinery will be a light oil plant and will have a capacity of 30,000 bbl. daily of enriched crude from the upper Veracruz and lower Tamaulipas oil fields. Production will consist of standard gasoline (about 65 octane), kerosene, diesel fuel, gas oil, fuel oil, and liquified bottled gas.

Petroleos Mexicanos is completing a refinery at Atzacotalco, a suburb of Mexico City. It will have a daily capacity of 40,000 bbl. and will produce 1,000 bbl. of 100-octane gasoline per day and 5,000 bbl. of 60-70 octane. Philips Petroleum Corp. is furnishing the know-how for this HF alkylation unit.

Guanos y Fertilizante de Mexico, S. A., has under construction a contact sulphuric acid plant at San Luis Potosi in the state of the same name. It will have a capacity of 50 tons a day and is being built by Chemical Construction Corp. The company plans to add an ammonia plant of 50 tons capacity immediately and will produce ammonium sulphate for the fertilizer trade.

Hewitt Rubber Corp. of Buffalo and Fabrica de Artifacts de Hule Eureka, S. A., the largest manufacturer of mechanical rubber products in Mexico entered into a working agreement a short time ago. The former supplies equipment and technical know-how to increase the output of the Mexican company. In return, Hewitt acquires a preferred

stock interest in Eureka and will resume annual service fees.

Reynolds Metals Co. (Reynolds International Mexicana) is erecting a plant at Tlalnepantla, a few miles from the capital. Aluminum ingot will be shipped from the U. S. and fabricated into a variety of products. Alumino Industrial de Mexico (Canadian interests) has a plant under construction near Mexico City which will convert Canadian aluminum pigs to powder, sheets and profiles.

Marquette Cement Manufacturing Co. and Universal Atlas Cement Co. have become interested in Mexican projects. The former is reported to be supplying designing, construction, technical and operating services for two plants. One will be the Atoyac plant

near Orizaba in the State of Veracruz and the other in the State of Chihuahua. Atlas is interested in a cement mill at Irapuato between Mexico City and Guadalajara in State of Jolisco.

Johns Manville Corp. has recently organized a Mexican company, Asbestos de Mexico, S. A., to make asbestos products. E. R. Squibb & Son de Mexico, S. A., is said to have a penicillin plant about ready to operate and will shortly complete construction of a streptomycin plant. In addition a plant with capacity to cover the national demand for acetic acid, is under construction.

The number of industries in the consumers goods group is increasing. Relying to a large extent on imports of caustic soda and oils, but to no less degree on locally produced raw materials, a fairly large soap industry has been developed. The production of matches, candles, paints and varnishes, and printing inks, also is important although the quality of most of these products is rather low.

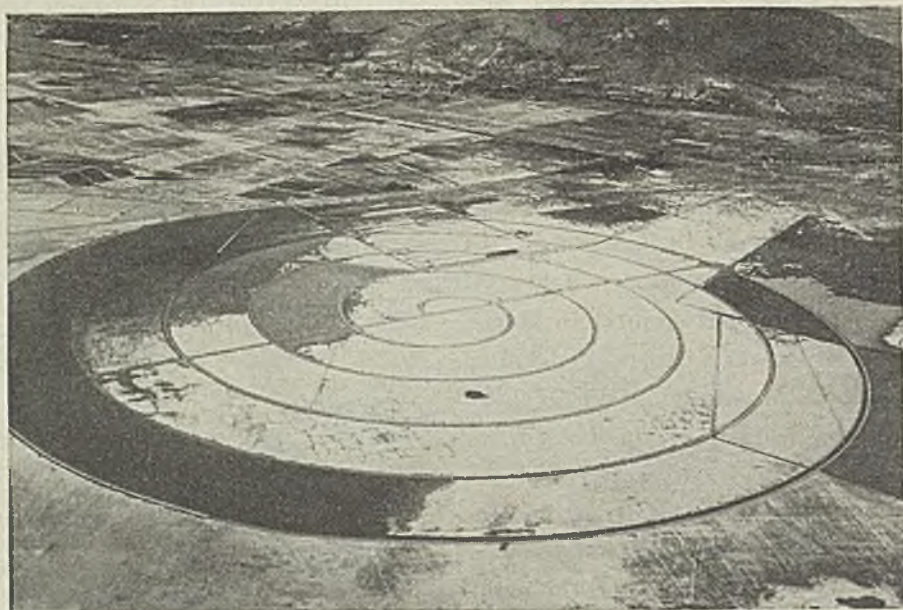
The principle of joint enterprise, advocated by the commissions of Inter-American Development of the 21 American Republics, is being carried out in the promotion of new industries in Mexico by United States and Mexican interests.

The commissions of Inter-American Development, affiliated with the Inter-American Commission, adopted a resolution in May 1944 recommending "that there be promoted, wherever possible, with just and equitable terms for both parties, the joint participation of foreign and domestic capital in the development of all types of enterprise."

It is difficult to determine to what extent American capital is participating in these chemical developments below the Rio Grande. However, it probably ranges all the way from 100 percent United States ownership down to none at all. In some cases, American companies have merely management or technical contracts, with or without

Here is one of Mexico's black and colored printing ink producers





Ola, Mexicana Aerophoto

From this 2,000-acre solar evaporator Sosa Texcoco, S. A., will recover alkalis. The plant is a short distance from the evaporator

financial or stock participation. In a few instances U. S. technicians have been employed in concerns entirely Mexican.

Reynolds International is said to have been organized in accordance with the mixed capital plan by the Banco Nacional de Mexico and the Reynolds Metals Co. of Richmond, Va. Celanese jointly American-Mexican, (Celanese, by special permission of the Mexican Government has 51 percent stock interest in the Mexican company), but Squibb, U. S. Rubber, Goodrich, Goodyear, Parke Davis, Abbott Laboratories, Johns Manville, U. S. Plywood and others have not been announced. It has been stated that there is no ban to the transfer of dividends and funds between Mexico and the U. S., and there is no indication of any limitation in sight.

In an effort to stimulate essential industries, Mexico inaugurated legislation in 1940. Major incentive provided is a five-year exemption from taxes. In the interval since this legislation became law about 400 new companies with initial capital of about \$50,000,000 have registered and are utilizing the special benefits conferred. Since 1940, it is estimated that investment in all types of industries has amounted to about \$90,000,000. Total capital invested in all manufacturing industries in Mexico prior to 1940 amounted to barely \$780,000,000.

Summarizing progress under the act, the Bank of Mexico lists new essential industries in the first five years of the life of the act (with capitalization converted to dollars at the rate of 5 pesos to \$1):

No. of Enterprises	Type	Capital (000 omitted)
71	Foodstuffs and beverages	\$1,624
55	Metal products	13,797
28	Chemicals	4,357
88	Lumber, paper, ceramics	3,880
43	Miscellaneous	12,669

The Mexican Government is encouraging

IMPORTS OF CERTAIN ORGANIC CHEMICALS INTO MEXICO

Item	Kilograms		
	1939	1941	1943
Acetanilide	1,493	3,059	5,859
Acetates:			
Benzyl	982	1,498	5,541
Butyl (ether) ...	10,451	6,146	3,452
Ethyl .....	.....	981	2,537
Acetone	73,254	138,563	33,592
Acids:			
Acetic	5,009	18,853	11,596
Acetic (denatured)	442,044	424,227	430,605
Acetylsalicylic ..	72,943	68,007	69,424
Benzoic	2,524	2,905	3,051
Carbofic	10,231	7,952	4,049
Citric	167,589	171,593	69,897
Cresylic	341,661	335,957	297,253
Formic	46,017	50,815	14,428
Lactic	22,437	56,996	46,194
Oxalic	33,032	12,001	62,662
Phthalic	14,193	7,734	5,244
Salicylic	7,266	7,868	9,516
Tannic	9,245	14,946	7,094
Tartaric	107,184	171,923	167,377
Alcohols:			
Amyl	114	173	2,047
Butyl	4,496	10,314	2,040
Methyl	8,240	16,690	37,552
Alizarines	56,315	35,491	23,105
Aniline oil	8,593	5,885	27,223
Anthracene	121	462	2,729
Antipyrine	3,606	4,414	2,263
Benzo-naphthol ..	1,310	4,271	1,638
Carbon tetrachloride	19,173	21,534	50,300
Chloroform	5,605	9,559	27,091
Coal-tar dyes	8,188,834	10,785,324	910,949
Ether (ethyl)	2,865	3,305	2,111
Ethyl chloride	3,895	32,821	86,579
Formaldehyde	101,099	25,994	86,226
Glycols	28,927	42,080	57,104
Hexamethylene-tetramine	5,340	4,696	7,290
Hydroquinone	4,188	3,381	1,061
Menthol	4,615	5,372	2,151
Naphthol	17,236	43,047	14,342
Nitrobenzene	7,214	8,451	5,781
Phenacetin	6,338	10,615	4,935
Phenyl salicylate ..	1,253	1,485	3,625
Pyridine	2,366	2,752	4,452
Vanillin	4,371	5,695	8,642

Source: Foreign Commerce Weekly, Nov. 25, 1944, p. 7.

the development of industries which are wisely conceived, particularly industries which will increase the self sufficiency of the country, and especially those which will convert Mexican raw materials into products that will be consumed within the Republic.

That part of the chemical industry in Mexico in which U. S. capital has no part operates in part under governmental and in part under private control and ownership. Governmental participation in the chemical industry was brought about by the exigencies of the second World War when the Mexican Government found it advisable to intervene, manage and operate the important pharmaceutical and chemical companies which were owned and directed by Axis, principally German, interests prior to the war. On June 13, 1942, Presidential decree brought the leading German, Italian and Japanese commercial establishments under Mexican control.

Before the recent war Germany unquestionably dominated the chemical market in Mexico. General de Anilinas, S. A., Carlos Stein y Cia., La Union Quimica, S. A., Casa Bayer, and Beick-Felix y Cia., and others had large and efficient distributing set-ups aided by corps of trained technical service men traveling in the field and bringing technical assistance of high caliber to clients in specialized fields.

By the beginning of 1943, however, a remarkable change had occurred. Germany was exporting nothing to Mexico and that country was looking to her neighbor north of the Rio Grande for her trade in chemicals. Her import figures represent almost entirely American goods and most of her exports of chemicals have been to the United States.

As might be expected from the geographical positions of the neighbors across the Rio Grande it is normal for this country to be Mexico's foremost market for its exports and source of supply for its import requirements. Before the second World War the ratio of this trade to Mexico's total was about 63 percent. The difference between this figure and the 85 percent for 1944 contributed substantially toward filling the gaps left by the cutting off of Europe in the early years of the war, as L. B. Clark of the U. S. Embassy in Mexico has stated.

In 1944 Mexican chemical imports reached somewhat over \$26,000,000 which compares with \$20,000,000 in 1941. The leading imports were coal tar dyes, synthetic rubber, copper sulphate, insecticides, sodium carbonate and bicarbonate, caustic and tannin extracts.

A reciprocal trade agreement between the two countries was signed on Dec. 23, 1942, and became effective on Jan. 30, 1943. The agreement granted duty reductions or bound the existing customs treatment on most of the principal articles of trade between the two countries, and provided for unconditional most-favored-nation treatment with respect to the internal taxation of

imports. The duty concessions of the trade agreement are too numerous for presentation here, but an analysis of the general provisions, as well as of the duty concessions granted by each country, may be obtained from Bureau of Foreign and Domestic Commerce. As this is being written the reciprocal trade agreement between the two countries is being revised.

The Mexican Ministry of Finance, by the issuance of Administrative Circular 309-8-101, published in the *Diario Oficial* of Dec. 5, 1945, and effective therewith, has subjected 74 additional items in the Mexican import tariff to the requirements of import licensing. This circular was issued pursuant to powers granted to the Ministry of Executive Decree of April 14, 1944, published in the *Diario Oficial* of May 2, 1944. The list of chemical commodities which may be imported only upon the issuance of an import license by the Ministry of Finance is given elsewhere in this report.

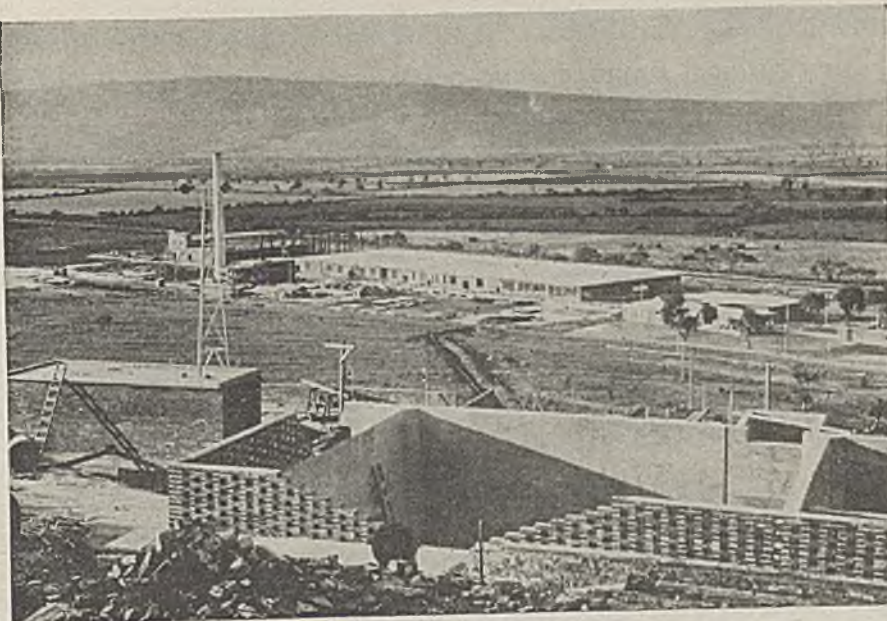
There are some Mexicans who are convinced that their youthful chemical industry should have greater protection in the form of higher tariffs, etc., from the larger, more powerful U. S. competition. Lead by Engineer José Domingo Larrin, a leader of the National Chamber of Processing Industries, president of *Productos Químico de Mexico, S. A.*, and one of the most influential executives in the industry, the movement is making a strong bid for recognition.

Opposed to this movement are Mexicans who believe higher tariffs will result in greater inflation, lowering the quality of local products and other adverse effects on the industry.

The domestic chemical manufacturers produce alcohol, pharmaceuticals, fertilizers, insecticides, sulphuric acid, soaps, candles, printing inks, glues, paints and varnishes, vegetable oils and waxes, matches, naval stores, arsenic, mercury, explosives and many other products. The list has been growing in importance for some years. Most of the heavy chemicals are made by a few large concerns, but the output of pharmaceuticals, soaps and cosmetics come from a large number of small firms, ranging in size from one-room establishments to several large well-equipped plants.

The chemical industry is located chiefly in the Federal District and in the States of Jalisco, Nuevo Leon, and Coahuila, with smaller establishments in the States of Mexico, Guanajuato, Michoacan, Nayarit, Puebla, Tamaulipas, Veracruz, Chihuahua and Yucatan. The census of 1940 gave 410 firms producing chemicals which employed 9,137 workers. The capital investment of these leading establishments is 56,759,000 pesos, and the production value in 1939 was 129,113,000 pesos.

The country has a fairly wide variety of natural resources which provide the many raw materials for the chemical industry. The industrial census of 1940 shows that the value of domestic raw materials consumed



Celanese Mexicana, S. A., cellulose acetate yarn plant at Ocotlan, Jalisco, is jointly financed by Celanese Corp. of America and Mexican interests

by the leading chemical manufacturers was 53 percent of the value of all raw materials used by them. Natural gas is available in the States of Tamaulipas, Nuevo Leon and Coahuila, and is utilized to some extent in the oil regions of Tamaulipas, but most of the gas used as fuel is brought from Texas. Petroleum for fuel and as a raw material is found in abundance. Coal is produced in the State of Coahuila and deposits have been reported in the States of Oaxaca and Puebla. Sugar cane, which supplies the raw material for alcohol and refined sugar is grown in 28 of the 32 states and territories. Sulphur deposits in the States of San Luis

Potosi, Veracruz and others are more than ample to supply the domestic chemical industry. Mexico is one of the largest growers of limes which are the raw material for citric acid and lime oil. Substantial amounts of both animal fats and vegetable oils are generally available in Mexico for the soap industry.

Vast quantities of salt are recovered from the waters along the east and west coasts and from inland deposits. Mexico is one of the leading producers of arsenic and mercury. Pine forests are plentiful for the recovery of naval stores. Lime is found in several localities.

Some research and development work is carried on, in fact, in recent years there has been considerable increase due partly to the increase in technical graduates of the local universities. Most of the research work has been in connection with public health, for the control of malaria and other tropical diseases.

The National University of Mexico is graduating more and more chemical engineers each year and the newer Technical Institute in Mexico City is gradually getting its chemical engineering department into operation. In addition to the chemists and engineers who graduate from local institutions many young Mexicans attend universities in Texas and elsewhere in the United States and return to their own country to enter the chemical industry.

Young Mexican chemists and engineers are brought to the United States for advanced training by U. S. concerns which have joined with Mexican capital in launching mixed capital enterprises. Upon completion of their training in the U. S., the young Mexicans return to join the technical staffs of the associate Mexican companies.

Among the concerns which announced the training of Mexican nationals in technical

REQUIREMENTS MET BY DOMESTIC PRODUCTION

Inorganic		Organic	
Ammonium sulphate	25%	Acetic acid	1%
Bismuth salts	75%	Acetone	5%
Calcium chloride	10%	Acetylene	100%
Calcium phosphate	70%	Benzol	100%
Chlorine	10%	Butane	50%
Copper sulphate	5%	Butyl alcohol	70%
Hydrochloric acid	30%	Calcium carbide	100%
Hydrofluoric acid	10%	Castor oil (refined)	5%
Hydrogen peroxide	20%	Citric acid	5%
Lead arsenate	80%	Ethane	50%
Mercuric chloride	70%	Ethyl alcohol	100%
Sodium carbonate	1%	Formaldehyde	0%
Sodium hydroxide	1%	Glucosates	80%
Sodium phosphate	10%	Glycerine	70%
Sodium silicate	40%	Hormones	40%
Sodium sulphate	20%	Lactates	50%
Sodium sulphide	10%	Liver extracts	25%
Stannous chloride	10%	Menthol	10%
Stannous oxide	40%	Methyl alcohol	5%
Stannic sulphate	10%	Nitric ether	20% to 100%
Sulphur	50%	Stearic acid	30%
Sulphur dioxide	30%	Sulphuric acid	
Sulphuric acid	80%	ether	20% to 100%
Zinc oxide	60%	Tartaric acid and salts	30%

NEW CHEMICAL MANUFACTURING COMPANIES NOT YET IN PRODUCTION

Name and Address	Products	Capital	
		Dollars (U.S.)	Pesos
Salico, S. A. Marsella 54, Mexico, D F	Acetyl-salicylic acid, salicylates, phenol, acetic acid	125,000	600,000
Salinas del Pacifico, S. A. Palma 45, Mexico, D F	Salt, sodium sulphate	208,333	1,000,000
Cia. Mexicana de Hielo Slecó, S. A. San Pedro Palacho, Veracruz	Carbon dioxide	41,667	200,000
Productos Quimicos Boyle, S. A. I. la Catolica 45, Mexico, D F	Potassium chlorate, caustic soda	52,083	250,000
Colorantes de Mexico, S. A. I. la Catolica No. 33, Mexico, D F	Mono-azo dyes	52,083	250,000
Sara Texcoco, S. A. San Cristobal Xepepec, Edo. Mexico	Soda ash, caustic soda, salt	2,083,333	10,000,000
Cia. Industrializadora del Lirio, S. A. Av. Juarez 64, Mexico, D F	(To manufacture potassium chlorate and potassium chloride from lillies.)	52,083	250,000

and industrial know-how are the Westinghouse Electric Corp., the Celanese Corp. of America, and Reynolds Metals Co.

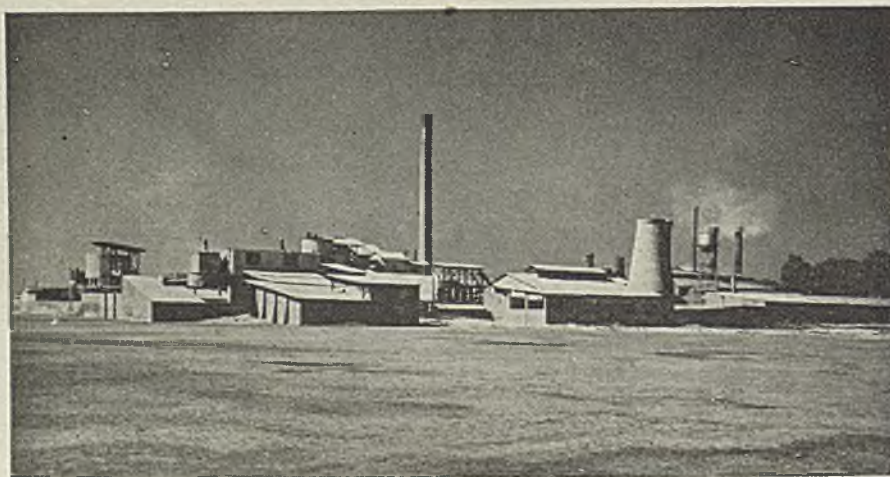
A few of the most interesting Mexican chemical products and industries have been selected for special attention. They appear below in alphabetical order.

Alcohol—Large quantities of ethyl alcohol are produced from sugar cane molasses, which is plentiful, in the states of Veracruz, Sinaloa, Puebla, and Jalisco. There are in the neighborhood of 100 plants, of which the most important are: Atencingo, San Cristobal, Cuatotolapan, La Iberia, El Mante, San Martin, San Miguelito, Motzorongo, San Nicholas, El Potriro and Victoria. Their production is distributed through the Sociedad Nacional de Productores de Alcohol. This organization controls the market and manufactures special denatured alcohols for use in hospitals, in perfumes and in other industrial products. In 1939 combined investments of plants in the Sociedad group totaled \$1,544,300, and the annual production was valued at \$2,793,000, and since that time production has more than doubled.

Production of alcohol has risen rapidly from 6,090,300 gal. in 1940, to 6,805,500 gal. in 1941, to 9,133,000 gal. in 1942, to an estimated 12,000,000 gal. in 1943. Of the foregoing 360,000 gal. were denatured in 1940, 473,000 gal. in 1941 and 510,250 gal. in 1942. In the war years exports of alcohol from Mexico were substantial, in 1942 they totaled 1,321,700 gal. and in the first nine months of the next year they reached 3,693,000 gal. This large increase in exports was due to an agreement made by Mexico with the U. S. to sell part of her production. Wines and other alcoholic beverages were also exported in large volumes.

Acids—The consumption of sulphuric acid by textile, chemical, explosives, mining, fertilizer and steel industries has been increasing in recent years. Sulphuric acid is made by several manufacturers. Fabrica de Acidos, La Viga, S. A., (the former German-owned plant that has since been taken over by the Mexican Government), and Hard Chemical Works, S. A., are making acid at Mexico City. Petroleos Mexicanos is making acid at two of its refineries. Guanos y Fertilizantes de Mexico, S. A., is now producing

Productos Quimicos Mexicanos' plant at Mexico City, is one of the country's largest and most important chemical plants



acid near Cerritos in the state of San Luis Potosi and will shortly have a new contact acid plant in operation. It is being built by Chemical Construction Corp. American Smelting & Refining Co. (Cia. Carbonifera de Saxonas, S. A.) is making acid at Nueva Rosita in the State of Coahuila. This plant utilizes the sulphur dioxide obtained from the roasting of zinc concentrates. The company produces annually about 20,000 tons of 98 percent acid and 2,000 tons of zinc sulphate.

Exports of sulphuric acid were made to the U. S. in 1938 and '39; they amounted to 200 and 748 tons respectively. No exports are shown for the year 1940 and 1941. Imports were 119 tons in 1938, 49 tons in 1939, 316 tons in 1940, 697 tons in 1942 and 84 tons in 1945.

Hard Chemical Works of Mexico City produces hydrochloric and nitric acids. Fabrica de Acidos La Viga makes both of these mineral acids and in addition acetic acid. Productos Quimicos Mexicanos, S. A., produces hydrochloric acid from chlorine generated in its Nelson cells. Nitric acid is made by Cia. Mexicana Explosivos.

Arsenic—The Republic ranks among the world's leading producers of arsenic. Its production of white arsenic is a byproduct in the smelting of principally arsenical lead ores at the plant of the American Smelting & Refining Co. at San Luis Potosi and that of the American Metal Co. at Torreon, Coahuila. Prior to the war Mexico was the source of about one-third of the supplies of the United States. In 1942 increased production in the U. S. caused this country to depend on Mexico for only one-fifth of its requirements. Imports from Mexico increased from 8,133 tons in 1939 to 15,974 in 1943, but dropped to 8,743 tons in 1944. The Mexican arsenic bearing ores are gradually being exhausted, therefore a drop in the production of arsenic is to be expected. In recent years the production of calcium arsenate has been started.

Calcium Carbide and Acetylene—Calcium carbide production is somewhat more than 10,000 metric tons annually. The two producers are: Cia Mexicana de Carburo de Calcio, S. A., in Mexico City; and Cia Mexicana Aga., S. A., at Guadalajara, Jalisco. The Mexico City plant is slightly smaller than the other.

The total production of these two plants is sufficient to meet the demands of the local industry which means the acetylene plants. Nevertheless some importations have been made in recent years. For instance, in 1940, 56 tons of carbide were imported and 769 tons the following year. On the other hand about one-tenth of the local production of carbide is exported to other Latin American countries.

Acetylene is used for welding, and for industrial and farm illumination, and is purchased by the government for harbor and navigation lights. The largest producer of acetylene is the Gas Acetileno A. G. A.

which makes 90 percent of the country's total in its plants at Mexico City, Monterrey, Tampico, Guadalejara, and Mazatlan. It is said to have plans for a plant at Puebla. Among the other producers are: Cia. Mexicana de Soldadma Autogena; Commonwealth Products Co. of Mexico, S. A.

Apparently the local production has been increased so as to meet the demands. Imports decreased from 55 tons, gross weight, in 1935 to 35 tons in 1937 and to only 20 tons in 1941.

Caustic Soda and Soda Ash—At the present time the only commercial production of caustic is at the Mexico City plant of Productos Quimicos Mexicanos, S. A. This is one of the largest and most important Mexican chemical plants. It has 240 Nelson cells which serve as the basis of most of its products, liquid chlorine, caustic, (48 percent solution) calcium hypochlorite, calcium chloride, precipitated calcium carbonate, calcium arsenate, hydrochloric acid, carbon bisulphate and potassium chlorate. Electrochemical industries in the Federal District obtain power at 6.2 mils per kw.hr.

This firm has been producing annually about 1,500 metric tons of caustic which is sold to the nearby refinery of Pemex and to some extent to the soap and textile industries. Between 1939 and 1943 another company operated a plant near Mexico City. It produced small quantities from Texcoco Lake bed deposits. Due to operational difficulties and insufficient funds production was suspended.

Total output of caustic in 1940 was 685 metric tons; in 1941, 2,642 tons; in 1942, 1,490 tons; in 1943, 980 tons; in 1944, 1,698 and in 1945 it is estimated to have been about 1,200 tons.

Consumption has been about 30,000 metric tons per year. At the present time it is being consumed at this same rate. However, there has been a gradual increase due to the expansion of the petroleum refining, textiles, soap and vegetable oil industries. Soap has consumed 64 percent, petroleum refining 14 percent; textiles 10 percent, vegetable oils 8 percent, and miscellaneous industries 4 percent.

Imports were 16,545,263 kg. in 1938,

16,753,792 in 1940, 27,326,850 in 1942, 16,015,586 in 1943 and 22,310,818 in 1944. During these years the United States has supplied 99 percent of the imports.

Next year the situation should change for the plant at San Cristobal Xetepec, near Mexico City, of the Sosa Texcoco, S. A., will be in operation, provided equipment can be obtained. It is expected to have an output of 100 tons per day of soda ash from which 30 tons will be converted into caustic. When

IMPORTS OF INSECTICIDES INTO MEXICO

Commodity	[Pounds]					
	1938		1941		1944	
	Total	From U. S.	Total	From U. S.	Total	From U. S.
Arsenate and arsenite of calcium and preparations	75,291	75,146	740,153	740,153	546,130	546,130
Arsenate and arsenite of copper and preparations	22,317	(*)	25,557	(*)	6,136	(*)
Arsenate and arsenite of lead and preparations	27,784	(*)	145,131	(*)	230,122	(*)
Arsenates and arsenites, unspecified	80,560	58,865	150,790	146,900	130,253	130,253
Bordeaux mixture	12,794	(*)	1,100	(*)	8,375	(*)
Calcium cyanide (for fumigation)	695	(*)	209	(*)	110	(*)
Chlorobenzene (for fumigation)	5,388	(*)	21,835	(*)	22,880	(*)
Copper sulphate	2,974,653	2,917,523	3,140,282	3,140,130	8,003,281	8,003,281
Creolin	138,000	18,152	121,438	108,482	188,718	181,200
Cresylic acid	626,600	311,680	739,105	484,792	563,055	452,175
Disinfectants derived from coal tar, unspecified	42,858	29,548	155,738	154,376	115,284	115,284
Disinfectants for rooms and sanitation services, unspecified	31,594	25,476	55,575	29,119	58,890	58,890
Disinfectants, unspecified, for external use	40,047	30,558	49,247	42,394	54,404	54,404
Formaldehyde	155,085	47,372	57,187	56,344	524,751	524,751
Insecticidal preparations derived from pyrethrum (liquid)	30,147	28,970	278,298	277,281	383,670	383,670
Insecticide preparations, unspecified	84,467	49,383	188,480	186,353	549,285	549,278
Insecticides in an oil solution	11,185	(*)	11,284	(*)	2,422	(*)
Naphthalene	60,740	667	50,375	30,428	44,772	10,865
Nicotine sulphate	12,065	12,065	17,479	17,479	8,830	8,830
Paris green	500	(*)	580	(*)	5,933	(*)
Potassium and sodium fluorides	4,875	(*)	108,992	(*)	83,380	(*)
Total	4,437,665	(†)13,605,405	6,059,136	(†)15,413,991	11,540,681	(†)11,019,011

*Not available. †Total of items recorded—distribution by countries of origin not available in all cases
Source: Bureau of Foreign and Domestic Commerce.

COMPANIES PRODUCING CHEMICALS AS BYPRODUCTS

Name and Address	Products	Capital		Employees	Annual Business Volume	
		Dollars (U.S.)	Pesos		Dollars (U.S.)	Pesos
La Luz, S. A. Nonoalco y Cedro, Mexico, D F	Glycerine, soap, vegetable oils	416,667	2,000,000	80	1,666,667	8,000,000
Colgate-Palmolive-Peet, S. A. Cda. de la Ronda 51, Mexico, D F	Glycerine, soap	416,667	2,000,000	105	1,666,667	8,000,000
La Economica, S. A. Naranja 268, Mexico, D F	Glycerine	104,167	500,000	35	416,667	2,000,000
Bola de Nieve, S. A. Laguna de Terminos, Mexico, D F	Glycerine, vegetable fats	312,500	1,500,000	60	625,000	3,000,000
Cia. Metalurgica Penoles, S. A. 16 de Sept. 57, Mexico, D F	Arsenic, lead, zinc	625,000	3,000,000	500	1,250,000	6,000,000
Cia. Minera Asarco, S. A. Madero 55, Mexico, D F	Arsenic, lead, zinc	2,083,333	10,000,000	1000	4,166,667	20,000,000
Petroleos Mexicanos Av. Juarez 92, Mexico, D F	Tetra-ethyl lead, sulphuric acid, wax, petroleum derivatives					
Sociedad Nacional de Productores de Alcohol, S. R. L. de I. P. de C. V. San Juan de Lebron 37, Mexico, D F	Representing 65 producers of ethyl alcohol					

this plant is in operation local production of caustic should account for 30 percent or more of Mexico's requirements.

Soda ash requirements also have been on the increase in recent years due to the glass industry, which has accounted for 75 percent of the total consumption. The remainder of the demand has come from the manufacturers of sodium silicate, soap, and other products. Almost all of the ash used in Mexico is imported from the U. S. Imports have increased from 47,000,000 lb. in 1941 to 82,000,000 in 1944. The latter were valued at a million dollars.

The Lake Texcoco development previously referred to is interesting. It started out to be a land reclamations project financed by the government. Later the Sociedad Mexicana de Credito Industrial, S. A., set up a corporation with a capital of five million pesos for the exploitation of the salts dissolved in the waters of the lake. The operation company is Sosa Texcoco, S. A.

The salts are dissolved by well and river water and pumped into a caracol which is a solar evaporator of 2,000 acres or the size of Central Park in New York. From it are evaporated 40,000 cu.m. of water per day. The concentrated solution which collects in the center of the caracol is now being pumped to a 10 ton per day pilot plant near the evaporator. The solution is treated with carbon dioxide, bicarbonate settles out in Dorr thickeners and is centrifuged. The partially dried bicarbonate is burned in furnaces to remove carbon dioxide (which is used in treating the original liquor). Salt is removed, purified and sold. The buildings for a plant ten times the size of the pilot plant have been completed and when equipment that has been on order for many months is obtained it can be expected to operate. This is a splendid appearing plant, complete with laboratories, office buildings, hospitals, dining room, all enclosed in the customary Mexican 8-ft. concrete wall.

Coal Tar Dyes—At present Mexico makes none of the coal tar dyes it consumes, however a Mexico City company has announced its intentions of coupling imported intermediates and raw materials to form finished products of the monoazo class of dyes. Production is not expected to exceed 60 metric tons (132,276 lb.) a year.

The annual consumption of coal tar dyes in Mexico averages about 2,500,000 lb. or 1,100 metric tons on the "as shipped" basis. Imports are generally of "multiple strength" dyes and both imports and consumption figures would be three to five times as high if reported on a single strength basis. Value of consumption is about 3 million dollars. Textiles require 80 percent of the consumption; leather, 8 percent; paper, 3 percent; and miscellaneous 9 percent. An expansion in the textile industry during the war years developed a slight increase in consumption. The current year will probably show a decline of 10 to 15

CHEMICAL MANUFACTURING COMPANIES IN MEXICO

Name and Address	Products	Capital		Em- ployees	Annual Business Volume	
		Dollars (U.S.)	Pesos		Dollars (U.S.)	Pesos
Acidos, Organicos, S. A. Tlalnepantla, Edo. de Mexico	Yeast (projected: acetic acid, lactic acid, citric acid, calcium acetate)	125,000	600,000	30	62,500	300,000
Baterias Mexico, S. A. Penitenciaría 34, Mexico, D F	Copper sulphate, mercury salts	20,833	100,000	25	166,667	800,000
Beick, Felix y Cia., S. A. Fab. de Acidos "La Viga," S. A. Calz. de la Viga 54, Mexico, D F	Sulphuric acid, nitric acid phosphates, copper sulphate, sulphuric ether, hydrochloric acid, sodium sulphate, glue, carbon dioxide	2,083,333	10,000,000	800	3,125,000	15,000,000
Fertilizantes de Mexico, S. A. Monte de Piedad 13, Mexico, D F	Calcium arsenate, superphosphate	104,167	500,000	64	312,500	1,500,000
Productos Revuelta, S. A. Granada 96, Mexico, D F	Sodium sulphite, sodium sulphate, citric acid, stearic acid, magnesium sulphate	104,167	500,000	44	312,500	1,500,000
Industrias Proquifa, S. A. Dr. Casimiro Liceaga 41, Mexico, D F	Copper salts, mercury salts	41,667	200,000	18	62,500	300,000
Hard Chemical Works, S. A. Lago Sirahuen 49, Mexico, D F	Essential oils, hydrogen peroxide, mercury salts, sulphuric ether, nitric ether, sodium sulphate, sulphuric acid, hydrochloric acid	312,500	1,500,000	67	625,000	3,000,000
General de Química, S. A. Calz. San Juan Aragon 214, Villa Madero, D F	Sodium hypochlorite, sodium sulphate, zinc salts	104,167	500,000	25	312,500	1,500,000
Cia. Mexicana de Carburo de Calcio, S. A. Morales 76-A, Mexico, D F	Calcium carbide, oxygen, acetylene	312,500	1,500,000	100	625,000	3,000,000
Cia. Mexicana de Oxide de Zinc, S. A. Alamo 219, Mexico, D F	Zinc oxide, pigments	10,417	50,000	17	31,250	150,000
Destilacion de Madera, S. A. Priv. Victor Hugo 3, Mexico, D F	Acetic acid, methyl alcohol, acetone	20,833	100,000	20	31,250	150,000
Carburo, S. A.		208,333	1,000,000	65	312,500	1,500,000
Laboratorios Quimicos, S. A. Calz. Mexico-Puebla K.7, Mexico, D F	Cacodylates, tartarates, essential oils	4,667	200,000	32	62,500	300,000
Cromo Industrial, S. A. Nardo 219, Mexico, D F	Lead arsenate, copper arsenate, copper sulphate	1,042	50,000	12	20,833	100,000
Productos Quimicos Mexicanos, S. A. Monte de Piedad 15, Mexico, D F	Calcium hypochlorite, caustic soda, chlorine, calcium arsenate, hydrochloric acid, calcium chloride, precipitated calcium carbonate, carbon bisulphide	625,000	3,000,000	120	625,000	3,000,000
Productos de Zinc, S. A. Monterrey, N. L.	Zinc oxide	15,625	75,000	14	31,250	150,000
Química del Norte, S. A. Padre Mier 223, Monterrey, N. L.	Acetic acid, acetone, methyl alcohol, creosote, carbon	31,250	150,000	37	62,500	300,000
Azufre Refinado, S. A. Cipres 377, Mexico, D F	Refined sulphur	20,833	100,000	15	4,667	200,000
Azul de Ultramar, S. A. Calle 4 No. 46, San Pedro de los Pinos, D F	Ultramarine blue, pigments	31,250	150,000	23	62,500	300,000
Hectamil, S. A. San Bartolo Naucalpan, Edo. de Mexico	Ultramarine blue, pigments	20,833	100,000	18	41,667	200,000
Salinas de Mexico, S. A. Salinas, S. L. P.	Salt, sodium sulphate	1,250,000	6,000,000	800	2,083,333	10,000,000

percent. Most dyes in prewar years were supplied by Germany, but since the start of the war the U. S. has supplied 85 percent and Switzerland the remaining.

Fertilizers—Fertilizer consumption is in the neighborhood of only 30,000 metric tons annually, notwithstanding there are an estimated 20,000,000 acres of land under cultivation. In other words very little fertilizer is used in Mexican agriculture since less than 1 percent of the land is fertilized. As a result of constant cultivation of the majority of the arable lands over a period of many years, Mexican soils are practically depleted of the fertilizing elements necessary to produce satisfactory crops. It is estimated that to fertilize only the principal crops, such as corn, wheat, cotton, beans, sugar cane, tomatoes and oil seed 3 million tons of fertilizer would be needed.

Fertilizer consumption is very low owing principally to lack of training of the farmer although during the war consumption has

also been restricted by the shortage of supply and transportation. The trend in the consumption of fertilizers of all types has been upward during the past decade and it is expected to continue indefinitely. The government is mindful of the necessity to increase the food supply and is strongly behind the movement to use more fertilizers. This governmental influence may bring about as much as 100 percent increase in the use of fertilizer during the next five or ten years.

The fertilizer materials that are needed in the country are ammonia salts and phosphates. Phosphate deposits at present discovered are low grade and it will be necessary initially to import rock. The ammonia salt most practical for production and distribution in Mexico is the sulphate, a small amount of which is now made as a by-product of coke production at Rosita. Studies of agricultural needs indicate a probable near future annual demand for superphosphate (18 percent P_2O_5) of 133,500 metric tons.

Only two chemical fertilizers are produced in the country, ammonium sulphate and normal superphosphate. Only one company has produced the former and its production has averaged 3,000 metric tons annually for the past decade. A large organization is now bidding for a 50 ton a day ammonia unit of one of the Defense Plant Corp.'s surplus plants in the Southwest. If successful in its bidding the unit will be moved to Mexico and used in the production of ammonium sulphate.

There are two producers of standard superphosphate. The plant located at Torren, Coahuila, produces 6,000 metric tons per year from phosphate rock. The Mexico City plant makes 2,000 tons per year principally from bones. A third concern, Guanos y Fertilizantes, S. A., semi-official, has under construction a superphosphate plant of 75 to 80 tons per day at San Luis Potosi (Chemical Construction Corp. is building the plant). Total Mexican capacity for

CHEMICAL MANUFACTURING COMPANIES IN MEXICO — Continued

Name and Address	Products	Capital		Employees	Annual Business Volume	
		Dollars (U.S.)	Pesos		Dollars (U.S.)	Pesos
Carbonato de Calcio, S. A. Calle 18 No. 9, San Pedro de los Pinos, D F	Calcium carbonate	20,833	100,000	18	62,500	300,000
Guanos y Fertilizantes de Mexico, S. A. V. Carranza 25, Mexico, D F	Sulphuric acid, ammonium sulphate, super-phosphate, bird guano, bone meal, fish meal	2,083,333	10,000,000	200	416,667	2,000,000
Cia. Mexicana de Azufre, S. R. L. Balderas 44, Mexico, D F	Sulphur	41,667	200,000	20	62,500	300,000
Cia. Industrial Dermatol. S. A. Sabino 360, Mexico, D F	Sulphonated oils, pigments	20,833	100,000	12	41,667	200,000
Cia. Mexicana Aga, S. A. Clavijero 40, Mexico, D F	Calcium carbide, acetylene, oxygen	312,500	1,500,000	95	625,000	3,000,000
Cia. Nacional de Oxidos, S. A. Nonaalco 130, Mexico, D F	Zinc oxide, pigments, lead oxide	52,083	250,000	28	72,917	350,000
Silicatos de Mexico, S. A. Nino Perdido 82, Mexico, D F	Sodium silicate	15,625	75,000	16	31,250	150,000
Productos Tonicos, S. A. Sidar y Rivorosa 50, Mexico, D F	Tannin compounds	15,625	75,000	9	31,250	150,000
Cia. Carbonifera de Sabinas, S. A. Nueva Rosita, Coahuila	Sulphuric acid, ammonium sulphate, benzene, toluene, naphthalene, xylois, creosote	1,666,667	8,000,000	600	3,333,333	16,000,000
Hachmeister de Mexico, S. A. Madero 35, Mexico, D F	Ultramarine blue, pigments, tin oxides, tin sulphate	31,250	150,000	20	62,500	300,000
Sulphatos de Cobre, S. R. L. Bajia de Todos Santos 89, Mexico D F	Copper sulphate	5,208	25,000	9	10,417	50,000
Materias Primas Minerales, S. R. L. San Antonio Abad 19, Mexico, D F	Talc, calcium carbonate, lime	10,417	50,000	13	31,250	150,000
Azteca, S. A. Calle 16 y Central, San Pedro de los Pinos, D F	Lime	20,833	100,000	20	62,500	300,000
Calidra, S. A. FF.CC. Nacionales 155, Mexico, D F	Lime	62,500	300,000	35	125,000	600,000
Agustin Argenti Colon 815, Guadalajara, Jal.	Insecticides, zinc oxide	20,833	100,000	15	41,667	200,000
General Electroquimica, S. A. Eligio 7-A, Mexico, D F	Calcium arsenate, lead arsenate	20,833	100,000	18	41,667	200,000
Productos Cantabria, S. R. L. Inglaterra y Roble, Guadalajara, Jal.	Calcium carbonate, activated carbon	10,417	50,000	12	31,250	150,000
Productos Electroquimicos, S. A. El Ancona 68, Mexico, D F	Ammonium persulphate, hydrogen peroxide	20,833	100,000	20	41,667	200,000
Rey-Ort, S. R. P. Fermin Riestra 468, Guadalajara, Jal.	Carbon dioxide, magnesium carbonate	10,417	50,000	14	31,250	150,000
Nitromex, S. A. Calle 2 No. 6, San Pedro de los Pinos, D F	Sodium and potassium chlorates	52,083	250,000			
Cia. Nacional de Acidos, S. A. San Luis, Potosi (55% owned by Guanos y Fertilizantes de Mexico, S. A.)	Sulphuric acid	312,500	1,500,000	15		
Industria Mexicana de Tintos Bahia Concepcion 3, Mexico, D F	Printing ink			75		

UNITED STATES EXPORTS OF PLASTICS MATERIALS TO MEXICO

	Synthetic gums and resins		Pyroxylin (sheets, rods and tubes)		Cellulose acetate (Sheets, rods, tubes, etc.)	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Average during prewar years (1936-39).....	217,113	39,477	2,810	2,069	1,731	843
1940.....	432,369	110,292	2,668	2,006	26,408	14,019
1941.....	315,458	68,197	8,096	8,137	337,984	133,058
1942.....	465,601	106,171	16,809	18,204	402,264	184,129
1943.....	560,794	157,839	27,791	27,199	208,434	86,439
Average during war years (1940-43).....	443,556	110,625	13,841	13,886	243,772	104,411

Source: Bureau of the Census, United States Department of Commerce.

superphosphate production should be approximately 20,000 metric tons by 1947 and may be sufficient to supply the entire local demand.

Mexico produces two natural fertilizers, manure and guano. The semi-official organization, Guanos y Fertilizantes de Mexico, S. A., has been given exclusive concessions to exploit all deposits of guano in Mexico. Production of all types of guano in 1946 is expected to be 3,500 metric tons.

Industrial Explosives—For several years the production of dynamite has averaged between 16 and 18 million pounds and black powder about 500,000 lb. This production has been by an American owned company, a du Pont subsidiary, who has been supplying about 90 percent of the country's requirements of industrial explosives for many years. About 80 percent of the output is used for the mining industry, 15 percent for construction and the remaining 5 percent for miscellaneous purposes. While the trend in production and consumption was up (20 percent) during the war years the present trend is downward.

Insecticides—The insecticide industry has expanded to a leading position during the last decade. Its products have increased in value from 1,500,000 pesos ten or twelve years ago to 3,500,000 pesos in 1945. And indications are that the market will go to from 8 to 10 million pesos in the next few years, due to activity in the trade, health control measures promoted by the Ministry of Public Health, and government educational programs.

Production and imports have increased in recent years. The U. S. has been called on to supply most of the imports. About \$800,000 worth of insecticides, fungicides, disinfectants and materials for their preparation were shipped from the U. S. to Mexico in 1943 and 1944. Copper sulphate accounted for one-half of the trade.

About 4,000 metric tons of copper sulphate are used annually on the banana plantations and another 2,000 tons on the citrus fruits, grapes and for other purposes.

In some years as much as 5,500 metric tons of arsenicals have been used, however in a normal year about one-half that amount

is consumed. Following is a breakdown of the average annual production:

White arsenic.....	1,500,000 lb.
Calcium arsenate....	4,000,000 lb.
Lead arsenate.....	220,000 lb.
Paris green.....	45,000 lb.
Others	100,000 lb.

Calcium arsenate and fly sprays are the only insecticides made in large quantities. At the present time several small plants for the production of insecticides are under construction and indications are that the capacities of established plants will shortly be expanded.

Mercury—Production of mercury has risen rapidly in recent years due entirely to an increase in price. From an output of 254,269 kg. in 1939 it rose rapidly to 401,715 in 1940, to 797,623 in 1941, to the all-time high of 1,118,369 in 1942 but tapered off in 1943 to 976,326 and in 1944 to 898,470. When the price dropped from \$196 a flask to \$96 in 1944 the small high-cost producers closed down.

Naval Stores—Strange as it may seem, the eruption of a volcano was required to disrupt the naval stores industry. The coming of the volcano, Paricutin, damaged a large portion of the producing area destroying many trees and damaging others over an area of several hundred square miles in the States of Jalisco and Michoacan. This destruction lowered the output of the industry in 1944. In the normal years before this event the industry produced 13,000 metric tons of rosin and 3,200 tons of turpentine. The output in the war years was also affected by labor shortages and transportation difficulties.

Paints and Varnishes—The paint and varnish industry has increased in importance during the past decade. From 22 factories, the industry has grown to 36. The most important producers are Productos Solex, S. A.; Ambra, S. A.; Productos Piel Roja, S. A.; Pinturas Morlac, S. de R. L.; Productos Optimus, S. de R. L.; Productos Aurolin, S. A.; Productos Var-Mex, A. en P.; Cia. Mexicana de Pinturas "International," S. A.; Esmaltes y Lacquers, S. A.; Productos Lac-co, and Rapidol, S. A.

Annual sales of the industry are now about

MEXICO IMPORTS INTO U.S., 1944

Commodity Description	Quantity	\$ Value
Rubber guayule	15009057 lb.	3351233
Turpentine spirits	795265 gal.	525448
Chicle crude	17487968 lb.	9773812
Gums and resin NES	518210 lb.	193384
Rosin not for violins	3214300 lb.	145944
Jalap	79252 lb.	27580
Sarsaparilla root	53564 lb.	7106
Roots veg crude no achi NES	311690 lb.	24920
Cr. drug flowers fruit etc.	81554 lb.	8252
Fish livers for drugs	2285105 lb.	1631455
Fish liver oil NES advanced	2871 lb.	1536
Taxabl oil in fish liver oil	2857 lb.	
Castor beans	96957 lb.	1996
Flaxseed	445502 bu.	1357734
Sesame seed	61839 lb.	8116
Soybeans	2557 lb.	502
Vegetable wax candleilla	6711191 lb.	1848832
Oiticica oil	70657 lb.	14485
Geranium oil	8 lb.	140
Rose oil or otto of roses	1 oz.	18
Lemon grass oil	1058 lb.	743
Lavender oil	55 lb.	1193
Lime oil	126392 lb.	682405
Linaloe oil or bois de rose	116875 lb.	299293
Orris oil		16
Patchouli oil	16 lb.	268
Vetivert oil	36 lb.	1113
Oil essent a dist no alc NES	1 lb.	106
Saffron crude	3467 lb.	2113
Dyeing articles crude NES	2346 lb.	1311
Dead or creosote oil	87681 gal.	10368
Coal tar medicinals NES	53 lb.	236
Caffeine	20833 lb.	220519
Ichthyol a sulph bitumens	52913 lb.	22022
Urlics concentrates a deriv.		5934
Arsenic trioxide	17485726 ctb.	449517
Naphthenic acids	8381 lb.	3594
Ethyl alcohol	5697082 gal.	2334123
Argals etc. U90 pct pot bitart	52500 lb.	692
Strontianite and celestite	6340895 lb.	38191
Coconut shell char	715904 lb.	16891
Flavoring ext etc. w.o. alc.	47 lb.	706
Zinc sulphate.	1084669 lb.	28678
Iron oxide a hydrox natural	55115 lb.	415
Barytes ore crude	678 ton	3551
Guano	135 stn.	3124
Dried blood NES	31 stn.	1445
Animal manures	2581 stn.	15739
Fish scrap and fish meal	259 stn.	13330
Fertilizer substances NES	2920 stn.	14588
Bombs rockets a fireworks NES	3292 lb.	1836
Toilet soap ov 20 cents pound	1954 lb.	885
Animal oil in toilet soap	915 lb.	
Coc oil n us in t soap o20c	5 lb.	
Tax oil cont soap ov 20 ct lb	6 lb.	
Medicated soap	29 lb.	11
Anim oil in medic soap	14 lb.	
Soap and soap powder NES	4000 lb.	570
Floral essences a concretes	8 lb.	3968
Mixt cont essential oils etc.	77 lb.	905
Perfumery containing alcohol	.857 lb.	10930
Perfumery not cont alcohol	5 lb.	49
Toilet water cont alcohol	15274 lb.	29295
Toilet water not con alcohol		2
Cosmetics containing alcohol	1207 lb.	1646
Cosmetics not cont alcohol		429

Source: U. S. Bureau of Census

\$4,000,000. It is generally believed that this industry will continue its upward swing.

Pharmaceuticals—The average Mexican is a relatively large consumer of pharmaceuticals. This has resulted in a large number of important manufacturers and hundreds of small laboratories which specialize in proprietary and non-proprietary medicines. Many of the large United States drug houses are in Mexico. Such names as Sidney Ross, Abbott, Wyeth, Squibb, Sharp & Doame, Parke Davis

UNITED STATES EXPORTS OF CHEMICALS TO MEXICO IN 1945

Commodity Description	Unit	Quantity	\$ Value
Citric acid	lb.	282,552	64,254
Oxalic acid	lb.	127,407	16,155
Acids and anhydrides NES	lb.	336,534	60,550
Hydrochloric acid	lb.	121,761	7,843
Boric acid	lb.	279,145	14,967
Chromic acid	lb.	3,958	1,036
Nitric acid	lb.	22,500	3,400
Sulphuric acid fuming	lb.	35,957	2,031
Sulphuric acid NES	lb.	131,916	5,219
Arsenious oxide	lb.	752	329
Molybdenum trioxide	lb.	142	240
Phosphoric acid	lb.	44,761	4,390
Inorganic acid anhydride NES	gal.	20,714	5,800
Methanol	lb.	2,342	943
Ethylene glycol	lb.	25,008	2,622
Denatured alcohol solidified	lb.	120	37
Butanol	lb.	3,634	483
Glycerin	lb.	1,050,545	162,295
Alcohols NES	lb.	724,260	77,936
Acetone	lb.	308,886	26,467
Butyl acetate	lb.	48,403	8,532
Carbon bisulphide	lb.	450,685	32,936
Formaldehyde 40 pct. solution	lb.	343,231	19,814
Paraformaldehyde solid	lb.	2,650	590
Amyl acetate	lb.	5,507	1,746
Cellulose acetate flake, etc.	lb.	5,569	1,108
Carbon tetrachloride	lb.	97,362	7,752
Ethyl acetate	lb.	228,133	28,265
Sodium acetate	lb.	56,398	3,731
Methyl ethyl ketone	lb.	2,938	277
Ethyl ether	lb.	54,982	9,197
Camphor natural synthetic	lb.	10,133	5,284
Hexamethylene tetramine	lb.	21,306	7,836
Organic chemicals NES	lb.	869,396	316,636
Aluminum sulphate	lb.	783,328	12,243
Aluminum chloride anhydrous	lb.	2,263	262
Aluminum compounds NES	lb.	1,786,616	72,285
Calcium hypochlorite	lb.	11,247	2,999
Bleaching powder NES	lb.	984,088	28,170
Calcium carbide	lb.	539,681	24,574
Calcium chloride	lb.	1,032,515	18,876
Bromine	lb.	416	470
Potassium bromide	lb.	8,276	2,101
Sodium bromide	lb.	6,425	1,545
Ethylene dibromide	lb.	4,500	1,260
Bromine bromide bromates NES	lb.	24,315	12,911
Potassium iodides	lb.	5,668	8,324
Iodine crude and resublimed	lb.	5,598	8,120
Iodine NES	lb.	1,276	3,899
Potassium bichromate chromate	lb.	75,380	9,876
Potassium hydroxide	lb.	151,692	14,471
Potassium carbonate & mix.	lb.	385,061	28,222
Potassium bitartrate & mix.	lb.	2,758	2,046
Potassium chlorate and mix.	lb.	1,090,957	144,788
Potassium cyanide & mixtures	lb.	17,035	6,536
Potassium nitrate 8 P May 1, 1937	lb.	1,525	543
Potassium nitrate NES	lb.	417,109	30,942
Potassium permanganate & mix.	lb.	60,262	18,208
Rochelle salts	lb.	172	126
Potassium compounds NES	lb.	76,748	17,327
Sodium metaborate	lb.	8,849	1,165
Sodium tetraborate	lb.	2,769,306	95,401
Borates NES	lb.	173,998	2,485
Sodium silicate	lb.	584,395	13,261
Sodium carbonate calcined	lb.	80,614,754	1,045,675
Sodium bicarbonate	lb.	6,440,131	151,939
Sodium bichromate & chromate	lb.	702,647	68,228
Sodium cyanide	lb.	35,622	4,727
Sodium hydroxide	lb.	39,729,103	955,339
Sodium phosphate	lb.	903,571	83,726
Sodium hydrosulphite & comp.	lb.	350,859	48,171
Sodium chlorate	lb.	40,975	4,683
Sodium perborate	lb.	18,632	3,327
Sodium compounds NES	lb.	7,797,335	214,401
Tin compounds	lb.	1,354	856
Aqua ammonia	lb.	186,374	6,767
Ammonium bicarbonate & carb.	lb.	443,081	30,696
Ammonium chloride	lb.	220,866	13,485
Ammonium nitrate	lb.	5,706,990	245,239
Urea ammonium	lb.	188,982	12,428
Ammonium compounds NES	lb.	42,703	80,774
Ammonia anhydrous	lb.	918,116	40,468
Gaseous refrigerants NES	lb.	143,627	28,340
Chlorine	cu. ft.	719,131	890
Helium gas	cu. ft.	65,300	140
Gases lung irritant NES	lb.	280	928
Gases screening smoke	lb.	705	59,603
Gases liquefied, solid, NES	lb.	467,327	1,525
Antimony oxides	lb.	10,000	6,405
Antimony salts & comp. NES	lb.	33,357	17,884
Bismuth nitrates and mix.	lb.	14,516	

Commodity Description	Unit	Quantity	\$ Value
Bismuth carbonates & mix.	lb.	8,126	12,079
Bismuth salts & comp. NES	lb.	6,251	13,984
Cadmium salts and compounds	lb.	20	35
Chromium salts & comp. NES	lb.	11,341	2,035
Cobalt salts and comp. NES	lb.	9,526	7,402
Cupric oxide	lb.	1,556	425
Cuprous oxide	lb.	2,430	660
Copper salts & compounds NES	lb.	19,828	2,330
Manganese dioxide, all grades	lb.	495,154	19,878
Manganese salts and comp. NES	lb.	112,834	4,153
Mercurous chloride	lb.	87	225
Mercuric chloride	lb.	291	725
Mercuric oxide red & yellow	lb.	58	215
Mercury salts & comp. NES	lb.	174	574
Nickel salts and compounds	lb.	79,220	27,407
Radium salts and compounds	mgm.	321	7,374
Sirontium nitrate	lb.	21,973	3,171
Sirontium salts & comp. NES	lb.	629	564
Titanium salts & comp. NES	lb.	5,000	800
Tungsten salts and compounds	lb.	39	121
Uranium salts and compounds	gm.	21,821	350
Vanadium oxide	lb.	5,642	4,389
Vanadium salts & comp. NES	lb.	55	103
Zinc chloride	lb.	103,612	6,836
Zinc sulphate	lb.	5,905	1,102
Zinc salts & comp. NES	lb.	122,216	13,788
Zirconium oxides	lb.	49,400	12,339
Zirconium salts & comp. NES	lb.	10,950	1,631
Platinum salts & compounds	oz.	39	191
Plat. group salts & comp. NES	oz.	3	67
Phosphorus elemental	lb.	85,409	42,112
Industrial chemicals NES	lb.	175,310	
Ocher, umber & iron oxide NES	lb.	330,135	33,870
Pigments mineral earth NES	lb.	979,876	34,988
Zinc oxide	lb.	197,042	15,624
Lithopane	lb.	2,281,784	107,356
Lampblack	lb.	36,898	4,109
Carbon black or gas black	lb.	4,835,794	240,050
Red lead, dry	lb.	102,535	10,369
Litharge	lb.	150,643	17,445
White lead, dry	lb.	73,490	6,766
White lead in oil	lb.	32,087	3,852
Titanium dioxide & pigments	lb.	777,138	91,514
Pigments chrome 10 pct. chrom.	lb.	141,999	26,943
Sublimed lead dry	lb.	4,215	359
Zinc sulphide	lb.	4,322	2,444
Pigments chemical NES	lb.	905,174	288,246
Paints bituminous, liq., plast.	lb.		1,317
Red lead in oil	lb.	443,576	145,572
Paint colors paste oil NES	lb.	415,307	41,299
Water paints dry	gal.	43,002	64,201
Emulsion paints	gal.	40,914	58,299
Water paints paste form	gal.	78,413	186,501
Laquers nitrocell, pigmented	gal.	19,389	38,356
Laquers nitrocell, clear	gal.	92,175	89,372
Thinners for nitrocell, laqa.	gal.	361,222	759,760
Rdy. mxd. paints stains enmts.	gal.	94,828	167,231
Varnishes, oil, spir, nat., syn.	lb.	9,873,520	173,745
Ammonium sulphate	lb.	120	46
Calcium nitrate	lb.	2,480,305	53,443
Sodium nitrate NES	lb.	17,600	801
Urea	lb.	83,303	2,833
Nitrog. chem. materials NES	ton	51	620
Phos. rock Fla. land pebble	lb.	24,110	353
Normal superphosphate	lb.	24,400	621
Concentrated superphosphate	lb.	140,557	7,456
Phos. fertilizer material NES	lb.	1,147,356	17,348
Potassium chloride	lb.	925	167
Potassium sulphate	lb.	705,100	4,421
Pot. fert. mat. k20 20 pct. & ov.	lb.	500	60
Pot. fert. mat. k20 under 20 pct.	lb.	13,250	834
Fert. nitrog phosphatic types	lb.	58,240	3,157
Fert. mix. prepared	lb.	3,988	5,274
Powder, smokeless	lb.	3,733,343	424,113
Dynamite	lb.	269,348	49,864
Explosives NES	lb.	1,313	699
Soap, medicated	lb.	55,743	19,013
Soap, toilet or fancy	lb.	12,329	1,866
Soap, laundry	lb.	108,915	21,691
Soap, powdered or flaked	lb.	4,340	1,131
Shaving creams	lb.	5,319	6,046
Shaving cakes, powders, sticks	lb.	244,209	25,817
Scouring bricks, pastes etc.	lb.	30,466	5,042
Soap NES	lb.	3,289	2,998
Dental creams	lb.	6,949	5,282
Dentifrices NES	lb.	15,745	135,065
Talcum powder in packages	lb.	17,966	11,939
Face and compact powder	lb.	17,966	11,088
Cold creams	lb.		
Vanishing creams	lb.		114,980
Creams lotions balms NES	lb.		

UNITED STATES EXPORTS OF CHEMICALS TO MEXICO IN 1945

Commodity Description	Unit	Quantity	\$ Value	Commodity Description	Unit	Quantity	\$ Value
Cottonseed oil refined ed.	lb.	16,784	3,950	Acetylsalicylic acid tablets			6,484
Soybean oil refined edible	lb.	1,317	239	Belladonna extract ointment	lb.	662	1,821
Peanut oil edible	lb.	69	12	Hyoscyamus extract	lb.	153	1,086
Cocoa butter	lb.	316,873	87,477	Scopolamine or hyoscyne	oz.	55	775
Palm & kernel oil ed. or ref.	lb.	3,264	592	Tablets, powders, ointment NES			416,905
Vegetable stearin	lb.	466	186	Atropine sulphate	oz.	200	1,220
Vegetable oils & fats ed. NES	lb.	2,786	864	Caffeine alkaloid	lb.	12,605	37,721
Buna S	lb.	6,225,359	2,151,305	Caffein salts, compounds	lb.	643	1,814
Butyl copolymers, isoprene, etc.	lb.	24,192	7,616	Radium salts, compounds	mgm.	631	17,440
Neoprene polymers, chloroprene	lb.	390,775	169,786	Strychnine and salts thereof	oz.	1,011	656
Synthetic rubbers NES	lb.	591	300	Theobromine and salts a comp.	lb.	1,987	6,116
Rubber reclaimed	lb.	762,027	54,859	Theophylline salts thereof	oz.	37,083	19,292
Rubber scrap	lb.	2,538,026	24,052	Benzocaine, benzoate, etc.	lb.	2,833	15,680
Rubber cement	gal.	4,166	9,516	Acetylsalicylic acid in bulk	lb.	418,267	173,129
Soybeans, except canned	lb.	470	48	Acyphenetidine	lb.	4,651	4,648
Cottonseed	lb.	6,049,256	372,717	Glycerophosphoric acid salts	lb.	15,627	18,639
Flaxseed	lb.	574,440	34,964	Phenolphthalein	lb.	1,376	1,287
Seeds: hemp, perilla, poppy, etc.	lb.	1,592	414	Sulphanilamide	lb.	5,113	16,066
Coconut oil crude	lb.	3,248	544	Sulphathiazole & derivatives	lb.	86,924	282,958
Linseed oil	lb.	26,324	4,539	Sulphadiazine & derivatives	lb.	19,617	136,923
Fatty acids, vegetable origin	lb.	59,003	9,187	Sulphaguanidine	lb.	8,241	45,599
Olive oil foots	lb.	60,640	10,447	Sulphonamide drugs NES	lb.	26,055	175,489
Vegetable soap stick	lb.	547,573	16,279	Medicinal chem. presc. use NES			2,444,348
Castor oil, commercial	lb.	6,768	1,184	Liniments			3,465
Olive oil ined. ex. sul foots	lb.	30	18	Cold, cough, etc., preparations			98,563
Oil & fat expressed iner. NES	lb.	8,887	5,563	Laxatives, cathartics, etc.			141,890
Peppermint oil	lb.	42,611	337,627	Milk of magnesia			5,492
Spearmint & other mint oil, NES	lb.	6,290	26,207	Digestive preparations			121,511
Citrus oils	lb.	10,722	53,015	Remedies, headache, neuralgia			138,611
Oil of citronella	lb.	18,827	18,687	Belladonna, fluid ext., etc.	lb.	405	2,361
Oils not essntl & distld NES	lb.	23,215	76,259	Stramonium extract	lb.	22	54
Oils blend etc. perfume flav	lb.	150,154	1,027,949	Prop. medicinal prep. NES			614,799
Lagwood extract	lb.	6,828	2,243	Nicotine sulphate	lb.	7,934	7,135
Quebracho extract	lb.	36,104	3,157	Copper sulphate	lb.	5,493,213	279,680
Extracts dyeing tanning NES	lb.	600,817	50,305	Lead arsenate	lb.	353,310	41,365
Gum rosin	lb.	34,390	2,605	Calcium arsenate	lb.	27,360	2,192
Wood rosin	lb.	120,295	9,164	Petroleum-oil sprays agric.	gal.	3,661	2,497
Gum spirits of turpentine	gal.	1,320	1,512	Pyrethrum extract	lb.	5,975	5,734
Wood turpentine	gal.	2,234	2,670	Seed disinfectants	lb.	33,022	13,172
Pine oil pine oil prod. etc.	gal.	77,466	47,293	Paradichlorobenzene	lb.	20,311	2,608
Tar and pitch of wood	lb.	962,719	52,154	Cupric acetoarsenite	lb.	7,136	1,820
Tall oil	lb.	88,660	14,061	Pyrethrum powders	lb.	3,267	704
Chicle	lb.	2,000	1,300	Rotenone	lb.	288	52
Shellac bleached and unblchd.	lb.	55,474	26,788	Calcium cyanide	lb.	26,153	6,175
Rosin NES	lb.	5,147	1,059	Insecticides, fungicides, agri.	lb.	1,008,830	233,169
Gum benzoin	lb.	63	207	Insecticides etc. H.H. and Ind.	lb.	1,315,163	312,422
Gums, resins, natural, modified	lb.	304,589	148,843	Disinfectants etc. H.H. and Ind.	lb.	270,160	30,082
Gums, resins, natrl, crude, NES	lb.	60,949	12,053	Baking powder	lb.	354,682	52,387
Coal tar crude and refined	gal.	5,180	1,149	Dextrine or british gum	lb.	455,019	34,402
Benzol or benzene	gal.	8,436	1,295	Tobacco sauging, tobacco orig.	lb.	22,250	2,753
Coal tar pitch	ton	24	885	Pigmented resin emulsion tex.	lb.	57,856	7,632
Cresote or dead oil	gal.	502,256	71,620	Detergents dyeing assist. etc.	lb.	405,261	99,183
Toluene	lb.	211	47	Textile specialty comps NES	lb.	911,685	168,321
Xylene	lb.	9,063	473	Tanning mixtures chromium	lb.	622,777	49,266
Naphthalene	lb.	204	31	Tanning compounds NES	lb.	1,880,839	193,928
Pyridine crude or refined	lb.	4,386	1,652	Water softeners etc.	lb.	2,851,449	242,728
Coal tar crude NES	lb.	21,980	1,241	Metal working compounds	lb.	530,285	59,623
Phenol carbolic acid	lb.	28,214	4,072	Ester gums	lb.	50,840	7,854
Picric acid	lb.	206	224	Alkyd resins	lb.	146,678	27,841
Cresylic acid and cresols	lb.	389,211	28,736	Phenol-formaldehyde resins	lb.	393,857	66,795
Benzoic acid tech. & med. gr.	lb.	3,739	2,058	Tar acid resins NES	lb.	90,202	14,968
Salicylic acid tech. & med.	lb.	5,232	1,947	Urea-formaldehyde resins	lb.	233,556	55,709
Coal tar acids	lb.	5,193	2,972	Urea resins, NES	lb.	69,022	13,182
Aniline oil	lb.	1,370	222	Casein	lb.	10,135	2,491
Aniline salts	lb.	65,977	15,438	Methyl methacrylate unfab.	lb.	1,418	1,782
Naphthal and flakes beta	lb.	11,393	2,913	Gums resins synthetic NES	lb.	404,685	84,583
Dimethylaniline	lb.	56	35	Polymers of styrene, etc.	lb.	687,537	269,592
Diphenylamine	lb.	5,595	4,747	Phenol-formaldehyde forms lam.	lb.	19,909	12,855
Sodium pentachlorophenate	lb.	500	98	Urea-formaldehyde forms lam.	lb.	2,500	1,536
Phthalic anhydride	lb.	26,909	4,163	Syn. resin NES forms lam.	lb.	16,549	12,581
Tricresyl phosphate	lb.	2,050	650	Phenol-formaldehyde forms and lam.	lb.	14,460	5,796
Dibutyl diethyl phthalot, etc.	lb.	10,738	2,501	Methyl methacrylt, forms and lam.	lb.	6,617	7,167
Nitro derivatives, benzene, etc.	lb.	61,894	3,421	Syn. resin NES forms and lam.	lb.	2,174	2,088
Coal tar intermediates NES	lb.	72,415	28,387	Pyroxylin sheets rods etc.	lb.	62,903	61,146
Rubber compounding agents	lb.	423,865	118,536	Cellulose plastic mold comp.	lb.	678,431	246,103
Color lakes and toners	lb.	95,183	65,343	Cellulose acetate sheets etc.	lb.	17,030	36,567
Sulphur black	lb.	202,101	49,199	Cellulose plast film support	lb.	40	43
Synthetic indigo	lb.	131,445	88,025	Nitro cell solu. mlt.	lb.	3,172	830
Coal tar dyes NES	lb.	1,938,498	1,790,813	Pectin	lb.	4,793	4,681
Vanillin all types	lb.	2,013	6,159	Animal charcoal, carbons, etc.	lb.	722,652	70,773
Syn. flavor & perfume mat. NES	lb.	22,220	37,684	Rubber compound agents NES	lb.	91,269	29,649
Methyl salicylate tech. & med.	lb.	16,265	6,061	Ethyl fluid	gal.	181,970	754,655
Sodium benzoate tech. & med.	lb.	25,421	10,783	Liquid gum inhibitors			18,376
Photographic chem. coal tar	lb.	14,999	11,727	Licorice extract and mass.			8,015
Coal tar prod. finished NES	lb.	18,689	22,421	Reagent chemical, laby. use			40,361
Castor oil medicinal	gal.	183	670	Chemical spec. compounds NES			681,997
White mineral oil	gal.	273,552	102,892	Acetic acid	lb.	61,642	8,349
Fish oils and concentrates	lb.	34,921	73,887	Acetic anhydride	lb.	19,560	2,437
Quinine salts, compounds NES	oz.	106,237	55,728	Tartaric acid	lb.	10,757	8,110

Source: U.S. Bureau of Census, Dept. of Commerce

and American Home Products are well known. E. R. Squibb & Son de Mexico has a penicillin plant that is about completed. A streptomycin plant also is now under construction.

Plastics—The growth of the plastic molding industry has paralleled that in the United States, however, production of plastic materials has been limited to a few specific thermosetting plastics materials. The 20 molders have already expanded their manufacturing facilities in anticipation of the time when they can obtain additional molding equipment. The industry has been using about 3,500,000 lb. of plastic materials but shortly this figure should be doubled or even quadrupled.

Rayon—In May 1941 a Mexican company, Productora de Artisela, S. A., was organized to produce rayon. Equipment was purchased and moved to Mexico from Hampton Co. manufacturers of rayon at Easthampton, Mass. It had produced 4,750 lb. of viscose rayon daily. This plant was erected at Alvero, Obregon. Later it was taken over by Artisela Mexicana, S. A., (Celanese Corp. of Amer.) and is now being modified so as to produce both continuous and staple fiber.

At the present time Celanese and Mexican interests (Banco Nacional de Mexico) are building a plant in Mexico at Ocotlan, Jalisco, to produce acetate rayon. This plant will be in operation before the end of the year. These interests have selected a location for a large viscose plant which will be operated by Viscosa Mexicana. The two companies which will operate the new viscose and acetate mills have a total capitalization of 35,000,000 pesos. The two mills will produce a total of 10,000,000 to 12,000,000 lb. of rayon yarn.

Sulphur—Sulphur has been found in 18 states. The most important of the producing areas is at Cerritos, San Luis Potosi. The production of sulphur-bearing ores in 1943 totaled 26,149,469 kg.; in 1944, 30,511,850; and in 1945, 42,691,060. These ores contain between 15 and 20 percent sulphur.

Recently, two companies, one a government organization, are reported to have under consideration the development of deposits in the Tehauantepec area. One of these companies has commenced drilling. There are rumors that other sulphur deposits are to be exploited but due to poor transportation in the locations where these deposits are located there is not much likelihood of success.

Two chemical companies consume between 3,000 and 4,000 tons of sulphur annually for the production of sulphuric acid. While the chemical industry is the largest consumer of sulphur, substantial amounts go to the fertilizer and insecticide manufacturers, the rubber industry, and the pulp and paper mills. Total consumption is estimated to be about 5,000 or 6,000 tons. Some sulphur is imported from the U. S.

MADE SUBJECT TO MEXICAN IMPORT RESTRICTIONS

Nov. 27, 1945

Schedule Code No.	Commodity
3.23.11	Calcium carbonate
6.00.90	Liquid organic acids, not specified
6.00.91	Solid organic acids, not specified
6.03.93	Mixtures of ethers and alcohols used in the manufacture of varnishes and colors
6.03.99	Ethers, not specified
6.05.90	Salts, not specified, of organic origin, the weight of which including its container exceeds 20 kilos, on condition, besides, that proof be given of its industrial use, subject to the judgment of the Custom's Inspector or on being presented before the Custom's General Administration, on application started on making the inspection.
6.05.91	Salts of organic origin, not specified
6.06.40	Acetylene
6.06.80	Mixtures and preparations of organic origin used in the manufacture of pharmaceutical products.
6.06.81	Mixture and preparations, not specified, of organic origin, when proof of their industrial use is made, according to the judgment of the Customs Inspector, or on being presented before the Custom's General Administration, on application started on making the inspection.
6.06.82	Organic mixtures or preparations, even when they have mineral basis, when proof of same is made according to the judgment of the Customs Inspector or before the Customs General Administration, and which products are destined for hastening the vulcanizing of rubber.
6.06.90	Products of organic origin, not specified, for non-industrial uses.
6.10.90	Liquid inorganic acids, not specified
6.10.91	Solid inorganic acids, not specified
6.12.03	Lead chromate
6.12.41	Calcium hypochlorite
6.12.46	Calcium chloride, in flakes, non deliquescent, packed in textile or paper bags, the weight of which, including the container, exceeds 45 kilos.
6.12.53	Potassium and sodium chlorates.
6.13.30	Mixtures and preparations of mineral origin used in the manufacture of pharmaceutical products.
6.13.31	Mixtures and preparations, not specified, of mineral origin, when proof is obtained of their industrial use, according to the judgment of the Customs Inspector, or before the General Customs Administration by application made on inspection.
6.13.36	Mixtures and preparations of mineral origin used in the manufacture of toilet articles, such products not being perfumed.
6.13.38	Mixtures and preparations of chlorine basis, used as decolorants by industry.
6.13.90	Products of mineral origin, not specified, for non-industrial uses.
6.20.23	Calcium carbide.
6.21.10	Mixtures and preparations of organometallic origin, used in the manufacture of pharmaceutical products.
6.21.11	Mixtures and preparations of organo-metallic origin, not specified, when proof is made of their industrial use according to the judgment of the Customs Inspector, or before the Customs General Administration by application made after inspection.
6.21.17	Mixtures and preparations of organo-metallic origin, used in the manufacture of toilet articles, such products not being perfumed.
6.30.32	Calcium arsenite or arseniate and their insecticide preparations.
6.30.33	Copper arsenite or arseniate and their insecticide preparations, the weight of which including the container exceeds 20 kilos.
6.30.34	Lead arsenite or arseniate and their insecticide preparations.
6.30.35	Insecticide preparations, liquid, of pyrethrum derived products, even when they contain aromatic materials.
6.30.38	Arsenites or arseniates, not specified and their insecticide preparations, the weight of which including the container, exceeds 20 kilos.
6.30.39	Insecticide preparations, not specified.
6.30.46	Copper aceto-arseniate (paris green).
6.61.00	Varnishes, shoe polishes, colors and pigments for shoes and leathers, the weight of which including the packing is up to 5 kilos.
6.61.01	Varnishes, shoe polishes, colors and pigments for shoes and leathers, which do not have a base of alcohols or ethers, included in the classifications 601 and 603 of the Mexican General Imports Tax List the weight of which including the container is not greater than 5 kilos.
6.61.21	Varnishes and colors prepared with a basis of alcohols or ethers, included in the Classifications 601 and 603 of the Mexican Imports General Tax List, in any kind of container.
6.61.28	Prepared varnishes and colors not specified, the weight of which including the container is up to 5 kilos.
6.61.29	Prepared varnishes and colors, not specified, the weight of which including the container exceeds 5 kilos.

Source: Diario Oficial, Dec. 5, 1945

PROCESS EQUIPMENT NEWS

THEODORE R. OLIVE, Associate Editor

ALUMINUM STEPLADDER

WEIGHING only 16 lb. in the 5 ft. size, a line of aluminum folding stepladders is available in sizes of 4, 5, and 6 ft. from Aluminum Ladder Co., Worthington, Pa. The ladder is constructed entirely from aluminum alloy 52S, which has a tensile strength of 37,000 lb. per sq. in. Non-skid treads are provided for safety. Great strength is said to be combined with exceptionally light weight.

DIFFERENTIAL GAGE

A VARIETY of applications in industrial process control and in laboratory testing operations can be handled with a new differential pressure gage that is being offered by Kollsman Instrument Division of Square D Co., Elmhurst, N. Y. The unit may be calibrated either in inches of water or inches of mercury, with several standard ranges available covering differences in pressure from 50 to 300 in. of water. Gages are compact, with a $3\frac{1}{2}$ in. diameter dial. Accuracy is claimed to be within approximately 1 percent. The gage is mechanical in type, having two pressure connections, one directly to the inside of a metal diaphragm, the other to the airtight case surrounding the diaphragm. Variations in pressure inside the diaphragm, as compared with that in the case, cause expansion or contraction of the diaphragm which is then measured and transmitted to a pointer.

SELF-PRIMING PUMP

CAPACITIES in the range from 50 to 4,000 g.p.m. are available in the Type E line of industrial self-priming pumps, available in electric and belt-driven models, and announced by Marlow Pumps, Ridgewood, N. J. These pumps have been tested widely in wartime applications and now are being

5-ft. aluminum stepladder



produced for regular industrial purposes. They employ a unique diffuser design which is said to permit them to prime and reprime automatically without recirculation or the use of any automatic mechanical devices. As in regular centrifugal pumps, the impeller alone moves the liquid so that a high degree of efficiency is claimed.

Sizes for these pumps range from $1\frac{1}{2}$ to 10 in., with operating heads from 10 to 150 ft., for the handling of clear, gritty, warm or volatile liquids.

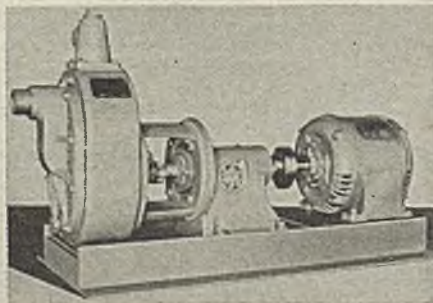
STEAM CLEANING UNIT

WEIGHING only 28 lb. and easily portable, the Turco Hydro Steam cleaning unit utilizes any available steam supply of 80 to 150 lb. pressure for steam cleaning operations. It is provided with quick couplings to permit fast connection. Three manual controls vary the temperature, quantity of detergent solution used, and the nozzle pressure to handle the needs of any particular job. The device can be adjusted to deliver a high temperature penetrating spray or a moderately warm spray. Any of a wide variety of specialized cleaning compounds produced by this manufacturer can be used, depending on requirements. The cleaner has no moving parts, pumps, pressure tanks, motors, electrical connections or other complications. It is manufactured by Turco Products, Inc., 6135 South Central Ave., Los Angeles 1, Calif.

Small differential pressure gage



Type E self-priming pump



JAW CRUSHER

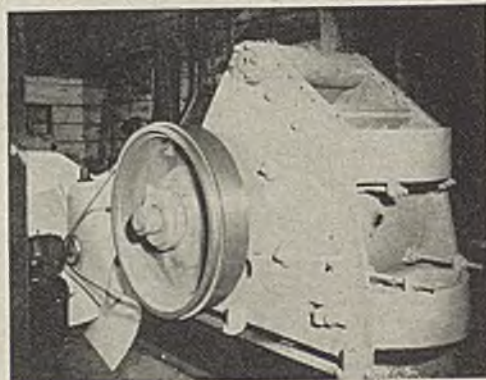
NOVEL principles that are said to result in extremely high efficiency compared with conventional jaw crushers have been incorporated in the design of the new Simplex single-jaw crusher announced by Straub Mfg. Co., 507 Chestnut St., Oakland 7, Calif. Jaw crushers are generally similar to the original Blake design of 50 years ago. In such crushers a considerable part of the power applied is absorbed in friction, in lifting the massive moving parts, and pushing the material being crushed backward toward the feed end as it is nipped. The last mentioned characteristic tends also toward excessive wear. Authorities are quoted as stating that 50 to 70 percent of the full load power is consumed by the crusher running empty, and that at least a 125 percent overload motor is needed for starting. In a typical 30x18-in. machine running at 225 or 250 r.p.m. and drawing about 40 hp. at full load, a 50-hp. motor would be needed for starting, while 20 to 28 hp. would be required to keep it running empty.

By contrast, the accompanying illustration shows a 30x15-in. model of the new Simplex crusher running empty at 380 r.p.m. with a running expenditure of $1\frac{1}{2}$ hp. Note that no

Turco steam cleaning unit in operation



Simplex crusher, running light, without foundations bolts and with only $1\frac{1}{2}$ hp. for running



foundation bolts are used in the test installation (indicating no vibration), and that the extra energy required for starting is supplied by the 5-hp. across-the-line-start motor, driving the relatively light fly-drive wheel through a small V-belt. Owing to balanced design and the use of maximum leverages, no other flywheel is needed.

The results noted are achieved by use of a new design of movable jaw, the upper pivot of which lies on the line forming the center of the vee between the two jaws. A pitman operating on an eccentric applies power to the central pivot of a pair of toggle arms which in turn transmit motion to the bottom of the movable jaw. These parts operate in an oil bath, with the motion transmitted to the jaw through a flexible diaphragm. In addition, oil is filtered and circulated by an oil pump on the crusher shaft to bearings above the oil reservoir level. Although it is claimed that there is very little wear (and none of the back-slipping that produces wear in conventional crushers), provision is made to take up wear and backlash automatically in all of the bearings of the pressure-applying system.

MOISTURE DETECTOR

MODEL S is the designation of a new Delmhorst moisture detector for materials in sheet form which has been announced by Colloid Equipment Co., 50 Church St., New York 7, N. Y. The new detector, resulting from many years of development work by W. J. Delmhorst, operates on a 110 volt a.c. lighting circuit and makes determinations, it is claimed, with an accuracy between 3 and 15 percent, depending on the material tested. In use, the sheet material, which may be up to $\frac{3}{8}$ in. thick, is slipped into a deep throated arm where it is clamped under always uniform pressure be-

Moisture detector for sheet material



Non-metallic three-way valve



tween electrodes. Moisture content is immediately indicated on a meter through the use of a circuit incorporating electronic amplification. Such materials as paper, cardboard and veneer may be handled.

THREE-WAY VALVE

A FLEXIBLE molded synthetic-rubber tube, incased in a molded plastic body, is used in the new Grove Flex-tube three-way valve introduced by Grove Regulator Co., 65th and Hollis Sts., Oakland 8, Calif. The valve is said to be suitable for handling all types of fluids, including gases, chemicals and liquids, particularly for hydraulic or pneumatic cylinder operation. Since it does not restrict flow the unit is said to be satisfactory for controlling viscous or solids-carrying liquids, while its non-metallic construction permits the handling of highly corrosive or erosive liquids or gases. An over-center cam, operated manually, opens or closes the ports at each half turn of the hand wheel. A special self-locking feature is said to assure positive, tight shutoff over extended periods of time. Sizes available are $\frac{1}{8}$ and $\frac{1}{4}$ in., for working pressures up to 250 lb. and a maximum temperature of 150 deg. F.

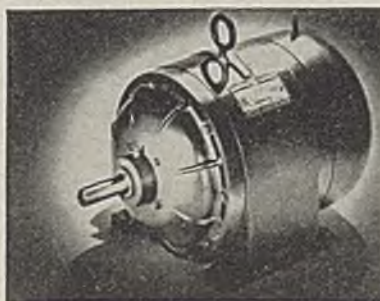
PLASTIC SLIDE RULE

BINDING or sticking of the slide under varying atmospheric conditions are said to be impossible in the new plastic 10-in. slide rule brought out recently by Charles Bruning Co., 4754-10 Montrose Ave., Chicago 41, Ill. Remarkable dimensional stability is claimed for the new material and it is said that the precision graduations are unaffected by temperature changes. The glass indicator is mounted in a polished stainless steel frame which holds it firmly in place. The beveled edges of the rule are graduated in inches and centimeters and the scales include the conventional A, B, CI, C, D, K, S, L and T scales. The tension on the slide is readily adjustable by four screws on the back of the rule.

All-plastic slide rule



Totally inclosed fan-cooled motor



INCLOSED MOTOR

DESIGNED for use in extremely dusty, dirty and corrosive atmospheres is a new totally inclosed, fan-cooled motor which has been added to the line of Tri-Clad induction motors produced by General Electric Co., Schenectady, N. Y. The new motor, produced in standard, explosion-proof and dust-explosion-proof types in sizes from 1 to 1,000 hp., is suitable for use in Class I, Groups C and D, and Class II, Groups E, F and G hazardous locations. The motor is particularly compact, employing a double-shell, cast-iron frame with cast-iron end shields and conduit box for protection from external blows, dripping water, dust, vapors and corrosive liquids. Cooling is accomplished by a non-sparking external fan which is protected by a cast-iron housing with a screened air intake opening. Designed for full-voltage starting, the motor uses simple, inexpensive control equipment, has a high pull-up torque and high maximum running torque for temporary overloads.

NEOPRENE COVERALL

IMPERVIOUSNESS to oil and greases, and high resistance to acids and alkalis, is claimed for the new buff colored neoprene-coated coverall introduced by Benson & Associates, 310 South Michigan Ave., Chicago 4, Ill. Produced for this concern by the United States Rubber Co., the coverall completely protects the worker from neck to shoe-tops. Protected zipper closures are provided at the front, at wrists and at ankles. A hood which can be snapped on at the back of the collar, protects the entire head from splashes and spray, and is designed to permit goggles or face masks to be worn comfortably when the hood is in place. The coverall is light in weight, weighing less than 3 lb., and is especially useful for tank cleaning of all types.

THERMOCOUPLE TUBE

TO PERMIT measurement of low gas pressures in the range from 0.01 to 100 microns with an accuracy of plus or minus 5 percent, Sylvania Electric Products, Inc., Electronics Division, Boston 15, Mass., has introduced a vacuum measuring device of the thermo-

Light-weight neoprene coverall



Vacuum measuring thermocouple tube





Automatic weight adjustor

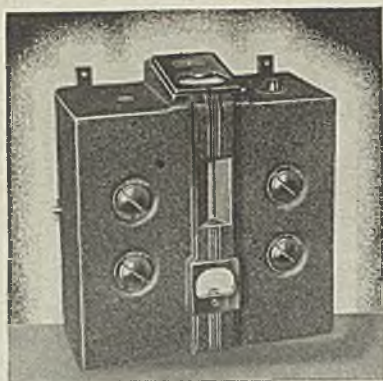
couple type. This consists of a tube with the hot junction of a thermocouple element centered on a filament heater. Measurements of gas pressure are made through variations in thermal conductivity of the gas surrounding the thermocouple. The device resembles a four-pronged vacuum tube which is sealed directly to the evacuated apparatus by means of tabulation provided on top of the bulb. Direct measurement may be made with a 0.250 microammeter which may be calibrated for each gas measured.

WEIGHT ADJUSTOR

A VARIETY of commodities which flow freely can be packaged to accurate weight through the use of the new automatic weight adjustor manufactured by the Fred Goat Co., 314 Dean St., Brooklyn, N. Y. Operating automatically at high speed, the machine receives partially filled packages from volumetric or rough weight fillers and adds sufficient material to bring the packages up to the desired gross weight. The packages travel through the machine on a conveyor in timed cycles, passing through a series of stations at each of which progressively smaller increments of material are added as required until the package is brought up to the desired final weight. Material is added in each station only if the weight of the package upon reaching that station is below the preset weight limit of that station. The desired minimum weight is thus positively attained and the maximum overweight tolerance is limited to the smallest and final increment. The machine illustrated in the accompanying view handles 60 packages up to 1 lb. in weight per minute, is fully automatic, requiring no operator, and utilizes only a $\frac{1}{2}$ -hp. motor.

OXYGEN-HYDROGEN DETECTOR

BOTH OXYGEN and hydrogen impurities in gases may be detected and measured with the same instrument, a new device known as the Deoxo indicator, that has been put on the market by Baker & Co., Newark 5, N. J. The instrument, originally announced for determining oxygen impurities, has been further refined and is now available for detecting and measuring the presence of hydrogen in inert gases such as nitrogen, carbon dioxide, and saturated hydrocarbon gases. It



Oxygen-hydrogen indicator

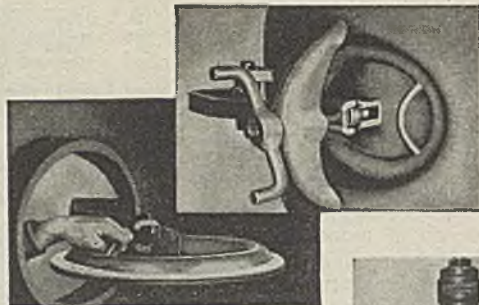
is available regularly as an indicator but can be provided with a circular chart type potentiometer - recorder and air-operated controller if desired. The presence of from 0.001 to 1.0 percent oxygen impurities can be measured at a conservative accuracy of plus or minus 2 percent of the instrument range.

The instrument operates by measuring the increase in temperature of the gas sample which results from combination of the oxygen impurity with the hydrogen. Except when the sample already contains hydrogen, a small amount is added from a self-contained electrolytic cell. After passing through a drying chamber and an activated carbon purifier, the sample enters a calorimeter containing a precious metal catalyst. During passage over the catalyst, combination of any oxygen present with the hydrogen is effected. The heat liberated is directly proportional to the concentration of oxygen in the sample since an excess of hydrogen is either present or added. A thermocouple is used to measure the temperature rise.

By means of a slight change in the electrolytic cell, whereby excess oxygen instead of hydrogen is introduced into the sample, the instrument may be modified to detect and measure small quantities of hydrogen impurity in other gases. To allow for possible changes in the activity of the catalyst over a long period, a means for readily recalibrating the instrument are provided.

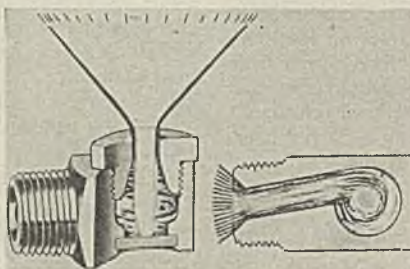
COVER SUPPORT

ACCESS to pressure vessels of all kinds through manhole openings is facilitated by a new dual swing support for the manhole cover which has recently been introduced by Lenape Hydraulic Pressing & Forging Co., P. O. Box 23, West Chester, Pa. Ordinarily, supports for manhole covers swing the cover inward only. The new support, used in conjunction with Lenape standard elliptical manhole covers, permits such covers to be manipulated and withdrawn through the opening and swung aside so as to be out of the way. Covers so equipped are available in standard sizes for 10x15 to 18x24 in. manholes, for use wherever manways are required for frequent ac-



Dual swing cover support

Improved spray nozzle



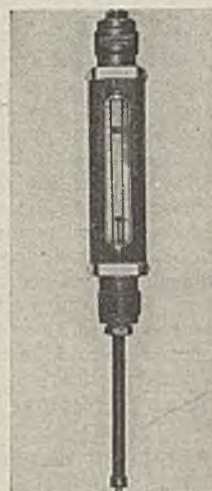
cess. Covers are made in carbon and stainless steels.

CARBIDE-INSERT NOZZLE

INCREASE in service life up to 100 times in a vortex type spray nozzle is claimed for a design change that has been made in its Whirljet nozzles by Spraying Systems Co., 4023 West Lake St., Chicago 24, Ill. The change consists in use of a tungsten carbide insert in the base of the vortex chamber which resists the action of any abrasive particles that may be mixed in the liquid to be sprayed. The terrific whirling action set up in the vortex chamber of nozzles of this type in the past has made them subject to wear from such abrasive particles. The use of the tungsten carbide insert is said effectively to reduce wear from this cause.

CONTINUOUS VISCOSIMETER

INSTANTANEOUS observation of viscosity values existing in a moving fluid stream under full line pressure is possible with the new continuous viscosimeter recently announced by Fischer & Porter Co., County Line Road, Hatboro, Pa. The instrument is available in simple indicating form or may be arranged if desired for continuously recording viscosity values on a 24-hour chart, or for controlling viscosity by automatic blending or heating means. The device is a modification of the rotameter. The novel departure is in the use of two rotameter bobs in the same tube. One, which is fully compensated for viscosity, is used to adjust the flow rate through the metering tube to a constant and standard value by automatic flow control. The other bob, uncompensated for viscosity, then assumes a position in the tube proportional to the viscosity of the fluid measured at the existing temperature. Calibration of the tube includes an index line for adjusting the flow rate and a viscosity scale. The instrument is



Continuous viscosimeter

said to be particularly valuable for continuously blending lube oils, indicating the end points in various plastic processes, and in the maintenance of constant fuel oil viscosity for improved burner operation.

15-LB. EXTINGUISHER

SIMPLIFIED carrying and operating features are incorporated in a new trigger-touch 15-lb. carbon dioxide extinguisher introduced by Randolph Laboratories, 8 East Kinzie St., Chicago 11, Ill. An accompanying illustration shows the arched steel handle and the operating trigger. Grasping the unit by its handle, the operator removes the extinguisher from its bracket and carries it with only one hand, leaving the other arm free to remove obstacles or open doors en route to the scene of action. On approaching the fire he grasps the nozzle handle with his free hand, aims it at the base of the flames and with one touch of the thumb trigger discharges as much snowy carbon dioxide gas as may be needed. Release of the trigger automatically stops the flow.

PROTECTIVE LEGGINGS

PROTECTION of the legs and shins of industrial workers against heat, sparks, hot metal and acid splashes and abrasions is afforded by the new Guardwell Frank leggings made by Safety Clothing & Equipment Co., 7016 Euclid Ave., Cleveland 3, Ohio. The body of the legging is made from either Underwriters' grade asbestos, grade 1 chrome tanned heat resistant leather, fireproofed duck, or impregnated synthetic duck, depending on the use to which the leggings will be put. The inside front of the legging is reinforced with

Thumb-control 15-lb. extinguisher



Leggings for leg protection



heavy canvas and between this canvas and the body of the legging are inserted two pieces of fiber for extra protection against splash and impact. Side stays of non-rusting metal keep the legging in a firm, upright, comfortable position on the leg and provide proper adjustment to any leg size.

SPRAY NOZZLES

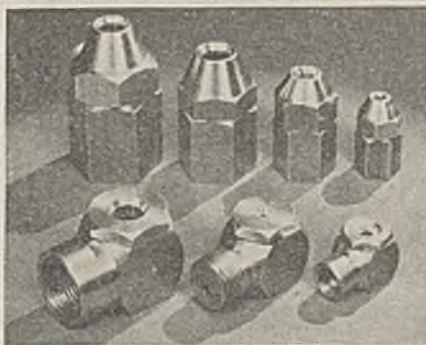
A VARIETY of spray nozzles for the handling of water, oils and other liquids, designed to meet specific requirements for a variety of jobs, has been announced by Delavan Engineering Co., Des Moines, Iowa. Some of the nozzles are shown in an accompanying illustration. Nozzles in the rear row are Types WS and WSS. The former type produces a hollow cone spray and the latter a full cone spray. Available with both female and male pipe thread connections, sizes range from $\frac{1}{4}$ to 1 in. and capacities from 0.15 to 24 g.p.m.

In the foreground of the illustration, the nozzles are Type WR, available in sizes from $\frac{1}{4}$ to $\frac{3}{4}$ in. These various nozzles find application in air conditioning, air washing, humidifying, room cooling, industrial and other uses. They are designed to be taken apart readily for cleaning and present simple design and non-clogging features.

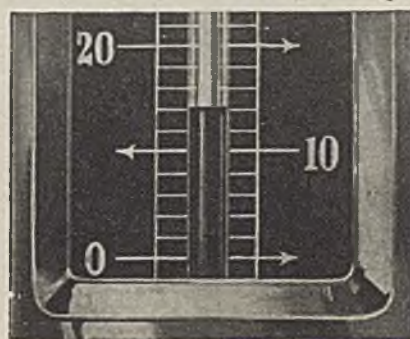
INDUSTRIAL THERMOMETER

READABILITY is said to have been greatly improved by the introduction of a new type of mercury tube employed in mercury industrial thermometers manufactured by the Philadelphia Thermometer Co., 4401 North 6th St., Philadelphia, Pa. The tube is elliptical in shape, with the bore so placed that the mercury column is magnified to full width of the tube. The yellow tube back, which is equal in width to the mercury column, is visible only above it, forming a

Spray nozzles of varying characteristics



High visibility industrial thermometer



sharp color contrast at the point of temperature reading. Thermometer cases and frames are designed to admit maximum light to both tube and calibrated scale, at the same time cutting down glare and reflection.

PRE-COLLECTOR

WHERE contaminated air that is cleaned by a dust collection system contains materials having a recovery value, or abrasive particles, the new Velocitrap announced by Claude H. Schneible Co., 2827 25th St., Detroit 16, Mich., is useful as a pre-collector. The device salvages valuable materials in a dry state for return to the process and greatly reduces abrasive wear in the duct system and collectors, also eliminating the settling out of materials in the ducts.

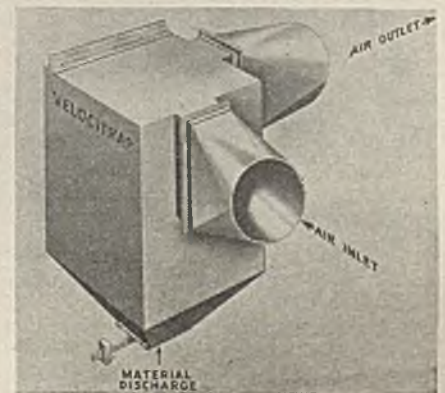
The Velocitrap is placed in the intake duct ahead of the collector and employs slot-shaped openings in an elbow of the duct to separate the larger solid particles by centrifugal force, depositing them in a hopper. Hence only a minimum of the smaller solids reach the dust collector. The device is made in four types for various operating conditions and in a wide range of sizes from 2,000 to 20,000 c.f.m. It may be used in conjunction with any dry or wet dust collection system.

EQUIPMENT BRIEFS

AN UNUSUAL packaging machine, developed by the Goodyear Tire & Rubber Co., Akron, Ohio, has recently been demonstrated at both the Packaging Exposition in Atlantic City and the Plastics Show in New York. This device, which is used for wrapping individual packages in Pliofilm transparent, waterproof, thermoplastic packaging material, automatically wraps and seals objects of assorted sizes and shapes. The Pliofilm is passed over electrically heated rollers between two high speed foam-rubber belts which cushion the plasticized film tightly around the surfaces of the object to be wrapped, at the same time forcing all air from within the formed closure. Speeds of the belts up to 300 ft. per minute can be used, according to A. B. Clunan, manager of this company's packaging sales division, who invented the machine.

A VARIETY of new switches intended primarily for communications and electronic instrument applications has been announced by General Control Co., 1200 Soldiers

Pre-collector for dust removal



Field Road, Boston 34, Mass. The Model MCF five-position cam-lever switch is locking or non-locking in all positions except the center position, which is always locking. The motion of the switch from the center to all switching positions is straight line. Contacts handle up to 10 amp. at 125 volt a.c. The new Master Model MPB switch is a nine-position push button switch made in both locking and non-locking frame types. The locking frame type has eight positions and one reset position any switching combination previously set being released by one operation of the reset button. The rating is 5-10 amp. at 125 volts a.c.

HITHERTO inaccessible water supplies for fire fighting may be used, employing the pump booster known as the Accel-O-Rate, which has been announced by the Jet Pump Division of Derbyshire Machine & Tool Co., 5215-J Belfield Ave., Philadelphia 44, Pa. Using standard fire pumping equipment, or its equivalent, the booster will lift water vertically 100 ft or more and will draft water for distances of 200-300 ft. from water sources impossible to reach because of gulleys, ditches, mud or other obstacles. The jet pump principle is used, the unit having no moving parts and weighing but 18 lb. It is provided with connections for standard 2½ in. fire hose and is used submerged in the water supply.

TO FACILITATE the making of three-dimensional drawings, Instrumaster Industries, 7326 Arch St., Greenwich, Conn., has introduced a new line of drafting instruments of the stencil type. One type of stencil is suitable for isometric drawings, another for dimetric drawings. The stencils provide inch graduations at full scale along one vertical and two slanted edges and are provided with 27 elliptical openings correctly representing in the individual projections circles from ¼ to 2 in. diameter.

FOR FIRST AID use, Mine Safety Appliances Co., Pittsburgh 8, Pa., has introduced the Redi-Heat block, a new rapid and safe emergency heat source requiring no liquids. The block is entirely self-contained and is always ready for instant use, requiring only about one minute to reach top heat. Wrapped in a towel or blanket the block maintains its temperature for approximately one hour and furnishes safe heat for emergency treatment through the chemical action of a newly developed compound.

ARO EQUIPMENT CORP., Bryan, Ohio, has announced a gear-type hydraulic pump designated as Model H657-A which delivers 5½ g.p.m. at 2,800 r.p.m., in pressures up to 2,000 lb. per sq. in. The pump is suitable for a wide variety of hydraulic systems at pressures ranging from 100 to 2,000 lb. The size of the pump is approximately a 3¼ in. cube.

EXAMINE YOUR EXTINGUISHERS

NOW THAT standard fire extinguishers are again available, it is pointed out by Safety Research Institute, New York 17, N. Y., that those responsible for fire protection would do well to examine old and "Emergency Approved" extinguishers for possible

replacement. Many extinguishers that should have been retired previously were kept in service during the war because new extinguishers were available only to high priority holders. Sometimes even priority holders had to be satisfied with Emergency Approved extinguishers. The latter, of course, made use of various substitute materials and methods, some of which are not acceptable at the present, and their replacement has been described by Underwriters' Laboratories as a "necessary part of the cost of the war."

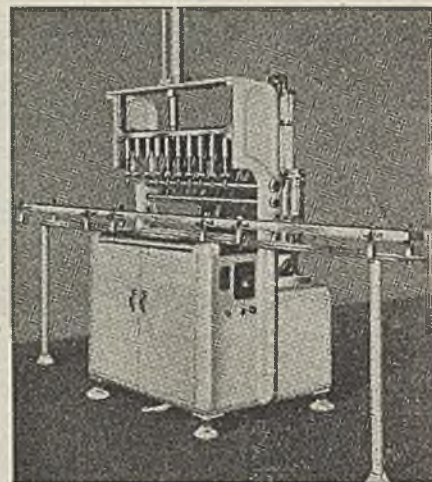
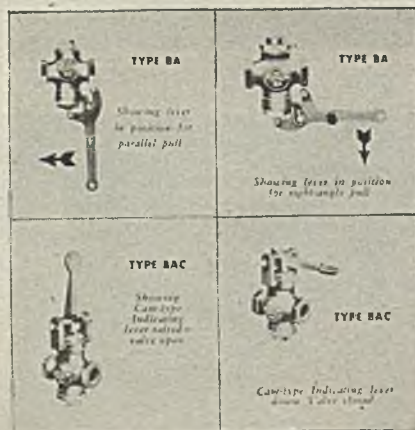
For purposes of identification, it should be noted that standard extinguishers bear the Factory Mutual Approved insignia consisting of the letters F.M. superimposed on a diamond-shaped design and the Underwriters' Laboratories label which reads "Underwriters' Laboratories Inspected." On the other hand, models which were made of substitute materials to meet the war emergency bear the usual approval indication as well as the letters "EAS" and the year the equipment was manufactured. This marking indicates that the equipment may require more careful inspection and maintenance and may not stand up as long as standard types.

IMMERSION HEATER

A SELF-CONTAINED unit for installation in industrial water tanks, drums, processing kettles, stills, sterilizers and similar equipment, which provides automatic electric heating for liquids, is available in a new immersion heater announced by the American Instrument Co., Silver Spring, Md. The heater incorporates an automatic temperature control which, once installed and set for the desired working temperature, permits maintenance of any temperature from room temperature to 350 deg.F. with a conservative accuracy of plus or minus 5 deg.F. A built-in safety control limits the temperature rise of the heater and thus protects it against overheating and burning out, should the liquid level fall and expose the heating element to the air.

The heater can easily and quickly be screwed into the walls of a tank or other container through a 1-in. pipe fitting or reducer, only two wires being connected from the current supply to the heater. Two or more such heaters can be installed on one application if desired. The sheath of the heater cannot become electrically

Ball valve showing various lever arrangements



Improved vacuum bottle filler

energized, thus eliminating danger of the material becoming electrically charged. A pilot light is provided to indicate when the heater is functioning. Such heaters are available with copper sheaths for water heating or steel sheaths for light oils, in wattage ratings of 250, 500, 750 and 1,000.

AIR OPERATING VALVE

SELF-SEALING construction is featured in a new ball-type air operating valve known as Type BA that has been announced recently by the Leslie Co., Grant Ave., Lyndhurst, N. J. The valve is fitted with a hand operating lever and a rotatable pivot so that the lever can be mounted in position for either a horizontal or a vertical pull. The ball valve closes tight with inlet pressure and the stuffing box is self-packed by the operating pressure when the valve is open to permit flow. Operating pressures up to 200 lb. are recommended. As shown in the accompanying illustration the valve can be provided with a cam-operated lever, thus becoming Type BAC. When this cam is used, the lever is held in the position thrown until manually returned to the original position.

VACUUM BOTTLE FILLER

PNEUMO-VAC is the name of a new vacuum bottle filler announced by Ertel Engineering Corp., 300 Front St., Kingston, N. Y. The unit is semi-automatic and is suitable for the rapid filling of bottles or jugs within the height range from 3 to 13 in. Its average filling speed measured in quarts is 50 bottles per minute. It is activated by a balanced foot valve which permits free use of the operator's hands, thus reducing physical effort to an absolute minimum. The unit employs newly designed valve-type spouts which are said positively to eliminate drip. The liquid filling height can be accurately and simply regulated and is said not to vary until reset. Liquid contact parts are available either in bronze plated or in stainless steel. The vacuum pumps are automatically lubricated and inclosed in a readily accessible cabinet, along with the vacuum selector valves and motors. Pilot lights indicate position of the vacuum circuits and liquid is supplied to the filler reservoir by gravity from a constant level tank.

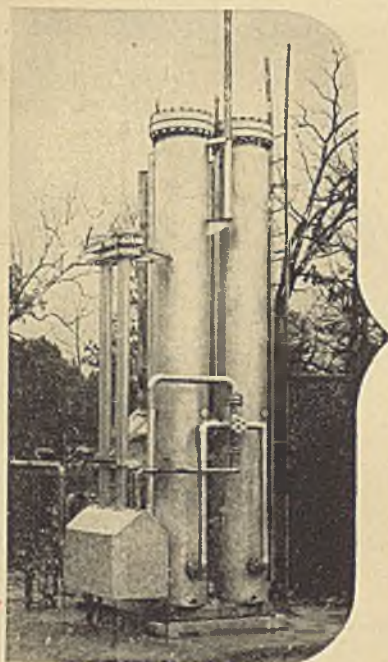
For effective, economical



DEHYDRATION

OF GASES AND LIQUID HYDROCARBONS

specify a GIRDLER plant



THE automatic well-head gas dehydration unit shown at the left is a typical example of how it pays to get GIRDLER on the job. No operator is needed for this factory assembled "package" unit . . . fifteen minutes attention once each week keeps it in running order. The only utility required is a minute fraction of the gas for fuel. No steam. No electric power. No solutions. There are practically no moving parts.

Dehydration plants of every size—solid dessicant systems (like the one illustrated), diethylene glycol systems, refrigeration systems or combinations of these—have been designed for simple operation and built for economical performance by Girdler specialists in gas processing. Girdler dehydration plants are being used for high pressure

natural gas transmission lines, liquid or solid carbon dioxide production, various chemical operations involving gases, metallurgical operations involving controlled atmospheres, and for the dehydration of special gases such as nitrogen, hydrogen, and carbon monoxide.

For direct evidence of what this wealth of experience means to you, write today giving a brief outline of your specific dehydration problem.

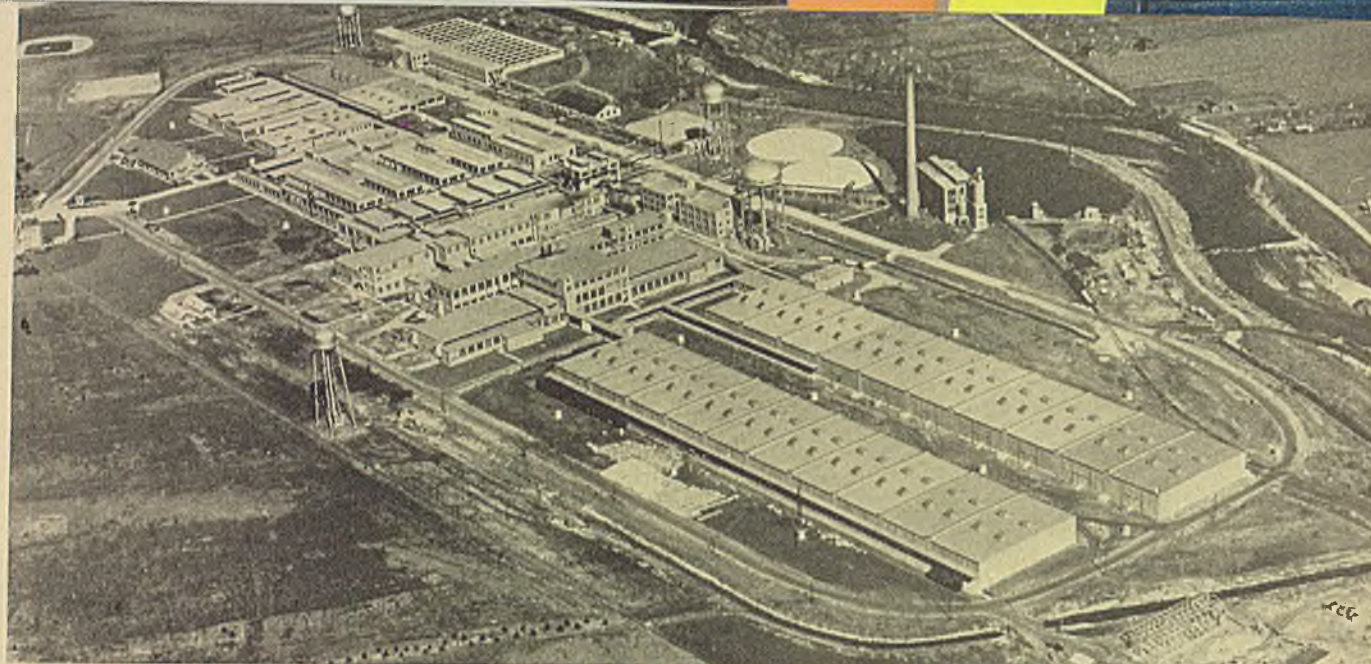
Girdler offers processes for gas manufacture, purification, separation, and dehydration. Consult Girdler about your problems concerning hydrogen sulphide, carbon monoxide, carbon dioxide, inert and controlled atmospheres, natural gas, refinery gases, liquid hydrocarbons, hydrogen, nitrogen. Originators of the Girbotol Process.

WE DON'T GUESS ABOUT GAS



The GIRDLER CORPORATION

Gas Processes Division, Dept. CM-6, Louisville 1, Ky.
District Offices: 150 Broadway, New York 7, N. Y.
2612 Russ Bldg., San Francisco 4, Calif.
21 E. Second St., Tulsa, Okla.



At the present time several mills are making flax papers of which Ecusta Paper Corp. at Pisgah Forest, N. C., is the largest producer, turning out 50 tons of cigarette and other fine flax papers per day. This mill is undergoing a third expansion

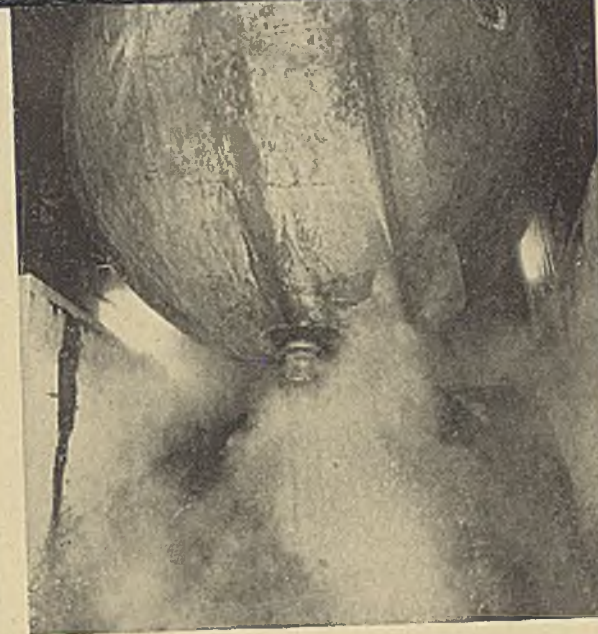
Fairfield Aerial Survey



Flax for the Ecusta mill comes from Minnesota and California, the former supplying the greater percentage. California flax supplied by California Central Fibre Corp. is decidedly lighter in color but this difference has no effect on volume of chemicals consumed in processing



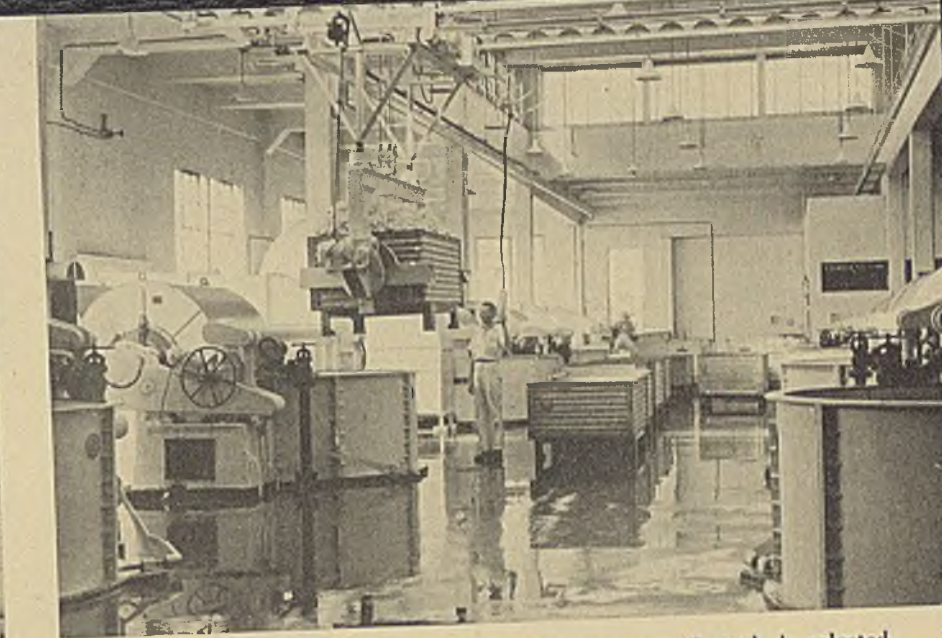
1 Decorticated flax straw in 150 to 160-lb. bales is conveyed from box cars to storage in large warehouses having a floor space of five acres, or directly to the pulp mill. A year's requirements must be kept on hand



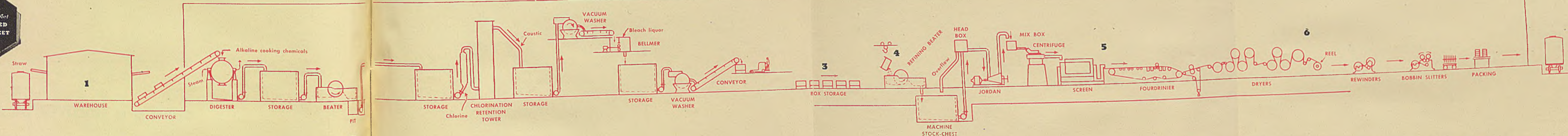
2 Straw is loaded into rotary spherical digesters with a capacity of 4½ tons. Cooking solution is made in measuring tanks and pumped to digesters



3 In the paper mill stock is stored in shredded lap form in galvanized iron boxes which can be easily handled by electric lift trucks or other means



4 When loading the beaters, the appropriate type of stock is selected and conveyed by electric truck to aisles between beaters from which a crane picks up the box and dumps the stock into the beater



CIGARETTE PAPER

At the present time several mills are making flax papers of which the Ecusta Paper Corp. at Pisgah Forest, N. C., is the largest producer, turning out about 50 tons of cigarette and fine papers per day.

The raw material is decorticated flax straw which comes from California and Minnesota. From storage the bales are conveyed to the pulp mill where the fiber is loaded into rotary spherical digesters with a capacity of 4½ tons of flax. The cooking solution is made up in measuring tanks, mixed in another tank, and pumped into the digester. The flax is cooked for five hours in the alkaline liquor with 75 lb. steam pressure.

The contents of the digester are washed and dumped into a trench, and then pumped into an agitated storage chest. In breaker beaters the raw stock is given a final washing, and fibers are cut to proper length for this phase of processing. After a short time in a trench it is pumped to storage chests and from them goes to the bleaching system.

The bleached stock is dropped out of the Bellmets, in which the final bleaching action is carried to a definite point as determined by control tests. It then goes to chests and is fed and washed on vacuum washers. The washed stock is conveyed directly to pulp storage.

In the paper mill the wet lap goes into beaters where the inherent strength in the fiber is brought out. Beaters are emptied into machine chests where broke, filler, precipitated calcium carbonate, and water are added. A Jordan then completes the refining operation. Stock flows from the Jordans to a mixing box where it is diluted and mixed with white water returned from the paper machine. A centrifuge removes foreign particles and screen plates remove fiber knots. The pulp fibers are now completely dispersed and flow to the machine head box, and then onto the fourdrinier wire of the paper machines. Here the pulp suspension, which is 99 percent water at this stage, is converted into paper, passed through a series of steam heated dryer cylinders, and inspected.

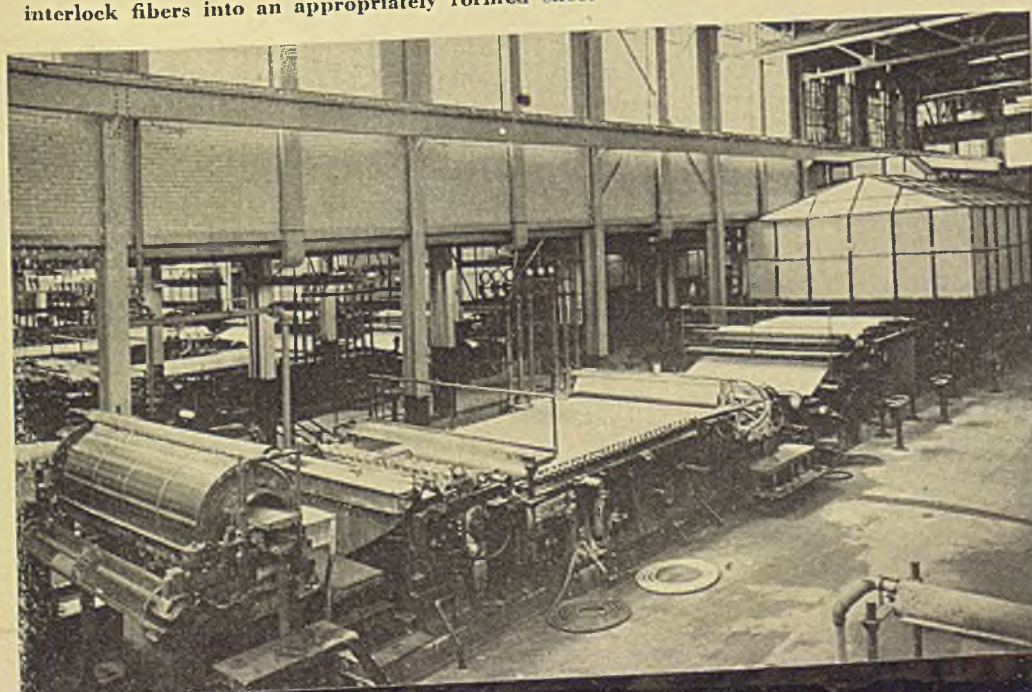
For a more detailed account of the operations in the Ecusta Paper Corp.'s Pisgah Forest, N. C., plant the reader is referred to the accompanying illustrated article on pages 94-97.

CHEMICAL & METALLURGICAL
ENGINEERING

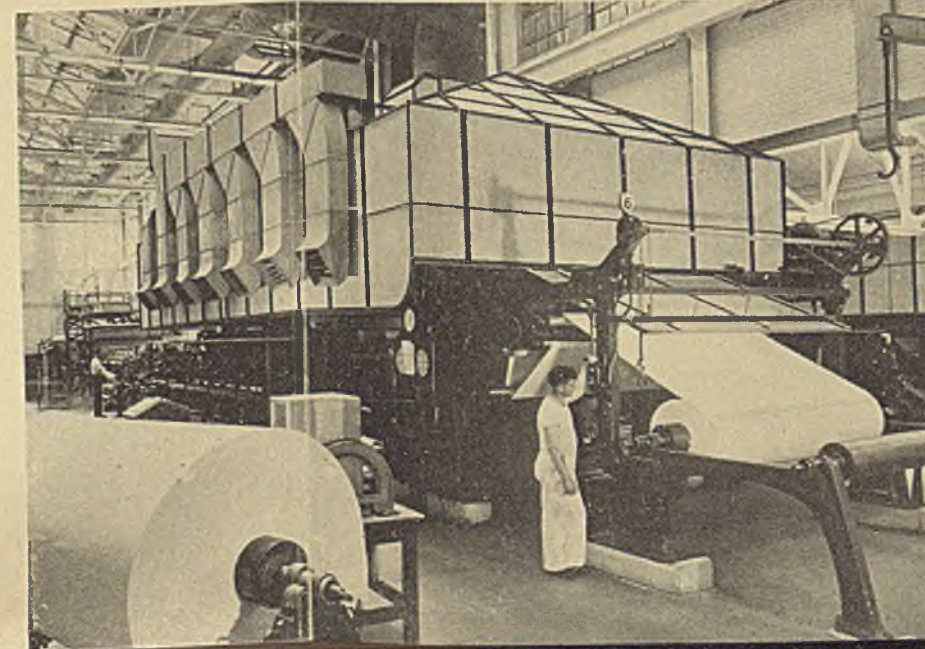
JUNE, 1946

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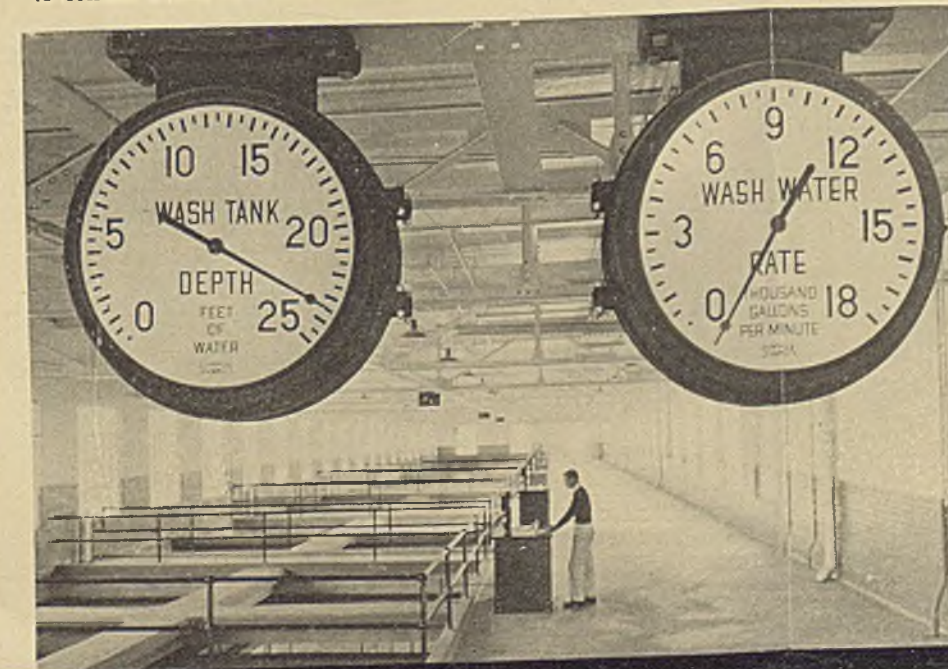
5 The fourdrinier wire is finely built mesh endlessly woven. The pulp suspension which is over 99 percent water at this stage, flows over the wire where a lateral motion helps to interlock fibers into an appropriately formed sheet



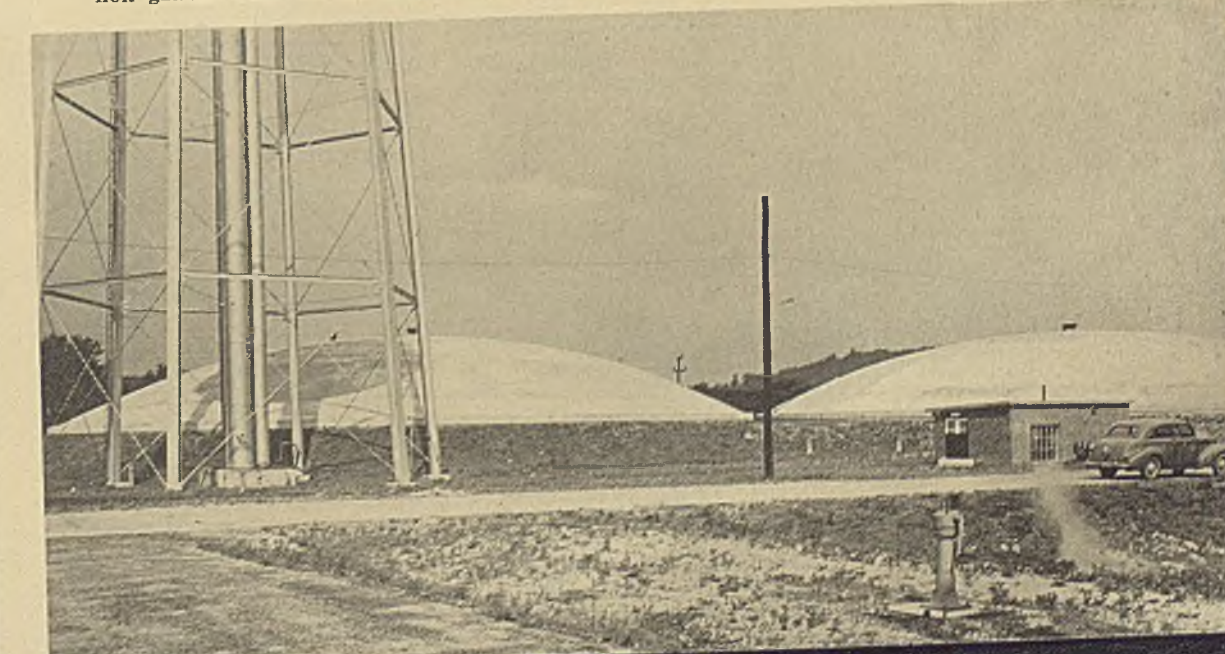
6 Paper has been dried mechanically as far as possible when it leaves the press section. The web is then carried through dryer cylinders. Paper is now dry and after passing under a fluorescent light for rigid inspection is wound on a mandrel



Papermaking requires large volumes of water, 155 gal. per pound of paper are used at Ecusta. The filter plant has a designed capacity of 20 million gallons per day. A control board can detect trouble at any point in the filter plant

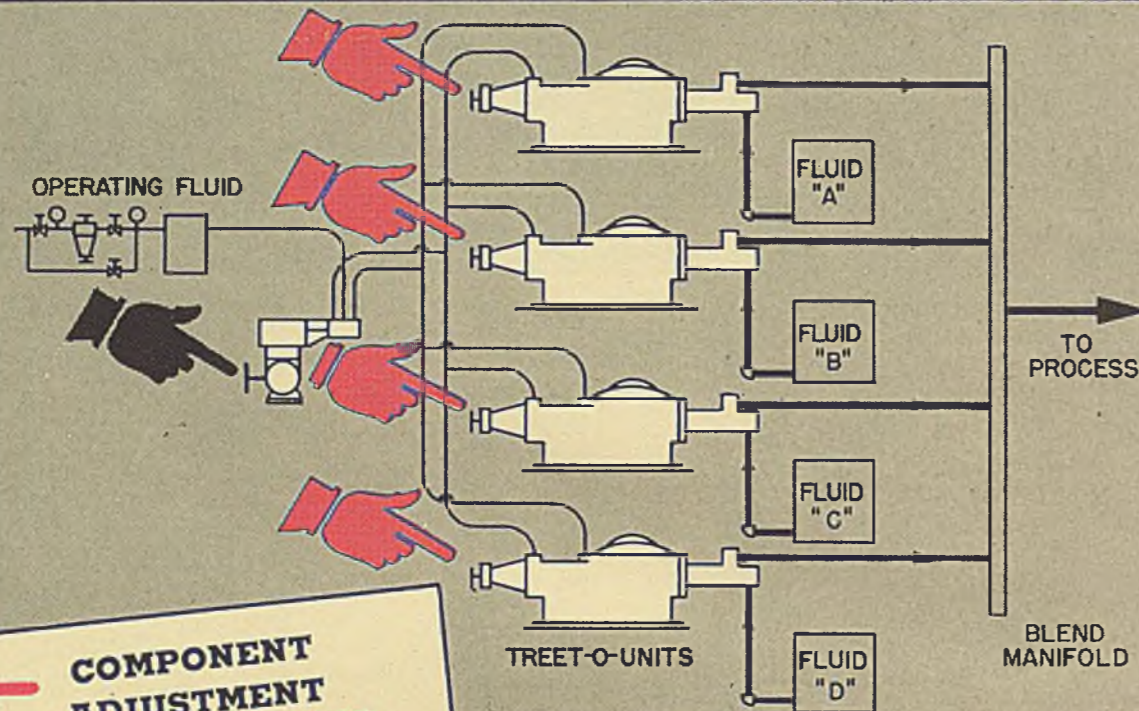


At all times, 0.2 p.p.m. of chlorine are kept in the water, and a uniform pH is maintained. The filtered water is pumped to two Prestressed Gunite reservoirs with a capacity of one and a half million gallons each. Adequacy of water supply is extremely important



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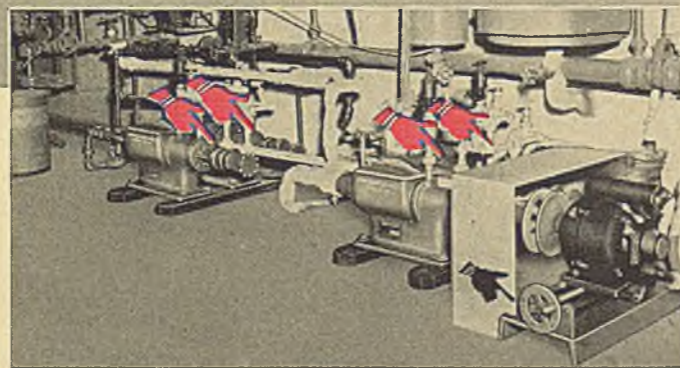
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NEW PRODUCTS AND MATERIALS

R. W. PORTER, Assistant Editor

TRANSLUCENT LACQUER

A NEW FINISH for automobile bodies has recently been announced by the E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. Known as Duco Metalli-Chrome nitrocellulose lacquer, this new material is said to have greater durability, richer colors, and more translucency than heretofore possible. This new finish is claimed to be considerably better than the metallic colors of the past in which aluminum particles added to the lacquer mixtures provided a subdued sparkle. The metallic chromes are made by a patented method.

Pigment particles as they come from the grinder are very fine but do not remain that way. When they are dried, they tend to agglomerate so that when they go into suspension in the carrying vehicle they have grown considerably. In the past, this has eliminated any chance of light penetration between the particles and reflection back from the base surface. The new method used in making metallic lacquer depends on the method for transferring the wet pigment particles direct from grinding to the lacquer and at the same time removing all traces of water. In this way calcining is eliminated. When the pigment is sprayed onto the metal surface and the vehicle solution evaporates, there is left on the surface a microscopically divided finish through which light penetrates and reflects back giving a translucent effect.

The metallic chrome finishes embody a new pigment material, ferric hydroxide. While this has been used for many years for manufacturing iron oxide pigments, it has never been used as a pigment itself. It has been possible to use ferric hydroxide by means of first removing it from the water in which it is precipitated and then transferring it to a lacquer vehicle without drying it. Along with the ferric hydroxide, aluminum flakes are employed to give the mirror effect in this lacquer. While nitrocellulose lacquer not covered by an opaque pigment fail rapidly under sunlight, tests have shown that the new metallic chromes which are not opaque wear longer than the earlier lacquers developed for automobile use. It is expected that this new finish will cost considerably more than standard finishes.

MILDEW-PROOFING AGENT

MARKETED under the brand name of Nuocides, a new line of fungicide concentrates is now available from the Nuodex Products Co., Inc., 743 Magnolia Ave., Elizabeth, N. J. Nuocides are solutions of liquid emulsion bases designed for controlling mildew or rot in textiles, lumber, paints, cordage and other similar products. They are usually ap-

plied to these products during processing operations. They can be processed without heating into ready-to-use preservatives or added in chemical processing. A good degree of resistance to mildew and rotting can be obtained from treatment with the different Nuocides which include both solvent and water soluble preparations. These fungicides include materials which are microbistatic in that they arrest or inhibit microbial growth; others are microbiocidal in that they destroy micro-organisms. This material is claimed to impart longer life and mildew resistance to the fabric backing and finished coatings of oilcloth, artificial leather, rubberized fabrics, resin-coated fabrics, and other similar materials. Rope may be made from low-grade fibers which when thus treated are satisfactory for many purposes. Threads and fabrics from cotton, linen and rayon yarns may be protected from mildew and mold during and after processing. Various adhesives can be made mold-resistant with these fungicides. Casein and non-casein plastics have been protected against mildew growth, and rotting of wood in its various forms may be prevented.

WHITE CARBON BLACK

UNDER development for over ten years, a fumed silicate has been produced in experimental quantities by the B. F. Goodrich Co., Akron, Ohio. Fumed silica is used in the manufacture of rubber products in

the same manner as carbon black. This new white carbon black is a product of sand and alcohol. Ethyl silicate, a volatile liquid chemically combined from sand and alcohol is burned, resulting in a white soot. The superfine white partly translucent powder looks and acts entirely unlike the plain sand from which it is derived although it has the same chemical formula. Under an electron microscope, the superfine translucent powder is made up of particles that have the same size and shape as carbon black, and performs exactly in the same way, giving rubber compounds added tear resistance, abrasion resistance and tensile strength without affecting the color or translucency.

Use of carbon black has prevented the manufacture of many colored rubber products since even a tiny percentage of carbon black, a product of imperfect combustion of waste natural gas, in a rubber compound makes it impossible to achieve white or light colored end products. By using the new silica powder, not only white, but all other colors will be possible without any difficulty. By substituting the fumed silicate for carbon black, a rubber tire emerges from the mold with a light gray color. This will enable the manufacturer to turn out casings in any color desired with both the tread and side walls the same color. Test tires are being made with this material. Practically any other coloring material can be added to make various colored rubber products which were impossible when carbon black was used. Commercial utilization of this compound is still not practical because of its present high cost in relation to carbon black. To date production has been on a pilot plant basis only.

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SYNTHETIC AMINO ACID

ONE OF the ten amino acids considered essential for the growth of man and animals, methionine has been synthesized by a new commercial process by the U. S. Industrial Chemicals, Inc., 60 East 42nd St., New York 17, N. Y. Having the formula $C_5H_{11}NO_2S$ it is also known as 2-amino-4-methylthiobutanoic acid. This material has previously been available only in minute quantities and at a cost of several hundred dollars per pound. It is expected that the new process will reduce the cost about 97 percent to make methionine available for the number of important medical uses which are already known, and for others now under study. It is said to be particularly valuable in treatment of liver disorders.

As one of the essential amino acids, methionine is an exogenous substance which cannot be synthesized by the human or animal body and consequently must be in-

corporated in the diet. It is present in various proteins and the best source is milk and dairy products such as cheese. One quart of milk contains about 1 g. of methionine.

Certain liver diseases, such as acute necrosis, and chronic cirrhosis, are brought about by insufficient intake of methionine. Methionine is claimed to be valuable in the treatment of burns, shocks, exposure, and acute surgical conditions. Although the best natural sources of methionine are dairy products, fish and liver, therapeutic doses of natural methionine would call for an abnormally large food intake. For example, four to ten quarts of milk per day would be required for a therapeutic dose while a few grams of the new synthetic product will produce the same effect. Experimental quantities of this substance have been produced in the past from organs of sheep and cattle, and by high-cost, small-scale laboratory processes. The new synthetic, now in commercial manufacture, is being supplied only to drug and pharmaceutical manufacturers.

ANTI-SLIP COATING

ADDITION of a new product to its line of industrial coatings has been announced by the Flintkote Co., 30 Rockefeller Plaza, New York 20, N. Y. Under the brand name of Flintred this new product consists of a synthetic plastic anti-slip coating which is applied by trowel over steel, concrete, aluminum, galvanized iron, hard tile and wood floors. On clean steel it serves as a corrosion resistant protective coating in addition to its function of overcoming slipperiness. It is resistant to water, gasoline, oil, alcohol, and ordinary fats and greases. Flintred will be available in red, green and slate blue, and is usually applied in coats of approximately $\frac{1}{8}$ to $\frac{1}{4}$ in. in thickness.

This new coating is not a paint. It is a synthetic plastic material incorporating a mineral type filler which imparts toughness to meet wear and tractive resistance against slipperiness when wet. While it is flammable in liquid form, when it has hardened after application it is non-flammable to the degree that it will not support combustion. It should be stored and applied at temperatures within the temperature range of 50 to 100 deg. F. It is available in 5 gal. containers and its coverage varies with the type of surface on which it is used. It is recommended for use around machinery, on steps and ladder treads, on ramps and platforms, on steel decks and floors, and on areas that become unsafe underfoot when wet from water, oil or similar materials.

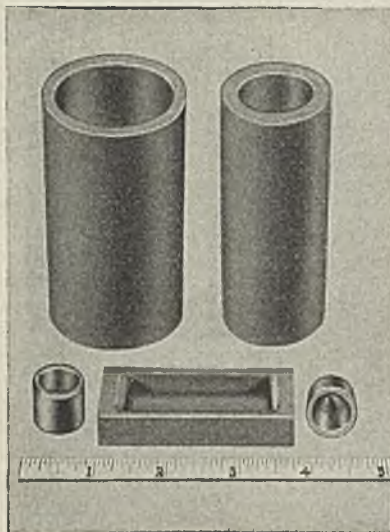
PEANUT FIBER

PROTEIN fiber made from peanuts has been recently announced by the Southern Regional Research Laboratory, U. S. Department of Agriculture, New Orleans, La. This new fiber has been developed through all stages of textile manufacture, including knitting and twisting. In producing the fiber, protein is removed from peanut meal by an alkaline solution after the raw peanut meal has been bleached. The meal residue after the protein fiber is removed still contains enough protein to be valuable as livestock

feed. This new fiber is similar to Ardil developed by the Imperial Chemical Industries in England. The fiber, which makes a fabric similar to wool, is not yet in commercial manufacture.

TUNGSTEN SHAPES

ATTRACTIVE for many applications because of its high melting point of 6,100 deg. F., tungsten metal is nevertheless difficult to form into the shapes required and must be worked by the methods of powder metallurgy. Kennametal Inc., Latrobe, Pa., has



Large tungsten shapes formed by powder metallurgy

recently applied methods developed in the manufacture of cemented carbide compositions to the forming of tungsten shapes such as large crucibles and boats for the high temperature melting of refractory materials and high melting metals.

An indication of the size of objects that can be formed in this way is shown in the accompanying view, the largest crucible being $1\frac{1}{2}$ in. inside diameter by 3 in. deep and weighing in excess of 2 lb. Considerably larger sizes, up to about 3 in. in diameter and about 10 lb. in weight, are possible. Virtually all shapes may be made of a very pure grade tungsten without a binder. The strength is sufficient for most purposes, but does not compare with that for worked tungsten. However, improvement in strength can be made by alloying with tantalum or other metals, which can be done in the procedure used. A little porosity results, and this, too, can be reduced by certain alloying additions where necessary. Tungsten, being readily oxidized at elevated temperatures, must be used only in a vacuum or in heating equipment which provides inert or reducing atmospheres.

THERMOPLASTIC RESINS

MANUFACTURED for military purposes during the war, a new series of resins under the trade name of Kendex is now being manufactured by the Kendall Refining Co., Bradford, Pa. These resins were not available before the war, although their development

goes back further than that. The Kendex resins range from hard brittle substances to tough rubbery products with some of the characteristics of elastomers. The surface and feel may be waxy, tacky, or hard and mar-resistant. All of these products are characterized by their dark color which ranges from a brownish black to jet black. Some are claimed to be outstanding in the hydrocarbon resin field because of the relatively small variation in physical properties caused by temperature changes. They are all produced from petroleum. Suggested uses for the various Kendex resins include the following: laminants, adhesives or binders, rubber extenders and plasticizers, mastic binders, baking varnishes, pipe coatings, polishers, casting waxes, sealing compounds, water resistant coating compounds and many others. These resins are all thermoplastic and may be applied hot or by many of the usual methods such as hot melt dipping or saturating, doctoring, spraying, roll coating, extruding, etc. The flash and fire points of all the Kendex resins are well into the safe working range for hot application. Some of these resins may be emulsified and they all may be handled cold as liquids by blending with various solvents. They are marketed in 100-lb. non-returnable fiber containers or in 350-lb. drums.

ROSIN SOAP

ONE of a family of rosin soaps developed by the Hercules Powder Co., Wilmington, Del., is now finding many civilian uses. Dresinate 731, the sodium soap of a disproportionated pale wood rosin, replaced fatty acid soap during the war in the production of synthetic rubber. It is a pale-colored paste, having a total solids content of 64 percent, and an acid number of 12. Its viscosity is sufficiently low to enable it to be handled in drums and tanks. Dresinate 731 is used as an emulsifier in high solids latices and in other emulsion polymerization systems utilizing monomers other than butadiene and styrene. It has been used successfully in the emulsion copolymerization of butadiene and acrylonitrile, isoprene and styrene, and in the polymerization of styrene, methyl methacrylate and butadiene. Tests have shown that GR-S-10 compounded stocks possess higher tensile strength, greater elongation, superior tear resistance, better flex-cut growth, when Dresinate 731 is used in place of fatty acid soaps.

RUBBER CHEMICALS

FULL-SCALE production of the first of a series of rubber chemicals known as Darex Copolymers has recently been announced by the Dewey & Almy Chemical Co., Cambridge, Mass. Darex Copolymers Nos. 2 and 3 have been evaluated both in the laboratory and in small-scale commercial plants. They have proved to be good processing aids and compounding ingredients and are claimed to improve the following qualities in various products: Abrasion resistance and flexibility in GR-S and natural rubber shoe soles and top lifts; hardness and tensile strength in molded semi-hard rubber elec-

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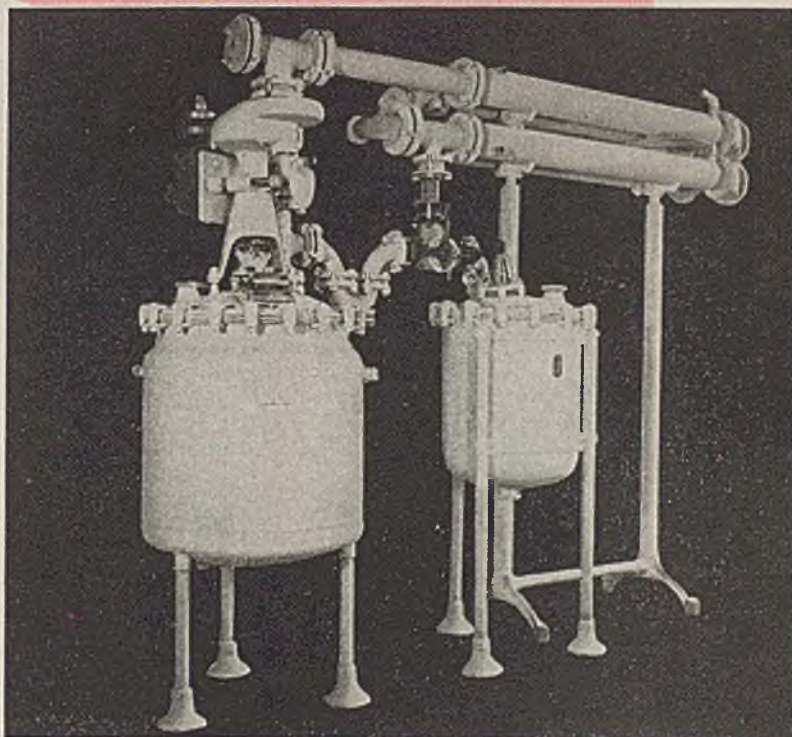
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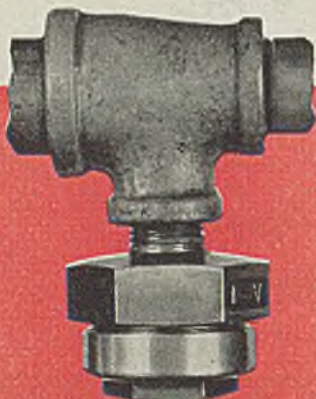
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trical and automotive parts; dielectric strength and moisture resistance in GR-S, GR-I, and GR-M wires insulation; rate of extrusion and movement in thin-walled GR-S tubing and Neoprene hose. Tests indicate possibilities for improving feel and embossing characteristics of coated fabrics and artificial leather, for increasing resilience and toughness of hard rubber; buna grinding wheels and molded plastics; for imparting good chemical and moisture resistance to rubber resin base paints and paper coatings; for improving wearability and color possibilities in rubber tile and flooring. They also show promise for use in such products as tennis balls, hot water bottles, typewriter rolls, and erasers. As processing aid in extruded hose and wire installations, Darex copolymers impart smoothness to gum rubber stocks without reducing the apparent rubber content; in calendered and spread goods, smoother, glossier surfaces are secured; and in molded goods they increase the ease of flow and reduce mold shrinkage. GR-S, buna-N, butyl, and Neoprene synthetic rubbers and with various types of plastics. They may be milled, extruded, calendered, compression and injection-molded in regular rubber and plastic equipment.

ALKYLAMINE

Now available in experimental quantities from the Commercial Solvents Corp., 17 East 42nd St., New York, N. Y., Diisopropylamine is similar to other secondary amines. It has a boiling point of 83.7 deg. C., and for this reason can be conveniently used with less loss of volatile material than is the case when lower secondary amines are employed. It has a freezing point of below -60 deg. C., and is partially miscible with water and completely miscible with most organic solvents. Diisopropylamine is suggested as a starting material for the synthesis of a variety of products such as textile specialties, detergents, inhibitors, dyes, pharmaceuticals, and other similar products.

SYNTHETIC DETERGENT

Introduced recently by the Alrose Chemical Co., 180 Mill St., Cranston, R. I., a new dry synthetic detergent is claimed to have good possibilities for household and textile use. The active ingredient of this material, which is known as Alosene PD, is a modified alcohol sulphate. It contains 15 percent active ingredients, 85 percent inorganic salts; a 1 percent solution has a surface tension of 30.5 dynes per centimeter at 25 deg. C. Alosene is a white, odorless, non-caking, non-dusting, dense powder and is soluble in cold water yielding opalescent, soaplike solution at 1 percent concentration. At temperatures higher than 35 deg. C., the solution is colorless and transparent. It is stable in storage and in acid or alkaline solutions; Alosene PD exhibits good detergent on both wool and cotton in neutral solutions. Cleaning efficiency is claimed to improve with increasing temperature with no redeposit of soil on long exposure. It is also claimed to be a better detergent in hard water than in soft water and may be used with alkalis such as phosphates, silicates, bicarbonate, borax, and with high concentrations of neutral salts to improve

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Monsanto GVL is completely miscible with water and most organic liquids. It is non-irritating and safe for most normal uses—non-flammable at ordinary temperatures—colorless—possesses only a mild odor. Its solvent action does not disappear when mixed with water, but remains present in proportion to its concentration. It is a good solvent for most synthetic resins, films, and fibers.

Note the physical properties and suggested applications of Monsanto GVL—they may indicate new uses to you. Samples and technical bulletin No. OD-104 may be obtained by contacting the nearest Monsanto Office, or writing MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1705 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Cincinnati, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.



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Special printing inks	Window-cleaning fluid
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Pounds per Gallon	8.75
Boiling Point (760 mm.)	Approximately 206°C. (403°F.)
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Crystallizing Point	Approximately -37°C. (-35°F.)
Viscosity at 25°C.	2.18 Centipoises
pH Anhydrous	7.0
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Proximity to rapidly growing domestic and Latin American markets plus exceptional transportation facilities by rail, sea, highway and air accent Pensacola's opportunities for industry, especially in the fields of chemicals, plastics, paints and varnishes, furniture and wood products, boat building, textiles and soap manufacture from locally available raw materials.

Industrialists located in Pensacola are served by two railroads with terminal facilities, a sheltered barge canal from the Mexican border to New Jersey, a magnificent harbor with a 52-hour "turn-around" service to Havana and trunk highway access to southern and midwestern markets.

When considered in connection with Pensacola's ideal climate, cooperative labor, low taxes, inexhaustible supply of soft water, 99.98% pure, inexpensive electric power, natural gas, oil and coal, these transportation advantages offer additional evidence that **PENSACOLA IS THE SPOT** for industry today.

Write immediately for information. Advise us of your requirements. Your correspondence will be held in strict confidence.



detergencies. It retains considerable activity in dilute acetic acid which may be used where there is danger of colors running. A 1 percent solution of Alrosene PD at 45 deg. C. produces six volumes of foam upon agitating. Foam draining is slow and stability is good. It is unaffected by 550 ppm calcium chloride hardness. This new detergent may be used for various industrial applications and for laundering, upholstery and rug cleaning, general household cleaning, etc. It may be mixed with soap powder, other synthetic detergents, alkalies, neutral salts, and proteins.

ETHYL SILICATE

COMMERCIAL quantities of ethyl silicate 40 are now available from the Carbide & Carbon Chemical Corp., 30 East 42nd St., New York 17, N. Y. Ethyl silicate 40 is a new condensation product containing approximately 40 percent available silica. It is a light brown, mild odored liquid and undergoes the hydrolysis and subsequent dehydration characteristic of pure tetraethyl orthosilicate. It is claimed to deposit silica at lower cost than other ethyl silicates. This new polymer, which is a convenient source of adhesive silica, is suggested for use as a refractory particle binder, for weatherproofing stonework, for formulating special heat-resistant surface coatings, and may also be used for gelling such liquids as acetone, ethanol, and isopropanol to make solid fuels.

ALUMINUM FINISHES

NOW AVAILABLE for civilian use, nine types of aluminum protective coatings designated as the Alumcote series has been announced by the Watson-Standard Co., Pittsburgh 12, Pa. Incorporating a number of improvements developed during the war, these coatings have been designated to specific requirements. They are claimed to make possible smoother, more brilliant and more durable product finishes. Coatings in this series are recommended for use in a number of different applications in various fields. An Alumcote finish for black plate should be of interest to container manufacturers, metal fabricators and to lithographers. A heat-resistant coating is available for reflectors, stoves and heaters. Smooth, tough and brilliant coatings have been formulated to withstand abrasion and severe handling and are said to be useful in various types of toys. Paper converters, too, are expected to find Alumcote suitable for producing embossed, decorative and protective food packing products.

SYNTHETIC CRYSTAL

PROMISING to have wide application in petroleum refining, synthetic rubber production, and in other industries where the use of infrared rays are, or can be, used to advantage in manufacturing controls, a new synthetic crystal made of silver chloride is now commercially available from the Harshaw Chemical Co., 1945 E. 97th St., Cleveland, Ohio. Ordinarily light rays pass through samples of hydrocarbon without change. However, infrared or ultraviolet rays are stopped or obstructed by some of the material. When such obstructions occur, a shadow is cast and such shadows are recorded

Here!

A NEW I*P*E CONTROLLED AGITATION REACTOR

FOR PRODUCTS THAT CHANGE

CONSISTENCY DURING PROCESSING

★ No step bearing required in tank...wide spaced anti-friction bearings on vertical shaft eliminate need.



★ Variable Speed Agitation allows processing over wide range of viscosities.

★ "Tailored" to your own manufacturing process.

★ Trouble-free! No Oil Leaks on Vertical Shaft.

★ Made of any weldable metal—A.S.M.E. Code.

Variable speed agitation may be the answer to your processing problem!—This new I*P*E kettle is built in sizes up to 3000 gal. and each installation is engineered to your own specific manufacturing requirements.

I*P*E also designs and builds complete equipment—for resin esterification, continuous neutralization, continuous organic processing, paint and varnish manufacture, etc.—and DELIVERS ON TIME.

Let I*P*E analyze your production process, make suggestions to help step up your output. We can point to engineering problems solved, attempted by few other manufacturers. Why not write, phone, wire today?

INDUSTRIAL PROCESS ENGINEERS

"Special and Standard Process Equipment"

Engineered to Your Requirements"

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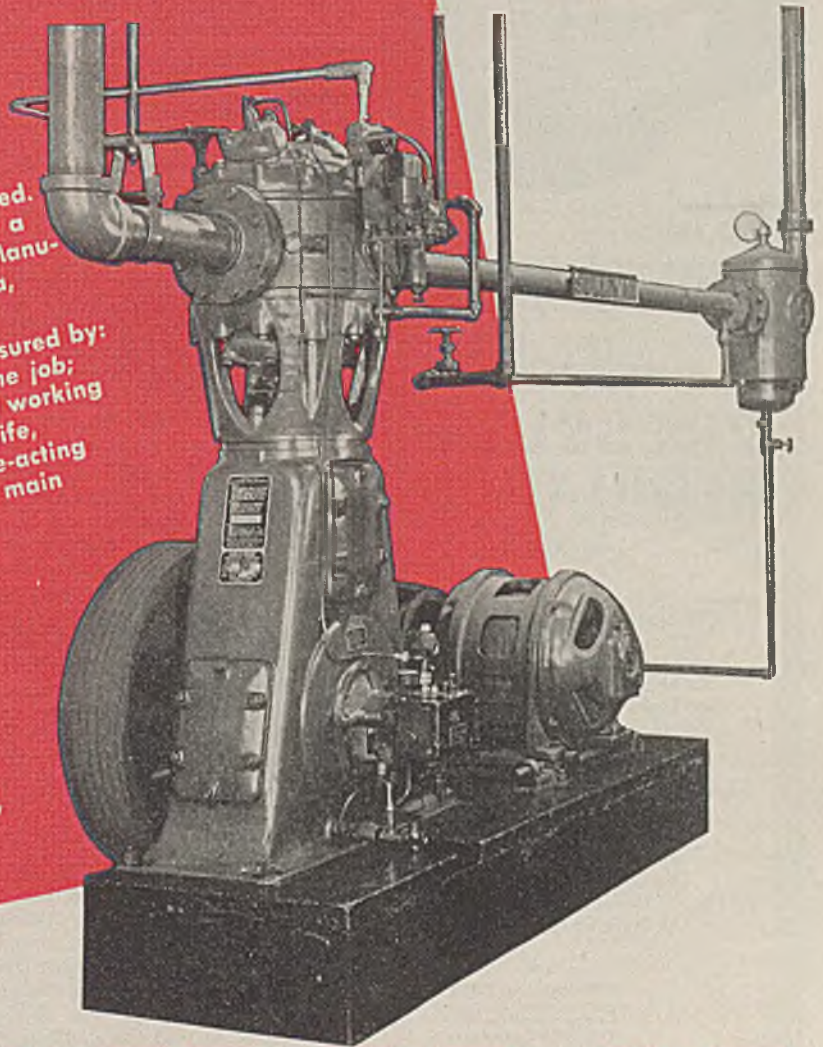
24 hr. per day reliability

... proved by more than
**150,000 H. P. in operation
today**

Hundreds of Sullivan WG-9 Compressors are on the job twenty-four hours a day in industrial plants where compressed air requirements are moderate and continuous, or for specialized uses in large plants particularly where floor space is limited. Shown here is a typical installation of a WG-9 in the plant of Royal Metal Manufacturing Co., Michigan City, Indiana, makers of Royalchrome furniture.

Long, trouble-free operation is assured by:
(1) cylinder liners replaceable on the job;
(2) full force-feed lubrication to aid working parts; (3) Sullivan patented, long-life, "Dual-Cushion" valves; (4) double-acting construction, and (5) anti-friction main bearings. Available in eleven sizes with displacements from 153 to 832 C.F.M. at pressures from 30 to 150 lbs. Send for Bulletin A-43 for complete details. Sullivan Division, Joy Manufacturing Company, Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

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modern, heavy-duty,
double-acting
air compressor



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THE WORLD'S FINEST AIR COMPRESSORS FROM 1/4 TO 600 H. P.

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Stationary and Portable Air Compressors, Pneumatic Casting Grips,
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The CASH-ACME All-brass Type A-31 is but one of many types of SMALL SIZE Pressure Reducing Valves developed by our Engineering Department for SMALL VOLUME Installations. Many thousands of these popular little regulators are now in use on:

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on a graph or wave line. The amount of foreign matter can then be readily determined by an experienced operator on the spectroscopic machine. The new silver chloride crystal is said to be valuable in this type of analytical equipment. Silver chloride crystals can be grown in eight days, can then be rolled, pressed, stamped or cut into any shape or thickness desired, after which they require no polishing.

MERCERIZING ASSISTANT

ANOTHER of the Dypenol series of mercerizing assistants under the brand name of Dypenol SED has been announced by the Dexter Chemical Corp., 819 Edgewater Road, New York, N. Y. This chemical is added directly to the mercerizing caustic and is said to eliminate preliminary boiling out of the yarn or fabric. This mercerizing assistant is also claimed to permit higher mercerizing speeds without decrease in the degree of mercerization. It has good wetting speed and does not lose its power through exhaustion onto the goods nor on standing in the caustic. Dypenol SED is recommended for use in caustic soda solutions ranging in strength from 48 deg. Tw. to 58 deg. Tw.

CLEANER

DEVELOPED and tested by the Ethyl Corp., Detroit, Mich., a new multi-purpose household cleaner and car wash is now available. Consisting of a synthetic detergent derived from petroleum, it contains no animal or vegetable fats, greases, acids or strong alkali. It is sold in the concentrated liquid form to be diluted with water. Ethyl cleaner is recommended for various home uses including cleaning painted walls and woodwork, enameled and porcelain finishes, tile, windows, refrigerators, stoves, upholstery and rugs, and for washing fine woollens. It is effective in cleaning all surfaces of an automobile including the body, windshield and windows, chromeware, upholstery, tires, etc. It leaves no soapy film and suds readily in any kind of water; hard, soft, or even sea water. It is available from grocery, drug, hardware and automotive accessory wholesalers, department stores and oil companies in four convenient quantities: 6 oz., 16 oz., 24 oz., and 32 oz.

NITROCELLULOSE COATING

DANGER of bottle breakage can be obviated, it is claimed, through the use of a tough nitrocellulose plastic coating which serves as a protective armor around a glass bottle and holds its shape, even though the glass underneath is shattered. Protected bottles of this type have been developed by the Detroit Macoid Corp., Detroit, Mich., according to Hercules Powder Co., Wilmington, Del. At the present time 1-gal. bottles are being coated in this fashion with a solution based on Hercules nitrocellulose. An even film of 20-25 thousandths of an inch is secured by a dipping operation.

PLASTIC DYE

A NEW coloring material known as Krieger-O-Dip Universal dye for use with several types of plastics has been announced by the Krieger Color and Chemical Co., 6531 Santa Monica Blvd., Hollywood 38, Calif. It is available in several colors.

Savings EFFECTED BY ST. REGIS PACKAGING SYSTEMS

CASE HISTORY #1 . . \$5.71 per ton

saving on container \$5.46
saving on packaging operation . . \$.25
total saving \$5.71

CASE HISTORY #2 . . \$2.50 per ton

saving on container \$1.32
saving on packaging operation . . \$1.18
total saving \$2.50

CASE HISTORY #3 . . \$1.80 per ton

saving on container \$1.64
saving on packaging operation . . \$.16
total saving \$1.80

CASE HISTORY #4 . . \$1.56 per ton

saving on container \$1.55
saving on packaging operation . . \$.01
total saving \$1.56

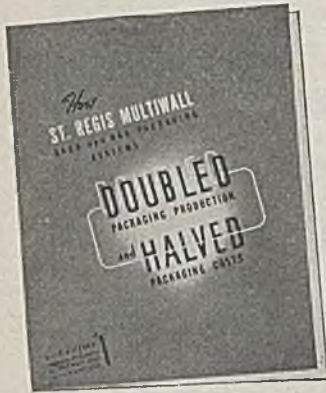
CASE HISTORY #5 . . \$5.06 per ton

saving on container \$3.56
saving on packaging operation . . \$1.50
total saving \$5.06

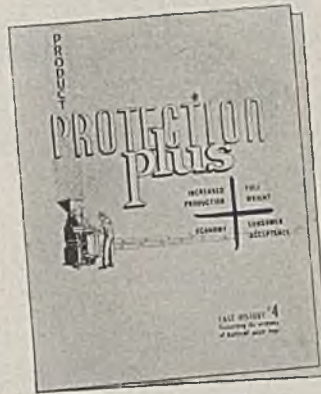
Multiwall paper bags are now serving American industry in high-speed machine packaging of over 300 different chemical, food, fertilizer and rock products. These five "case histories" outline the detailed factual experience of leading concerns in the use of fast, cost-saving St. Regis Packaging Systems.

WATCH THESE PAGES FOR
FURTHER CASE HISTORIES

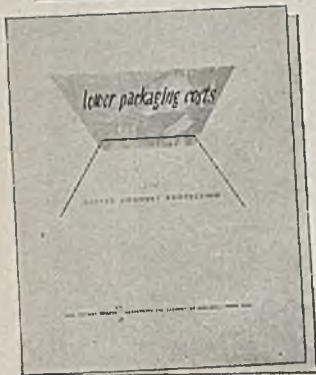
THESE "CASE HISTORIES" SHOW HOW ST. REGIS PACKAGING SYSTEMS INCREASE PRODUCTION - REDUCE PACKAGING COSTS



1 manufacturer of ready mixed cake flours . . . installation of a St. Regis Valve-bag Packaging System raised production from 9,000 lbs. per hour to 18,000 lbs. per hour with no increase in labor costs.



4 prominent salt manufacturer increased packaging output 18% with the same crew by changing over to the St. Regis Valve-bag Packaging System . . . and effected a saving of 45% in overall packaging costs.



2 several well-known fertilizer manufacturers were using eight men to pack burlap bags. St. Regis Valve-bag Packaging Systems enabled these companies to "up" production 20% per hour with only 5 men packing and handling.



5 manufacturer of cocoa installed a St. Regis Valve-bag Packaging System. Result: an increase of 62½% in production, a saving in labor costs of 60%, a saving in container costs of over 55%.



3 manufacturer of granite poultry grit formerly employed a 14-man crew to fill, sew and handle a maximum output of 60,000 lbs. per hour. Installation of a St. Regis Valve-bag Packaging System enabled poultry grit manufacturer to double production with smaller crew . . . reduce container costs 54.4%.

The "case histories" illustrated above have proved of great value to manufacturers throughout the country . . . perhaps they will be of equal value to your company. Write for the folders that interest you the most . . . or, if you would prefer to have a St. Regis sales representative talk over your specific problems with you, just 'phone or write your nearest St. Regis Sales Office.

Years of experience in the pioneering of automatic packaging in multiple-layer paper bags has enabled St. Regis to recommend the correct packaging system to suit the needs of manufacturers of over 300 different products including chemical, food, fertilizer and rock products. The coupon is for your convenience.



ST. REGIS SALES CORPORATION

(Sales Subsidiary of St. Regis Paper Company)

NEW YORK 17: 230 Park Ave.

CHICAGO 1: 230 No. Michigan Ave.

BALTIMORE 2: 2601 O'Sullivan Bldg.

SAN FRANCISCO 4: 1 Montgomery St.

Without obligation, please send me full details regarding "Case Histories" outlined above.

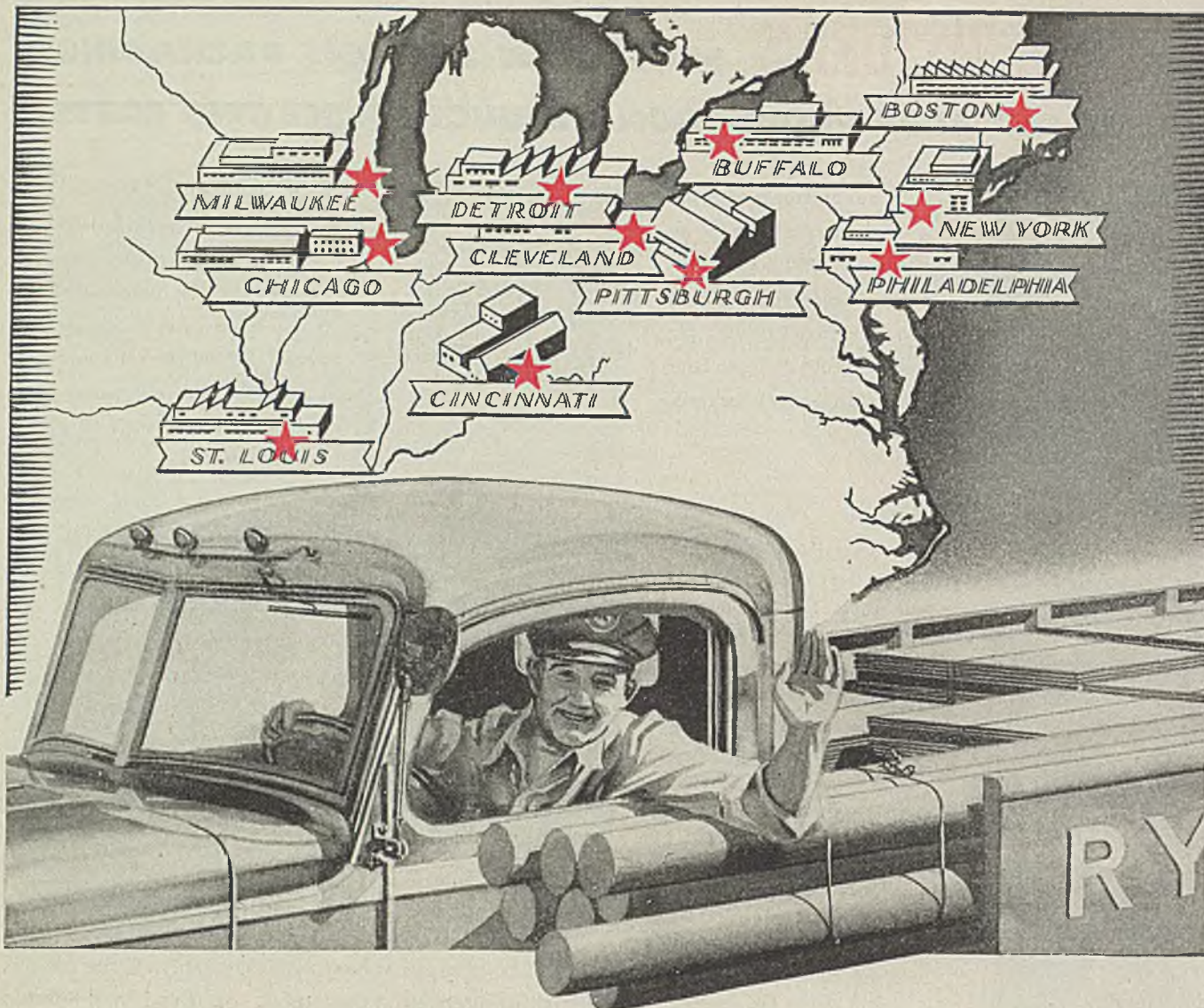
No. 1 No. 2 No. 3 No. 4 No. 5

Name _____

Company _____

Address _____

Birmingham Boston Cleveland Dallas Denver Detroit
Franklin, Va. Los Angeles Nazareth, Pa. New Orleans
No. Kansas City, Mo. Ocala, Fla. Oswego, N. Y. Seattle Toledo
IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal, Vancouver.



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ELEVEN Ryerson Steel-Service Plants provide unmatched facilities virtually next door to every steel user in the principal markets of the United States. Though many sizes are missing because of the steel shortage, each plant has large, diversified stocks. Each is backed up by the inventories and facilities of the others. These strategically-located steel stocks plus modern high speed equipment are your assurance that orders will be filled accurately and promptly.

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stock is available to you at every plant in the Ryerson network. When you need steel of any kind call Ryerson.

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PRINCIPAL PRODUCTS

Carbon and Alloy Steels, Allegheny Stainless, Tool Steel, Bars, Plates, Sheets, Structurals, Mechanical Tubing, Inland 4-Way Floor Plate, Reinforcing Bars and Accessories, Boiler Tubes, Welding Rod, Babbitt, Bolts, Rivets, Metal Working Tools & Machinery, etc.

RYERSON STEEL

CHEMICAL ENGINEERING NEWS

FIRST MEETING OF CHEMICAL WARFARE ASSOCIATION

FIRST annual meeting of the recently formed Chemical Warfare Association was held at Edgewood Arsenal, Md., on May 24-25. Because of transportation difficulties, some of the speakers who were scheduled to address the meeting were unable to be present. Maj. Gen. Alden H. Waitt, chief of the Chemical Warfare Service spoke on "Postwar Plans for Chemical Warfare Service." Dr. W. A. Noyes, president-elect of the American Chemical Society discussed "Chemical Research and Developments in World War II" and Lt. Gen. J. Lawton Collins, director of information of the War Department, presented an address on "Major Lessons of World War II." Dr. Noyes' paper was read by T. H. Marshall.

The New York Chapter of the Chemical Warfare Association held its first meeting early in May and formally organized by electing the following officers: Charles H. Minor, Taylor-Wharton Iron & Steel Corp., president; S. W. Jacobs, Niagara Alkali Co., vice president; Jerome F. McGinty, Millmaster Chemical Co., secretary; and Marvin J. Silberman, Royal Lace Paper Co., treasurer.

RADIOACTIVE ISOTOPES TO BE MADE AVAILABLE

DETAILS of a program for the nationwide distribution of beneficial radioactive isotopes to be produced from the uranium chain-reacting "atom pile" of the Clinton Laboratories at Oak Ridge, were announced on June 14. The isotopes to be made available will be used in research work in pure and applied sciences.

Distribution will be coordinated and supervised by an advisory committee on isotope distribution policy, members of which were appointed by Maj. Gen. L. R. Groves, Chief of the Manhattan Engineer District, on recommendation and nomination by the National Academy of Sciences.

Only qualified institutions such as recognized research laboratories including industrial research laboratories, hospitals, universities, and clinical investigation groups will be able to obtain the radioactive material. All groups using these isotopes for fundamental research or applied science will be required to publish their findings.

CHINESE ENGINEERS WILL HOLD CONVENTION

THIRD annual convention, since its revival in 1942, of the Chinese Institute of Engineers, America Section, will open at the Hotel New Yorker, New York, on June 29 and continue through July 1. Membership of the section now exceeds 1,000 scattered throughout the United States. The program includes a business meeting, technical sessions, plant visits, and the annual banquet. During the technical sessions there will be

talks by leading Chinese and American engineers who recently returned from technical missions to Taiwan and other parts of China. Group visits will be conducted to industrial and utility plants in and around New York.

Dr. P. H. Chang, new Chinese Consul-General in New York and official spokesman for the Chinese Government in Chungking during the war years, will be the main speaker at the banquet which will be held on the evening of July 1.

DUPONT TO HAVE PLASTICS PLANT IN WEST VIRGINIA

ABOUT the middle of May it was announced that within a month construction would start on a new plastic plant for E. I. du Pont de Nemours & Co. at Washington Bottom, near Parkersburg, W. Va. Arnold E. Pitcher, general manager of the plastics department said the new plant will manufacture Lucite acrylic resin and polythene molding powder. A new unit also will be afforded for the production of nylon bristles and molding powder. Construction has been approved by the Civilian Production Administration and the construction division of du Pont's engineering department will be in charge of the work. Temporary offices were established on May 15 in a former home on the 400-acre plant site.

THE GEORGE WESTINGHOUSE CENTENNIAL FORUM

SPONSORED by the Westinghouse Educational Foundation in commemoration of the 100th anniversary of the birth of George Westinghouse, noted inventor and industrial pioneer, a three-day forum was held at Pittsburgh on May 16-18, with the role of

science in advancing civilization as the keynote. The occasion brought together many of the men responsible for major wartime scientific advances.

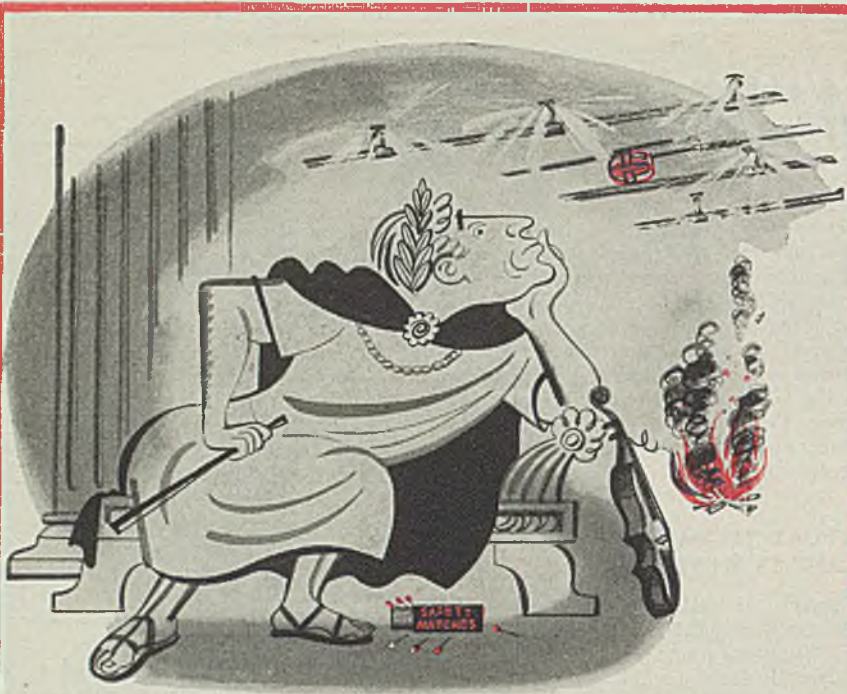
At the luncheon on May 16, Gwilym A. Price, president of the Westinghouse Electric Corp. and treasurer of the Westinghouse Educational Foundation, emphasized the necessity for preventing another war. He said the instruments, techniques, and theories, developed for purposes of destruction, have given us a new wealth and a new challenge. He referred to the awesome power we now have for destruction as awakening us to a new realization of the impact of science on our affairs. In return for our new-found wealth we are forced to assume new and critical responsibilities. We must view the bewildering number of forces and agencies we have with conviction and faith and shape them to good purpose.

L. W. Chubb, director of the Westinghouse research laboratories, urged that scientific knowledge be applied so that more people may benefit by it more quickly. He pointed out that the more rapid unfolding of the secrets of nature, the encouragement given to scientific pursuits and especially the technical accomplishments during the war have shown more than ever before the great influence of science on our national welfare. He further pointed out that although the war has been described as a scientists war, actually science alone could not have brought victory as it was the combination of scientific knowledge and industrial know-how that spelled superiority over the Axis.

One of the most important sessions was given over to a symposium on "The Future of Atomic Energy." Foremost authorities on atomic research joined in predicting a brilliant peacetime future for this new source of energy in the generation of electricity, in

Dr. J. Robert Oppenheimer, professor of physics, University of California, and director of the laboratory at Los Alamos, N. Mex., where the atomic bomb was perfected, addressing the George Washington Centennial Forum at Pittsburgh





*What would Nero the Fiddler have done
If "Automatic" Sprinkler had spoiled his fun?
Rome wouldn't have blazed
and a Caesar, amazed,
Would have picked up his fiddle and run.*

The familiar proverb, "Rome wasn't built in a day", could be aptly applied to the thousands of businesses that are yearly destroyed by fire, hundreds of which sustain financial ruin.

In figures, this statement is even more shocking . . . over twelve billion dollars of fire loss in 30 years. And, much of this loss could have been prevented on the basis of today's fire-fighting methods and advanced fire protection equipment. "Automatic" Sprinkler systems, for example, are now available in every field of activity and lives and property are safeguarded as it was never thought possible to do in the past.

Yes, there's an "Automatic" Sprinkler system to suit your most rigid fire protection requirements. Why don't you investigate today? There's no obligation.



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medicine, biology and chemistry, providing an effective international control can be set up to regulate the manufacture of bombs.

Dr. J. Robert Oppenheimer, professor of physics, University of California, who directed the special laboratory at Los Alamos, N. Mex., where the atomic bomb was perfected, reviewed suggestions already advanced for international control of atomic energy and expressed the belief that much might be accomplished through world government with international law applying to the citizens of nations as federal law does to those of states.

Dr. Enrico Fermi, professor of physics, University of Chicago, brought up the possibilities of atomic energy as a source for the generation of power. He said we might conceive that 20 or 30 years from now the general scheme of atomic energy production may be perhaps as follows. There will be large central installations in which very great amounts of power will be produced and transformed into electricity energy or steam for local power consumption. Besides directly producing power, these large units also may produce some plutonium which will be extracted and distributed to small installations in which plutonium and not uranium will be used as the primary fuel. This plan would have the advantage of permitting wide use of relatively small power units thereby reducing the difficulties of distribution.

Dr. Hugh S. Taylor, dean of the Graduate School, Princeton University, spoke on the chemical aspects of atomic research. He placed much value on the tracer technics which, through the use of radioactive substances, enable the scientist to speed up analytical processes. He declared this will be particularly valuable in the fields of metallurgy and metallography and also in operations where problems of fluid flow must be solved. He suggested that we should go back to our fundamentals of inorganic and organic chemistry to ascertain whether, with the newer reagents now available on large technical scale, we cannot devise new approaches to old objectives.

Discussing the biological phase of atomic energy Dr. W. Edward Chamberlain, professor of roentgenology and radiology, Temple University, said the new science of atomic energy will benefit biology and medicine not only directly, as when radioactive isotopes from cyclotron, betatron or chain-reaction-pile are put to work as tracers, or as therapeutic agents but indirectly, through the spectacular advances which it has produced and will continue to produce in all scientific thinking.

MONSANTO GRANTS ACADEMIC LEAVE TO SCIENTISTS

INAUGURATION of an academic leave for the technical personnel of Monsanto Chemical Co. to enable them to return to universities of their choice for an academic year of study at full salary, was announced in New York last month by Dr. Carroll A. Hochwalt of Dayton, Monsanto's director of central research.

Addressing the National Industrial Conference Board, Dr. Hochwalt said the leave of absence was established to encourage the scientific work and development of technical personnel in physics, chemistry and chemical engineering. Four leaves will be



High pressure union between hot molecules . . .



CUTS THE COST OF STUFF AND THINGS

Chemists have learned to mix the unmixables. It wasn't so only a generation ago. Solids and liquids and gases which formerly remained strictly aloof from each other, today can be united under high pressure and heat.

They produce a myriad of low-cost miracles. The lustrous yet washable gowns; the beautifully stockinged leg; brilliant plastics; weed killers; quick drying paints; fireproof lumber—all are facts of life grandma didn't know about. All are results of high pressuring molecules.

Members of Dresser Industries engineer high-pressure equipment for this large scale chemistry. Pumps that push these hot mixtures around under hundreds of pounds pressure per square inch. Compressors that squeeze chemical activity into the more reluctant substances at 5000 pounds pressure. Storage tanks that hold half a million cubic feet of temperamental gas ready and waiting under a tight lid at 100 pounds to the square inch.

But the compressors and pumps and vessels are themselves made of elements which tend to unite chemically with the contents under heat and pressure. Licking corrosion in high-pressure equipment has been one of Dresser Industries' contributions to lower-cost luxury. As chemistry thinks up new problems, Dresser Industries, Inc., creates the equipment that is *First to Be New—Last to Wear Out.*

BOVAIRD & SEYFANG Manufacturing Co.,
Bradford, Pa.

BRYANT Heater Company, Cleveland, Ohio

CLARK Bros. Co., Inc., Olean, New York

DAY & NIGHT Mfg. Co., Monrovia, Calif.

DRESSER Manufacturing Div., Bradford, Pa.

DRESSER Manufacturing Company Limited,
Toronto, Ont., Canada

INTERNATIONAL Derrick & Equipment Co.,
Columbus, Marietta & Delaware, Ohio;
Beaumont, Texas; Torrance, Calif.

PAYNE Furnace Co., Beverly Hills, Calif.

SECURITY Engineering Co., Inc., Whittier, Calif.

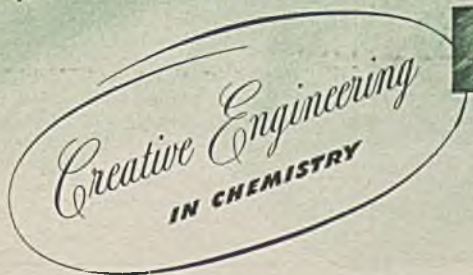
KOBE, Inc., Huntington Park, Calif.

PACIFIC Pumps, Inc., Huntington Park, Calif.

ROOTS-CONNERSVILLE Blower Corporation,
Connorsville, Ind.

STACEY BROS. Gas Construction Company,
Cincinnati, Ohio

VAN DER HORST Corporation of America,
Olean, N. Y. and Cleveland, Ohio



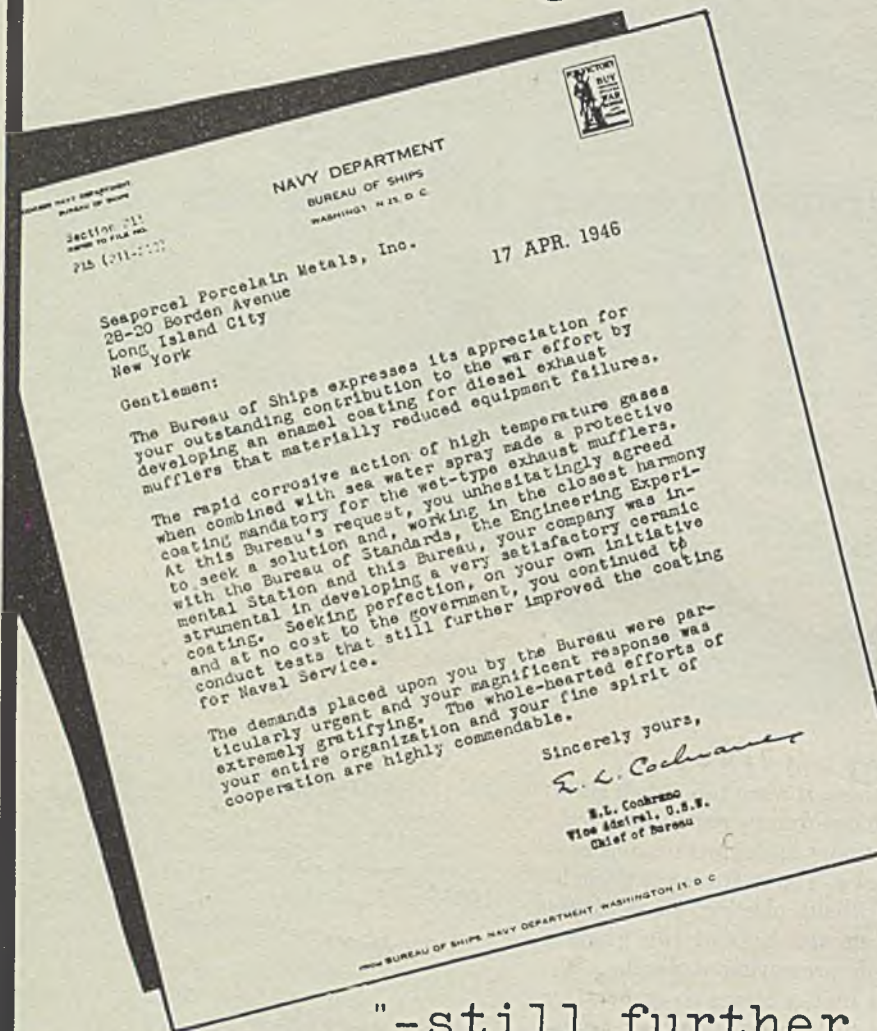
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OIL AND GAS EQUIPMENT A SPECIALTY

"-a very satisfactory ceramic coating-"



"-still further improved-"

Even as we co-operated with the Navy, we stand ready to work with you in developing economical applications of our standard and special formula porcelain enamels.

architectural finishes • signs • equipment for corrosive service tanks • stack liners and uptakes • general jobbing enameling • sheet metal fabrication.

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granted each year and will be made on the basis of especially meritorious service and outstanding performance in scientific work carried out at any period and in any location in the service of Monsanto. The recipients will return to campuses of their own choosing for refresher courses and original research.

FIBER DRUM INDUSTRY FORMS TRADE ASSOCIATION

FOLLOWING preliminary meetings held in New York in February and March, members of the fiber drum industry recently met in Cleveland and formally completed the organization of a trade association. Officers elected were: H. L. Carpenter, president Carpenter Container Corp., Brooklyn, president; W. J. Mahoney, president, Master Package Corp., Owen, Wisc., vice president; Glenn Mather, the container company division, Continental Can Co., Inc., Van Wert, Ohio, secretary; and R. C. Carlson, president, Emery-Carpenter Container Co., Cincinnati, treasurer.

CONFERENCE OF CHEMICAL INSTITUTE OF CANADA

HOLDING its annual conference at the Royal York Hotel, Toronto, on June 24-26, The Chemical Institute of Canada has arranged technical sessions devoted to biochemistry, chemical education, chemical engineering, protective coatings, pure chemistry, rubber and textiles. A symposium on conservation will be held dealing with soils, wild life and water courses, and forestry.

Chemical equipment, apparatus, products and appliances will be exhibited by approximately 45 leading manufacturers and sup-

CONVENTION CALENDAR

Chemical Institute of Canada, annual conference, Royal York Hotel, Toronto, Ont., Canada, June 24-26.

American Society for Testing Materials, annual meeting, Hotel Statler, Buffalo, N. Y., June 24-28.

American Institute of Chemical Engineers, regional meeting, Palace Hotel, San Francisco, Calif., August 25-28.

American Chemical Society, 110th meeting, Chicago, Ill., September 9-13.

Fourth National Chemical Exposition, Chicago, Ill., September 10-14.

Instrument Society of America, first national conference and exhibit, William Penn Hotel, Pittsburgh, Pa., September 16-20.

The Electrochemical Society, Inc., fall meeting, Hotel Royal York, Toronto, Canada, October 16-19.

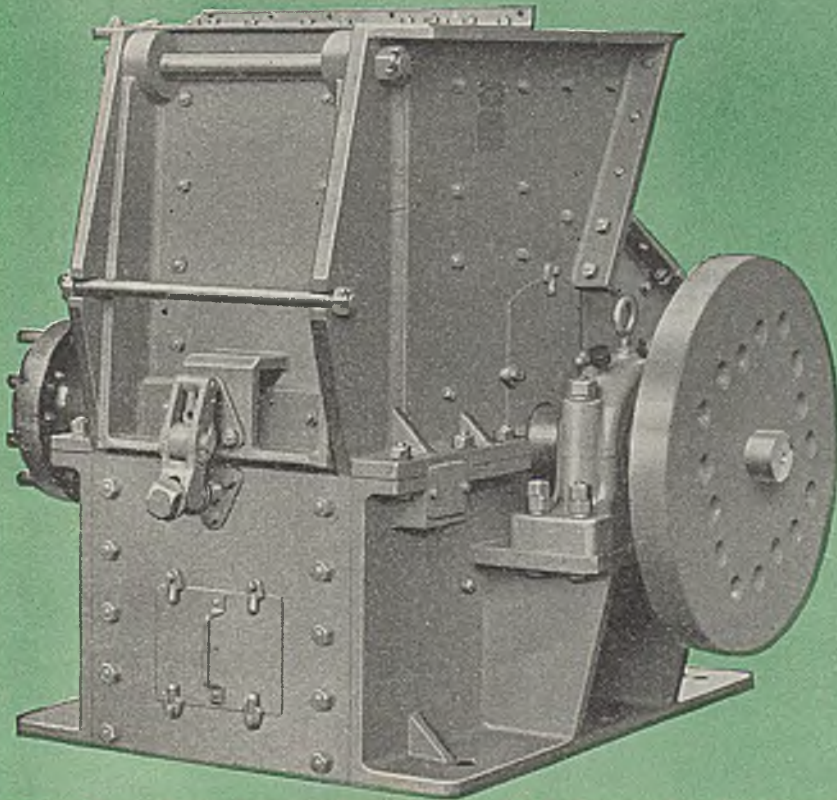
Federation of Paint and Varnish Production Clubs, annual convention and paint industries show, Hotel Claridge, Atlantic City, N. J., November 4-6.

National Paint, Varnish & Lacquer Association, annual convention, Atlantic City, N. J., November 6-8.

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REDUCTION
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or CRUSHING**



No reduction job is too big, none too complex for Jeffrey to solve. Whether materials are minerals, chemicals, plastics or refuse, Jeffrey has the right unit.

Shown is a heavy duty, Type B-3 unit which has many uses as a primary breaker.

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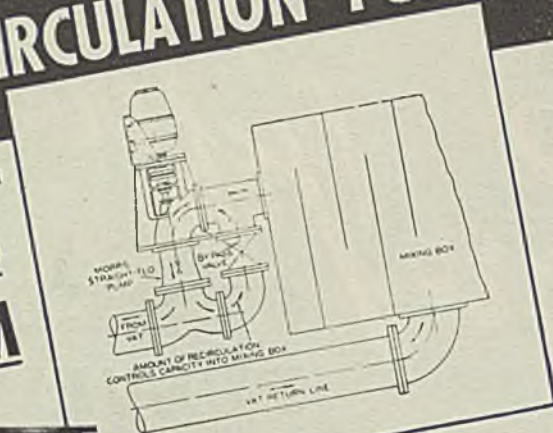
Baltimore 1	Buffalo 2	Cleveland 13	Harlan	Milwaukee 11	Pittsburgh 22
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Boston 14	Cincinnati 2	Detroit 13	Huntington 19	Philadelphia 3	Salt Lake City 1
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**NOW -
A VAT-CIRCULATION PUMP**

**Complete with
BY-PASS
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Either Vertical Straightflo or horizontal type may be adapted to this installation.

The MORRIS Straightflo

None of the efficiency losses of a variable-speed AC motor. No expensive DC installations. No hydraulic or electric drive couplings. Just a simple BY-PASS SYSTEM that recirculates the unwanted pulp back through the pump.

gives

**VARIABLE CAPACITY
with a constant-speed
induction motor**

That's the secret of the Morris Straightflo Vat-Circulation Pump. It gives you high volume or low volume . . . both at low head, and with no increase in power consumption as the delivered volume is increased.

It is so simple, so economical, so practical. Avoids all the cost and efficiency losses of a wound-rotor, variable-speed AC motor. Does away with all troublesome complications. Just adjust a simple valve in the BY-PASS SYSTEM; it sends the unwanted portion of the pulp back through the suction end of the pump thereby cutting the delivered flow to any amount you want.

Engineered to Specific Needs

Morris Straightflo (axial flow) Pumps are built to the specific requirements of the job, designed to give optimum performance under all the conditions encountered. Suction and discharge elbows can be furnished in almost any position desired. Write for bulletin No. 167.

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CENTRIFUGAL PUMPS

pliers. The American Chemical Society exhibit on atomic energy also will be on display.

Special speakers at the general sessions and dinners will include Hon. George Drew, Premier of Canada; Dr. E. H. Land, Polaroid Corp.; W. S. Richardson, B. F. Goodrich Chemical Co.; Dr. A. L. Washburn, Arctic Institute of North America; Dr. E. C. Williams, Schenley Distillers Corp.

Non-technical talks and movies on plastics, synthetic fibers, foods, laundering practices, etc., are arranged for the ladies in addition to separate entertainment and social functions. The annual dinner on June 25 will be followed by a dance.

STANDARD OF OHIO HOLDS TECHNICAL MEETING

THE successful character of a three-day technical meeting held last month in Hot Springs, Va. for discussion of current refinery, research and process control problems and developments has led The Standard Oil Co. (Ohio) to schedule annual meetings of this type for key members of its technical staff.

Sixty of the company's research and refinery engineers, chemists, refinery managers and manufacturing executives participated in the first of these sessions which was planned by E. B. McConnell, general manager of the manufacturing department. The program included presentation of a number of original papers by members of the Sohio staff on process, testing and research questions concerning operating methods and product development work.

G. W. Hanneken, vice president in charge of manufacturing, who addressed the opening dinner, pointed out that these conferences were conceived for the exchange of views, as well as to acquaint all key members of the technical staff with detailed developments in the more important aspects of refinery operation and control, product development and research.

DOW CONSOLIDATES ALL MAGNESIUM OPERATIONS

CONSOLIDATION of magnesium operations of The Dow Chemical Co. under a separate executive board and general manager and the resumption of magnesium production at the company's sea water plant at Freeport, Texas, were announced simultaneously on May 17 by Dr. Willard H. Dow, president and general manager of the company who will act as chairman of the new executive board.

This brings the company's magnesium sales, fabrication and technical divisions together under the general managership of Dr. J. D. Hanawalt, former director of metallurgical research, and is expected to facilitate maximum coordination of effort. Production of magnesium ingot at the company's Texas plant, which has been closed since the end of the war, will be resumed as soon as possible and is expected to reach full capacity by midsummer.

Serving on the executive board of the magnesium division with Dr. Dow and Dr. Hanawalt will be G. F. Dressel, former production manager who is now assistant general manager, Dr. T. H. McConica III, former assistant technical director who is



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Prevents Sludge and Rust

STOPPAGES of hydraulic mechanisms may occur at any time, and they generally come suddenly, with no apparent warning. Most stoppages are caused by: 1) *sludge*, due to oxidation of the hydraulic oil, and 2) *rust*, due to moisture that gets through ordinary oil film onto the metal parts. Rust is particularly likely to form during periods when the machine is idle.

Texaco Regal Oils (R & O) are strongly inhibited against both rust and oxidation. They stand up under high temperatures and agitation—preventing sludge formation. They “plate” the surfaces of valves, gears and other parts with a rust resisting film so that moisture does not reach metal surfaces. In addition, *Regal Oils (R & O)* will not

foam. This means smooth, dependable operation.

Texaco Regal Oils (R & O) have proved themselves in service on all types of hydraulic units, from giant presses to small machine tools. One nationally famous user writes that they “. . . have eliminated the difficulties formerly experienced with oil varnish in the hydraulic system.” Leading hydraulic equipment manufacturers use and recommend *Texaco Regal Oils (R & O)*.

There is a complete line of *Texaco Regal Oils (R & O)* to meet every hydraulic machine requirement. For full information, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



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TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT STARRING JAMES MELTON WITH HIS GUEST, ED WYNN—CBS



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In and near Mexico City, you will find many fine, time proven Layne Well Water System installations. A partial tabulation shows Layne Well Water Systems serving Mexico City, an Automobile Assembly Plant, a large Chemical and Pharmaceutical works, Tire and Rubber Companies and extensive Irrigation Projects in the Valley of Mexico adjacent to Mexico City. As in the States—and elsewhere throughout the world—these Mexico installations are giving highly efficient and exceptionally dependable service.

Layne Well Water Systems are designed and built to exceed the usual passable quality mark. Company policy has never been to allow corner cutting in quality or skillful manufacture. Such a policy has made Layne Well Water Systems world famous and given owners immeasurable satisfaction.

If you are in need of a new water system, late literature should be read very carefully. Address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

HIGHEST EFFICIENCY

Layne Vertical Turbine pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves hundreds of dollars on power cost per year.

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**WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS**

now technical assistant to the general manager; H. Freuhauf, former manager of the Bay City, Mich., foundry and fabrication plant, who has been named production manager; L. B. Grant, who continues in the capacity of sales manager; and C. E. Nelson, former assistant technical director who is advanced to technical director.

STANDARD OF INDIANA WILL CONSOLIDATE REFINERIES

WARTIME technological developments in petroleum refining have forced the Standard Oil Co. (Indiana) to a decision to close its refineries at Neodesha, Kas., and Greybull, Wyo., and consolidate operations with those of other Standard refineries.

The decision will become effective about two and a half years hence at Neodesha and about two years hence at Greybull. Installation of catalytic cracking equipment during the war, the company explained, has developed a competitive situation that would require such equipment to be installed at these two refineries as well as at other Standard refineries not far from each of the two. Engineering studies showed that this duplication would be uneconomic and compelled the decision to close the two plants.

Construction of catalytic crackers and related equipment has been decided upon for the Sugar Creek, Mo., refinery, near Kansas City, and the Casper refinery, in Wyoming. Negotiations will soon be opened with the unions at those plants to work out a basis for the transfer of Neodesha employees to such jobs as will be available at Sugar Creek and similarly for the transfer of Greybull employees to Casper.

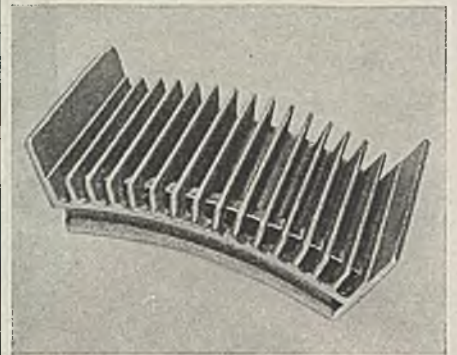
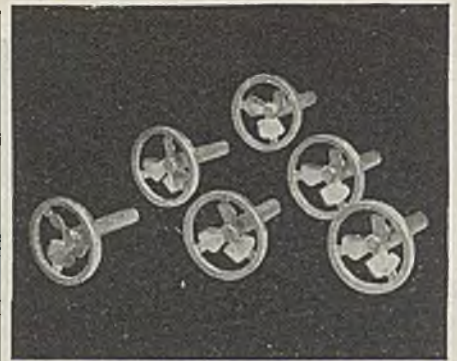
CHARLESTON SECTION AICHE HOLDS ANNUAL MEETING

ANNUAL meeting of the Charleston Section of the American Institute of Chemical Engineers was held at Charleston, W. Va., on May 16. R. F. Moran of Westvaco Chlorine Products Corp. was selected as chairman for the coming year. Other officers elected were F. A. Otto, E. I. du Pont de Nemours & Co., vice chairman; D. J. Porter, Westvaco Chlorine Products Corp., secretary; J. F. Roe, Monsanto Chemical Co., treasurer; and R. Voorhees, Carbide & Carbon Chemical Corp., member-at-large.

INSTITUTE OF CHEMISTS ELECTS OFFICERS

At its annual meeting held on May 17 at the Hotel Biltmore, New York, the American Institute of Chemists was informed by Dr. Gustav Egloff, retiring president, that membership in the Institute has continually increased to reach the all-time high of 2042. The establishment of a new chapter in New Jersey brings the total number of local active groups to 12. He expressed the regret of the members at the resignation of Howard S. Neiman as secretary, a position he ably filled for 20 years. The Gold Medal of the Institute was presented to Robert P. Russell of the Standard Oil Development Co.

Officers for the ensuing year were elected as follows: Dr. Foster D. Snell, president,



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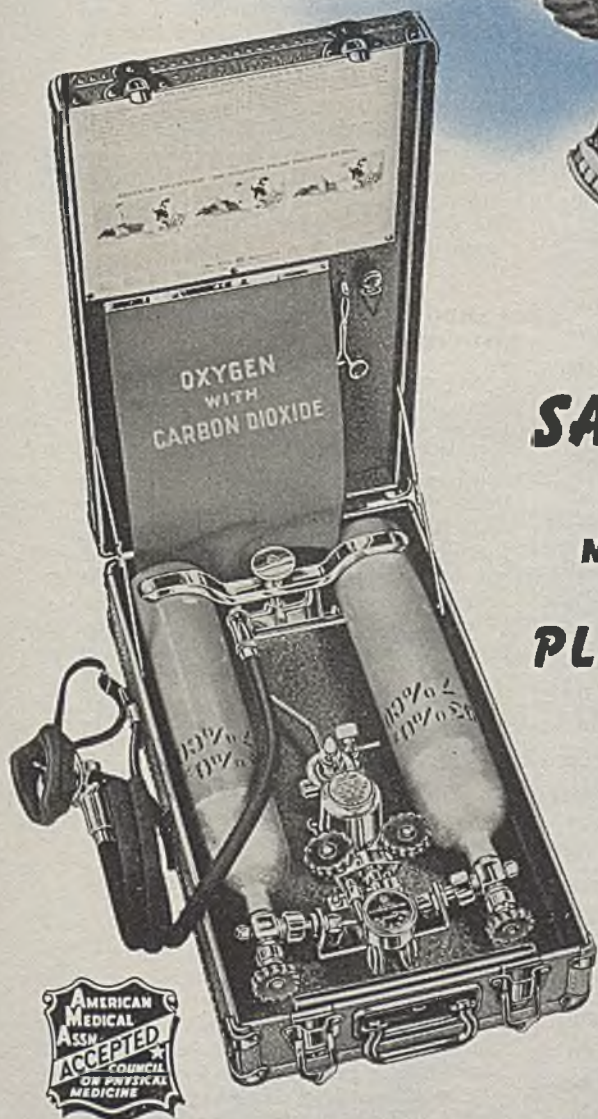


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MANUAL ARTIFICIAL RESPIRATION
PLUS THE H·H INHALATOR!

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With manual respiration begun, the second great essential is the prompt application of the H-H Inhalator—entering into the rhythm of the patient's respiration without the slightest break or pause, supplying, in quantity regulated automatically by individual lung demand, the stimulating mixture of oxygen-carbon dioxide necessary for rapid recovery—without suction or pressure—gently, naturally, effectively! Write for Bulletin CA-9.

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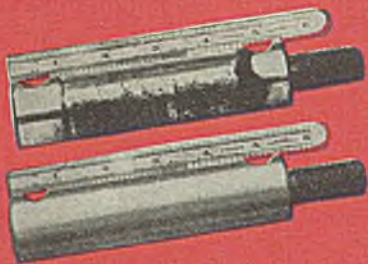
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THWARTS CORROSION!

These originally identical shackle pins from a ten ton truck were used in a comparative lubrication test for a period of one year. A well known conventional lubricant was used on the upper pin. Note the pitting from corrosion, also the excessive wear. LUBRIPLATE was used on the lower pin. Its surface remained bright and true as when the test began, proof that LUBRIPLATE is different . . . better.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

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DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

YOU CAN PREVENT RUST AND CORROSION

There is no need to dwell upon the ravages of rust and corrosion nor upon the tremendous tolls it takes every year from industry. We know it. The important thing is how to prevent it.

We also know that an unprotected ferrous metal surface if exposed to moisture will rust and that many non-ferrous metals will corrode in the presence of certain acids. The whole trick in preventing rust and corrosion is to keep the elements that cause rust and corrosion away from the metals.

In machinery it is often impossible or difficult to paint or enamel all metal parts that are subject to this form of damage. This is evident in the case of bearing surfaces and adjacent surfaces that are coated with oil or grease. Yet ordinary oils and greases do not offer complete protection against rust and corrosion.

It becomes obvious that when rust or corrosion regularly occurs, to prevent it a lubricant must be used that resists the conditions that cause it. That is one of the big reasons why LUBRIPLATE Lubricants are so widely used in all kinds of industries.

LUBRIPLATE is a tried and tested anti-rust and acid-resisting lubricant that can protect against the formation of rust and the destructive action of corrosion on bearings, gears, cams and other metal surfaces. And LUBRIPLATE lubricants provide superior lubrication as well. Possessing extra film strength, LUBRIPLATE lubricants keep metal surfaces apart, reduce heat and friction to a minimum, and arrest progressive wear.

A copy of "THE LUBRIPLATE SERVICE HANDBOOK" containing valuable information on the subject of lubrication will be furnished without charge by writing Fiske Brothers Refining Company, Newark 5, N. J. Adv.

Foster D. Snell, Inc., Brooklyn, president; Dr. Joseph Mattiello, technical director, Hilo Varnish Corp., Brooklyn, vice president; Dr. Lloyd Van Doren, chemical patents, New York, secretary; Frederick A. Hessel, president, Montclair Research Corp., Montclair, N. J., treasurer.

CHINESE CERAMIC SOCIETY HAS AMERICAN CHAPTER

Long before the present industrial age, fine ceramic articles were produced in China. Several years ago the Chinese Ceramic Society was formed to modernize the industry. During the war, production of ceramics suffered severely and its revival is part of the national industrialization plan. Among the many students and engineers sent to this country recently are about 20 who are working in the ceramic industry. At the recent annual convention of the American Ceramic Society, several Chinese ceramists organized the American Chapter of the Chinese Ceramic Society. Officers elected were Kuan-Han Sun, Fellow of the American Ceramic Society, president; Chen-Chung Tan, a specialist on refractories, secretary; and Gordon P. K. Chu, an expert on glass technology, treasurer. The New York address of the chapter is the office of the treasurer, 111 Broadway.

The newly-formed branch is collecting used books on ceramics and old issues of journals and magazines for the war torn areas of China and would appreciate donations from American ceramists. They may be sent to the Chinese Ceramic Society, Science and Technology Library, University of Pittsburgh, Pittsburgh, Pa.

CARBON DIOXIDE PUMPED TO CONSUMING PLANT

NEWEST and largest plant of the Liquid Carbonic Corp. is now in full-scale production of liquid carbon dioxide and dry ice at Belleville, N. J. The new plant is a modern structure embodying many of the latest trends in industrial plant design. It was built by the Walter Kidde Constructors, Inc. of New York. Indicative of the important role that location has assumed, the Belleville plant has been placed in immediate proximity to its largest consuming customer, Walter Kidde & Co., manufacturer of carbon dioxide fire extinguishing equipment. Whereas the carbon dioxide previously was delivered to this customer by truck or rail in the form of dry ice, it is now piped as a liquid under pressure directly to the consumer plant, eliminating many handling and shipping problems.

HONORARY MEMBERSHIPS IN THE CHEMISTS' CLUB

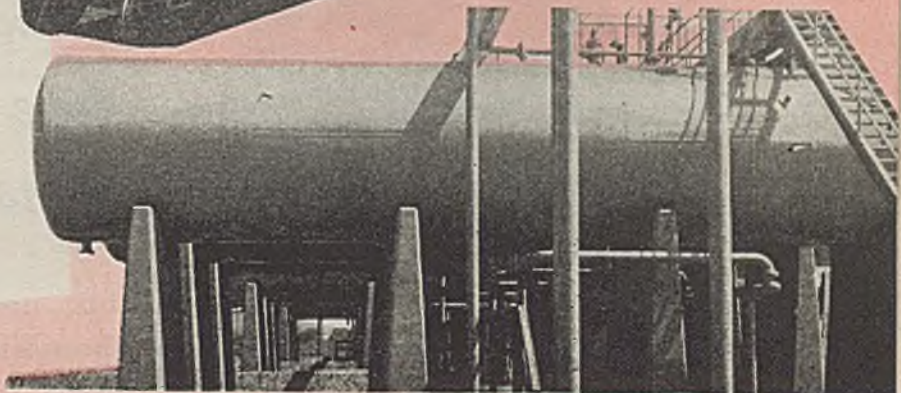
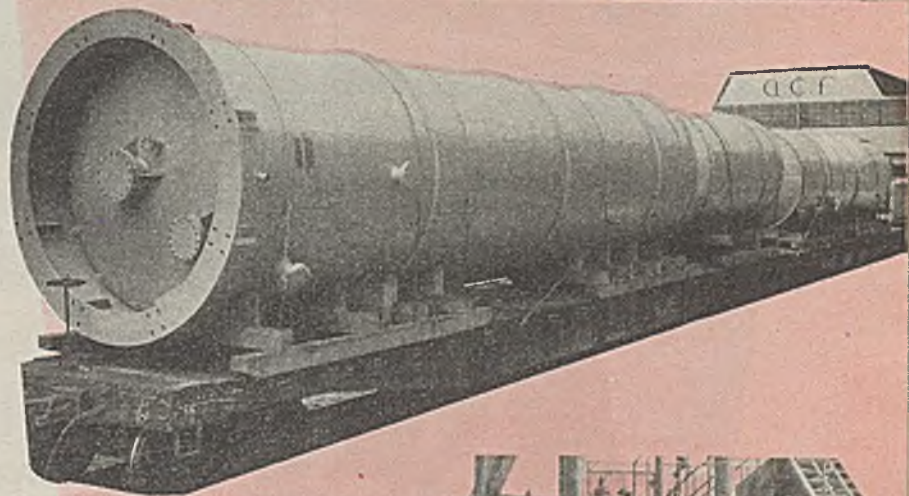
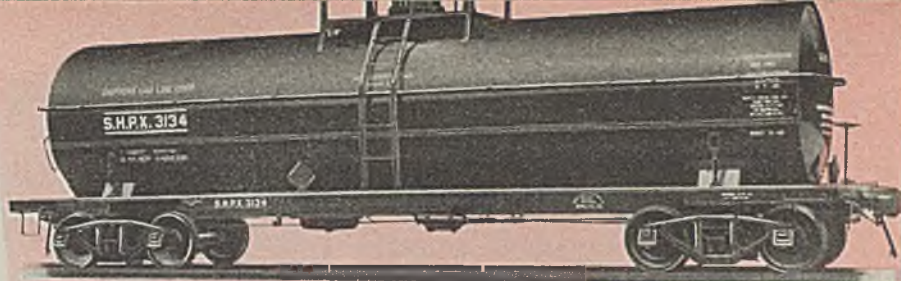
FOUR honorary memberships in the Chemists' Club of New York, the first such honors to be awarded since 1939, have been granted by the Club's membership. Honorary membership is given to outstanding individuals in the chemical field and only 33 have been given since the practice was instituted in 1909. The four recently honored are William Cullen, director of Imperial Chemical Industries, Ltd., and English chemical consultant; Sir Robert Robinson,

a.c.f.

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TECHNIQUE MEANS**

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**TANK CARS
PROCESSING
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STORAGE TANKS**



The service life you can expect from tank cars, processing equipment, and bulk storage tanks is in direct proportion to the lasting qualities of the welding techniques employed in their manufacture.

More than 30 years experience lies behind A.C.F. advanced welding methods—resulting in the development of precision machines and facilities today recognized as foremost in the industry.

A.C.F. "Unionmelt" submerged arc welding, for instance, is automatically controlled to produce smooth, consistent welds. Similarly, inner and outer welds are effectively joined and overlapped to provide greater strength and durability.

Stringent inspection in accordance with I.C.C., and A.S.M.E. U-68 and U-69 specifications assure the superiority of A.C.F. construction that results in greater safety, longer service life.

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This up-to-the-minute newspaper magazine shows how wide-awake management in many lines of business is utilizing palletized unit loads and fork trucks . . . to end the burden of costly manual methods and speed production.

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Waynflete Professor of Chemistry, Oxford University, and a world leader in organic chemistry; Maximilian Toch, president and chief chemist, Toch Brothers, Inc., chairman of the board, Standard Varnish Works, and a world authority in the field of paints and surface finishes; and Willis R. Whitney, formerly vice president and director of research, General Electric Co.

SIGMA XI HONORS RESEARCH CLUB OF CORNING GLASS

A GROWING trend on the part of academic and industrial scientists to work together more closely in the furtherance of research was noted last month at Corning, N. Y., where the Research Club of Corning Glass Works was installed as a member of the Society of The Sigma Xi, national honor society. Dr. J. C. Baker of the Harvard Observatory delivered the charge to the new affiliates and Prof. Carleton C. Murdock, representing the executive committee of the society, presented the charter of membership to Dr. Gail Smith, president of the Research Club.

NEW OVERSEAS TECHNICAL DIGEST MAKES ITS BOW

FIRST edition of a monthly industrial magazine, *The McGraw-Hill Digest*, published by McGraw-Hill Publishing Co., and directed toward the foreign field, came off the press on May 16. It has an initial circulation of 20,000 copies covering all countries except the United States and Canada. *The Digest* is an outgrowth of the *Overseas Digest* which was published during the war and distributed free of charge to the Armed Forces who sought current technical knowledge. By V-J Day it had reached a circulation of 197,000 copies.

CHARLES S. MUNSON HEADS MANUFACTURING CHEMISTS

AT ITS annual meeting held at Skytop, Pa., June 5-6, the Manufacturing Chemists Association elected Charles S. Munson president for the ensuing year. Mr. Munson who is chairman of the executive committee of U. S. Industrial Chemicals, Inc., and president of Air Reduction Co., succeeds Harry L. Derby, president, American Cyanamid & Chemical Corp.

Other officers elected are Leonard T. Beale, president, Pennsylvania Salt Mfg. Co., and Harold O. C. Ingraham, president, General Chemical Co., vice presidents; J. W. McLaughlin, vice president, Carbide & Carbon Chemicals Co., treasurer; Warren N. Watson, Washington, secretary. George W. Merck, president, Merck & Co., was elected chairman of the executive committee.

CORRECTION

IN THE introduction to the article "Bleaching Tallow with Sodium Chlorite" (*Chem. & Met.*, May 1946) the statement is made that "dry chlorine is generated outside the bleaching kettle, then bubbled through the hot tallow." Actually, it is dry chlorine dioxide that is generated outside the kettle.

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**THE NEW MODEL 21-102
CONSOLIDATED MASS SPECTROMETER
with NEW ionization chamber**

IMPROVEMENTS

1. New type ionization chamber.
2. New filament supply and control.
3. New temperature control of the ionization chamber.
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which provides the highest efficiency and accuracy for quantitative and qualitative analysis, research and control work. Write Dept. 6M for descriptive literature on this proven analytical tool.

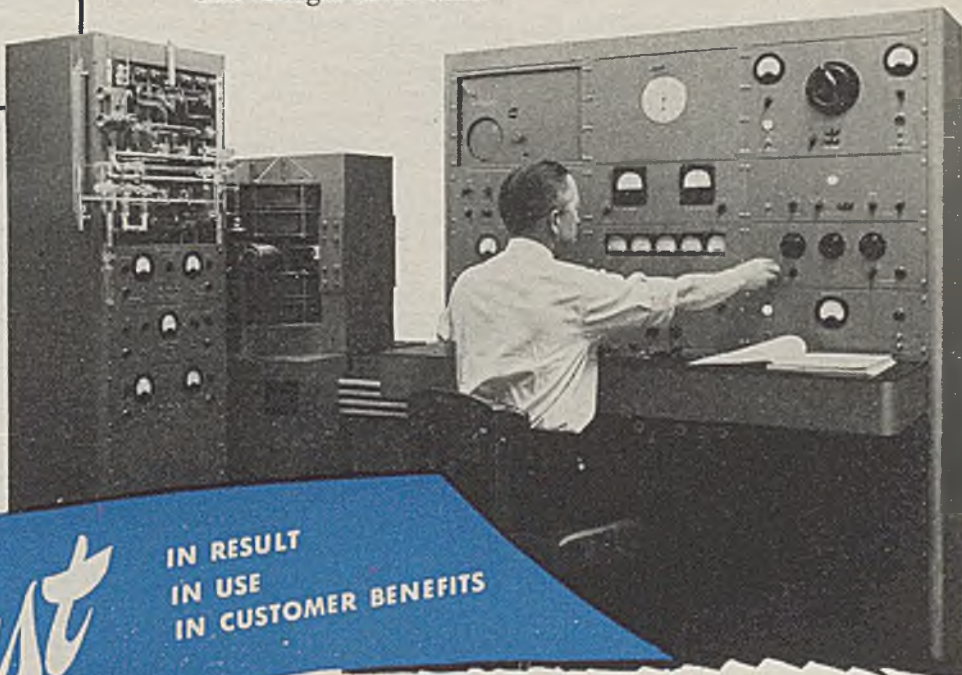
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Fewer man hours per analysis

- 25% to 35% savings in operating time by continuous automatic monitoring of ionizing current.
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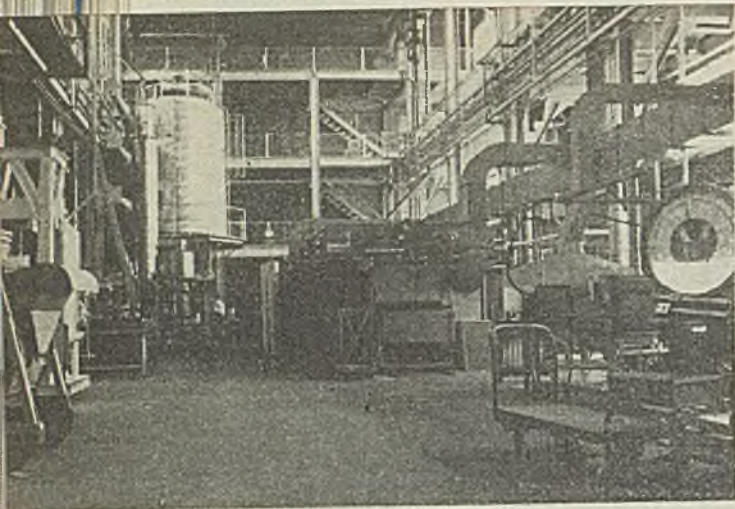
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Manufacturers of Mass Spectrometers, Vibration and Strain Analysis and Recording Equipment



Pilot plant room in the Western Regional Research Laboratory of the U. S. Department of Agriculture at Albany, Calif., where studies on the industrial utilization of farm products are conducted on a pilot-plant or semi-commercial scale. For a news item on antibiotics research at the laboratory, see p. 178

WEST'S FLUORINE INDUSTRY AT LOW EBB

BEFORE THE WAR, the West had no fluorine-producing industry. With the wartime building of five hydrofluoric acid alkylation units in petroleum refineries, a heavy demand for anhydrous acid arose in the region. General Chemical Co. then began production of AHF, together with intermittent manufacture of sodium fluoride and bifluoride and of ammonium bifluoride, at its El Segundo, Calif., plant. This firm is the only producer of fluorine chemicals west of the Rockies. However, with the closing down of three of the hydrofluoric acid alkylation units, the largest outlet for hydrofluoric acid has been severely restricted. Only the alkylation units of Standard Oil of California at Richmond and of General Petroleum Corp. at Torrance show promising prospects for continuing operations. With a combined alkylate capacity of some 4,700 bbl. daily and a probable consumption not greater than 1.0 lb. of AHF per bbl. of alkylate, these units could hardly consume more than 75 tons of AHF monthly. There are no other AHF-consuming industries in the West, since there is no production of freons, uranium fluoride, aluminum fluoride, or metal fluoride catalysts in the region.

In early 1945, there were 14 fluor spar mills equipped to produce acid-grade spar in the West, all located in Colorado, New Mexico and Utah. However, practically all of this raw material was shipped to the East. Western consumption of aqueous hydrofluoric acid and of most fluorine chemicals is relatively small, primarily because of the lack of consuming industries. However, with establishment of a large aluminum industry in the Northwest, consumption of anhydrous AlF_3 and of synthetic cryolite should now become stabilized for that region. Considerable cryolite is already used by western agriculture, and this insecticide shows promise of increasing usage. Freon refriger-

PACIFIC PROCESS INDUSTRIES

TRENDS • EVENTS • DEVELOPMENTS

JOHN R. CALLAHAM, Pacific Coast Editor, San Francisco, Calif.

GENERAL PETROLEUM EXPANDS TORRANCE REFINERY

IN ORDER to obtain more gasoline stock from the heavy, tarry crude residues left over from current refining methods, General Petroleum Corp. of California is now installing a delayed recycle coking unit at its Torrance, Calif., refinery. Cost of the unit, with supplemental facilities, is expected to be close to \$5,000,000. In addition, an Edeleanu sulphur dioxide treating unit expected to cost \$1,800,000 will be erected at the refinery later in the year. These expansions follow the wartime addition of four FCC units at Torrance.

The coking plant, being built by M. W. Kellogg Co., is expected to be completed during June. The installation includes two furnaces, four coking drums and conventional fractionating facilities. The two furnaces are identical, each serving alternately either of two of the four coke drums. Vapors from all drums will go to the common fractionating system. Under the planned operations of 17,000 bbl. of charging stock per stream day, the unit is expected to yield about 350 tons of coke daily. Some 65-70 percent of the charge will come off in the form of gas oil, 18-20 percent as gasoline stock, with the balance as gas. When finished, the Torrance installation will be one of the largest of its kind in the country.

Decoking of the drums will be by a hydraulic process rather than by the old manual or chain systems. The head of the drum is opened and a device similar to rotary well drilling equipment bores a hole through the bed of coke. A series of water nozzles revolving inside the hole breaks up the coke under a nozzle pressure of 1,200 lb. per sq. in. The coke is flushed from the bottom of the drum by the circulating water.

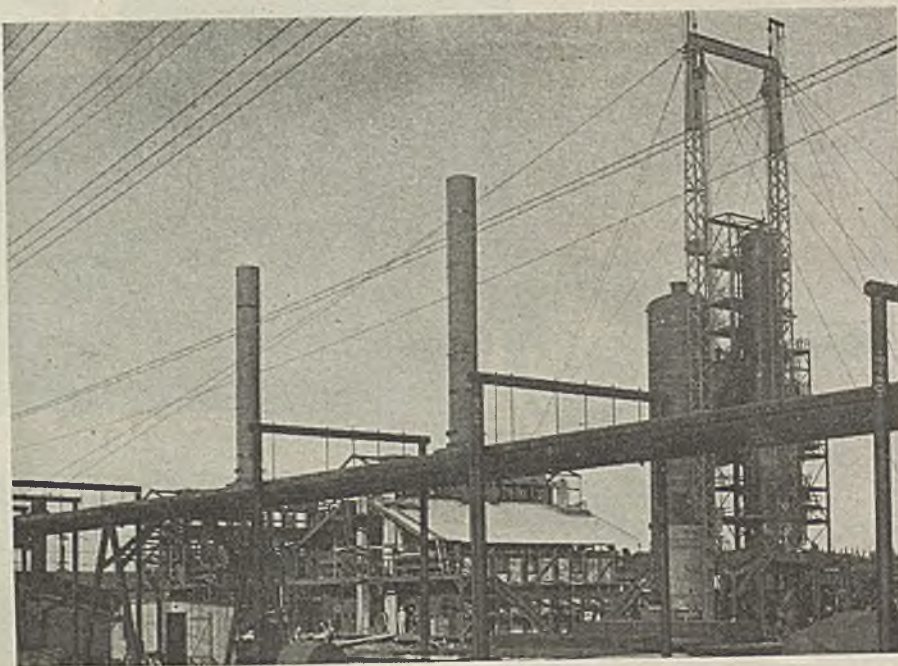
Engineering work for the Edeleanu unit has been completed and contract for construction awarded to E. B. Badger & Sons Co. This work is expected to be completed late this year or in early 1947. The unit is scheduled to be used in the manufacture of higher grades of diesel fuel, kerosene and solvents.

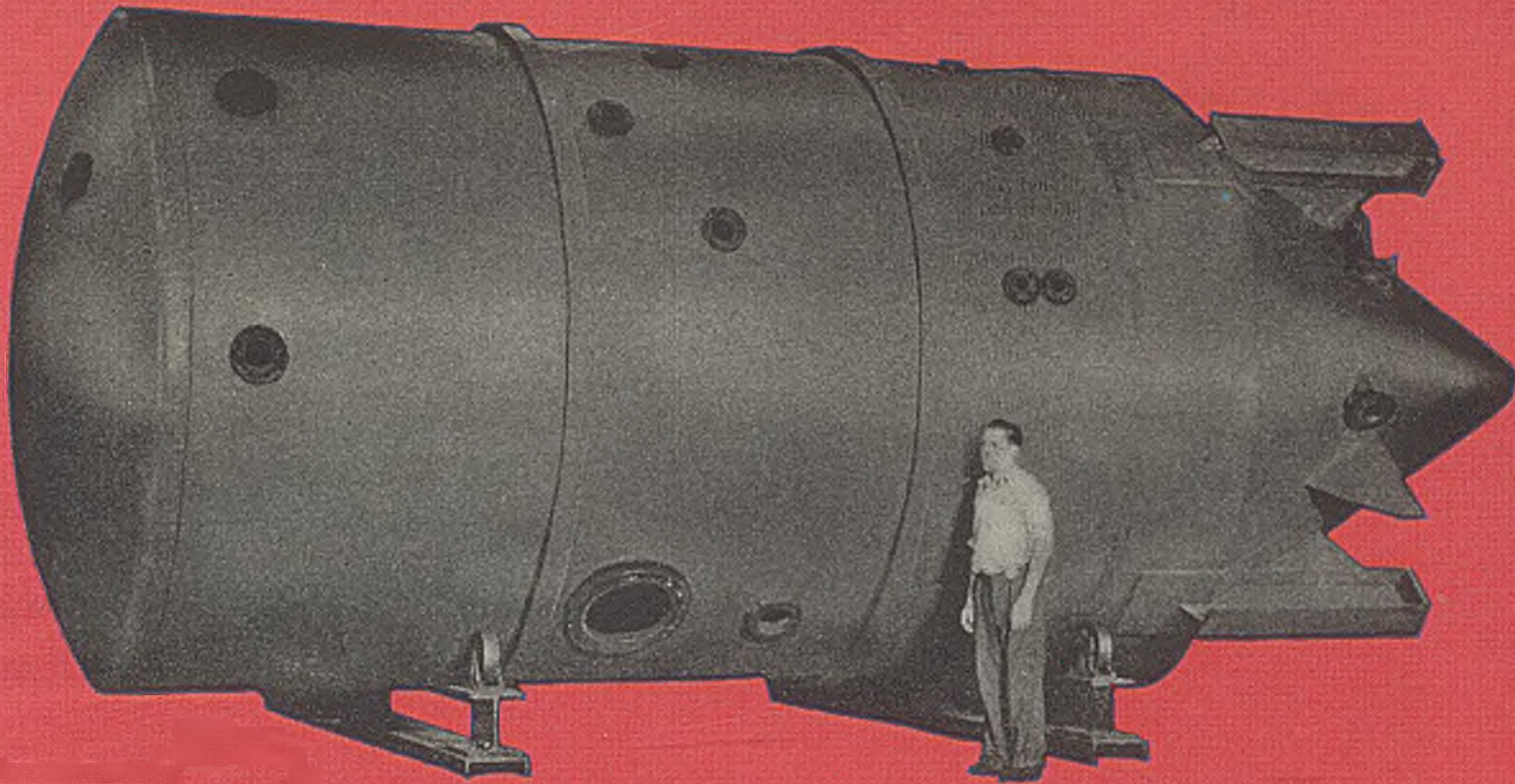
GUAYULE TO BE HARVESTED BY PRIVATE FIRM

PRIVATE INTERESTS headed by Hugh Anderson, Pasadena, Calif., have acquired the Phillips 1,100-acre ranch in San Geronio Pass between Beaumont and Banning with intentions to harvest and process guayule rubber, according to a report. The guayule on the ranch was planted as part of the federal government's \$40,000,000 wartime guayule rubber program, recently scrapped completely (*Chem. & Met.*, March 1946, p. 182). The stand on the Phillips ranch is said to be the largest remaining on sites formerly leased by the government.

The guayule crops on the Phillips ranch are believed to be worth, according to reports, some \$100,000 after processing in a new mill to be built by the present owners. Harvesting is expected to start soon.

Construction work is now progressing on the new \$5,000,000 delayed recycle coking unit being built at the Torrance refinery of General Petroleum Corp. of California

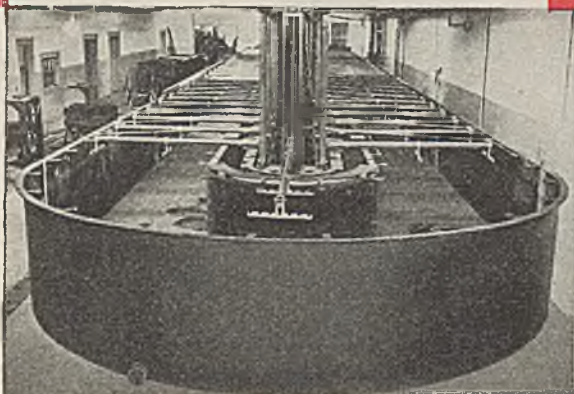




GIANT RUBBER-LINED EVAPORATOR

Evaporator or Crystallizer for use in large Rayon Plant to recover valuable crystallized chemicals from processing solution, 10'6" dia. 28' long. Lined with Manhattan Acid-Resisting Rubber. Weight approximately 30,000 lbs. Used under 29" vacuum.

You Get a "Plus" of Quality in
MANHATTAN Rubber Linings



THE WORLD'S LARGEST RUBBER-LINED NICKEL PLATING TANK, lined by Manhattan. Required 7 railroad flat cars to ship. Now in full operation with a large automatic elevator-type nickel plating conveyor.
 (Photo courtesy Hanson-Van Winkle-Munning Company)



RUBBER-LINED EQUIPMENT FOR METAL PICKLING PLANT—Spent liquor sewers, fume exhaust ducts and stacks, drain piping and fittings all lined with Manhattan Acid-Proof Rubber Lining. For use in continuous strip pickling process in large steel mill. This part-shipment weighed 15 tons.

Companies engaged in the chemical processing and storing, metal finishing, plating and related industries have contributed in making Manhattan the foremost Rubber Lining manufacturer. Manhattan Rubber Linings are widely used on tanks, filters, impellers, mixers, agitators and troughs, blowers, exhaust fans and ducts, dipping cages, vacuum crystallizers, pipe and fittings, and on other equipment in endless variety of shapes.

Your 40-Year "Plus" at Manhattan

- 1-** Experienced engineers and technique backed by 40 years of applying rubber to process handling equipment (53 years manufacturing other rubber products).
- 2-** Development of a special rubber-to-metal bond that defies mechanical separation.
- 3-** Compounding that will not crack or oxidize regardless of temperature changes and expansion or contraction of the metal.
- 4-** Utmost resistance to blows and abrasion.
- 5-** Enduring, dependable protection against corrosion and contamination.
- 6-** Elimination of stray currents.
- 7-** Extra long service and safety with resulting economies in handling most active acids, acid fumes, alkalis, salts, dye solutions and other caustic chemicals.

*Protect Your Equipment—Lower Your Operating Costs
 Consult Manhattan on corrosion and contamination jobs.*

RAYBESTOS-MANHATTAN, INC.

MANHATTAN RUBBER DIVISION

EXECUTIVE OFFICES AND FACTORIES

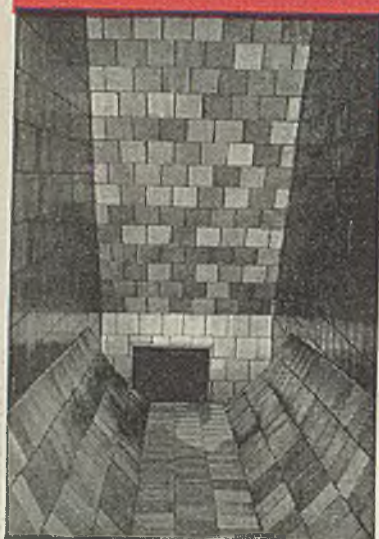
PASSAIC, NEW JERSEY



For Resistance to Both
ALKALIES AND ACIDS

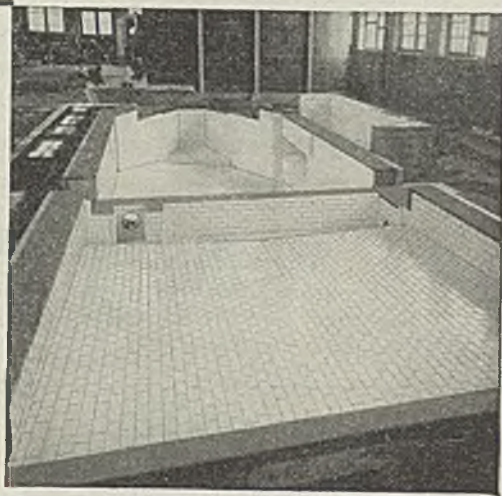
use

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Durisite Alkali-and-Acid-Resisting Cement will handle both strong and weak alkalis, strong and weak acids, as well as all solvents.* It will handle acids and alkalis alternately. And it will handle such solutions at temperatures up to 350° F.-375° F.

**Except for highly oxidizing solutions.*



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- 1** Durisite is non-toxic ... Has no dangerous effect on the skin.
- 2** Durisite can be stored indefinitely ... No deterioration, no spoilage loss.
- 3** Durisite is dense, non-porous ... Absorption less than 1/2 of 1%.
- 4** Durisite sets quickly by chemical action ... Takes an initial set in 20-30 minutes.

ants may grow in use as a result of the increase in quick-freeze units for processing western agricultural products. Growth in facilities for casting aluminum and magnesium will probably result in some increased demand for ammonium bifluoride, fluosilicate and fluoborate as sand agents. Demand for metal fluoborates will largely be dependent upon growth of the electroplating industry on the Pacific-Coast. There is little or no demand for the metal fluoride catalysts largely used in synthesis of organic chemicals.

NEW WHEAT GLUCOSE PLANT FINANCING ARRANGED

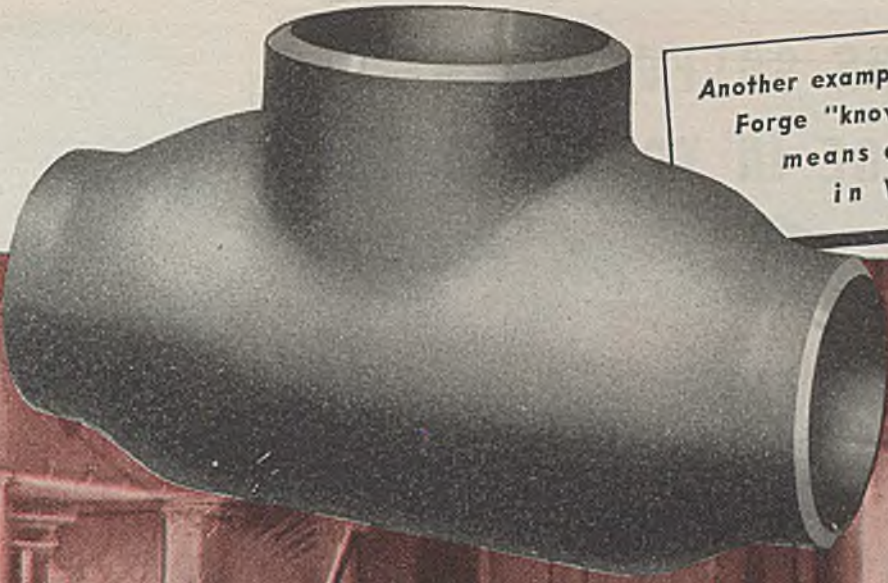
FINANCING has now been provided for the new \$900,000 wheat starch and glucose plant to be built at The Dalles, Ore., by the Northwest Chemurgy Cooperative, Wenatchee, Wash., according to Henry P. Carstensen, president. Some of the \$300,000 worth of equipment needed for the plant has already been ordered. The new unit will consist of a six-story building for producing wheat starch and two three-story wings for producing dextrose and glucose, together with storage space for at least 10,000 bu. of grain. Process to be used, the same as that used since 1943 at the Co-op's plant at Wenatchee, was introduced in this country by J. Lifszyc, Polish chemist now employed by Northwest Chemurgy. Essentially, the process consists of converting starch separated from cull wheat into glucose or dextrose by mineral acid hydrolysis. Animal feed will be a byproduct.

Northwest Chemurgy Cooperative already has three plants in operation in Washington. The Wenatchee unit is reported to convert 60 tons of cull wheat daily into starch and glucose, while the plant at Lynden produces the same products from cull potatoes. Another unit at Ellensburg produces potato starch. The two potato plants are said to be processing all the cull potatoes available in the surrounding territories. Experimental work is proceeding on developing other marketable products from potatoes.

Original purpose of the Northwest Chemurgy Cooperative was to develop new uses for wheat, production of which in the states of Washington, Oregon and Idaho has increased from 64 million bushels in 1909 to over 122 million bushels in 1945. The Cooperative purchases cull wheat from over 1,500 farmers who own the common stock. The Wenatchee plant, said to be the only one of its kind in the United States, produces starch, glucose, household sirup and a dairy feed byproduct; other chemurgic products from wheat such as gluten and wheat germ are reported to be under investigation. The new unit at The Dalles will be similar in design and operation.

NEW TYPE ATOM-SMASHER BEING BUILT

A POWERFUL new type atom-smasher known as the synchrotron, designed for the acceleration of electrons as projectiles, is now under construction at the University of California, Berkeley. Scheduled for completion early next year, the machine will accelerate electrons to energies of 300 million electron volts, three times that of existing models of the betatron. Theoretically, it may be possible in the future to accelerate



Another example of Taylor Forge "know-how" that means extra value in WeldELLS



Rare specimen in Welding Tees—

● When you think of a reducing tee you always picture it as reducing in the branch. But this one, for the peculiar purpose it serves, had to be made the other way around. It's a seamless, carbon-moly forging, five inches in the run with a seven-inch branch—an "increasing" tee, so to speak; one more example of those kinks that are found so abundantly in the Taylor Forge bag of tricks.

The "know-how" acquired during many years of performing these special—often extremely difficult—manufacturing operations, has a mighty important bearing on our standard line of WeldELLS, Welding Tees and other Taylor Forge Welding Fittings.

It means that in developing WeldELLS we did not have to ask what kind of fitting is easiest to manufacture. Instead we asked what comprises the ideal fitting, and then, with every special facility and process at our command, made that conception a reality.

That is why WeldELLS have tangents . . . why they have extra reinforcement where service stresses are greatest . . . why they have such extremely accurate dimensions . . . why they have the features listed opposite . . . why, in short,

WeldELLS have everything

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WeldELLS alone combine these features:

- **Seamless**—greater strength and uniformity.
- **Tangents**—keep weld away from zone of highest stress—simplify lining up.
- **Precision quarter-marked ends**—simplify layout and help insure accuracy.
- **Selective reinforcement**—provides uniform strength.
- **Permanent and complete identification marking**—saves time and eliminates errors in shop and field.
- **Wall thickness never less than specification minimum**—assures full strength and long life.
- **Machine tool beveled ends**—provides best welding surface and accurate bevel and land.
- **The most complete line of Welding Fittings and Forged Steel Flanges in the World**—insures complete service and undivided responsibility.

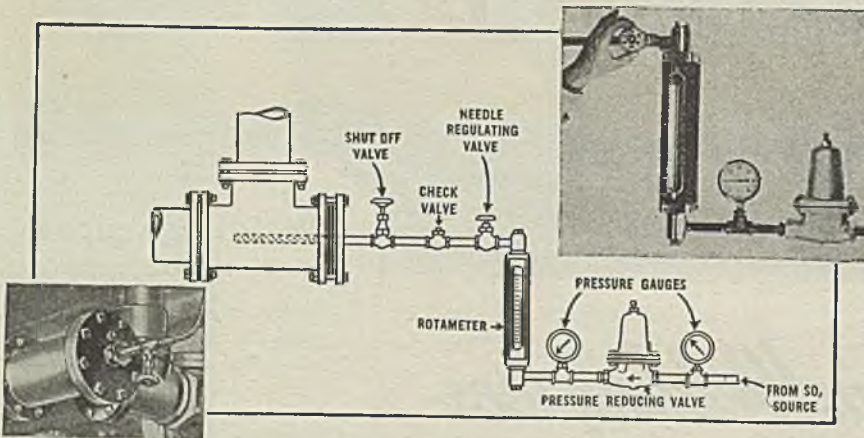


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- GREATER ECONOMY**—Small investment in equipment, materially reduced operating and maintenance costs, and freeing of valuable floor space.
- FINGER-TIP CONTROL**—Easy, positive, finger-tip control providing extreme accuracy for reaction or adjustment of pH.
- HIGHER PURITY**—Elimination of impurities inherent in burner gases (Ansul Liquid SO₂ is 99.9+ % [by weight] PURE).
- GREATER SOLUBILITY**—Solubility in water is 4 to 5 times greater than SO₂ from burner gas.

WRITE THE ANSUL TECHNICAL STAFF FOR FURTHER INFORMATION

PHYSICAL PROPERTIES

Chemical formula.....	SO ₂
Molecular weight.....	64.06
Color (gas and liquid).....	Colorless
Odor.....	Characteristic, pungent
Melting point.....	-103.9° F. (-75.5° C.)
Boiling point.....	14.0° F. (-10.0° C.)
Density of liquid at 80° F.....	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F.....	1.363
Density of gas at 0° C. and 760 mm.....	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature.....	314.82° F. (157.12° C.)
Critical pressure.....	1141.5 lbs. per sq. in. abs.
Solubility.....	Soluble in water
Purity.....	99.9+ % (by wt.) SO ₂ (H ₂ O less than 0.01 %)

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Send for Bulletin 020.1, "A Comparison of Ansul SO₂ and Sulfur Burner Gas," and also for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff.

WRITE: Dept. A.

ANSUL CHEMICAL COMPANY

INDUSTRIAL CHEMICALS DIVISION, MARINETTE, WIS.
Eastern Office: 60 E. 42nd St., New York City

electrons to energies of one billion electron volts with larger synchrotrons. Principle of the new machine is said to be as important a development in atom smashing as was the cyclotron.

Fundamental principle of the synchrotron is based on the "theory of phase stability" which makes it possible to shoot projectiles around a circular orbit an indefinite number of times by having them always arrive at a given point in time to receive an electrical acceleration. Thus the tendency of cyclotron projectiles to lag and thus fail to be accelerated will be overcome. Dr. E. M. McMillan, co-discoverer of neptunium and a leading nuclear physicist, devised the principle of the synchrotron and is supervising the construction. The Manhattan District is assisting the project, according to Dr. E. O. Lawrence, director of the University's Radiation Laboratory.

PAINT FIRM ENLARGING PLANT FACILITIES

NEW FACILITIES for the manufacture of paints and varnishes are under construction by W. P. Fuller & Co., oldest and largest manufacturer of paint products in the West, at the firm's S. San Francisco plant. Estimated to cost in the neighborhood of \$150,000 with equipment, the expansion consists of two new buildings adjoining present facilities. Construction work, begun last fall, is again proceeding after many interruptions. George Gibson is in charge of the firm's engineering and construction division.

In addition to paint, varnish and lacquer products, the S. San Francisco plant is a large producer of white lead and lead oxides. The firm, established in 1849 and with other factories at Los Angeles and Portland, produces a complete line of architectural and industrial finishes including waterproof and corrosion-resistant coatings used by the chemical process industries.

PROCESSED WASTE BARK COMMERCIALIZED

AFTER several years of research, processes have now been developed by Weyerhaeuser Timber Co., Longview, Wash., to convert log bark, one of the biggest waste products in lumbering, into commercial products, according to a recent announcement by Clark C. Heritage, technical director of the firm. This is considered to be the very first time that bark of timber trees has been put to profitable use in the Northwest and one of the first times in the history of the nation's lumbering industry. Construction work is now under way for the new bark-process plant near the firm's projected Longview plywood unit, which will be the present source of bark supply; it is expected that the plant will be in operation by September. Until the bark processing plant reaches satisfactory operations, it will be under the supervision of R. D. Pauley, manager of the development department, instituted in 1942, who also has charge of the pilot plant now producing for the market. At full production operations, the commercial plant is expected to employ about 30 workers and turn out a carload of finished product daily.

In the Weyerhaeuser processes, on which patents are pending, bark is broken down into three basic components—small flakes of a cork-like material, a fine powder of brown

$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_2 = \text{C} - \text{CH}_2\text{Cl} \end{array}$$

NEW

ALLYLS

$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_2 = \text{C} - \text{CH}_2\text{OH} \end{array}$$

Methallyl chloride and methallyl alcohol are new allyls now available in trial-lot quantities from Shell Chemical Corporation. Chemical properties are similar to allyl chloride and allyl alcohol — made available in commercial quantities last year.

METHALLYL CHLORIDE undergoes the usual replacement reactions of the chlorine atom, and reactions involving the double bond. Ammonolysis produces primary, secondary and tertiary amines; chlorohydration produces dichloro-tertiary-butyl alcohol. Methallyl chloride hydrates easily in the presence of aqueous solutions of mineral acids to produce chloro-tertiary-butyl alcohol.

In addition, methallyl chloride is an effective fumigant for grains, tobacco and dried fruits.

METHALLYL ALCOHOL readily forms esters. Those of lower organic acids are formed by distillation of the alcohol with the desired acid. Dibasic esters can be conveniently prepared by reacting acid anhydrides with methallyl alcohol in the presence of p-toluene sulfonic acid.

These esters undergo polymerization in the presence of peroxide catalysts . . . the dibasic esters yielding hard, chemically resistant, thermosetting resins. Methallyl alcohol thus offers new possibilities in the growing field of allyl resins.

	METHALLYL	
	CHLORIDE	ALCOHOL
Bolling Point °C. @ 760 mm.	72.2	114.5
Specific Gravity 20/4°C.	0.9257	0.8515
Refractive Index 20/D	1.4276	1.4255
Solubility in Water @ 20°C.	Less than 0.1 grams per 100 grams	Approx. 17 grams per 100 grams
Flash Point °F. (Tag Open Cup)	14	94

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soft tissue, and a hard tissue consisting of small, sticky fibers. From these, the plant separation process can yield five products. One is primarily cork, while the others are derived equally from each of the two other basic fractions. However, only three of the products to be commercialized have been announced. One is used in compounding resin glues for exterior-type plywood manufacture; this product will be used in the new Weyerhaeuser plywood plant at Longview. Demand for the glue extenders, also said to reduce the cost of glue formulation, has been in excess of the production capacity of the present pilot plant. Another of the products is a thermosetting molding compound, while the third will be used as an ingredient in the compounding of certain insecticides. Although other uses for the components of bark are under development by Weyerhaeuser, the company does not intend to produce any of the finished products for the time being but plans instead to sell the raw materials to other manufacturing and formulating firms.

Source of bark for the immediate future will largely be sawing operations of the new plywood mill. However, most important aspect of the entire series of developments is that bark, at present useful largely as a cheap fuel, now becomes a profitable by-product that will probably develop markets of a magnitude to justify barking the logs prior to sawmill operations. Company engineers are evidently anticipating such a development, for engineering work is now under way toward evolving the most suitable type of barker that could be used on logs before actual sawing in the mills. This, meaning that every bit of a log could be utilized either for lumber, pulp or bark products, would be a major step forward in more efficient conservation and utilization of the nation's wood resources.

PINE-ROOT AVIATION GAS USED BY JAPANESE

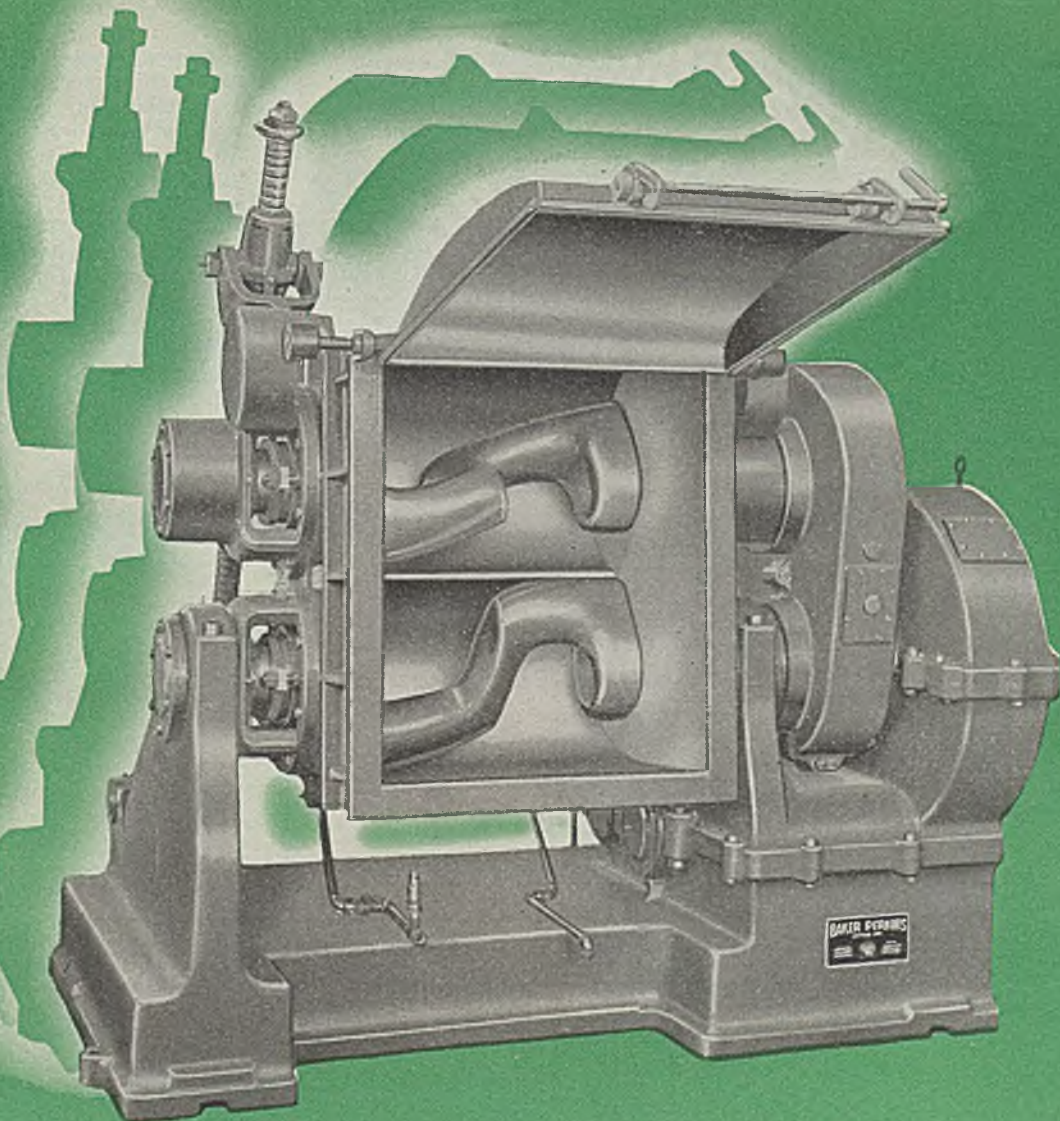
AT THE END of the war, Japan was producing 400,000 bbl. of 94-octane aviation gasoline annually from pine roots, reports George L. Neely of Standard Oil of California, San Francisco, who headed the petroleum division of the U. S. Naval Technical Mission in Japan. In fact, Neely predicts, the native intelligence and marked creative ability and ingenuity of the Japanese in scientific work, coupled with a high appreciation of the value of research, may well make Japan the scientific equal of prewar Germany within a few decades, although the country is not yet "of age" technically.

As an example of Japanese strides in petroleum research, Neely cited that the world's largest petroleum research plant was operated by the Japanese Navy near Tokyo. The project cost \$35,000,000 and included 78 laboratory buildings; 3,200 workers were employed. By the end of the war, the Japanese had developed processes for producing petroleum substitutes from pine tree roots and needles, rubber, barks of certain trees, orange peelings, sweet potatoes and soy beans.

Astounding as it may seem, the extraction of oil from pine roots, although highly expensive, became Japan's principal substitute source of aviation gasoline. Pine roots were split into kindling size by Japanese farmers and placed in simple, closed

Heavy Plastics Easily Compounded and Mixed in This Efficient Baker Perkins Mixer

Regardless of the viscosity of the plastic mass, there is a Baker Perkins Mixer that will mix all elements with the thoroughness necessary to uniform quality. The Size 15-GSE "Universal" type illustrated typifies the scientific design, expert engineering, and sound construction that have made Baker Perkins Mixers among the foremost in the plastics field. A 100-gallon working capacity model, it is designed with a fabricated steel plate trough shell with steel outer jacket casing which will withstand 80 lbs. steam pressure. Sigma-type blades assure swift, thorough kneading; powerful drive through self-contained speed reducer will mix even heavy asphalt tile masses to desired consistency. Our engineers will be glad to study your mixing requirements and determine which type Baker Perkins Mixer will speed your processing with greatest efficiency and lowest operating and maintenance costs. For complete particulars write BAKER PERKINS INC., CHEMICAL MACHINERY DIVISION, SAGINAW, MICHIGAN.



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TITEFLEX Flexible Tubing provides far longer service in the conveyance of chemical compounds or acids. Fabricated of brass, stainless steel, or monel metal to resist corrosion, Titeflex will withstand continued vibration. It remains leak-proof and pressure-tight for long years of service despite constant flexing and mechanical abuse. High corrosion resistance combined with maximum durability makes Titeflex by far the most dependable flexible connector.

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kettles, of which there were thousands scattered throughout the countryside. A fire was lit under the kettle and the oils vaporized from the roots by dry distillation and condensed in water-cooled pipes. The small container of crude pine roots was then taken by the farmer to the nearest village, where it was stored and eventually shipped to the refinery. The char left in the kettle was used as fuel for the next distillation. At the refinery, a catalytic process was used to convert the unsaturated compounds into aromatics which, after addition of 4 cc. of TEL, gave an aviation fuel of 94-octane rating. Some 2,500,000 bbl. of pine root oil was needed to give an annual output of 400,000 bbl. of 94-octane fuel. At this rate of production, the pine trees of Japan would have been exhausted by the end of 1946.

LONGVIEW MILL ADDITIONS PLANNED BY WEYERHAEUSER

New construction now planned by Weyerhaeuser Timber Co. at its Longview, Wash., plant, will cost some \$1,295,000 according to a recent report. Civilian Production Administration has approved construction of a plywood plant costing \$995,000 and miscellaneous work on the mill, docks and machine shop to cost some \$300,000. For developments on the new bark processing plant under construction, see *Chem. & Met.*, p. 172. This new construction is in addition to the \$5,000,000 pulp mill previously announced (*Chem. & Met.*, Oct. 1945, p. 178). The new sulphate mill planned for Longview will turn out 70,000 tons of pulp annually. In addition, work is reported now under way on the conversion of the 90,000-ton bleached sulphite plant to a new magnesia process that is said to require 15 percent less wood than the present sulphite method of pulping. The magnesia process will allow economic recovery of a substantial portion of the MgO and sulphur values of the treating chemicals.

LOS ANGELES PLASTICS FIELD NEEDS RAW MATERIALS

ALTHOUGH Los Angeles is one of the leading plastics molding, forming and machining areas of the country, practically all the raw materials used there must be shipped from plants located east of the Mississippi River. Even very little plastic powders, sheets, rods and tubes, or fibers are made in Los Angeles, according to a survey just completed by the industrial department of the Los Angeles Chamber of Commerce. Of the 369 plastics fabricating and molding plants in the 11 western states, 299 are located in this county, according to the survey. This represents a rapid growth over 1925 when there were about ten plastics firms in the area, as well as over 1942 when only about 50 plants were in existence. Los Angeles County ranks among the nation's highest producing centers in output of airplanes, assembly of automobiles, manufacture of furniture and house furnishings and in production of sportswear, all of which are increasing consumption of plastics and resins.

Of the plastics and resins raw materials, casein is produced in the Los Angeles area by two firms, styrene by one, glycerin by three, natural phenol by one, acetone by

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| <input type="checkbox"/> Alkali | <input type="checkbox"/> Extracts | <input type="checkbox"/> Pyroxylin |
| <input type="checkbox"/> Ammonia | <input type="checkbox"/> Flavors | <input type="checkbox"/> Resins |
| <input type="checkbox"/> Animal Oils | <input type="checkbox"/> Fuel Oil | <input type="checkbox"/> Rubber Cements |
| <input type="checkbox"/> Asphalt | <input type="checkbox"/> Gases | <input type="checkbox"/> Sizing |
| <input type="checkbox"/> Banana Pulp | <input type="checkbox"/> Gasoline | <input type="checkbox"/> Soap |
| <input type="checkbox"/> Beer | <input type="checkbox"/> Glue | <input type="checkbox"/> Solvents |
| <input type="checkbox"/> Beverages | <input type="checkbox"/> Grease | <input type="checkbox"/> Syrups |
| <input type="checkbox"/> Casein | <input type="checkbox"/> Gum | <input type="checkbox"/> Tar |
| <input type="checkbox"/> Castor Oil | <input type="checkbox"/> Hydrogenated Oil | <input type="checkbox"/> Tooth Paste |
| <input type="checkbox"/> Caustic | <input type="checkbox"/> Ink | <input type="checkbox"/> Vegetable Oils |
| <input type="checkbox"/> Cellulose | <input type="checkbox"/> Lacquers | <input type="checkbox"/> Water |
| <input type="checkbox"/> Cement | <input type="checkbox"/> Latex | <input type="checkbox"/> Wax |
| <input type="checkbox"/> Chocolate | <input type="checkbox"/> Molasses | |

Others

Name.....

Company.....

Address.....

Title.....



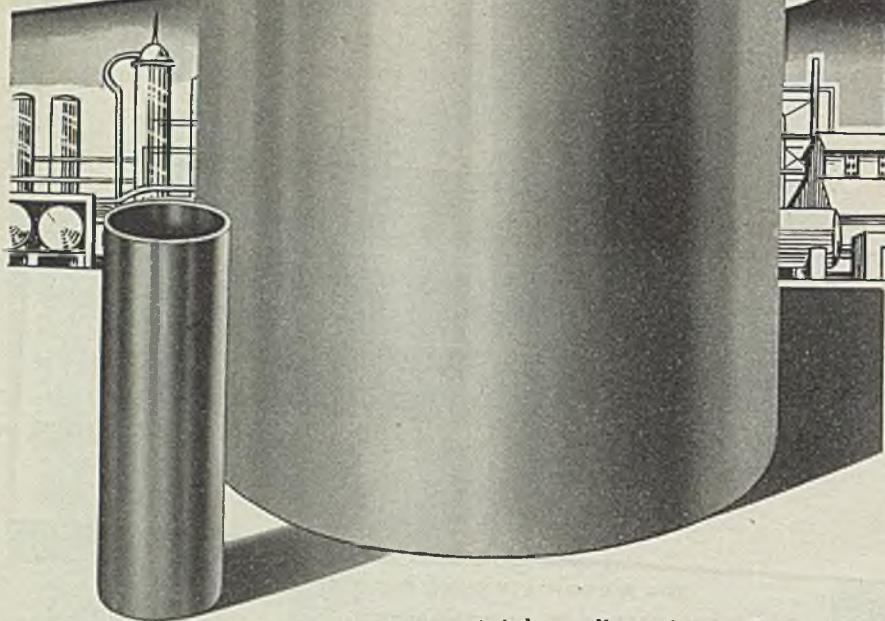
AUTO-KLEAN disc-type. For all fluids except those containing highly abrasive solids. Viscosities from 30 to 50,000 Saybolt seconds. Minimum pressure drop. Continuously cleanable by turning a handle (manually or automatically). Occupies no more space than usual partial-flow type. Sizes from 1 1/4" diam. x 7/8" cartridges to massive motor-driven models. Available with or without sump for built-in or external installations.



FLO-KLEAN wire-wound. For fluids containing highly abrasive solids such as metal chips, abrasive wheel particles, sand, etc. May be designed to remove particles .0025" or larger. Continuously cleaned by backwash system. Low pressure drop — fluid moves in straight line, encountering only momentary restriction. All parts made of metal — constructions to meet varying corrosive and erosive conditions.

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THE reduction of mechanical and processing costs has never been as important as now—in fact, it's the order of the day for every plant in the chemical field.

That's why the long service features built into Trentweld stainless steel tubing is of positive interest to engineers, particularly where there is a high temperature or corrosive pressure application. In this field, Trent experience is as wide as it is deep. Trent engineers are familiar with the many types of

stainless alloys, know the properties and characteristics that recommend each one for a specific application.

Please feel free to get the full story, particularly in terms of your own design requirements. Trent has the specialized machinery and engineering knowledge to handle any tubing problem from 1/8" diameter to 18" diameter. Write for technical data bulletin, or even better, address Dept. 10 for specific information on your particular problems.



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Chicago 11, Ill.

TRENT TUBE MFG. CO.

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East Troy, Wisconsin

one and alcohol by three. Resins are produced in the area by seven firms, according to the survey. Many of these operations are small and will probably remain so until local manufacture of basic plastics materials provides greater outlets.

BURNT LIME YIELDS IN CALIFORNIA INCREASE

COMPLETE 1945 returns from producers, supplied to the statistical section of the California Division of Mines, show an increase in production of burnt lime of 9,578 net tons over the 1944 yield. These figures do not include lime burnt from dolomite and used in the reduction of magnesia from sea water, as dolomite is treated as a separate mineral substance. In 1944 there were 164,494 tons of limestone burnt to yield 82,247 net tons of lime valued at \$883,009 while in 1945 the yield from 183,643 tons of limestone was 91,825 net tons valued at \$997,236. The following table gives the quarry location of producers during 1945.

California Producers of Burnt Lime—1945

Operator	Quarry
Westvaco Chlorine Products Corp.	Newark
Diamond Springs Lime Co.	Diamond Springs
California Portland Cement Co.	Colton
Chubbuck Lime Co.	Chubbuck
Henry Cowell Lime & Cement Co.	Santa Cruz
U. S. Lime Products Corp.	Sonora

IDAHO ALUMINA CLAY FIND ATTRACTS ATTENTION

DISCOVERY of a large deposit of high-grade alumina clay in western Idaho, said to average close to 20 percent Al_2O_3 , is attracting considerable attention in Northwest light age close to 20 percent Al_2O_3 , is attracting by the fact that the deposit is very near the Kaiser alumina reduction plant at Mead, near Spokane, Wash., which is dependent upon a Louisiana plant for its alumina cell feed. In addition, much speculation has recently centered around activities of the Aluminum Co. of America to develop the high-alumina clays of Oregon for its Pacific Northwest reduction plant.

Investigated jointly by the U. S. Geological Survey and the U. S. Bureau of Mines, the new "Excelsior" find is reported to contain an estimated 12,530,000 tons of ore, dry basis, that averages 28.7 percent alumina, 5.6 percent available iron oxide and a high percentage of titanium oxide, raw material for high-quality white paints. At present, there is no production of pigment-grade titanium dioxide in the West.

ANTIBIOTICS WORK PROGRESSES AT REGIONAL LAB

DEVELOPMENTS on several new antibiotics which show promise for use in medicine were recently disclosed at the Western Regional Research Laboratory of the U. S. Department of Agriculture at Albany, Calif. Three of the antibiotics are now in the laboratory-clinical stage of development, one is ready for pilot plant demonstration, while another has reached limited commercial production. The culture medium which seems to offer most promise for use in large-scale production technique is processed asparagus butt juice, a large agricultural waste product in certain western states. Development of this waste as a culture medium was largely

Aunt Bessie had a lot of luck—

"...a pinch of this,

a dash of that"



ALUMINAS FOR CATALYTIC PURPOSES

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These aluminas produced from crystalline aluminum tri-hydrate are catalytically active. Hard granules are available in graded mesh sizes up to one inch. Various grades are distinguished by surface area, porosity and soda contents as low as .1%.

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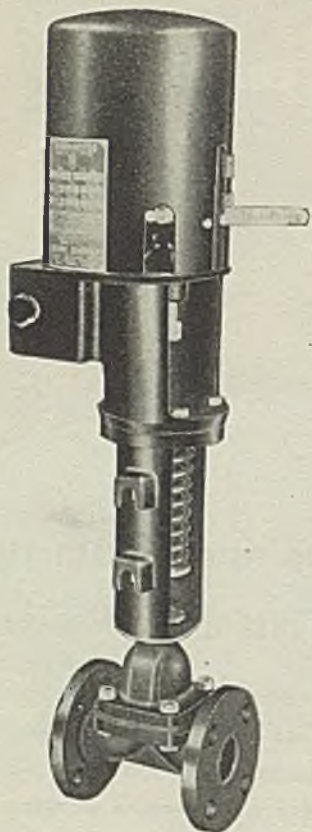


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the result of work conducted at the Albany laboratory (*Chem. & Met.*, March 1946, p. 178). The accompanying table summarizes the status of the new antibiotics on which work has been done at the WARRL. (Photo of laboratory on p. 168.)

A simplified procedure for preparing pure crystalline lysozyme, a bacteria-destroying enzyme, from waste egg whites was developed at the Western Regional Research Laboratory. The process is now ready for pilot plant demonstration and if lysozyme proves to be valuable in therapeutics or as a food preservative, it is believed to be feasible for commercial extraction at large egg freezing and drying plants. However, unless lysozyme can be modified by chemical treatment to destroy its shock-producing ability, use as an antibiotic against pathogenic bacteria must probably be limited to the surface of the body.

Citriin was produced at WRRRL by culturing the mold *Penicillium citrinum* on an asparagus juice concentrate medium. It can be purified by sublimation under reduced pressure or by solvent extraction. This antibiotic is now being evaluated as a potential therapeutic agent. Subtilin, an antibiotic found and produced by Albany scientists in

1943, can now be prepared by a modified process developed at the laboratory that gives a product about three times as active as that obtained by the original method. Pharmacological studies on toxicity of subtilin are now under way. Results of preliminary work, conducted cooperatively by WRRRL and the University of California, indicate that on guinea pigs subtilin shows a marked suppressive effect on tuberculosis infections.

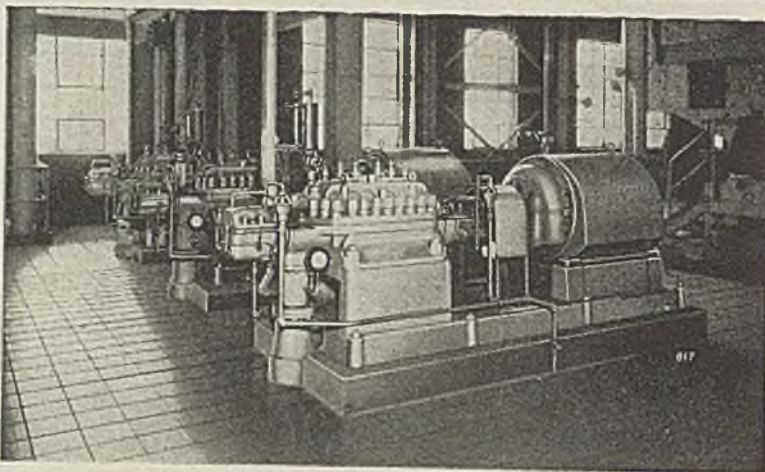
Tyrothricin, now produced on a limited commercial scale for external use against certain microbial infections, can be produced in higher yields when an asparagus butt juice concentrate is used as the culture medium, according to WRRRL research findings. Since tyrothricin destroys red blood corpuscles, its use in therapeutics is limited. However, it can be fractionated into two distinct antibiotics, one of which is gramicidin. This substance is also toxic, but it has been recently discovered at Albany that treatment with formaldehyde greatly reduces the hemolytic effect while largely retaining the antibiotic activity. Further studies of the chemical and biological properties of this promising modified gramicidin are in progress.

Recent Developments in Antibiotic Substances¹

Substance	Source	Preparation ²	Stage of Development
Lysozyme	Waste egg whites	asparagus juice culture	ready for pilot plant
Citriin	<i>Penicillium citrinum</i>	asparagus juice culture	laboratory-clinical
Subtilin (mod.)	<i>Bacillus citrinum</i>	membrane purification ³	laboratory-clinical
Tyrothricin	<i>Bacillus brevis</i>	asparagus juice culture ⁴	limited commercial
Gramicidin (mod.)	<i>Bacillus brevis</i>	tyrothricin fractionation ⁵	laboratory-clinical

¹ As developed at the Western Regional Research Laboratory and Pharmacological Laboratory, (Albany, Calif.) and other units of the U. S. Dept. of Agriculture. ² As indicated at the present stage of development. ³ Of crude subtilin extract from spent culture medium. ⁴ A modified culture medium shown to give increased yields. ⁵ Fractionation of tyrothricin and subsequent treatment of the gramicidin fraction with formaldehyde.

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IMPERIAL CHEMICAL INDUSTRIES HAS LARGE EXPANSION PROGRAM FOR ITS DYESTUFFS DIVISION

Special Correspondence

WHILE THE Wilton site is being prepared for the new £10,000,000 organic chemicals plant of Imperial Chemical Industries Ltd. in northeast Yorkshire, expenditure of similar magnitude is being planned by this leading combine of Britain's chemical industry in its dyestuffs division. The manufacturing facilities at Blackley and Trafford Park, Manchester, at Grangemouth, Stirlingshire, and at Hoddersfield, Yorkshire, will be extended at a total cost of £8,000,000, and another £1,000,000 will be spent on additions to the research and testing station at Blackley.

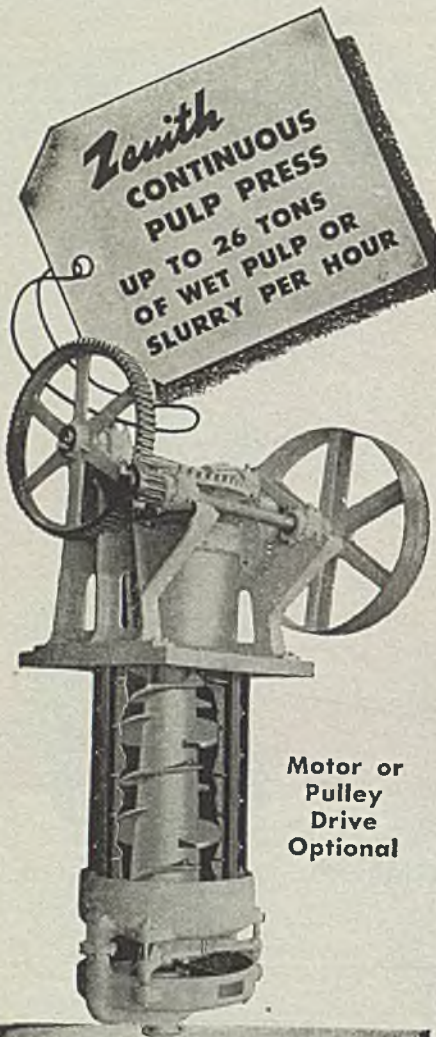
The three factories at Blackley—headquarters of the I.C.I. Dyestuffs Division—Trafford Park and Grangemouth so far concentrated on making dyestuffs; the Huddersfield plant will be concerned largely with intermediates. The research station at Blackley developed several important new drugs and insecticides over the past few years, but its main object will still be to develop better dyes and textile chemicals. Directly or indirectly, almost the whole £9,000,000 will thus be spent in the dyestuffs field.

The need for economy in the use of dyestuffs was brought home to the British public by wartime fashions with their pastel shades and limited range of colors. Now

that the armed forces need less, the export market calls for more dyestuffs, and the home consumer must still wait for the return of brighter and stronger colors. The extensions to be put into effect at I.C.I. dyestuffs factories probably serve in the first place for an expansion of export sales. With the—at least temporary—eclipse of German competition the foreign market for British dyestuffs seems almost unlimited, a fact which should make it easier for I.C.I. to obtain the necessary plant for its extension program.

The Wilton plant and the dyestuffs factories together will absorb less than half the total of over £40,000,000 capital expenditure projected under a provisional long-term program for the next eight years. Though this program, which has only just been announced, has not yet reached the stage of concrete plans, it has been stated that the first instalment will include important extensions of the alkali works and modernization of power plants in addition to the proposed work in the dyestuffs division.

In assessing the significance of this capital expenditure two factors deserve special mention: The acquisition of certain war factories which I.C.I. operated for the government during the war and will now run on



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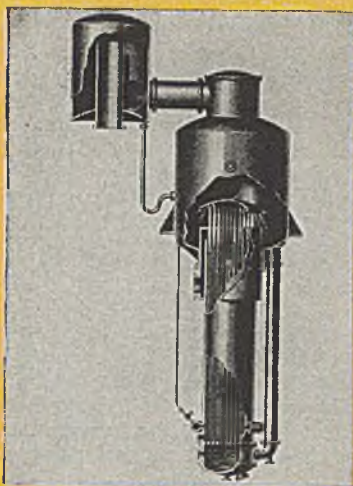
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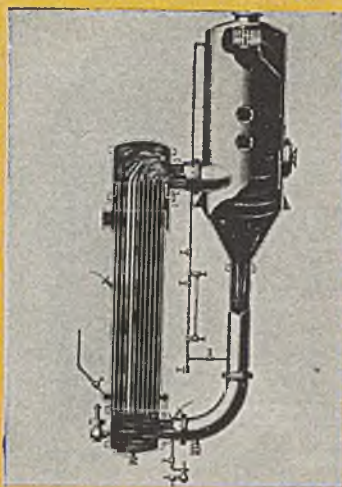


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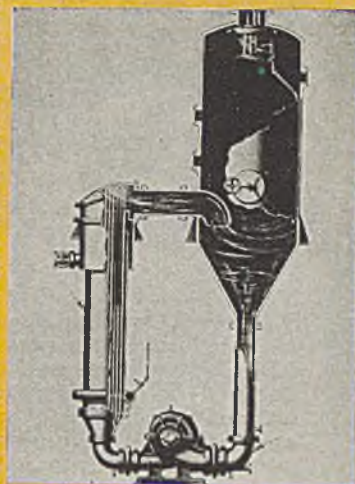
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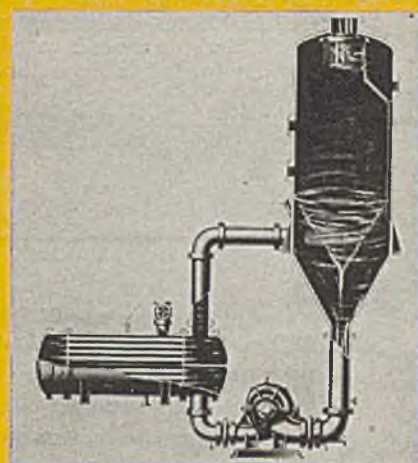


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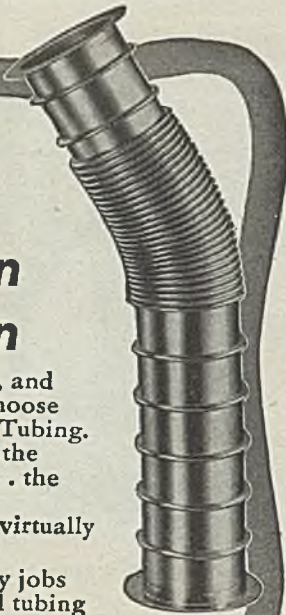
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its own, especially in the light metals field, and the anticipation of a research and development expenditure this year of £3,350,000, a figure equal to about one-fifth of all manufacturing profits. The latter item shows that the expenditure on new plant goes hand in hand with an intensification of technical and chemical research, the former reveals the war-conditioned stimulus to certain fields of the company's activities which for this reason do not feature so prominently in the eight-year program but will continue to progress.

OTHER EXPANSIONS

The projected expenditure of £40,000,000 over the next eight years compares with a consolidated balance sheet total of lands, buildings and plant of £48,600,000 at the end of 1945 when the company held cash and government securities shown at £17,850,000. These figures give some idea of the magnitude of the proposed plant additions in relation to existing factory capacities. I.C.I. does not stand alone with such ambitious expansion schemes. Reference was made in these notes to Courtauld's modernization and expansion program which was expected to absorb similarly large sums, and the reports of smaller chemical companies in Great Britain reveal the same pre-occupation with extension schemes, while balance sheets generally testify to a strong financial position.

True, this is partly due to neglect of normal plant repair and maintenance during the war and to smaller stocks of raw materials and finished manufactures. Government discouragement of higher dividends and the anticipation of substantial reconstruction and extension needs also has something to do with the retention of liquid funds by industrial companies. The continuation of official controls over capital issues is another factor making for conservative financial policies. But none of these factors would have become effective had not wartime capacity production permitted the industry to work with a satisfactory profit margin. The projected expansion will therefore be mainly financed out of the chemical producers' own resources.

That modernization of power plants is one of the main features of the first instalment of the I.C.I. construction program draws attention to the importance of satisfactory fuelling and power arrangements in new plants. Production in some chemical factories was held up last winter by shortage of coal, and the higher cost of fuel necessitates economy in its use. Unfortunately some of the older chemical works in England, built at a time when coal was both cheap and plentiful, use more fuel than can be justified at the present time of shortages. All chemical manufacturers will have to tackle the problems resulting from uneconomical power plants.

EQUIPMENT PLANTS

When Courtauld's announced its big expansion program, the company included plans for a factory to build textile and other machinery needed in its own plants. It would not be surprising if chemical producers generally would pay more attention to chemical engineering sections of their own, for provision of plant is likely soon to become one of the major bottlenecks in all expansion schemes. The British iron and

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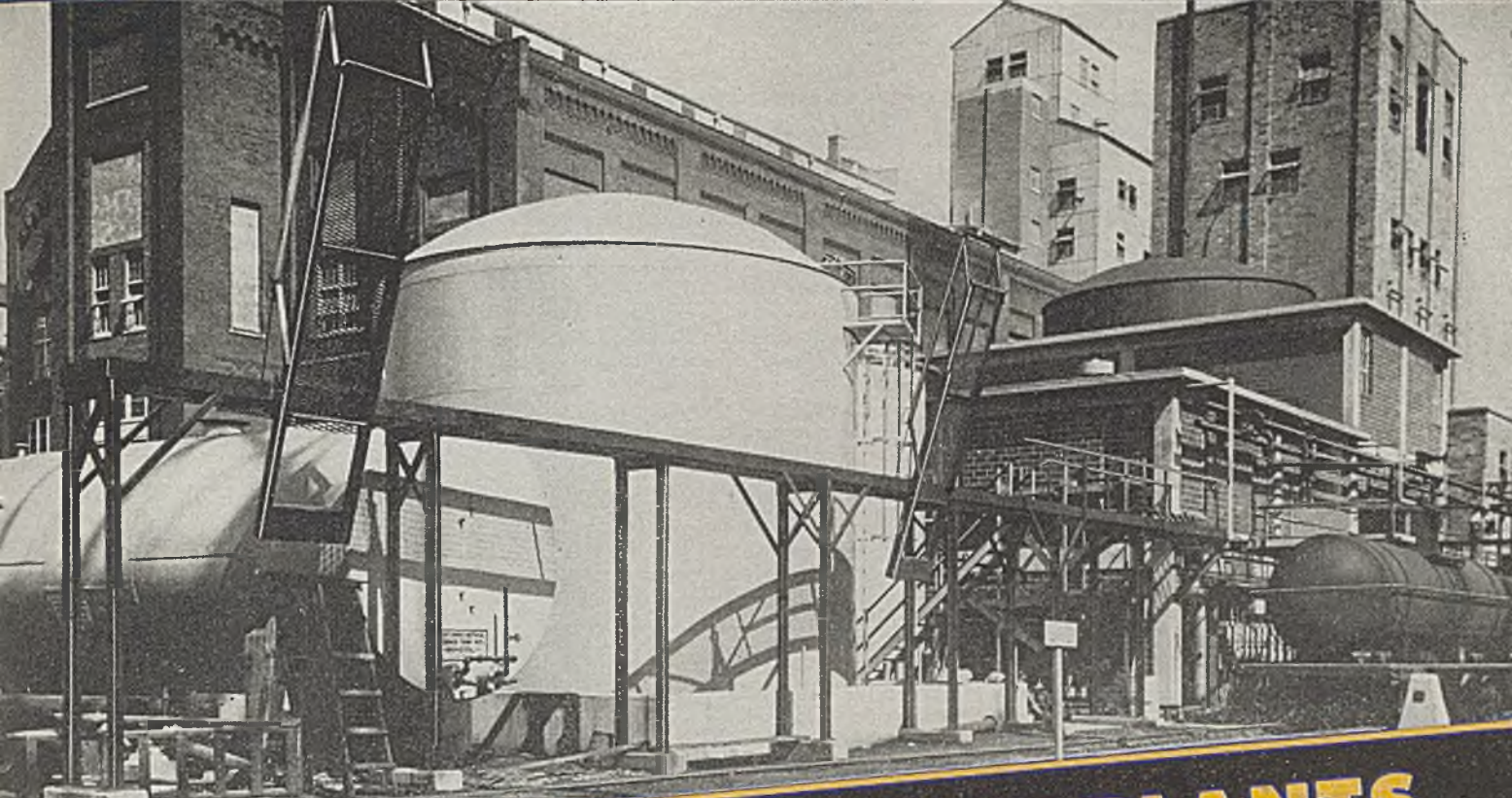
steel industry which intends to invest £168,000,000 in new iron and steel furnaces and mills stated that to meet this huge demand for new plant, big orders would have to be placed not only with British but also with U. S. engineering firms. The position in the chemical engineering industry is not greatly different. The new plant requirements of British chemical manufacturers cannot be met by British engineering firms without considerable delays.

CONSTRUCTION COSTS

The plans of the iron and steel industry assume that the average cost of new construction has doubled since prewar days, and though the return of more normal conditions may lower the cost of new plant, there is no doubt that the present cost of chemical plant is also nearly twice as high as before the war. Interest rates, on the other hand, have been reduced by skilful management of the capital market, and it may be thought that the saving in interest on borrowed capital is almost sufficient to offset the extra cost of plant resulting from present high prices, especially if the increased efficiency of modern installations is taken into account. Other costs, including in particular the wage bill, have also risen, and the changes in costs as a whole certainly work in favor of mechanization. Fuel and labor economy are likely to be the dominating features of plant construction in the next few years.

The higher the amount of money invested in plant as compared with the costs of operation, the more important it is, of course, to insure that plants are run at or near full capacity and that duplication by competing producers is avoided. The tendency towards bigger plant and vertical concentration of production to reduce transport requirements puts a premium on full-capacity work. With demand at its present level conditions are certainly favorable enough as far as this aspect of plant operation is concerned, but in some of the newer sections of the chemical industry, especially in the plastics field, there seems to be a tendency for producers who entered the industry as suppliers of one particular type of synthetic resin to spread both horizontally and vertically, with results on the industry as a whole which cannot yet be safely assessed.

There is, however, one section of the chemical industry in which plant extensions must as yet be postponed although demand is perhaps more pressing than anywhere else. Pinchin Johnson & Co., the leading firm in the paint industry, reported that the productive capacity of its various works is geared up to meet what should be the company's share of the demand, but the dominating factor is the raw material supply. There is a shortage of drying oils and other paint materials which shows little indication of a likely improvement in the near future, and while this state of affairs continues, there is little point in extending manufacturing facilities. There is, however, a great potential need for increased paint producing capacities, and as the financial position of the leading paint manufacturers does not differ much from that of other chemical producers, it seems likely that sooner or later this branch of the chemical industry will also experience a big extension and modernization drive.



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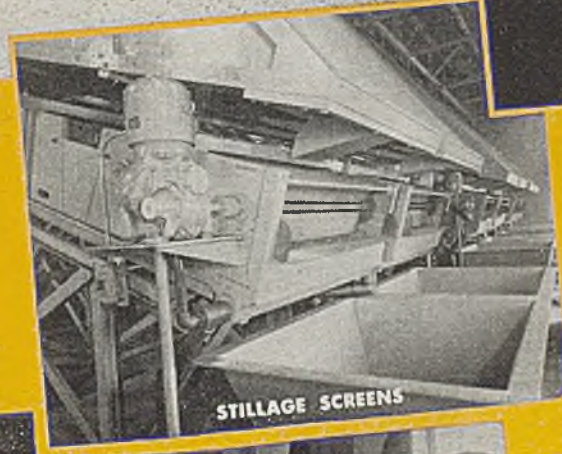
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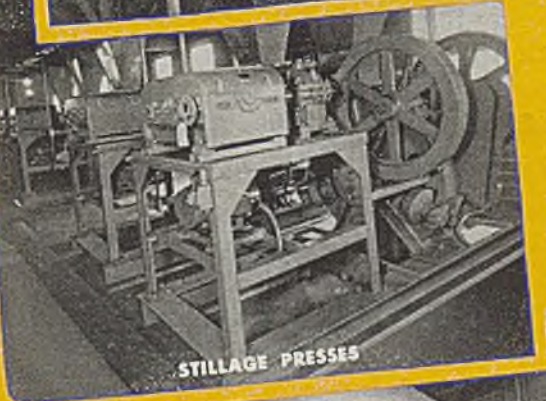
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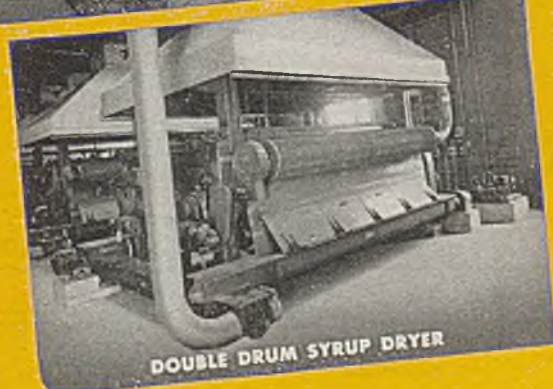
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802 Hamilton St. Harrison, N. J.

GOVERNMENT PRODUCTION OF DDT IN SOUTH AFRICA PUTS PRIVATE ENTERPRISE ON THE DEFENSIVE

Special Correspondence

THE ATTITUDE of industry towards the government's policy of manufacturing DDT has been defined by the director of the South African Federated Chamber of Industries, who said there were three main points in the attitude of the Chamber. The first was that industry was strongly opposed to any government policy of setting up factories to compete with private enterprise. Secondly, it was realized that special circumstances compelled the government to manufacture DDT at the present time, but it was maintained that these circumstances should not be allowed to establish the principle of state interference with private enterprise. Thirdly, industry was definitely opposed to any attempt by the government to compound and distribute DDT to the public in competition with industries well organized to handle this business.

When the manufacture of DDT concentrate was first suggested as a government enterprise the Federated Chamber of Industries indicated to the Minister of Economic Development that it opposed any encroachment on the sphere of private enterprise as a permanent measure. The Minister, however, pointed out during many discussions on this matter that DDT was urgently needed by farmers and that there were no factories able to manufacture the insecticides at short notice. The Federated Chamber finally accepted the Minister's assurance that

no public utility company would be established to distribute DDT and that its manufacture would be undertaken by a departmental factory only as a temporary measure.

The Chamber is still opposed to any intention by the government to make DDT up as an insecticide, as there are now factories able to undertake this work. If the government were to mix and distribute the finished product existing enterprises would be seriously affected and unemployment would result. On this point the Chamber has the Minister's assurance that the mixing and sale of DDT as an insecticide is only an interim measure, and that eventually the bulk of this business will be handed over to private enterprise.

A plant for the manufacture of cyanide for use by the gold mining industry is to be set up during the current year by African Explosives and Chemical Industries at the Klipspruit Sewage Disposal Works, outside Johannesburg. Methane gas, one of the products of sewage disposal, will be used in the manufacture of cyanide, and the company's synthetic plant at Modderfontein will supply the necessary ammonia. The company states that the new development has been made possible by close cooperation with Imperial Chemical Industries, Ltd.

It is considered possible that South Africa may lead the world in the production of fish flour for human consumption. It is claimed



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that large-scale production of fish flour for human consumption would solve the food problems of the Union and most other countries. Although South Africa is leading the world in the quest for the perfect fish flour for human consumption there remain certain snags in the way of large-scale production. An expert will leave shortly for the United States, Canada and Britain to search for machinery that can be used to overcome these snags.

SULPHUR RECOVERY

In the latest report of the Fuel Research Institute it is stated that owing to a threatened shortage of imported sulphur, experiments on the recovery of sulphur from pyrites in colliery washery wastes were undertaken. One investigation by the Wartime Research Committee showed that large amounts of pyrites could be recovered from Rand gold ore and that this source of supply would be much cheaper than pyrites from colliery waste. It was found that sulphur production from colliery waste would be expensive because the waste is located at different places, and thus crushing and handling costs would be high, and the final pyrites would still contain a fair amount of carbon. This finding, as well as the improved shipping position, led to the abandonment of the investigation.

A vacuum filter is being manufactured in South Africa, an inexpensive unit that is adequately meeting the requirements of milk laboratories where a number of pulps are being handled, and where quick and accurate filtering is required. The filter consists of two castings, the upper of which is the pulp container and the lower the base. The top casting is heavy enough to form an air seal between the filter medium and the base, and two dowel pins keep the castings in position, thus eliminating the need of clamps and thumb screws. The pulp to be dewatered is poured into the container, the vacuum is applied, and the solids are left in a cake on the filter paper. The filter paper and the cloth are supported by a wire screen placed over the drain grooves in the base. A tapped opening is provided for the filter connection, and the filter cake can easily be washed if this is desired.

Production of gum turpentine in the government pine forests near Cape Town reached a new level in 1945, when altogether 6,000 gallons of gum was tapped from the trees. These pines proved of inestimable value during the war when supplies of turpentine from overseas were limited. The tapping of the pines during the past four years has become a feature of the work of the Forestry Department near Cape Town, and supplies of the gum are sent monthly to Pretoria for processing.

A plan for a "central service station" for the South African chemical industry is to be put into effect. The adviser to the government on industrial chemical research said the station would advise, but not interfere with, private industry. It would be staffed with experts, and would provide library and laboratory facilities to aid industries in keeping abreast of current scientific information and in carrying out research projects. It would aid industry in the disposal and utilization of waste products, and bring the finest brains possible to bear on the problems of individual industries. The station will be

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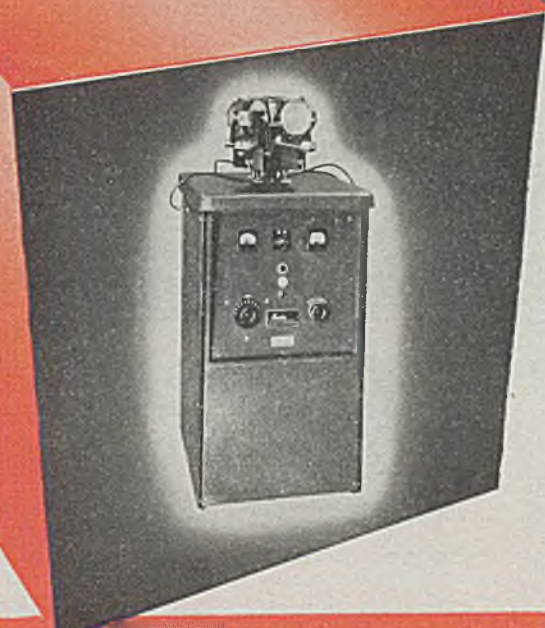
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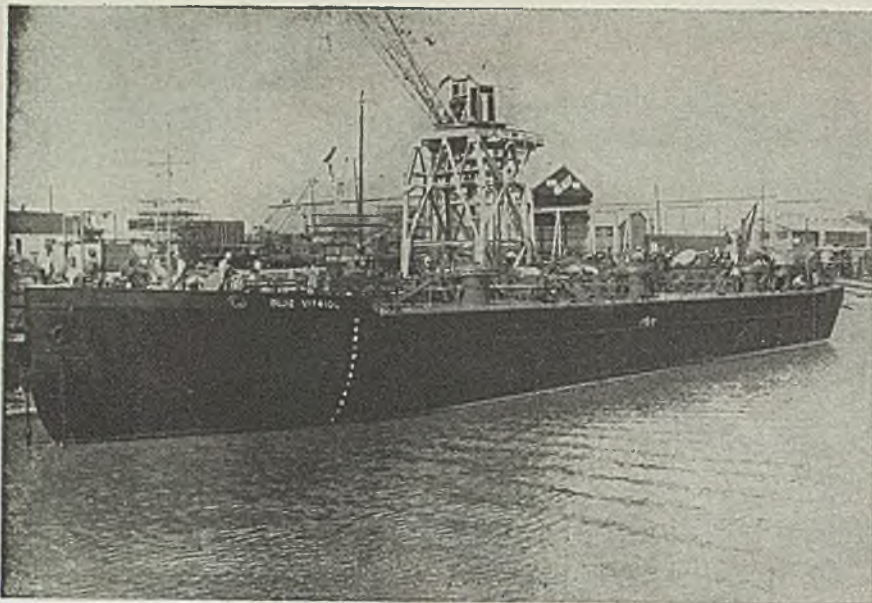


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part of the larger National Scientific Research Council.

The Secretary of Public Health said the government was now experimenting to ascertain the best way of introducing food yeast into the daily diet of large sections of the population who needed it most. It would first be necessary to establish a basic diet and then to build it up into a properly balanced diet. It was hoped that South Africa would be able to provide the basic diet. He said: "It is not a question of producing food yeast by the ton or allowing it to get on the market as another magic cure for all ills. The government is making arrangements to buy it and to feed it to the people in the proper way. Now that authority has been given for the government to purchase 50 tons of food yeast from a Natal firm, these things will be investigated by the nutrition section."

According to a government statement, in 1944 South Africa exported 6,732,609-lb. of soap and in 1945, 5,446,828-lb. The quantity of soap supplied as ships' stores in 1944 was 356,490-lb., and from January to November of last year the quantity was 172,110-lb.

NEW MATCH COMPANY

A new company with a capital of £300,000 was recently formed under the name of the Capital Match Corp., Ltd. The company proposes to manufacture safety matches at Bloemfontein, where a 20-acre site may be purchased. The address of the head office is P.O. Box 5561, Johannesburg. The output is expected to be 1,400 gross boxes a day, with an output of 2,100 gross boxes at a later date. It is expected that the firm will find a ready sale within a radius of 200 miles from Bloemfontein, the native territories alone offering considerable scope.

The Society of Refrigeration and Air-conditioning Manufacturers, Engineers and Importers of South Africa has been formed in Johannesburg to promote, encourage and protect the interests of members engaged in the refrigeration and air-conditioning plant and equipment trades. The society intends to collect and disseminate technical information for the benefit of its members and to undertake technical education of service engineers. The secretary's address is P.O. Box 4791, Johannesburg.

The glass position in South Africa is at present worse than it has been at any time since the war broke out, but there are good prospects that supplies will improve steadily until by the latter part of 1946 the country's demands should be met with little difficulty. Before the war, supplies of plate glass, sheet glass, figured glass, wired glass, and similar glass, came almost entirely from Great Britain, Belgium and France. After war broke out, and when Belgium and France were overrun, supplies came from Britain almost exclusively, with the United States supplying small quantities of sheet glass.

During the war period, the highest priority was given to the export of cement from South Africa to the Far East for war purposes. An average of 6,000 tons monthly was despatched to Calcutta, but all contracts have now been cancelled, and ample supplies are expected to be available for South Africa's building requirements.

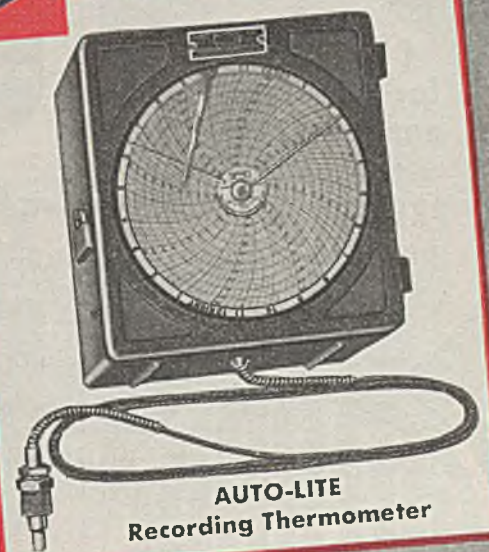
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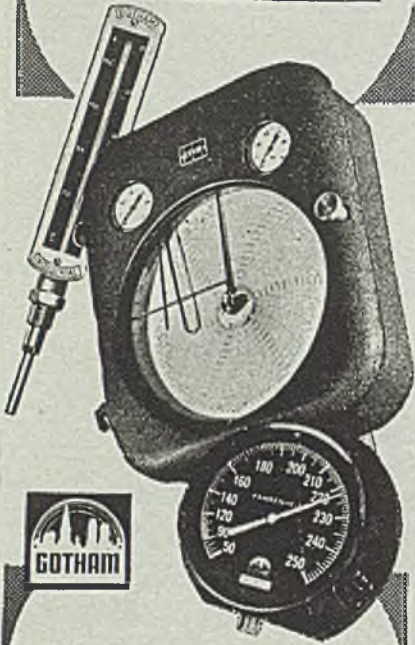
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ARGENTINA WILL LIMIT IMPORTS TO REQUIREMENTS WHICH CANNOT BE PRODUCED BY LOCAL INDUSTRY

Special Correspondence

WITH conflicting rumors, much discussion of tariff changes, and quick government action, the possibility of foretelling the role to be played in Argentina in the immediate postwar years by competing foreign industries becomes particularly difficult. In the present trend of government thinking, foreign competition in most lines is to be limited to the essential minimum, supplying only those requirements which cannot satisfactorily be produced by local industry.

Future trends of the Argentine chemical industry can probably be best judged from a study of the past. While coverage of war years' activities does not give a complete picture of this industry's requirements, certain factors are outstanding.

In this connection, a series of short articles written by prominent Argentine industrialists and carried recently in the local press are highly informative. The outgrowth of a questionnaire sent to members of the Unión Industrial Argentina, these articles constitute a direct opinion of the men actually engaged in industry, and, while many of the opinions expressed are possibly purely personal views of the men concerned, the following summary of chief facts contained give a reasonably complete round-up.

Though imports of industrial chemical products were moderately regular throughout the war, shortage of raw materials handicapped local production. With the end of the war the cost of raw materials will drop

considerably. Freedom of Customs duties on imports necessitates reasonably minimum protection for local industry through the removal of comparatively high duties on the raw materials used by the industries, which are now placed in an unfavorable position.

While the official Argentine foreign trade statistics for 1944 have not yet been released, the following comparative figures on imports, taken from shipping manifests, are available for the years 1944 and 1943:

Imports of Chemicals

	1944	1943
Coal-tar products	324,017	165,387
Medicinal and pharmaceutical preparations	827,859	481,294
Chemical specialties	3,380,815	3,455,137
Industrial chemicals	6,602,141	5,294,497
Pigments: Paints and varnishes	2,914,597	5,472,483
Fertilizers and explosives	14,495,780	10,040,056
Soap and toilet preparations	82,005	125,551

The return of normal foreign trade will bring particularly keen competition to the pharmaceutical branch of the Argentine chemical industry. The kinds of competition to be faced and the new development required, are not yet clear. In view of wartime Argentine expansion in the foreign markets, other governments may decide to compete, without consideration of immediate losses, to recover markets lost by them during the war.

The prospects to the different types of

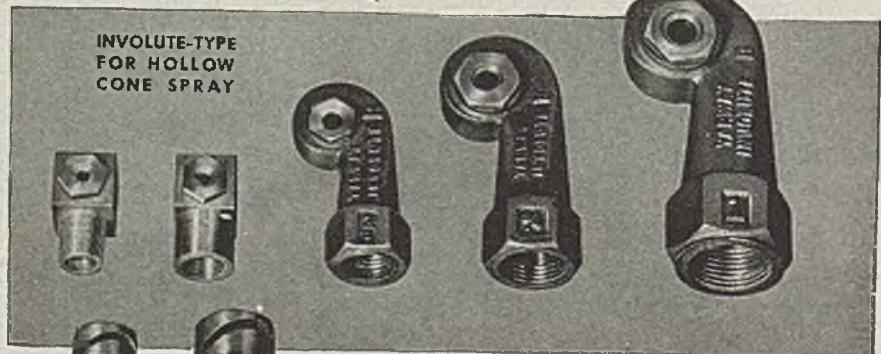
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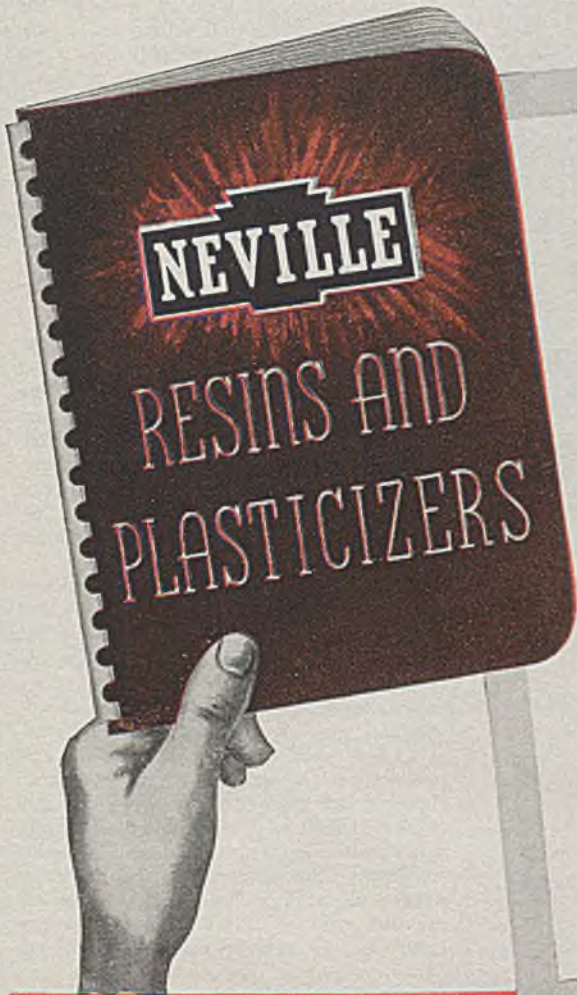


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pharmaceutical products vary widely. While Argentine industry depends upon imports of raw materials for medicinal products, foreign industries are dependent upon our raw materials for other classes. While the confused issue will be cleared principally by the stand taken by foreign producers, Argentine industry is prepared to hold its foreign markets principally for those products manufactured from local raw materials. Future Customs regulations will be of great importance.

PRICE COMPETITION

While Argentina does not have fear of competition in product quality, the same is not true regarding selling prices, production costs being considerably higher for the following reasons—small scale of manufacture; and high standard of living of the Argentine employee and workman. In those products made from local raw materials, the Argentine manufacture can successfully compete in both price and quality. Any possible loss in foreign markets may be compensated by increased expansion in the local market.

The cost of postwar replacement of stocks of chemical materials and equipment for this industry, according to a survey carried out by the Argentine Institute of Investigations and Economic Studies, is placed at slightly over 50 million pesos. This rates very low as compared with 866 millions for iron and steel, 693 million for textiles (cotton, wool, silk and linen), 550 million for jute, etc., 305 million for machinery and motors in general, 234 million for coal and petroleum, 154 million for wood and lumber and 117 million for vehicles.

With the exception of certain specialized kinds of equipment (including boilers), the machinery and spare parts required by the industrial chemicals industry may be obtained locally. Adapted to particular needs, they are not only cheaper, but may also be obtained more rapidly than imported products. The experience of war years is the best testimony to the excellent prospects of both chemical industry and the machine industry connected with it. Stock difficulties will disappear with the return of normal shipping conditions. Present trend in raw materials prices is downward. Production quality will improve with availability of better raw materials; quality may be maintained through choice of supply sources. Technical and scientific advances realized during the war in other countries will be introduced here.

The domestic demand for industrial chemicals can be met entirely by local production. Present exports are insignificant; prospective purchasers, various South American countries and South Africa.

The return of normal foreign trade will benefit the pharmaceutical industry through replacements of needed machinery, precision instruments, laboratory equipment and various other industrial requirements. It will also open other markets of the world for the export of all classes of drugs and basic raw materials.

Argentine need of machinery replacements is in many cases urgent. Local manufacturers should adopt new laboratory processes and new production methods evolved during the war. An outstanding need—technical laboratory glass equipment.

The minimum government action required by industrial chemical manufacturers is the

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An exclusive Foster Wheeler service is design—then manufacture—of special-service heating systems. The unit illustrated shows one application of Dowtherm heating to drying rolls.

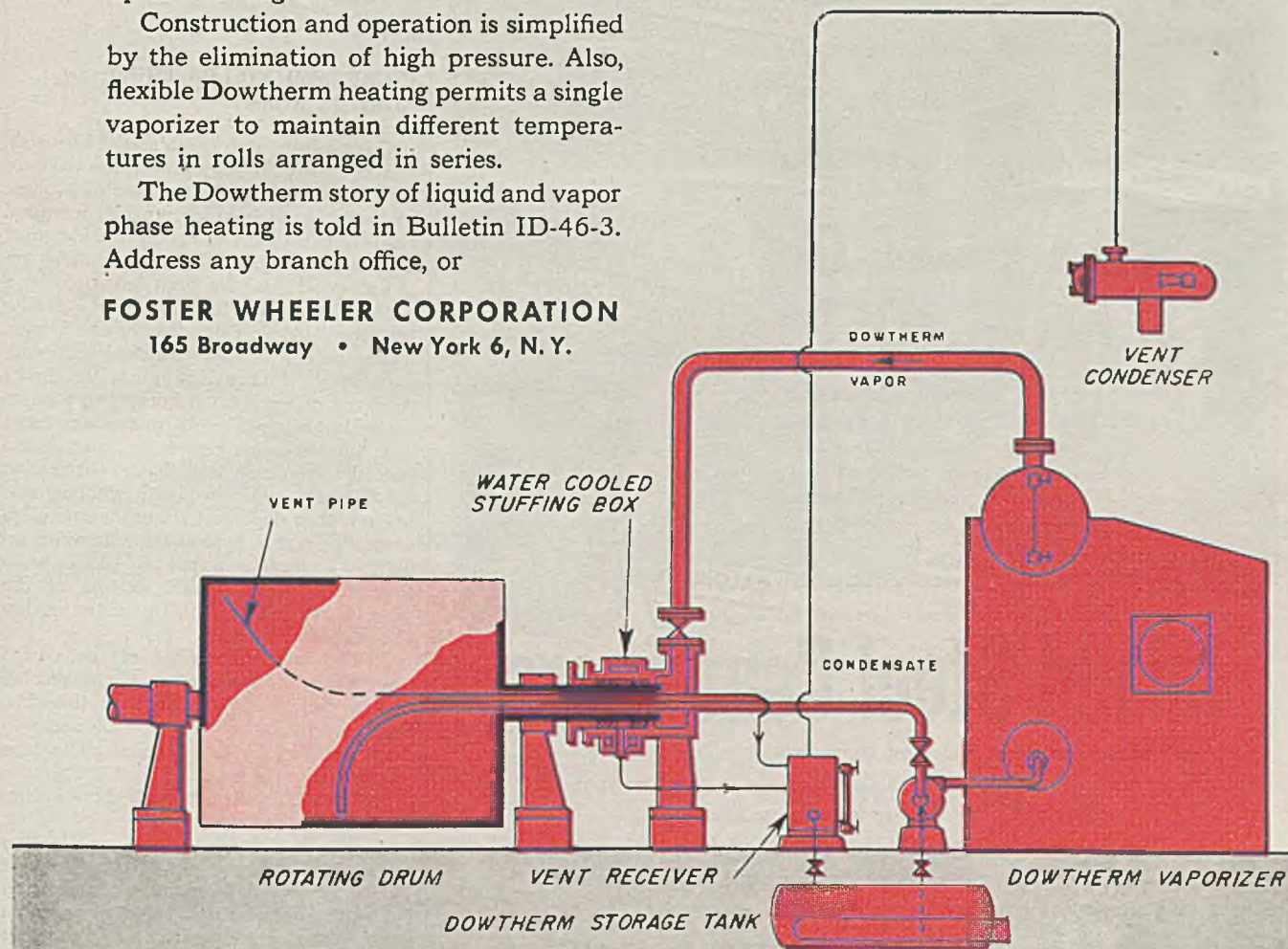
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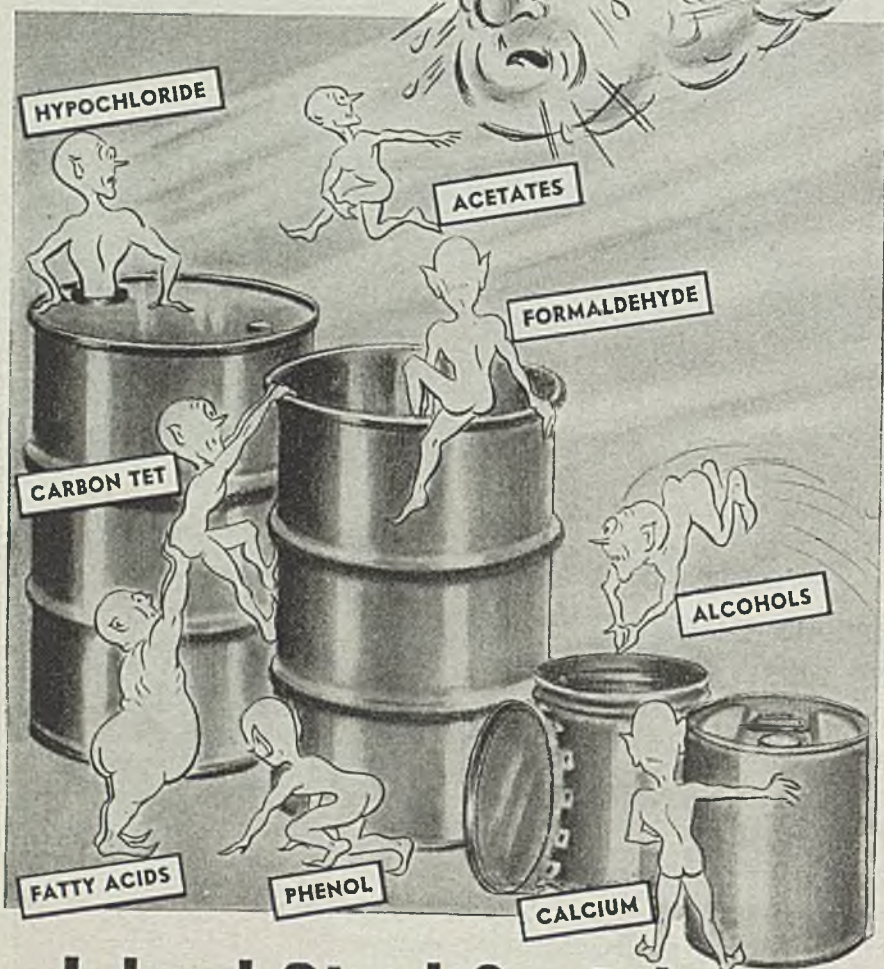
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removal of duties on raw materials not produced in the country, reducing their cost by approximately one half, and rationalization of internal and provincial taxes presently affecting locally manufactured goods only. Producers of pharmaceutical products require adjustment of Customs regulations to facilitate the importation of technical equipment and raw materials required. They advocate the placing of a protective duty on products similar to those manufactured locally.

Government industrial credit will particularly benefit the industry, with long-term credit facilitating the building of new factories and these solving the chief difficulty of this industry in former years.

While general production costs have increased as much as 100 percent, they should drop to an average of about 30 percent above prewar level. A "war baby", without competition, the industrial chemical industry's growth has not been affected by high costs. To maintain present high quality production, pharmaceutical manufacturers have two principal needs: To obtain imported raw material requirements at reasonable prices; and to hold the export market of those products manufactured from local raw material. With the return of open competition, the problem of high costs must be solved to insure the continued existence of this industry.

INCREASED YIELDS FROM COKE IN RUSSIA

Coke plants at Magnitogorsk, Kuznetsk, and elsewhere in Russia have for the past three years been using a method of washing coal with gasoline which provides increased yields of coke and also has a favorable effect on the tar. At the Magnitogorsk ovens anthracenic oil has also been employed as a wash. Much of the technique used is similar to comparable developments in the United States, though it was developed independently by the Energy Institute of the Soviet Academy of Sciences. According to Russian scientists, the chief results so far have been:

1. Increased production of coke ovens generally runs not less than 5 percent if the charge is moistened with gasoline, and not less than 4 percent if anthracenic oil is used. For certain byproducts (the most important—toluene) output is raised by a considerably larger figure, wetting of the mass of coal acting favorably on the quality of the crude benzene.

2. The increased weight of the charge from the wetting improves the quality of tars by diminishing cracking. In this case, the concentration of phenolcresols and pyridine bases in the tar is raised. The tar's specific gravity is lowered.

3. The quality of metallurgical coke is improved.

4. The technique can be rapidly and easily installed in any sort of coke plant. It can be used with all sorts of coal and different degrees of humidity. Tables of optimum percentages of gasoline to add under different conditions have been developed.

5. The technique simplifies charging of coke ovens. Also, the washed coal generally does not freeze in winter.

Further developments of the technique are planned, particularly use of a mixture of gasoline and anthracenic oil as a wash, which

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In formulations for flame and water repellency where 40% Chlorinated Paraffin may be used, here is a new and improved Hooker product. It is an exceptionally stable, light colored viscous liquid with an extremely low iron content.

Hooker specialized experience in chlorinating long chain aliphatics has resulted in the development of this improved product. CP-40 is compatible with a number of film forming resins, and may be used as a plasticizer or extender with them. Technical Data Sheet No. 731 which more completely describes CP-40 is available when requested on your company letterhead.

Physical Properties CP-40

Chlorine Content	42 ± 1%
Specific Gravity, 15.5°/15.5°C . .	1.185 ± .01
Viscosity at 210°F (Saybolt Universal)	160 to 180
Acidity as HCl	0.006% max.
Iron	10 ppm. max.
Color, Union Colorimeter ASTM	1.5 to 2.5
Thermal Stability (6 hours at 300°F)	0.15% HCl max.

Where the formulation calls for a 70% chlorinated paraffin, Hooker CP-70 is available for similar uses. This material is a brittle amber colored resin. It is crushed and shipped as a white powder which does not agglomerate on standing.

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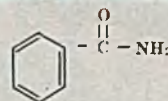
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For more complete information write on your letterhead for Technical Data Sheet No. 361 which lists the physical properties and a number of the reactions which Benzamide will undergo.

Because of its relative chemical inertness CP-70 is suggested also in formulations for fire-proof paints, adhesives, linoleum, etc. In protective coatings and paints it does not adversely affect the rate of drying. Technical Data Sheet No. 763, describing more fully the properties of this chemical, is available when requested on your company letterhead.

Physical Properties CP-70

Analysis (typical)	
Chlorine	69 to 73%
Free HCl	0.05 max.
Iron	0.01 max.
Softening Range	90° to 100°C
Acid Number, mg. KOH/gm.	0.50 max.



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Ampco-Trode coated aluminum bronze electrodes give a weld with the same excellent physical properties that Ampco Metal provides in the component parts.

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Ampco Metal, Inc.

Department CM-6 Milwaukee 4, Wisconsin
Field Offices in Principal Cities

AMPCO
Metal

End section and completed assembly of venturi tubes used in processing soap and fatty acid by-products. Because of the need for a metal to resist the corrosive action of fatty acids and alkalis, Ampco sheet, Ampco centrifugal castings, and Ampco-Trode electrodes were selected for fabrication.

considerably increases the weight of the coal. Addition of a small quantity of solid hydrophils (for example, C₂O) in the wash is also planned. The washing technique may also be extended generally to prevent freezing of coal, and it will allow an increase in the number of types of coal which can be coked.

Chiefly responsible for devising this washing technique is A. Agroskine, of the Krijanovski Energy Institute, of the USSR Academy of Sciences. His paper in "Comptes Rendus de l'Academie des Sciences de l'URSS, vol. XLIX, No. 4, Nov. 10, 1945, gives a description of his results.

CONSOLIDATED MINING BUYS CANADIAN NITRATE PLANTS

PURCHASE of two nitrate plants from the Dominion Government for \$7,500,000 has been completed by the Consolidated Mining & Smelting Co. of Canada, Ltd. One plant is located at Trail and the other at Calgary. The Trail plant was constructed for the government by Consolidated and the Calgary plant was operated under Consolidated supervision during the war period. Both plants were built to produce explosives and have since converted to the production of nitrate fertilizers. Announcement of the sale was made by C. D. Howe, Minister of Reconstruction and confirmed by R. E. Stavert, president of Consolidated who said the company intends to maintain full production at both plants.

EXPORTS FROM BRAZIL MADE NEW RECORD LAST YEAR

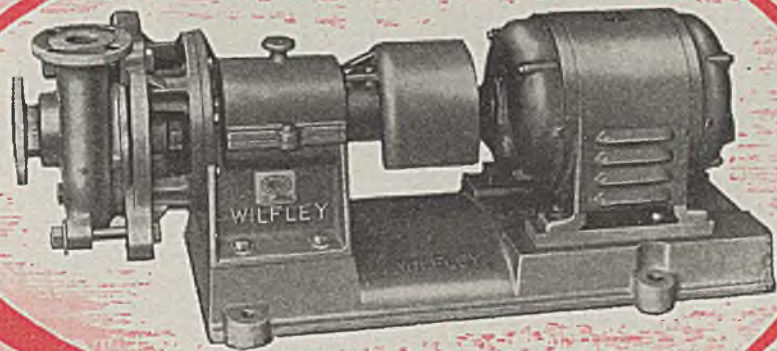
FIGURES just released by the Brazilian Government indicate that export trade did not fall off after the end of the war and the active demand for Brazilian goods is said to be continuing. Exports in 1945 reached the record-breaking figure of Cr\$12,197,510,000 or \$609,875,500. The volume of exports also showed a good increase the totals being 2,671,405 tons in 1944 and 3,027,221 in 1945. Nearly 50 percent by value were destined for the United States or 46 percent of the total volume. Coffee beans, cotton textiles, and raw cotton were the leading commodities exported but other shipments included 150,447 tons of castor beans, 18,887 tons of rubber, 9,432 tons of carnauba wax, and 476 tons of menthol. Cottonseed oil exports almost tripled in value over 1944 and babassu nuts registered the most sensational rise in the oil-bearing nut field, jumping from a value of \$793,150 in 1944 to \$4,488,850 in 1945.

ITALY INCREASES OUTPUTS OF ASBESTOS AND TALC

ITALY's asbestos mines are reported to be in a position to step up production considerably provided demand for export increases. During the third quarter of 1945, period for which latest figures are available, average monthly production of 360 tons was sufficient to meet domestic demands. This included 350 tons of short fiber asbestos and 10 tons of long. Average monthly production in 1938 was 550 tons of short fiber and 18 tons of long.

During the third quarter of 1945, pro-

For Acids...



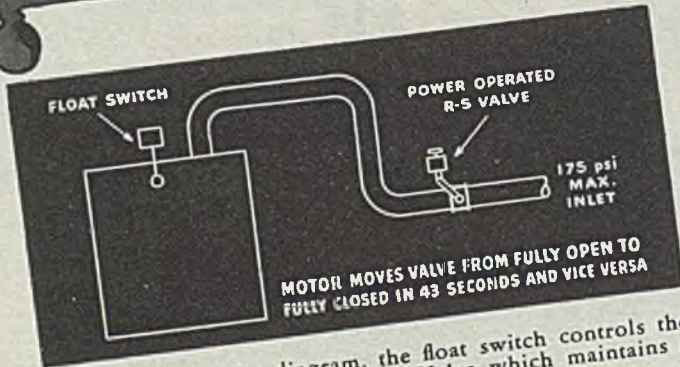
Trouble-Free Performance

...and dependability are notable characteristics of the WILFLEY Acid Pump. Exclusive features of design and construction enable the WILFLEY to handle acids, corrosives, hot liquids, mild abrasives without attention on uninterrupted 24-hour-a-day production schedules. Individual engineering assures proper application on every job. Works on both intermittent and continuous operations. 10- to 2,000 G.P.M. capacities; 15- to 150-ft. heads and higher. It's the pump to buy when you want low costs. Write or wire for further details.

WILFLEY
centrifugal PUMPS

A. R. WILFLEY & SONS, INC., Denver, Colorado, U.S.A. New York Office: 1775 Broadway, New York City

FLOAT SWITCH CONTROL

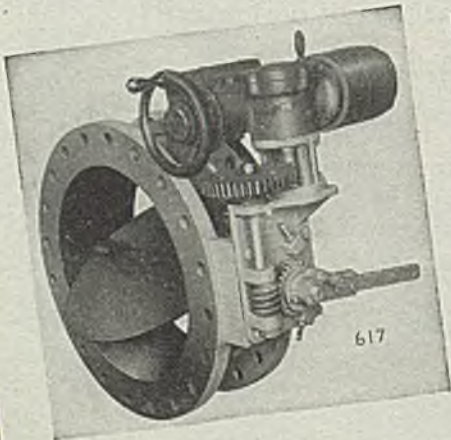


As indicated by the diagram, the float switch controls the power-operated, slow-acting R-S Valve which maintains a constant water supply in the storage tank.

Similar applications of automatically operated R-S Valves can be equipped with an air diaphragm, oil or hydraulic cylinder for the control and shut-off of a multitude of materials. The result is simplified performance, prevention of water hammer and line damage, unexcelled flow characteristics and reduced maintenance.

R-S Valves are used advantageously to reduce, regulate and shut off pressure whether above or below atmosphere; to control liquid level; to relieve and control back pressure; to maintain a constant differential pressure; to control rate of flow; to control combustion and govern the output of pumps, fans, engines and turbines.

No. 617



Extremely slow-acting valve equipped with electric motor control. The hand wheel on a gear reduction drive is for manual operation in case of power failure. Note the extended lever for operation of sister valve in parallel line.

Can be adapted to elevated or sub-zero temperatures. 15 to 900 psi.
Write for detailed information and Catalog No. 14-B.

VALVE DIVISION
R-S PRODUCTS CORPORATION
4523 Germantown Ave. • Philadelphia 44, Pa.

R-S

Streamlined
BUTTERFLY VALVES

duction of talc had reached a monthly average of between 1,000 and 1,200 tons compared with 4,250 tons in 1938. Increased production of talc also is held to be contingent on increased demand for exports.

HOLLAND MAY PRODUCE SYNTHETIC RUBBER

In a report from Amsterdam, the McGraw-Hill World News Bureau states that the Dutch government has appointed a commission to investigate the possibility of making synthetic rubber and plastics domestically. One member of the commission is now in the United States, studying American technique in these fields.

Meanwhile, all Dutch superphosphate factories have been back in operation since last November, and the Royal Sulphuric Acid Factory is working up to normal capacity.

SWEDEN USES EXCELSIOR AS BUILDING MATERIAL

A MEANS of saving wood in house construction, substituting for it compressed excelsior, is presented by a new method now being tried out in Sweden at a prefabricated house building plant. The excelsior is impregnated with certain chemicals, later mixed with cement, and then pressed into a mold formed by the wooden studs. The compressed material forms the curtain wall and at the same time acts as thermal insulation, having an efficiency said to be 300 percent better than that of wood alone. The method offers possible cost savings of 15 percent, as well as appreciably reducing the weight of the wall construction.

LONG-TERM PLAN FOR INDIAN DYESTUFF DEVELOPMENT

A NEW 20-year plan for the establishment of an independent Indian dyestuff industry, capable of producing all the dyes in substantial demand in the country together with all the necessary intermediates, is proposed in the report of the Dyestuffs Exploratory Committee of the Indian Board of Scientific and Industrial Research. Such a program, it is estimated, would cost approximately \$75,000,000.

The plan would comprise three stages: (1) manufacture of 51 basic synthetic dyes and some of the intermediates within a five-year period; (2) production of all the intermediates required for these 51 basic dyes within 10 years; (3) production of all the dyes in substantial demand in the country, plus all necessary intermediates, within 15-20 years.

Citing the importance of the dyestuffs industry to India's economy, the report asserted: "Unless a country is self-sufficient in this vital matter, its economic development is stunted in peace and liable to be seriously impaired in war."

SOUTH AFRICAN UNIVERSITY SEEKS CATALOGS

COURSES in chemical technology have been established in Natal University College, Durban, Union of South Africa, and the department of chemistry and chemical technology would like to receive catalogs



THE NAME TO WATCH IN CHEMICALS

ORONITE POLYBUTENES ARE AGAIN AVAILABLE



Again in ample supply, Oronite Polybutenes are offered in seven grades for application in many diversified industrial and manufacturing fields.

Among the many special uses of Oronite Polybutenes in volume are these: for adhesive and non-drying gasket compounds, insulated and impregnated paper wrappings, rubber latex extenders, as a dust trapping agent in air filters, in treatment of leather, for paraffine wax plasticizers, in the fabrication of electrical devices, and for many other uses.

Oronite Polybutenes are carefully engineered to fill the needs of up-to-the-minute industrial and manufacturing processes. An inquiry on your business letterhead as to specific uses in your own business will bring prompt reply.

1240

TYPICAL TESTS:

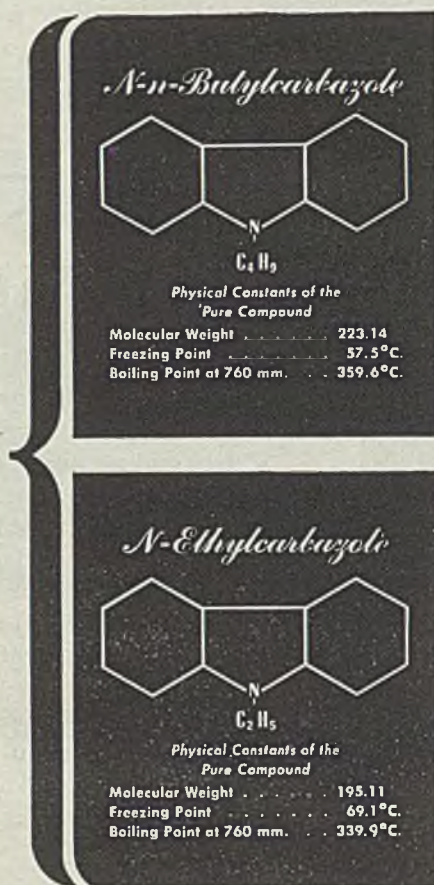
	No. 8	No. 12	No. 16	No. 20	No. 24	No. 32	No. 64
Flash Point, Clev.°F.	315	340	360	380	435	500	540
Viscosity 100°F. SSU	358	3390	5425	17160	49750	167500	347600
Viscosity 210°F. SSU	52	154	210	528	1060	3065	6075
Viscosity Index	71	75	80	100	104	115	119
Pour Point °F.	—30	—5	0	10	20	40	55
Solid Point °F.	—35	—10	—5	5	15	35	50
Gravity, API	35.4	32.0	31.0	29.8	27.9	26.0	25.0
Spec. Gravity . . . . .	.8478	.8654	.8708	.8772	.8877	.8984	.9042
Lbs. Per Gallon	7.059	7.206	7.251	7.305	7.392	7.481	7.529
Molecular Weight	370	530	600	700	900	1200	1500
Neut. Number . . . . .	.10	.10	.10	.05	.02	.01	.01
Sap. Number . . . . .	.3	.3	.2	.2	.2	.1	.1
Carbon %	0	0	0	0	0	.01	.02
Sulphur % . . . . .	.01	.01	.01	.02	.02	.02	.04
Sligh Oxidation Test	0	0	0	0	1	1	2
Color ASTM (Max.)	1½	1½	1½	2	2	2	2
Dielectric Strength	35,000	35,000	35,000	35,000	35,000	35,000	35,000

ORONITE CHEMICAL COMPANY

Russ Building, San Francisco 4, California
White-Henry-Stewart Bldg., Seattle 1, Wash.

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Reilly N-Alkyl Carbazoles



● Reilly N-alkylcarbazoles are high boiling, low melting solids, and stable, neutral compounds. The N-ethylcarbazole and the N-n-butylcarbazole are available in a 95% pure grade. Other N-alkylcarbazoles can be made available upon request.

Because of their solubility in a wide range of organic solvents, and their high boiling points, the N-alkylcarbazoles may be used as plasticizers for a large number of resins, and as rubber softening agents. They are also suggested for use in the synthesis of pharmaceuticals, dyestuffs, organic insecticides, plant hormones, fungicides, explosives, and as intermediates in various organic syntheses.

Send for 56-page second edition and supplementary printing describing the complete line of Reilly Coal Tar Chemicals, Oils, Acids, Bases and Intermediates.

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Reilly

COAL TAR PRODUCTS

★ 17 PLANTS *To Serve the Nation*

and manufacturers publications from companies in the United States. The course is intended to train students for responsible positions in the growing chemical industry in the Province of Natal and such publications would be of great assistance in this training.

GAS REFORMING PLANT FOR TOULOUSE, FRANCE

CONTRACT has been awarded by Office National de l'Azote of France for a gas reforming plant to be erected in Toulouse, France, on the Garonne River. The contract was given to Chemical Construction Corp., New York, and this company will design the plant and furnish the materials for construction and the equipment. The plant will use the methane steam process and convert natural gas, by high temperature cracking, into hydrogen and nitrogen for use in the synthesis of ammonia. It will have a charging capacity of about 20 million cubic feet of natural gas daily.

CHEMICAL PRODUCTION IN JAPAN AT LOW LEVEL

Basic heavy chemicals are being produced in Japan at the rate of about 19 percent of plant capacity, yielding only 14 percent of estimated minimum requirements, according to a recent report issued by the General Headquarters of the Supreme Commander for the Allied Powers. Fertilizer production is closest to capacity, but still falls far short of demand. Critically-needed salt also continues to be in short supply by reason of the coal shortage and typhoon damage.

Only one of four Solvay process soda ash plants was in operation at the beginning of this year, and production has been further restricted on account of an unfavorable price for the product. This latter factor may be somewhat relieved by the recent increase to 5,000 yen per metric ton. Caustic soda production, particularly by the electrolytic process, is very low.

Ethyl alcohol, produced by the fermentation of critically-important foods like sweet potatoes and corn, is being distilled in quantities nearly sufficient for immediate medical and industrial needs. Coke by-products are negligible, as the small allocations of coal are being used simply to heat the ovens and prevent the consequences of complete shutdown.

COKE INDUSTRY IN POLAND SLOWED BY LACK OF MARKETS

THE OUTPUT of the 20 coking plants operating in Poland at the end of last year was approximately one-third of capacity. The slowing up is due to the lack of demand for coke products and to a shortage of transportation facilities. Normal production is about 5,698,018 metric tons of coke, 815,000,000 cubic meters of gas, 221,000 tons of tar, 57,000 tons of sulphate of ammonia, and 77,000 tons of benzol. Despite the reduced production, stocks continued to increase with the possibility that further reductions in output would be necessary. Unless the output of pig iron and steel can be increased in a relatively short time, export markets must be found to keep the coke plants in operation.

*"I'll lay you a buck
it's the same outfit!"*



"Go on!" Sam retorted. "The heat's got you, Bill. Maybe you oughta put the insulation on your head."

"My head's all right," Bill declared. "And I guess I know who's installing the magnesia on our own steam lines."

"Maybe you think you know. All I say is, it can't be the same Armstrong. The company I'm talking about makes corkboard, like my nephew used in his new locker plant."

"That's just what I'm saying. Armstrong is an insulation outfit. They handle cold jobs, and heat jobs, too. I've talked to their foremen. Their trucks drive up to our plant. We've got a contract with them. What more do you want?"

"Pipe down, you birds," cut in the man behind them. "Don't you know there's a ball game going on here?"

"Keep your shirt on, fella," Sam shot back. "This is important."

"Look," says Bill. "Let's settle it this way. Monday morning, you phone the Armstrong Cork Company and ask them. If they don't sell heat insulation,

I'll buy both of us grandstand seats next Saturday. And if they *do* . . ."

• • •

Sam had to buy the baseball tickets, of course. For Armstrong does furnish heat insulation, as well as low-temperature insulation. Some folks know us best for one, some for the other. Many use our services on both.

In the low-temperature field, Armstrong supplies three kinds of insulation, to hold temperatures all the way down to 300° below zero. For heat applications, we offer a complete line of insulations for steam lines and equipment. And there are five types of

Armstrong's Insulating Brick to withstand temperatures all the way from 1600° to 2600°F.

We not only sell the materials, but we'll also be glad to help with your engineering problems. And we can supply skilled workmen to install your complete job. Materials, engineering, and workmanship together make up Armstrong's Contract Service. If you'd like the complete story, send for our new folder: "Armstrong's Insulation Contract Service." We think you'll find it interesting. Just drop a card to Armstrong Cork Co., Building Materials Div., 3306 Concord St., Lancaster, Penna.

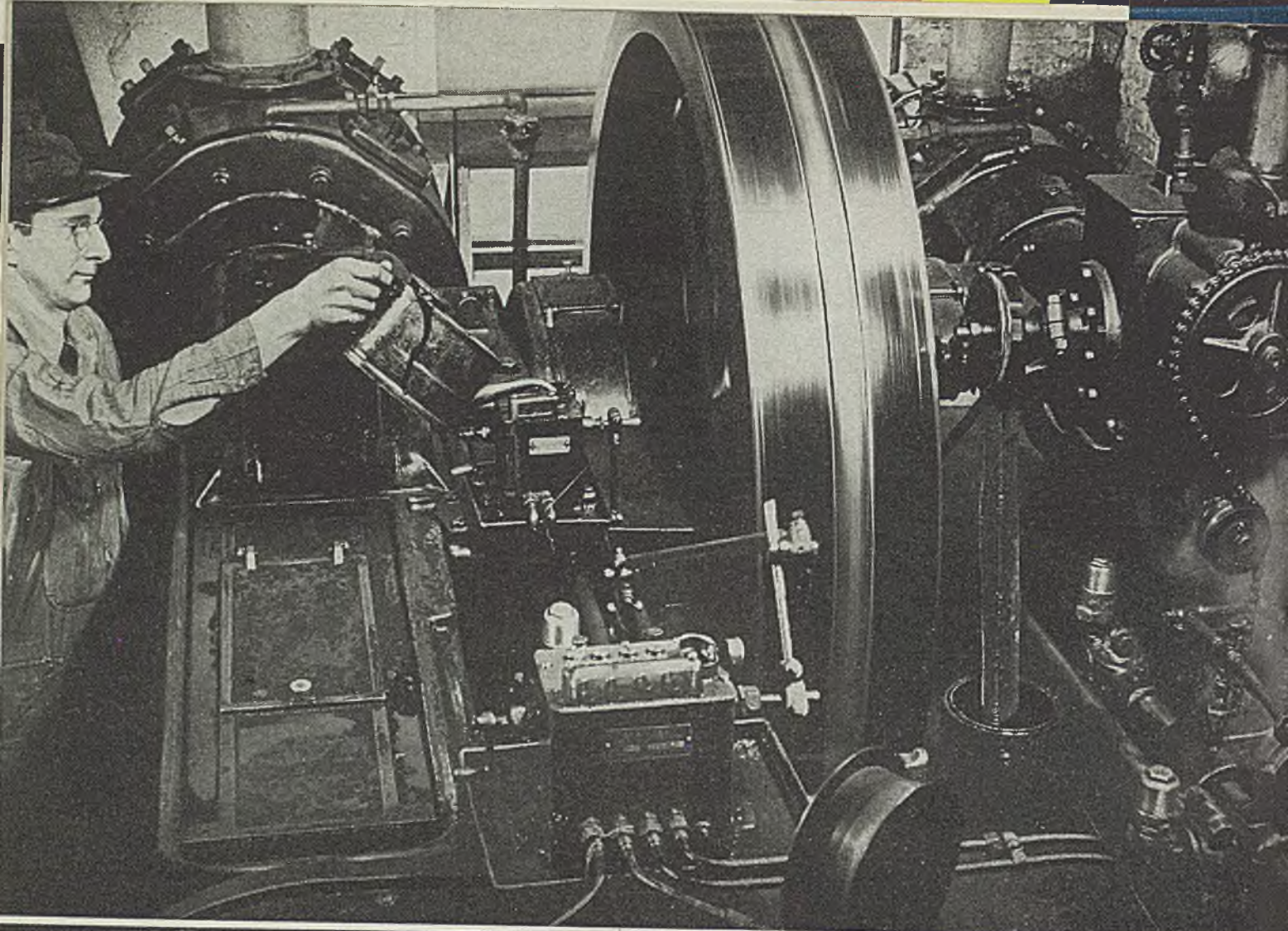


ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service
For All Temperatures

From 300°
Below Zero

To 2600°
Fahrenheit



COMPRESSOR SPEEDED-UP 20%

SUN COMPRESSOR-LUBRICANT . . .

Reduces Spring- and Valve-Breakage, Ends Shutdowns Due to Hard Carbon

When a compressor-overhaul puts a whole plant off stream, then it's vital to keep it running. Here's a case where correct compressor-lubrication meant the elimination of frequent interruptions . . . plus savings of over \$400 a year on maintenance.

A large plant was stumped by the problem of lubricating a compressor, rated at 600 r.p.m., but running 24 hours a day at 720 r.p.m.

Hard carbon formed, and springs and valves were being broken at the rate of more than 160 a year.

A Sun Engineer was called in and recommended a Solnus Oil. In eleven months with this new oil, only six springs and valves broke.

These results are typical of Sun performance throughout the chemical industry. A telephone call to the nearest Sun office will put one of the country's greatest service-organizations to work in your plant. Or write direct to . . .

SUN OIL COMPANY • Philadelphia 3, Pa.
Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

SUN
SUNOCO

**INDUSTRIAL
PRODUCTS**

GERMAN CHEMICAL INDUSTRIES

CERAMIC MATERIALS

IN ORDER to reduce the size of capacitors and other electrical equipment, high dielectric constant materials have been worked on by all the ceramic companies.

High dielectric constants, high permeability, high or low insulation, plus as well as negative temperature coefficients have been worked on intensively by Dr. Franz Rother of Lutz & Co. Likewise a relatively high degree of flexibility is accomplished; very thin sheets which can stand fair handling have been made and the materials may be cast and baked in fairly complicated forms. Perhaps the reason for these successes lies in compact mixing, grinding and filtering.

For the high dielectric constant materials, titanium dioxide is the basic constituent in one or the other of its different crystalline formations. Two sample formulations are:

Composition 964	
Rutile.....	69 parts
Titanium dioxide.....	10
Lanthanum oxide hydrate.....	10
Zirconium hydrate.....	10
Beryllium carbonate.....	1

Composition 336	
Rutile-oxide.....	97 parts
Lanthanum oxide hydrate.....	1
Zirconium hydrate.....	2

Dielectric constants (K) of these two materials are 90 and 105 respectively with temperature coefficients of -7×10^{-4} per deg. C.

Formula for a ceramic with a K of 405 and a positive temperature coefficient of

1.8×10^{-3} is:

Titanium dioxide.....	70 parts
Rutile.....	10
Titanium peroxide.....	13
Lanthanum oxide hydrate.....	7

High permeability materials with high electrical conductivity:

Ferric oxide Fe_2O_3	80 parts
Soapstone.....	15
Magnesium carbonate.....	5

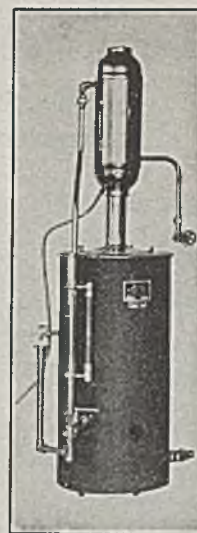
This material has a higher conductivity in the center than the outside. Conductivity of the entire piece can be raised by baking in nitrogen, thus reducing oxidation.

In producing these various ceramic materials, the raw materials in finely pulverized form, are weighed, mixed and tipped into revolving drums. Each drum contains about 1/3 flintstone, 1/3 of the mixture and 1/3 water. Quantity of water is measured so that about 2.5 liters is allowed for each 2 kg. of mixture. Water and mixture are milled for about 100 hr. Interior walls of the drum may be lined with porcelain or flintstone.

After the milling process is completed the mixture is passed through a fine sieve into a vat fitted with a propeller-shaped whirl. The whirl is kept in constant motion and the mixture pumped into a filter press at a pressure of 8 atm.

Cakes of substance emerging from the press are passed along to a roller device and reduced to small pieces which are once more passed through different sieves of varying

Automatic PYROGEN FREE PURITY



Actna Water Stills are designed by engineers and built by craftsmen to satisfy requirements demanded by every hospital and laboratory. They are **DEPENDABLE** with respect to their rated capacities and the unsurpassed quality of the distillate. The pyrogen-free Actna Water Still produces distilled water which can be, and is, used Safely and Confidently for intravenous, plasma, pharmaceutical and other work.

- Pure Distillate
- Compact Vertical Design—saves space, eliminates expansion strain
- Made for all fuels—steam, electricity or gas.
- A size to fit your need. Single, double or triple—from 1 to 150 gallon capacity per hour
- Economical

WRITE TODAY FOR ADDITIONAL
DESCRIPTIVE MATERIAL.

AETNA
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2ND AND SPRING STREETS
EVERETT 49, MASSACHUSETTS

OLDBURY ELECTRO-CHEMICAL COMPANY

HYPOPHOSPHITES POTASSIUM • CALCIUM • SODIUM

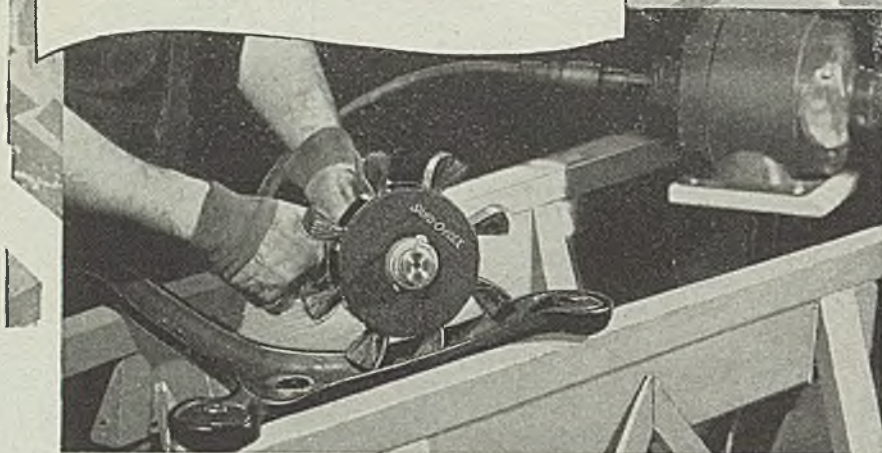
THESE chemicals are made according to National Formulary VII (N.F. VII) and packed in metal containers containing 25 or 50 lbs. net. We welcome inquiries regarding the use or potential use of the chemicals we manufacture.

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NIAGARA FALLS, NEW YORK

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Ingenious New Technical Methods

To Help You with Your
Reconversion Problems



New Brush-Backed, Strip-Fed Abrasive Wheel Deburrs, Sands Any Surface!

For sanding in and around the most irregular contours—for deburring parts too large to be tumbled—for removing rust, paint and imperfections from wood, plastics, rubber, earthenware and metals—the new Sand-O-Flex brush-backed abrasive wheel is MOST PRACTICAL.

The central magazine houses a strip abrasive cartridge, to be fed out as needed in front of the eight brushes which "cushion" the abrasive, and force it evenly over the most difficult surfaces. The Sand-O-Flex comes in 3 sizes, and is adaptable to any stationary or portable motor shaft, with speeds up to 1750 RPM. Abrasives are available in grits for every need.

To help speed production in dry, dusty work atmosphere, many mills and factories urge workers to chew gum to help relieve dry throat. *The reason:* Because dust causes throat irritation and dryness—but chewing Wrigley's Spearmint gum helps keep workers' mouths moist and fresh. *The result:* Reduced work interruptions and "time outs" to the drinking fountain. Even when workers' hands are busy, they can refresh as they work "on the job." And the chewing action helps keep workers alert and wide-awake.

You can get complete information from the
Sand-O-Flex Corporation
4373 Melrose Ave., Los Angeles 27, California



Abrasive Cartridge Shown Open



AA-75

mesh. It can then be pressed again into cakes and once more finely divided in the chopper. The final dimensions of the grains depend to a great extent on the nature of the objects to be made and also on the nature of the matrix used. The powder is then subjected to the ordinary processes of pottery.

For those masses with a high dielectric constant and low loss angle, the process of the ordinary tunnel kiln will serve satisfactorily. According to the size and strength of the objects, they will remain at a temperature of up to 1,400 deg. C. for periods of from 10 to 75 hr.

For adding the quality of permeability the operations are exactly the same. According to the value desired, the firing takes place in a reducing or an oxidizing atmosphere. For a reducing atmosphere it will suffice if further access is denied to air or, alternatively, if a hydrogen atmosphere is introduced.

Digest from "Report on Ceramic Developments of Dr. Rother, Lutz & Co., Lauf/Pegnitz," by R. H. Ranger.

PAINTS MADE WITHOUT DRYING OILS

ETABLISSEMENTS Alphonse Wyns is a paint manufacturing concern with factories in Belgium and France. During the occupation period they gave great attention to the question of making paints and enamels without or with minimum quantities of drying oils. The firm tried to substitute drying oils in paint by the use of the residual gums obtained from the distillation of crude benzol, and of light tar oils. These residual gums are partly polymerized resins of the coumarone-indene type. Three types of tar-oil distillation residues are called resinol, resigum and resilin.

Resinol is a liquid obtained by the distillation of the heavier fractions of the benzolated oils obtained by scrubbing coke oven gas.

Resigum is the final residue of the distillation of tar oil benzol which has been washed with sulphuric acid, water, caustic soda, and again with water. The residual gum should contain as little as possible of oils distilling below 250 deg. C. but its exact composition depends on the type of coal employed, the temperature of carbonization and the method of benzol recovery. A fairly standard type of resigum was desirable and rather exact laboratory control of incoming samples was necessary if very variable resigums were obtained. The lowest possible content of water and of naphthalene was arrived at. Factory specification for resigum for incorporation in paints was a maximum water-content of 1 percent and a maximum naphthalene content of 5 percent. The resigum must also have a neutral reaction and must give a transparent film when spread on glass.

The third useful residual resin from tar oils is known as resilin. This is the resin recovered from washing benzol with sulphuric acid. This residue, which precipitates in the washing acid, is an acidic mixture of a resin of the coumarone-indene type with sulphonated oils. This residue can be neutralized with caustic soda and the solid resin obtained can be dissolved in resinol to make a drying oil for paints. It

ALCOHOL STORAGE TANKS protected against fire by PROTECTOSPRAY



INSTALLATION AT FARM CROPS PROCESSING CORP., OMAHA, NEBRASKA

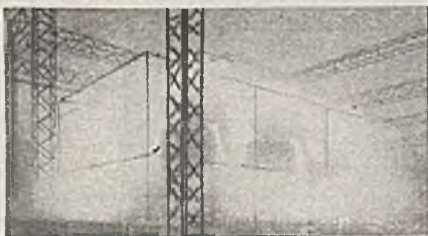
The storage of such highly flammable liquids as alcohol, gasoline, benzol, toluol, styrene, butane and butadiene creates extreme fire hazards. Grinnell has met this challenge with ProtectoSpray—a system designed to provide protection to tanks, structures and equipment in such extreme fire hazard areas.

ProtectoSpray delivers finely divided droplets of water from nozzles so placed as to assure complete coverage of exposed surfaces. This sustained spray provides insulation, plus cooling by evaporation and conduction, sufficient to protect the containers and structures from serious distortion or buckling even when exposed to the fiercest flames.

An experienced engineer from a nearby Grinnell office will gladly help you in working out complete fire protection for any hazard. Grinnell Company, Inc. Executive Offices, Providence 1, Rhode Island. Branch Offices in Principal Cities.



ENGINEERED FIRE PROTECTION



MULSIFYRE—For Oil Fires. A fixed installation for putting out fires in heavier oils and flammable liquids. Protects transformers, oil lines, quench tanks and bilges of oil-burning ships.



FLAMEBUSTER—For Manual Fire-Fighting. Low velocity spray for stubborn fires in light, flammable liquids; high velocity spray for fires in heavier oils; solid stream for mopping up.



AUTOMATIC SPRINKLERS—For Ordinary Risks. Protect over seventy billion dollars worth of property. Check fire at the source, day or night, before major damage can occur.

Safeguard
PRODUCT QUALITY



Republic STEVENS Metal
BARRELS AND DRUMS
 of **ENDURO Stainless Steel**

Don't take chances with product contamination. Use barrels and drums of Enduro—the lustrous metal that is inert to most chemical and food products—that is sanitary and easy to clean—that is resistant to corrosion—that is tough and strong—that is economical to use because it lasts so long.



The Republic STEVENS Line offers a type and size for every chemical and food plant need. Write us for literature.

★ ★ ★

The solid bead drum at the left and the patented Ringlox drum shown above are but two of the many styles in the complete Republic STEVENS Line.*

*U. S. Patent No. 1792281

NILES STEEL PRODUCTS DIVISION
REPUBLIC STEEL CORPORATION
 NILES, OHIO



Republic
STEVENS
METAL BARRELS AND DRUMS

appears, however, that resigum is a more satisfactory product than the solution of resin in resinol.

Resigum is completely miscible with mineral, animal and vegetable oils and with natural resins such as gum copal and colophony and with glyptals and phenolic resins.

Paints can be made with resigum without any addition of natural drying oil whatsoever. It is not claimed that such paints give as good a finish as normal paints. It is claimed that these paints nevertheless give good coverage and surface protection. The film given by resigum paint was highly flexible. It is admitted that paints in which some natural drying oil is incorporated in addition to resigum are much superior in finish to those containing resigum only.

Digest from "Paint Manufacture—Etablissements Alphonse Wyns, Vilvorde," by H. J. Phelts.

ALUMINA FROM COAL ASHES

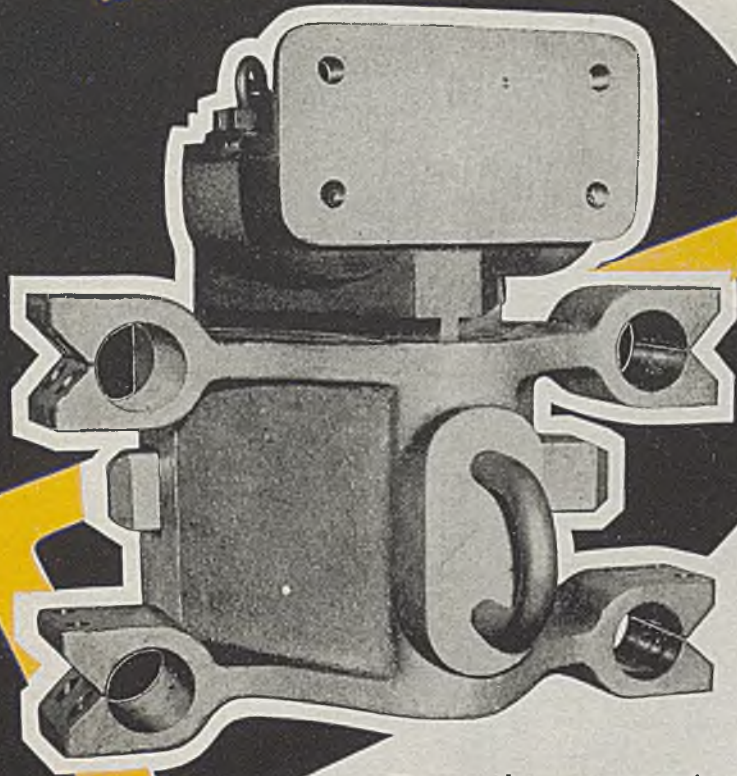
Two commercial plants to operate the Seailles-Dyckerhoff process for recovery of alumina from coal ashes were established during the war. Though technically the process was found practicable it was quite uneconomic with materials of such low alumina content as those used.

Essentially the process consists of burning an alumina-containing raw material with limestone; extracting the pulverized material with water by a countercurrent method; precipitating the alumina and lime from this solution by treatment with carbon dioxide and then subsequently extracting the alumina from the mix of these two solids by treatment with soda. An alternative procedure for the extraction is to treat the burned material with a sodium carbonate solution.

The object of establishing these plants in Germany was to produce alumina from indigenous raw materials. Both clay and colliery wastes were tested in the preliminary trials, but eventually it was decided to work on power station ashes as the raw material, selecting ashes with as high an alumina and as low a silica content as was possible. The raw mix of ashes and limestone was treated as in portland cement manufacture and burned in a rotary kiln with a reducing atmosphere to obtain the great bulk of the iron either as FeO or as metallic iron. The temperature of burning was about 1,300 deg. C. and the air flow through the cooler was reduced to give slow cooling and obtain a self-pulverizing clinker. The lime content of the raw mix was calculated as that required to form $2\text{CaO}\cdot\text{SiO}_2 + \text{CaO}\cdot\text{Al}_2\text{O}_3$ with about 10 percent excess. No allowance was made for iron oxide in the proportioning. A clinker of this composition should be self-pulverizing on slow cooling, and indeed, unless the clinker did self-pulverize, it was found that the alumina content which could subsequently be extracted was reduced. For 1 ton of alumina some 10-12 tons of ashes (25-30 percent alumina) and 15 tons of CaCO_3 were required. The clinker contained about 13-14 percent alumina and from 60-70 percent of this could be extracted by the sodium carbonate method. The self-pulverized clinker was treated with a sodium carbonate solution in a mixer from which both solution and solids passed to a

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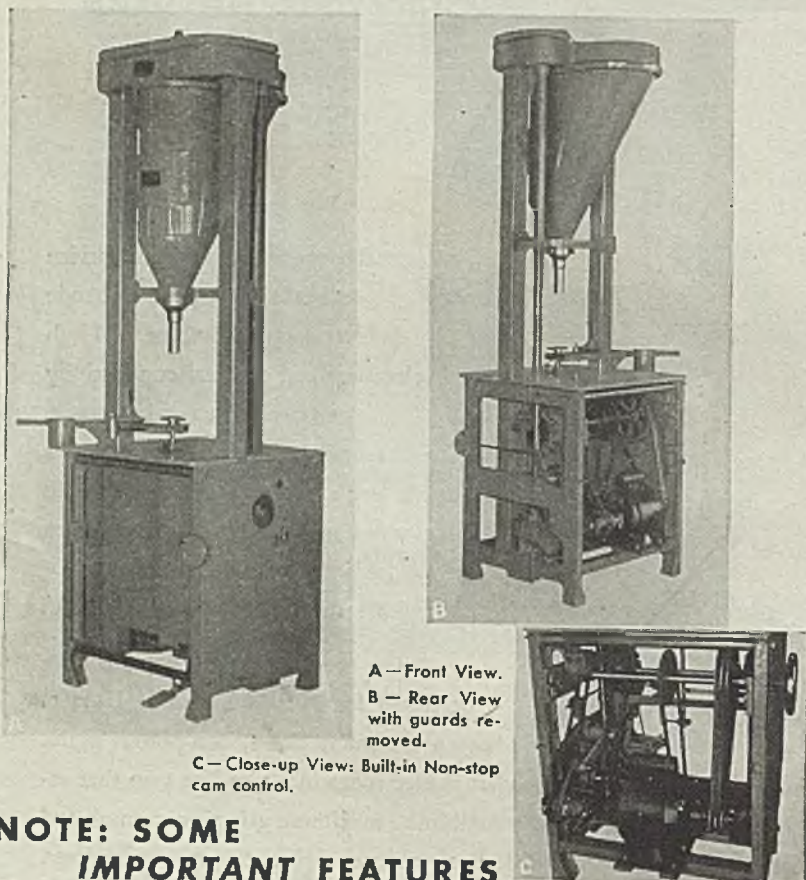
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A—Front View.
B—Rear View with guards removed.

C—Close-up View: Built-in Non-stop cam control.

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sedimentation tank or thickener. The mud which settled out in this thickener was passed to rotary vacuum filters and then used for manufacture of portland cement. The solution from the thickener was passed through filter presses and then precipitated by treatment with carbon dioxide. For this purpose the kiln gases were used but this led to some difficulty in plant operation and maintenance. The gases were first washed to remove dust and the wet gases containing sulphur dioxide caused trouble by corrosion of the pipelines. The solution obtained from the precipitator was returned to the circuit.

Digest from "Seailles-Dyckerhoff Alumina Process, Portlandement Fabrik Dyckerhoff & Sohne at Amoneburg Bei Blebrich," by F. M. Lea.

THERMOCOLOR PAINTS

HEAT-SENSITIVE metallic salts or pigments are a convenient method for measuring approximate temperatures on large surfaces such as boilers, dryers, furnaces, etc. Compounds of cadmium, cobalt, nickel, copper and manganese, in combination with other pigments and a suitable binding medium are useful for this purpose. Standard crayons or marking colors have been calibrated against time and temperature. Marking paints in which the color has been dispersed in urea-formaldehyde resin solution have been prepared. A few examples are tabulated below.

Digest from "Report on Thermocolour Paints, I. G. Farbenindustrie, Oppau (Ammoniaklaboratorium)," by V. C. Blalock.

Color Changes in Thermocolor Paints

Code	Color Change	Time vs. Temperature*				
		10	30	60	90	120
F36b	yellow— red brown	300	290	280	270	260
F214	purple— blue	150	140	137	133	130
F217	green— brown	230	220	210	200	195
F318	lt. red— lt. blue	72	65	62	60	58
F318	lt. blue beige	155	145	135	130	125
F320	grey-green— lt. blue	72	65	62	60	58
F320	lt. blue— olive gn.	155	145	135	130	125
F320	olive gn.— brown	230	220	210	200	195
F333	yellow— violet	120	110	105	103	100
F334	lt. green— blue	63	60	55	52	50
F335	red—blue	40	38	36	34	33

* Minutes vs. temperature, presumably deg. C.

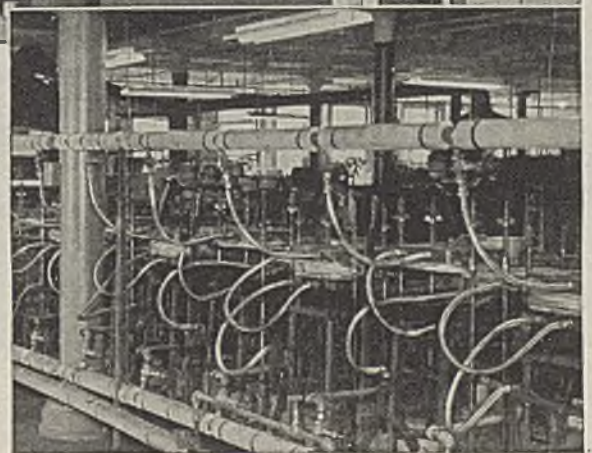
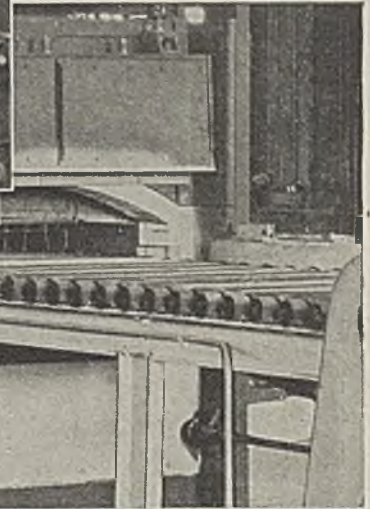
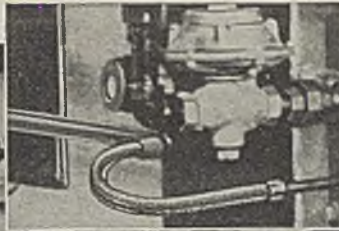
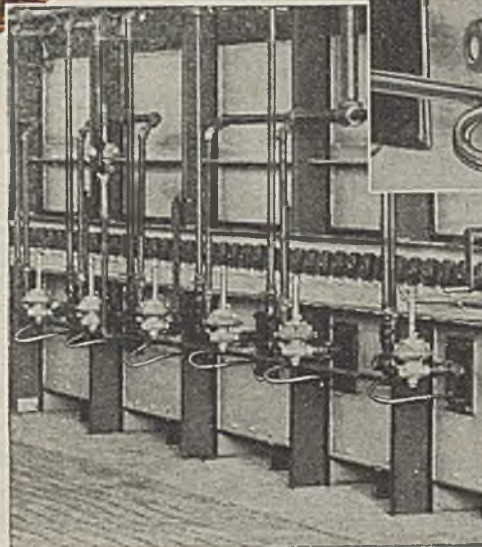
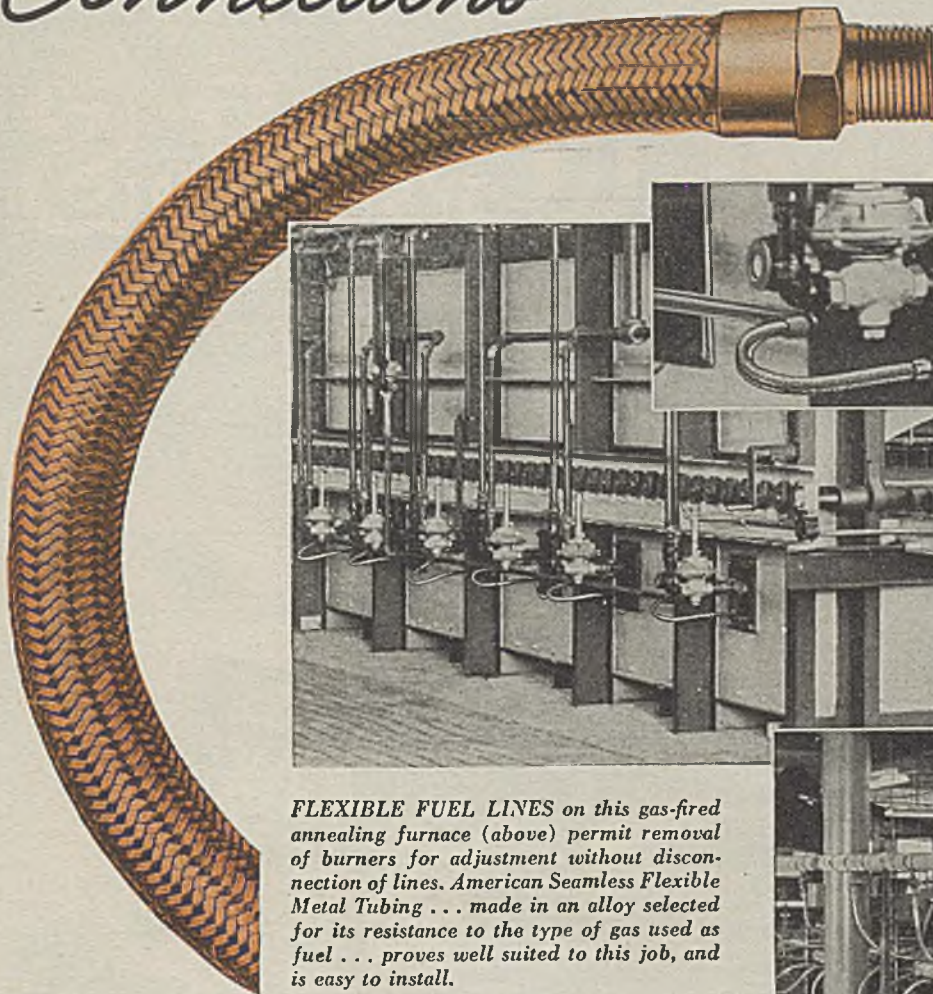
Composition of the Paints

Code	Formula
F36b	7 kg. Ferrite yellow 3½ kg. Plastopal*
F214	10 kg. CoNH ₄ PO ₄ ·H ₂ O 2.3 kg. Plastopal
F217	7 kg. CuSO ₄ ·3Cu(OH) ₂ ·H ₂ O
F318	3.75 kg. MgNH ₄ PO ₄ ·6H ₂ O 1.25 kg. CoNH ₄ PO ₄ ·6H ₂ O 2.5 kg. Pb(OH) ₂ 2.2 kg. Plastopal
F320	4.5 kg. MgNH ₄ PO ₄ ·6H ₂ O 1.5 kg. CoNH ₄ PO ₄ ·6H ₂ O 4.2 kg. Pb(OH) ₂ 2.8 kg. CuSO ₄ ·3Cu(OH) ₂ ·H ₂ O 4.5 kg. Plastopal
F333	4 kg. NiCl ₂ ·2C ₄ H ₁₂ N ₄ ·2H ₂ O 2 kg. TiO ₂ 2.5 kg. Plastopal
F334	4 kg. NiBr ₂ ·2C ₄ H ₁₂ N ₄ ·10H ₂ O 2 kg. TiO ₂ 2.5 kg. Plastopal
F335	4 kg. CoCl ₂ ·2C ₄ H ₁₂ N ₄ ·10H ₂ O 2 kg. TiO ₂ 2 kg. Plastopal

* Plastopal is a 50 percent solution of urea-formaldehyde resin in butyl alcohol. To obtain spraying or brushing consistency, products are reduced with ethyl alcohol—usually 100 parts color paste to 60 or 80 parts alcohol.

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FLEXIBLE FUEL LINES on this gas-fired annealing furnace (above) permit removal of burners for adjustment without disconnection of lines. American Seamless Flexible Metal Tubing . . . made in an alloy selected for its resistance to the type of gas used as fuel . . . proves well suited to this job, and is easy to install.

LIVE STEAM FOR FORMING HATS is fed through this maze of connectors (right) to hat-forming presses. American Seamless is used because it withstands heat and corrosion, permits ready opening and closing of presses.

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CHEMICALS INDISPENSABLE

N.A.C.E. Convention

MORE THAN 500 corrosionists from all parts of the country gathered in Kansas City, Mo., on May 7, 8 and 9 to attend the annual convention and exposition of the National Association of Corrosion Engineers. This was the Association's second national meeting and its first exposition of manufacturers' products. There was no question of the meeting's success; NACE has established its place among the national engineering societies.

COURSE PLOTTED

During the course of the convention the Association held a symposium to determine what line of activity it might best follow to supplement, and not overlap, the corrosion activities of other technical societies. Representatives of 14 societies explained how their respective organizations handled corrosion and on the basis of these reports the broad outlines of NACE's future were sketched in. Inasmuch as NACE is almost certainly destined to assume increasing importance, and perhaps become the central figure in the battle against corrosion, it would be a mistake not to take stock of the way in which the Association will probably shape up.

The fact that the meeting was attended by a surprisingly large number of the country's top corrosion workers is evidence enough that NACE has been received as a welcome approach to a real problem—namely, the problem of fostering inter-industry cooperation in attacking an inter-industry phenomenon. As now constituted, technical societies are generally related to a particular branch of science (American Chemical Society), or a special phase of engineering (American Society of Mechanical Engineers), or to a particular industry (American Petroleum Institute). Corrosion, however, is no respecter of such vertical classifications; in many of its aspects it is a horizontal phenomenon and very frequently information developed by one group of scientists or engineers bears directly on the problems of another.

That is where NACE fits in. By-and-large its members are also associated with one or another of these other organizations. NACE plays the role of the common meeting ground, the open forum, whereby knowledge gained in one industry can be made more immediately available to those concerned with a similar problem in another industry. As such, it performs a unique and much needed function.

In addition to serving as a medium of exchange, NACE may also be expected to initiate investigations of its own. It is recognized, however, that such investigations

should ordinarily be concerned with problems that are distinctly inter-industry in character. If a corrosion problem is peculiar to a certain industry, it can probably be handled most effectively by an industry association; if the problem extends to many industries then it comes within the proper scope of NACE. For example, corrosion by refrigerants probably represents a special problem for the American Society of Refrigerating Engineers, whereas corrosion by the fluid being cooled is a general problem for NACE. It is recognized also that NACE, as its name implies, may properly be expected to devote itself primarily to the practical, or engineering, aspects of corrosion. In this way it should serve to supplement and utilize the work of the corrosion division of the Electrochemical Society—a group that seems likely to devote a good deal of attention to the fundamental principles involved in corrosion.

It was also the consensus of opinion that NACE should not attempt any activities that have already become the well established function of some other organization—even though such activities might be considered within the province of NACE in that they are inter-industry in scope and of a practical engineering character. For example, the American Society for Testing Materials has been very active in developing corrosion testing methods and their correlation with performance; its testing methods frequently form parts of specifications. Since ASTM is so well established and so well organized to handle this kind of work, any duplication of such activities by NACE would probably be undesirable.

CORROSION ABSTRACTS

NACE, it was announced at the Kansas City meeting, has taken steps to relieve one of the major causes for complaint among corrosion workers, namely, the lack of any comprehensive abstracting service for current corrosion literature. With the help of the American Coordinating Committee on Corrosion, NACE plans to prepare such abstracts and publish them regularly in the Association's quarterly journal *Corrosion*. Abstracts will be so arranged and coded as to facilitate the preparation of bibliographies on particular topics, and every effort will be made to make the service as nearly complete as possible, the ultimate object being to include abstracts of all worthwhile domestic and foreign articles. In addition it is hoped that it will be possible to publish in *Corrosion* complete copies or extensive abstracts of papers on corrosion that may be presented before other technical societies.

OPEN MIND

One of the most optimistic signs to be seen at the recent convention was the evidence of the Association's breadth of interest. NACE was founded by a group of engineers from the petroleum industry, and although it aspired to embrace all industry, it was inevitable that during its first year or two it should assume the complexion of a petroleum-industry association, both in its membership and its papers. However, the group has continued its effort to attract corrosion engineers from other industries, and judging from the number of non-petroleum engineers present it is on its way to success in establishing itself as a truly inter-industry association. For example, in addition to symposiums on the oil and the natural gas industries, the program also included symposiums on corrosion in the water industry, the electrical and communication industries, and the chemical industry. It is probably true that petroleum still predominates but the Association is by no means tied to its apron strings. NACE is turning more and more to other industries; conversely, and equally important, an increasing number of corrosion engineers from other industries are coming to take an interest in the affairs of NACE.

EXPOSITION

Concurrently with its technical program NACE sponsored an exposition in which thirty-odd manufacturers displayed products employed in the mitigation of corrosion. Protective coatings and cathodic protection got by far the biggest play.

Protective Coatings—A majority of the protective coating exhibitors were concerned with protection of underground pipelines. Owens-Corning Fiberglas Corp. showed the Fiberglas mat used as underground pipe wrapping. The Tapecoat Co. showed the tape it makes by coating cotton fabric with low-melting coal tar; it is used for hand wrapping in the field, particularly across welded pipe joints. Hill, Hubbell Div. of General Paint Corp., featured its mill-coated steel pipe and Pipe Line Service Corp., Franklin Park, Ill., demonstrated its readiness to do the work of coating and wrapping to customer specifications. Coal tar enamels were recommended in the displays of both the Barrett Div. of Allied Chemical and Dye Corp. and the Reilly Tar & Chemical Co.; bituminous coatings were featured by Wailes Dove-Hermiston Corp. of Westfield, N. J. The largest items in the exposition were a Johns-Manville pipe coating and wrapping machine and a C-R-C pipe cleaning and priming machine, both in the booth of Crutcher-Rolfs-Cummings.

A new electronic holiday detector was in-

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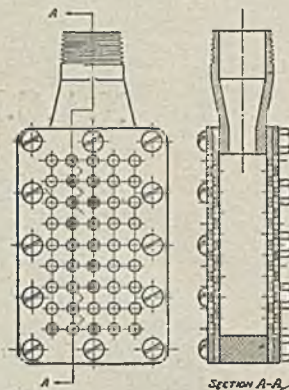
roduced at the exposition by the D. E. Stearns Co., Shreveport, Pa.; the detector, which weighs only 45 lb., runs on rubber rollers that can be adjusted to fit any size pipe and it consists essentially of a 6-v., three-cell storage battery, an oscillatory surge generator, and a rolling coil spring exploring electrode that loops around the pipe. The generator maintains an 8,000-v. potential between the electrode and the steel pipe; if the electrode rolls over a fault in the coating the circuit is completed and an alarm given. The Nox-Rust Chemical Corp. of Chicago showed an aluminum paint, an inhibited acid rust remover, and a cold-brushable petroleum base pipe coating. Dearborn Chemical Co., Chicago, featured its line of No-Oxid petroleum wax coatings and two of its No-Oxidized wrappers, one made by impregnating asbestos with the wax and the other, for export shipping, made by impregnating cotton cloth with cellulose acetate and wax and laminating it to cellulose acetate film. Corrosite, a comparatively new protective coating, was displayed by Baker Synthetics, Inc., New York; Corrosite is a blend of thermoplastic and thermosetting resins dissolved in high-boiling solvents. Amercoat vinyl-base paint and sheeting were shown by American Pipe and Construction Co. of South Gate, Calif., and both phenolic and vinyl base coatings were featured by the Lithgow Corp., of Chicago. United Chromium Co., New York, offered phenolic and vinyl coatings and a treating solution for anodically producing a chromate film on zinc and zinc coated parts.

Cathodic Protection—Aluminum, magnesium, and zinc sacrificial anodes for cathodic protection were shown by Apex Smelting Corp., Chicago, and magnesium anodes by Dow Chemical Co. Several manufacturers featured products used in cathodic protection by the method of impressed d.c. voltage. General Electric Co. exhibited Tungar rectifier bulbs and copper oxide rectifier stacks. Copper oxide rectifier units complete with multistep transformer and rectifier stacks were featured by Westinghouse Electric Corp. and by Graybar Electric Co. Graybar also had a variety of accessory equipment for cathodic protection, such as their new mechanical connectors for attaching leads to sacrificial anodes. Federal Telephone and Radio Corp. had several selenium rectifiers on display and Jacobs Wind Electric Co. of Minneapolis, a model of the windmill d.c. generator it has developed for cathodic protection of pipelines. Another model was shown by Electro Rust-Proofing Co., this one of a d.c. cathodic protection installation in an overhead water tank.

Miscellaneous—The U. S. Stoneware Co. showed acid and alkali resistant brick and cement, phenolic and furan paints, stoneware valves, Tygon (vinyl-base plastic) sheet, and some accessories for hooking up Tygon tubing, namely, a new fingertwist coupling, a Y-fitting, and a wall clamp. The company also exhibited a length of 3-in. porous ceramic pipe pressure-impregnated with Duralon, a furan resin. This impregnated porous ceramic ware was developed to get resistance to thermal shock and is said to withstand a water quench from 400 deg. F.

Johns-Manville Sales Corp. displayed Transite pipe fittings for oil field service and Illinois Electric Porcelain Co. showed

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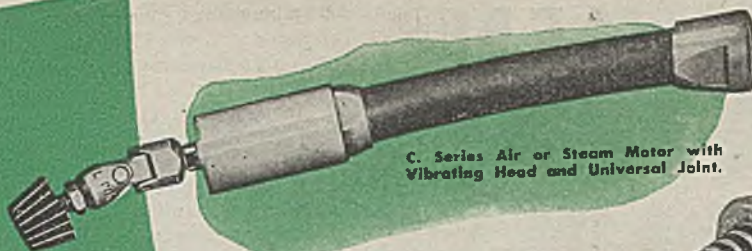
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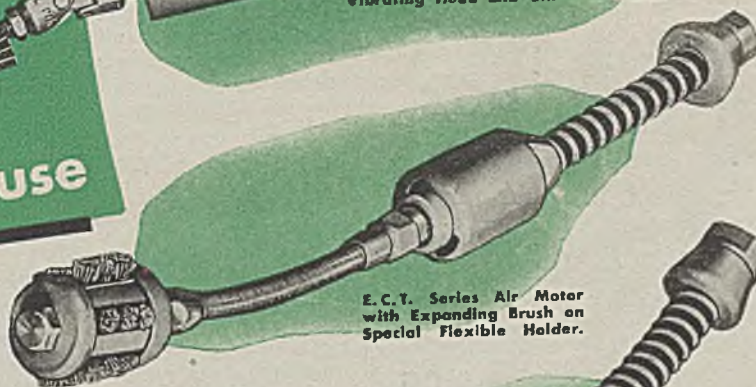
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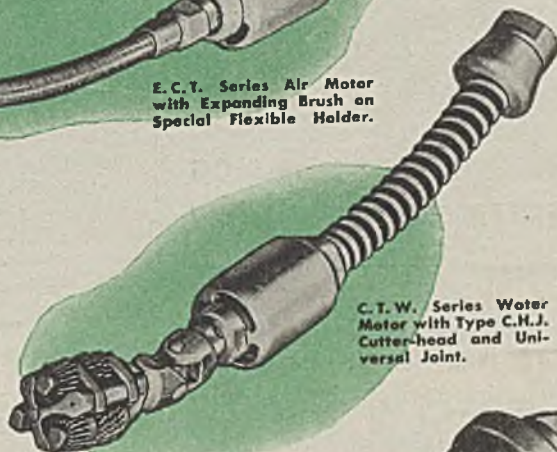
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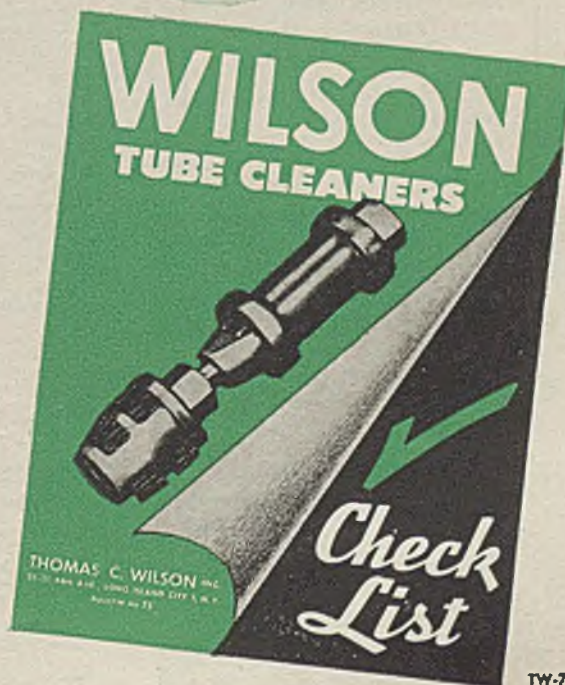
Like thousands of other engineers, you can obtain the same tube cleaner performance through use of the Wilson Tube Cleaner's Check-list (25,000 copies requested already). A glance at the booklet will show you how to determine quickly the correct choice of Wilson tube cleaning equipment (motor, cutter head, flexible shaft, or other accessory), so you will be assured of most efficient tube-cleaner performance.

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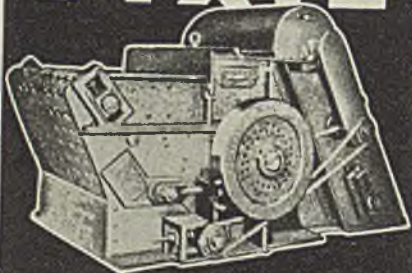
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porcelain pipe, valves, and fittings. The Cooper-Bessemer Corp., Mount Vernon, Ohio, had on display some of the corrosion resistant materials that go into the construction of the company's engines and compressors. These included: A hollow piston rod coated on the inside with a baked phenolic resin to protect against corrosion by cooling water; a diesel engine valve spring also protected by a phenolic coating; exhaust valves with the stems made of an alloy containing 18 percent Cr, 14 Ni, and 3 Mo and the head made of a precipitation hardening steel containing 24 percent Cr, 5 Ni, and 3 Mo; and an unloader valve and seat made of stainless steel containing 35 percent Ni and 15 Cr.

A metallizing gun and several metal sprayed objects were exhibited by the Metallizing Co. of America. The Aluminum Co. of America featured its Alcoa 3S condenser tubing and the International Nickel Co., an assortment of pump and valve parts, packing, metal gaskets and tubing made of nickel, Monel, Inconel and other nickel-bearing alloys.

One of the most interesting products presented at the exposition was the Probolog of the Shell Development Co. This is a device for nondestructive detection of corrosion in heat exchanger tubes; it records quantitatively all irregularities in any non-magnetic metal tube. It consists of a probe on the end of a cable, a probe puller, and an electronic strip recorder synchronized with the puller. Each tube is tested individually without being removed from the heat exchanger. The probe is simply pulled through the tube and any irregularity in the tube wall shows up on the tape as a deflection from a centerline.

CORROSION LITERATURE

A Theory of the Mechanism of Rusting of Low Alloy Steels in the Atmosphere. H. R. Copson, American Society for Testing Materials, preprint 25, 1945.—Propounds a new theory of the mechanism of rusting and concludes that corrosion rate depends on quality and quantity of water reaching steel surface. Based on the character of rust formed on low alloy steels.

Corrosion Fatigue Properties of Some Hard Lead Alloys in Sulphuric Acid. D. I. Mack, American Society for Testing Materials, preprint 32, 1945.—Describes an investigation of corrosion fatigue as it affects storage battery grids.

Inhibitors of Sulphate-Reducing Bacteria by Dyestuffs. T. H. Rogers, Journal Society of Chemical Industries, Oct. 1945, pp. 292-295.—Practical applications in cable storage tanks and gas holders.

Corrosion of Equipment in High Pressure Gas Wells. T. S. Bacon, Gas Age, Oct. 18, 1945, pp. 64-65.—A review of the phenomenon—where it has occurred, some of its idiosyncracies, and what is being done to investigate and prevent it.

German Stainless Steels. A. L. Feild, Iron Age, Dec. 20, 1945, pp. 60-67.—Gives properties, applications, and methods of processing and heat treating various types of stainless steels and high temperature alloys commercially produced in Germany during the war.

Throwing Power of Anodizing Baths. Robert S. Herwig and Albert Leigh, Iron Age, Dec. 20, 1945, pp. 51-53.—Device described for determining visually, especially in the case of blind holes and crevices, the degree of corrosion protection afforded by anodizing baths. It can also be applied to measure throwing power of plating baths.

Laboratory Corrosion Tests of Rotary Lime Kiln Refractories. G. R. Pole and A. W. Beinlich, American Ceramic Society Journal, Dec. 1, 1945, pp. 357-360.

Valve Facing Alloy Resists Corrosion at High Temperatures. V. C. Young, Materials and Methods, Dec. 1945, pp. 1744-1745.—Describes the satisfactory performance of the alloy at temperatures over 1,200 deg. F.

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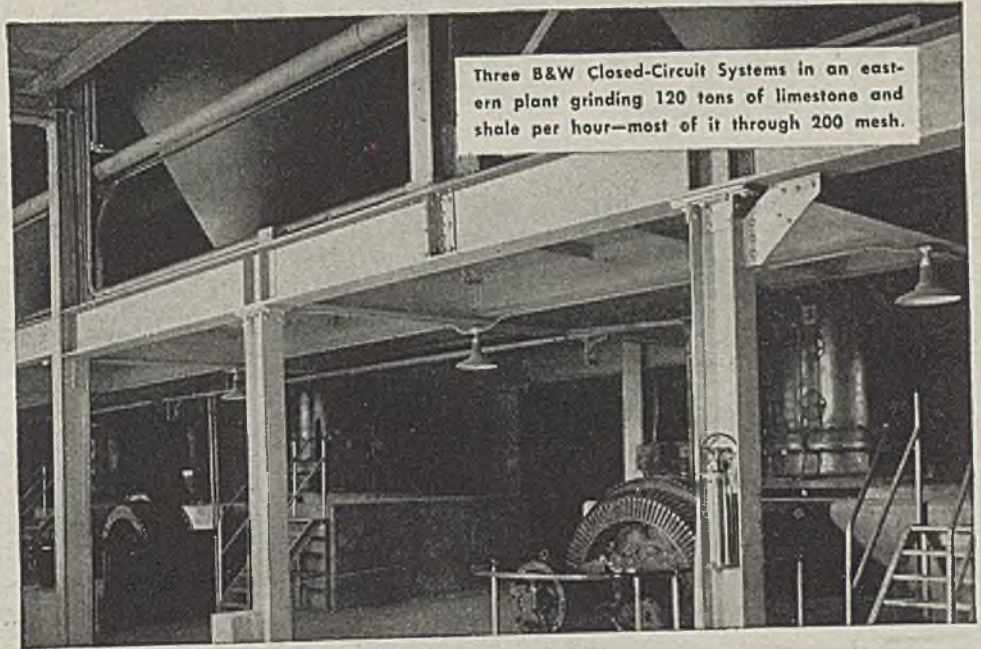
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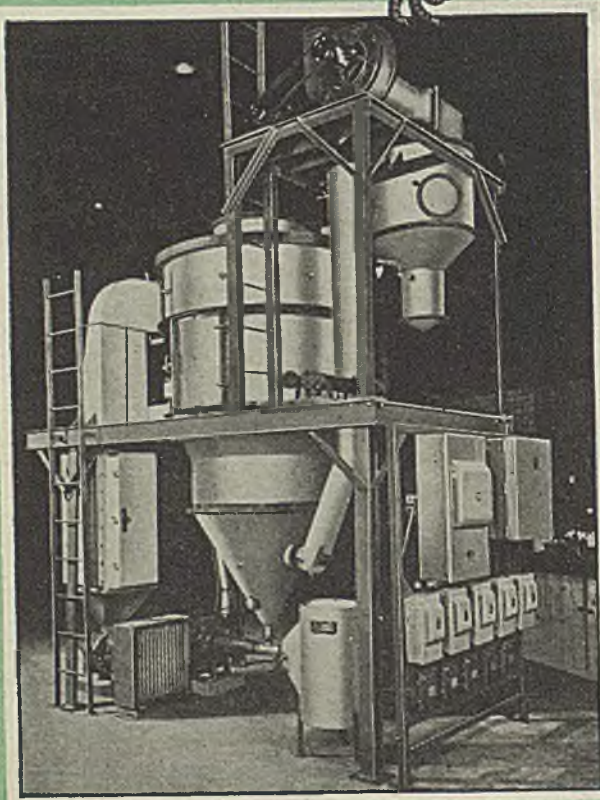
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FROM THE LOG OF EXPERIENCE

DAN GUTLEBEN, Engineer

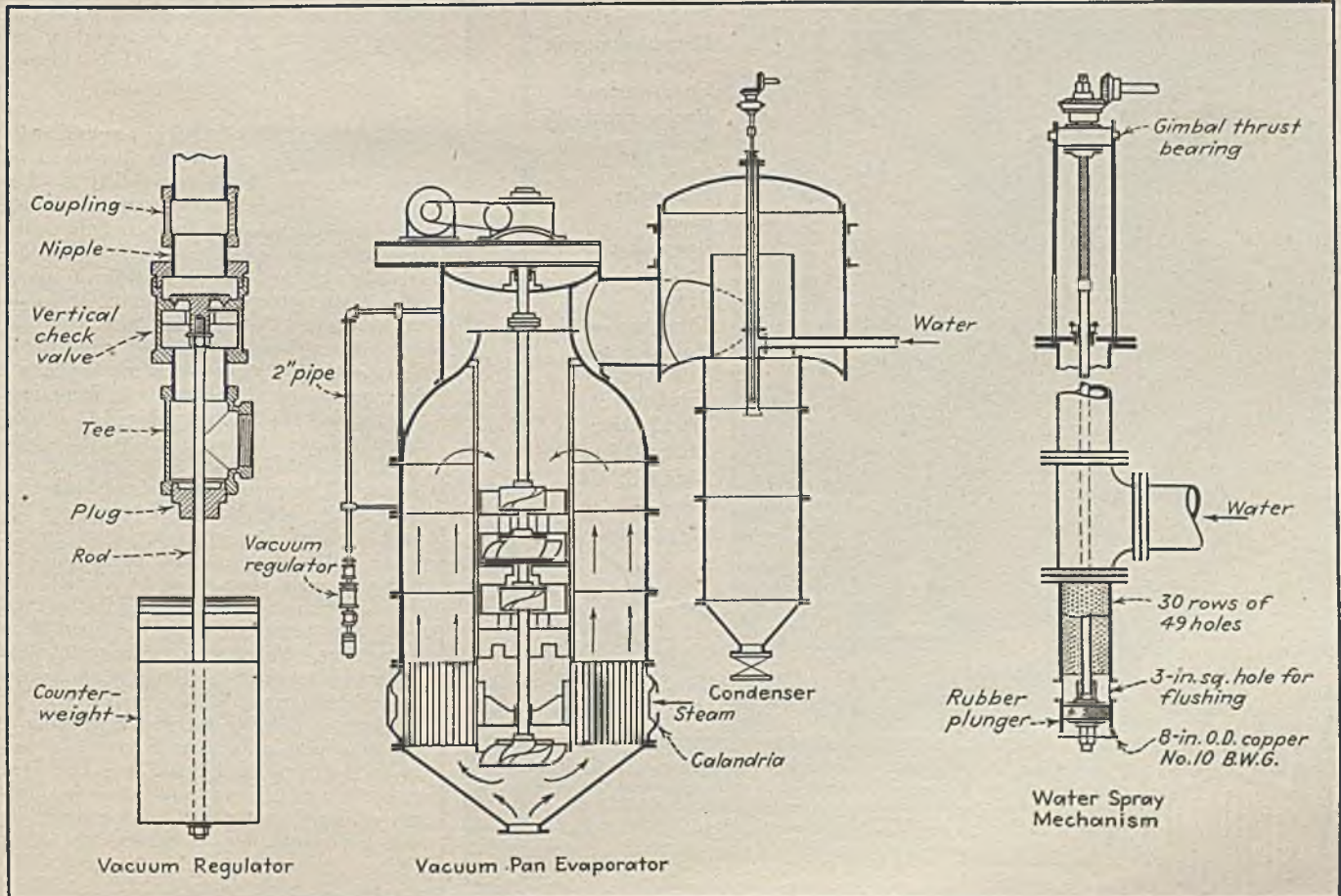
UNIFORMITY of the degree of vacuum in a vacuum pan is essential to the acquisition of uniformity in size of sugar crystals. A drop in the temperature of the massecuite increases the supersaturation of the mother liquor and immediately causes precipitation of fine crystals because the sugar does not have time to accrete to existing crystals. Fluctuations in the vacuum thus effect irregular sizes of crystals which are difficult to purge and to wash in the centrifugals, and some fine crystals even pass through the screens with the sirup. The guilty finger for fluctuating vacuum of course points to the condenser.

THE CONDENSER ordinarily receives its water supply through weirs, sprays or perforated pipes. The finer the dispersion of spray into the vapor space, the greater is the surface of contact area between the cold water and the vapor and accordingly the greater is the heat transfer per gallon of water. Our old parallel flow condensers were

equipped with horizontal 8-in. No. 14 copper pipes having $\frac{1}{8}$ -in. perforations to equal the cross sectional area of the pipe. In the course of time the holes eroded and the original spray lost its vigor and assumed the shape of a coarse rope drapery. By insensible gradations the consumption of water increased as well as the difference in terminal temperatures. The sugar boiler, finding greater comfort in the practice of speculation on the swivel chair than in the physics of crawling through the small manhole near the ceiling when there was a Sunday supplement to be read at home, opined that the gradual decline of efficiency was due to the general moral decay. After the pipe had been in use five years, Frank Harvey, the "Super," chanced to compare the current chart of the two-pen terminal thermometer on the condenser with an old one and immediately made a holler! Then the cause was discovered, new No. 10 perforated pipes were installed for three 14-ft. pans and presto one 10-in. raw water pump with its 200 hp.

motor was shut down. This brought the subject out into the open, and then in order to permit regulation of volume of the injection water without affecting the pressure, the spray pipe was arranged vertically and provided with a rubber plunger, as shown. By moving the plunger, as many spray holes can be uncovered as are needed to admit the quantity of water that the desired vacuum requires. The pressure of the water is constant and so the throttling of the volume does not affect the fineness or the vigor of the spray. This device has reduced the consumption of cold water and produces tail water of higher temperature. This has an additional advantage in that this water is used for boiler feed and for char washing and general plant supply. Moreover throttling can be made automatic by relaying an impulse from the vacuum within the pan for the control of a motor to set the plunger. The plunger stem could also be loaded with a counterweight analogously to the spring-loaded sprays in feed water heaters. In this

Forced-circulation vacuum pan for evaporation of sugar solution; detail shows (left) vacuum regulator and (right) constant-pressure, variable-volume water spray mechanism



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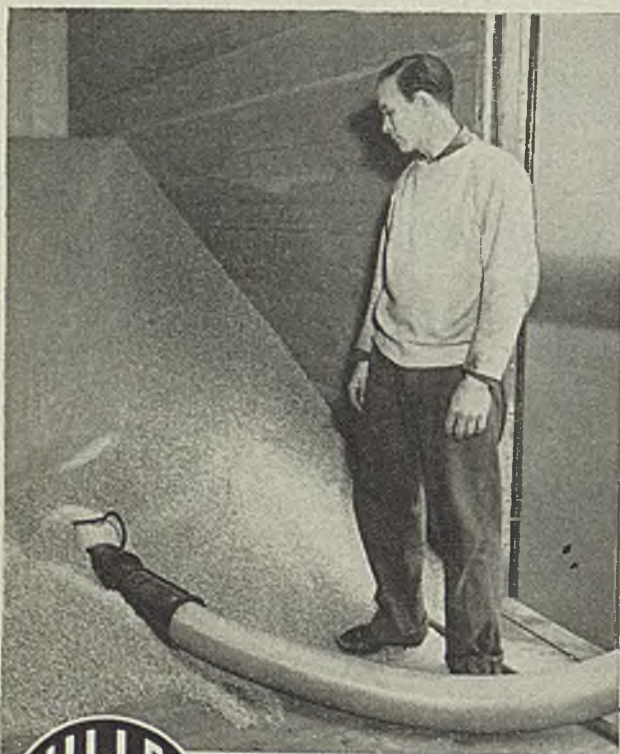
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 Ferrous sulphate
 Fuller's earth
 Grain dust
 Grits (corn)
 Gypsum
 Iron oxide
 Lime (caustic)
 Lime (hydrated)
 Lime (pebble)
 Lime (pulv.)
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 Malt
 Middlings
 Phosphate rock
 (pulverized)
 Record scrap
 Resin (synthetic)
 Rubber pellets
 Salt
 Salt cake
 Silex
 Soap chips
 Soda ash
 Starch
 Titanium oxide
 Volcanic ash
 (pulverized)
 Whiting
 Wood flour
 Zinc calcine
 Zinc sulphide

case the water volume would be controlled by means of a chronometer valve and the pressure and volume would automatically set the position of the plunger. After the vertical spray was installed all of the cataract baffles were removed except the two at the bottom.

NOW COMES AL WEBRE, the internationally known pan expert of the U. S. Pipe & Foundry Co., with a simple vacuum regulator that removes the alibi of imppecuniosity for any sugar boiler who wishes to take advantage of the profits of uniform vacuum but suffers from the restrictions of a cantankerous purchasing agent. In many of the Webre forced-circulation pans in Cuba he has installed a 2-in. vertical, weighted check valve vacuum breaker in front of the pan and connected it to the vapor pipe between the pan and the condenser. He sets the supply of injection water slightly above the demand for maximum vacuum and then lets a little air continuously bleed into the condenser to hold the vacuum at the point for which the counterweight is set. This simple device holds the vacuum within a fraction of an inch of the desired point.

MECHANICAL CIRCULATION in vacuum pans has long been thought of and some applications of the idea (including the chronicler's) had been made to prove its impracticability! However Al Webre ("Alfredo" to the Cuban sugar technologists) erected the achievement of success into an obsession. He applied the analysis of the blacksmith as well as the physicist and evolved a machine having the ruggedness of a rhinoceros. He followed his installations with painstaking tests and extracted amazing secrets which he promptly dissipated by way of bulletins (published by U. S. Pipe & Foundry Co.) to the craftsmen.

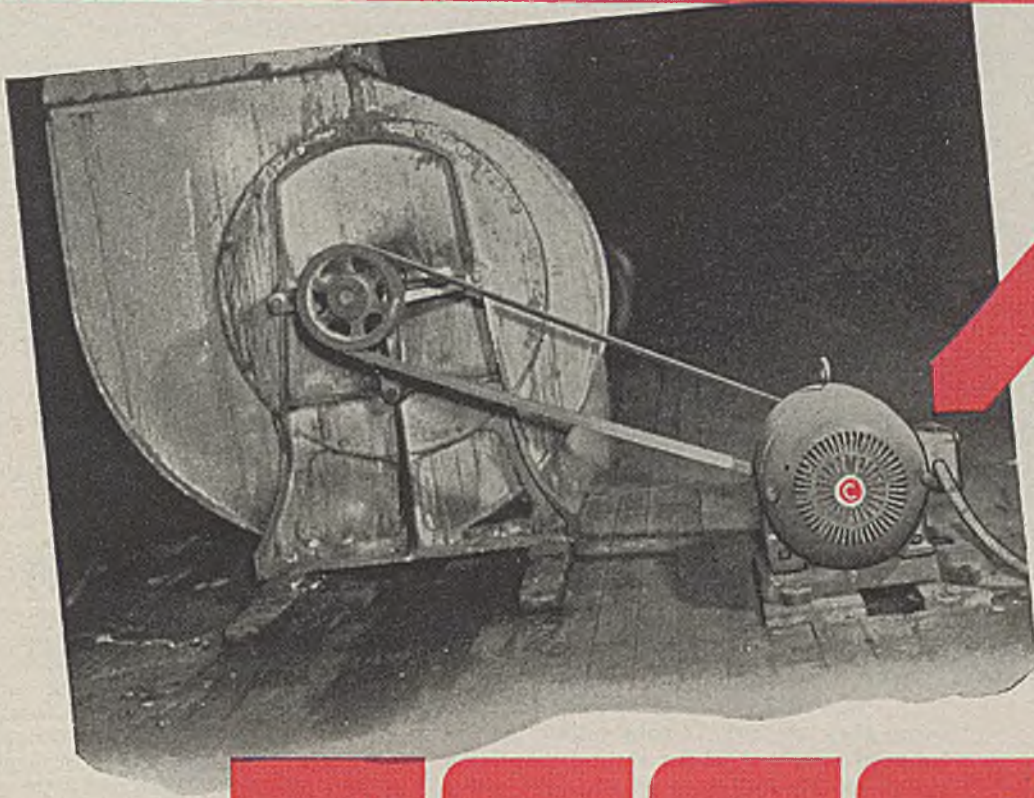
WEBRE KNOWS PANS in English, Spanish and French. When he discoursed on pans before the 1939 convention of "Los Technicos Azucarera" (for sugar) in Havana, they stood him up in front and decorated him with an honorary presidency for life. At home his son had difficulty with one of his college subjects and received a conditional grade. Down went Alfredo to the jewelers and bought the finest wrist watch he could find as a gift for the boy. The boy subsequently spent the war years flying over the Pacific. His brother (Yale '38) cruised in an Atlantic convoy and his sister's husband (Annapolis) commanded a fleet of subchasers. The enemy had a heavy price on their heads. Mrs. Webre and daughter Del took care of the wives and the babies.

His outstanding professional accomplishments include evaporator installations in many American and tropical sugar plantations and some very large distillery slop evaporators. When the borax plant was under development in Trona, Calif., years ago, Webre supplied the evaporator. The problem of foaming overwhelmed him. By way of groping, a foam index was established by stirring samples of liquid in a graduated glass, each test being standard as to quantity of liquid and period of stirring. The task was assigned to a laboratory boy. Each cycle of testing concluded with a soap washing and thorough rinsing of the glass. The

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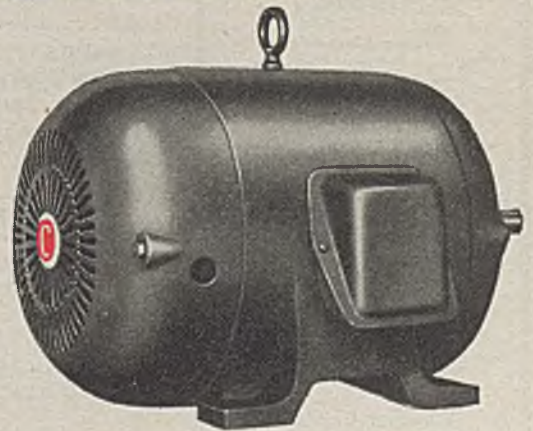
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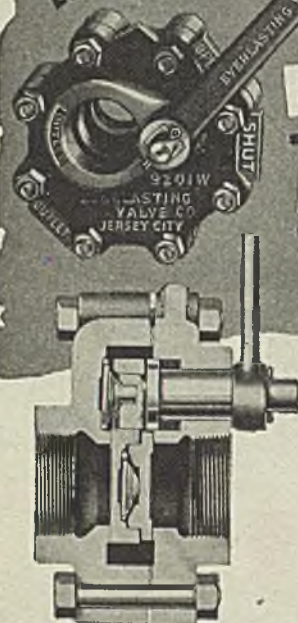
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routine grew monotonous. One noon when the staff returned from lunch they found the kid, in fear of censure, desperately trying to produce foam but the sample refused. "Hold everything." Speculation and investigation disclosed that the boy had forgotten to rinse the soap out of the test jar. Thus the kid's delinquency contributed to the success of Webre's evaporator.

THE OLD VACUUM PANS at the Pennsylvania Refinery, 14-ft. dia., were fitted with 1,300 sq.ft. of 4-in. coils in 75-ft. lengths and these were supplied with steam at 80 lb. from a turbine bleeder or from a pressure reducing valve followed by desuperheater. To satisfy curiosity about the claim of the experts, we admitted steam at 100 deg. superheat into one of the coil pans and, sure enough, the liquor exhibited no ambition. It acted like a blanket of thick oil with an occasional bubble spluttering out of the surface. Q.E.D.

In 1934 all of the coils were replaced with calandrias having about 4,000 sq.ft. of heating surface and using steam at 35 lb. The desuperheater was bypassed and the thermometers in the steam supply lines to the pans indicated a superheat of 100 deg. but there was no complaint. The time cycle with the calandria pans was reduced by at least one third.

In anticipation of operator unhappiness a small turbine pump was installed under one of the pans to draw condensate out of the collector pot and spray it into the steam supply pipe. A starter button was installed at the pan control board but the current switch was left open. The plant continued its daily production of between three and four million pounds of sugar with nary a peep from the sugar boilers. Three years later a sudden commotion arose on the pan floor. The operator had just discovered the thermometer and observed the 100 deg. superheat. "How could he be expected to boil sugar with steam like that! It can't be done!" It was unfortunate that after three years of tranquility he had found the thermometer, but anyhow the solution was at hand. We threw in the current switch and told the operator to push the button in front of pan No. 4. Immediately he observed a drop of 100 deg. in the steam temperature but there was no change in the cycle time nor in the steam flowmeter reading. Eventually tranquility returned, the condensate spray was removed and the thermometers continued to indicate 100 deg. superheat.

For the benefit of the harassed maintenance crew, the ends of all copper tubes for pans and heaters are upset for a length of 1½ in. to two gages thicker than the rest. This allows an occasional rerolling without too much reduction in the wall thickness. The usual thickness of pan tubes is No. 12 BWG with ends upset to No. 10.

Parenthetically, when the pans were reconstructed, the junk men offered 5c. per lb. for the old copper coils. This price was not attractive and so the coils were converted into electrolytic pigs at 80 lbs. per 100 of coils; 42,000 lb. of these were stored in the basement against future requirements of bronze castings. The price of copper rose to nearly 20c. Eventually WPB commandeered the copper at 12c. and, barring a few pigs pilfered by some thirsty Trojan, the entire lot went to war.

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Flash Point, Tag Open Cup			10 308
C	-26		20 478
F	-15		30 718
Specific Gravity, 25 C/4 C	0.686		40 1030
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NAMES IN THE NEWS



H. T. Clarke

Hans Thacher Clarke, member of the faculty of Columbia University, was chosen chairman-elect of the American Chemical Society's New York Section at the section's annual meeting.

Eugene W. Roslofe, formerly associated with the Institute of Fisheries Research in the Michigan Department of Conservation, has joined the staff of the Institute of Textile Technology, Charlotte.

R. N. Griswold has been promoted to be branch manager of the Pigment Department, Cincinnati office, of the Calco Chemical Division, American Cyanamid Co. He is a chemical engineering graduate of the University of Wisconsin.

Hood Worthington, on assignment for the last three years at the Hanford Engineer Works, has been appointed assistant director of the recently organized engineering research section, Rayon Technical Division, E. I. du Pont de Nemours and Co. A chemical engineer, he received his degree at Massachusetts Institute of Technology.

T. P. Sands has been appointed automotive engineer in the research department of Monsanto Chemical Co.'s organic chemicals division.

Jan Teppema has joined International Plastic Corp. of Morristown, N. J., as director of laboratory operations.

Esther A. Engle of the Commercial Solvents Corp., Terre Haute, Ind., has been elected chairman of the American Chemical Society's Wabash Valley Section for 1946-47. Miss Engle was chairman of the Lehigh Valley Section in 1940-41.

Charles T. Thum who served during World War II as Petroleum Containers Coordinator for the Army-Navy Petroleum Board, U. S. Joint Chiefs of Staff, has been named Chief Industrial Engineer of the Anasco division, General Aniline & Film Corp.



A. H. Calderwood

A. H. Calderwood, former manager of Shell Oil Co.'s Wilmington, Calif., refinery, has been made manager of the manufacturing department of Shell's San Francisco office to replace Monroe E. Spaght, recently appointed vice president of Shell Development Co. in New York. Calderwood, who has been with the company since 1923, was manager of Shell's wartime expansion at Dominguez, Calif.

William N. Lacey, professor of chemical engineering at the California Institute of technology, Pasadena, was recently presented with the Hanlon Award for meritorious services to the natural gasoline and condensate industries. The award is sponsored by the Natural Gasoline Association of America. Dr. Lacey is a member of the American Institute of Chemical Engineers and is chairman of the Southern California Chapter.

Clark F. Barb has been named head of the new department of petroleum production engineering at the Colorado School of Mines, Golden, Colo., and also director of petroleum research being conducted under the Colorado Industrial Development Research program. James O. Ball, formerly with the Bureau of Mines at Golden, is head of the new department of petroleum refining engineering. These two new departments are the result of reorganization of the department of petroleum engineering.

George W. Merck, president of Merck & Co. has been awarded the Medal of Merit the nation's highest civilian award, for his direction of the War Research Service. Mr. Merck has been on the chemical advisory committee of the Army and Navy Munitions Board since 1939 and was a special consultant to the Secretary of War on biological warfare from June 1944 to October 1945.

Dale R. Eberhart has been appointed Research Fellow of the Calco Chemical Division, American Cyanamid Co.



R. V. Yohe

Robert V. Yohe, vice president, has succeeded Burton F. Stauffer as president and general manager of American Anode, Inc., affiliate of the B. F. Goodrich Co.

Francis Chilson, head of Francis Chilson Industrial Consultants, was awarded the honorary degree of Doctor of Science by Duquesne University at the annual commencement exercises.

Robert B. MacMullin, former assistant director of research, Mathieson Alkali Works, and more recently in Germany as a chemical investigator, is now a consulting chemical engineer in Niagara Falls.

Clark G. Berry has become chief chemist of the Delaware Rayon Co., New Castle, Del. He was previously in research work with the Cellulose Group at the Institute of Paper Chemistry, and the Research Department of Skenandoa Rayon Corp.

George F. Kahle, formerly associated with the Office of the Chief of Ordnance handling production safety in munitions manufacturing plants, has joined the Heyden Chemical Corp.

Harry Burrell and C. P. Neidig have formed Burrell & Neidig, an industrial chemical consulting firm with offices at 115 Broadway, New York City.

Harry E. Cooper has been appointed manager of the Lastex yarn and rubber thread division of the United States Rubber Co., succeeding Harlow W. Waite, who is retiring after 42 years with the company.

Roger W. Hess, chemical engineering graduate of Brooklyn Polytechnic Institute, has been appointed to the sales engineering staff of Niagara Filter Corp.

S. C. Massari, recently awarded the Legion of Merit for his work in the Chicago Ordnance District, has been appointed technical consultant of the American Foundry-

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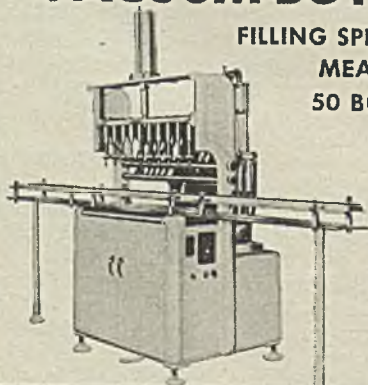
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men's Association. In the absence of N. F. Hindle, technical development program director, he carried through the program for the association's golden jubilee congress in Cleveland May 6 to 10.

Maurice H. Lockwood, outstanding figure in the fertilizer industry, and now chairman of the board of the National Fertilizer Association, will assume executive direction of the Association's activities as its president, at Washington, on July 1. He was a member of the Fertilizer Industry Advisory Committee during the war.

J. Robert Oppenheimer, professor of physics in the University of California, Berkeley, has returned to his post after a 4-year leave of absence, during which he served as director of the University's Los Alamos Scientific Laboratory, the New Mexico site of atomic bomb production. Professor Oppenheimer, who is one of the world's leading theoretical nuclear physicists hopes, as in the past, to act in a consultive capacity to the California Institute of Technology.

Robert P. Parker has been appointed assistant to the research director of the Calco Chemical Division, American Cyanamid Co. Dr. Parker received his doctorate from Yale University. For the past two years he has been an assistant director of the organic section of the research department.

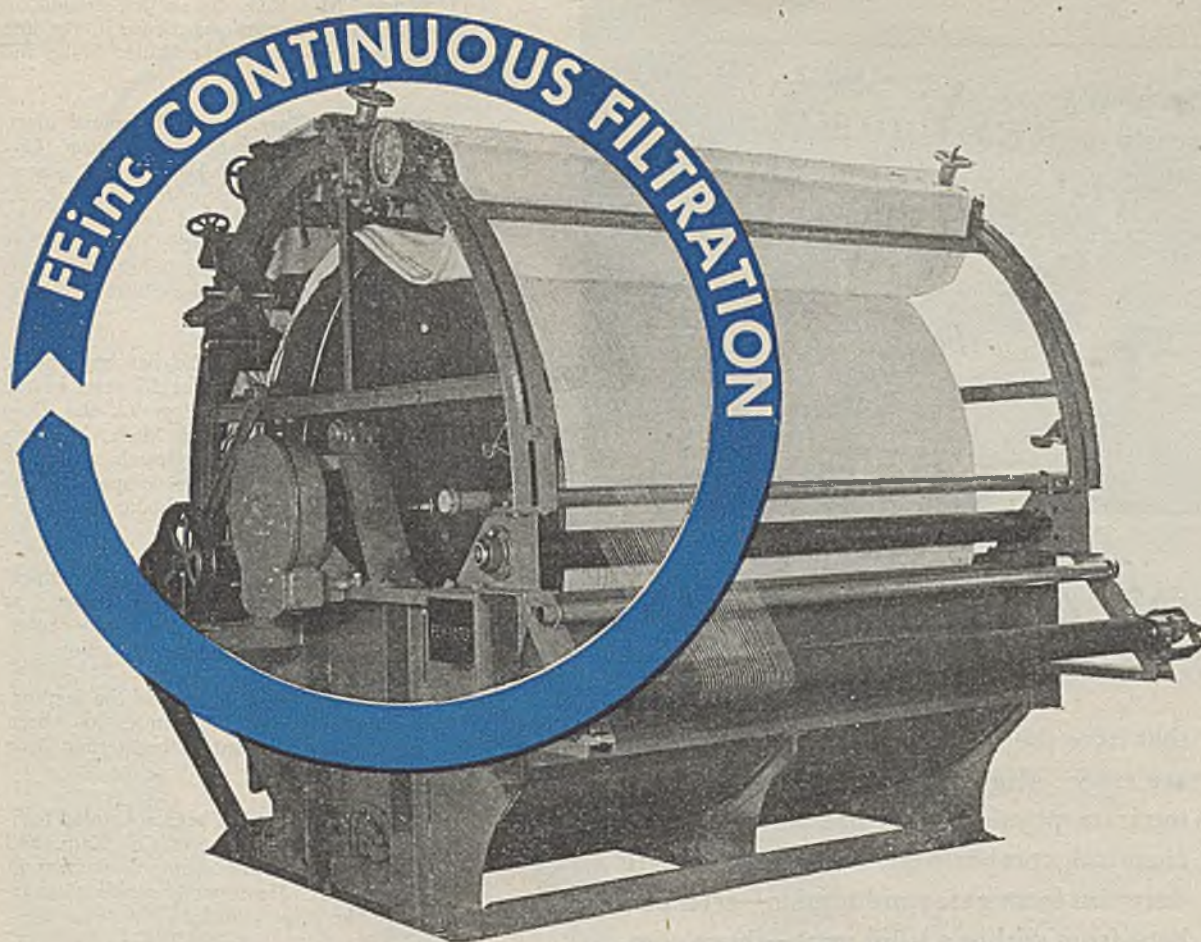
Ernest H. Volwiler, executive vice president of Abbott Laboratories, received the honorary degree of Doctor of Science at the Miami University (Ohio) commencement exercises.

Norman L. Krey, formerly with the Aluminum Co. of America, has been made works manager of Permanente Metals Corp.'s aluminum reduction plant at Mead, Wash. John R. Meek, who will be works manager for the Trentwood, Wash., rolling mill of Permanente, was also formerly with the Aluminum Co. of America.

George L. Neely has returned to his former position as lubricant division manager for Standard Oil of California, San Francisco. Neely had previously done technical work for Standard, notably in fuel and lubricant research. He played a leading role in the development of Standard's diesel engine lubricating oil and was identified with the development of aviation gasoline. As a Commander in the Navy he served as a "trouble shooter" on engineering problems in the Pacific.

Lee A. DuBridge, chairman of the physics department at Rochester University, has been elected president of the California Institute of Technology, Pasadena, succeeding Dr. Robert A. Millikan, retired. Dr. DuBridge was for six years head of the radiation laboratory, Massachusetts Institute of Technology, and during the war directed the radiation laboratory established by the National Defense Research Committee at that institution.

Francis M. Rich has been appointed vice president in charge of operations at the Fontana, Calif., iron and steel plant of Kaiser Co., Inc. A graduate of the University of



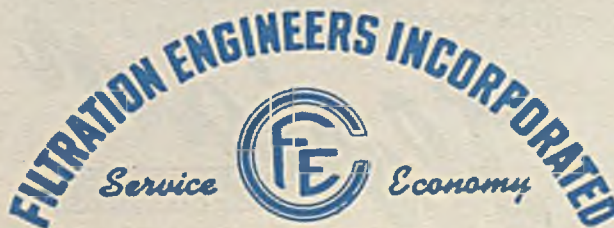
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Illinois, Mr. Rich has a background of more than 20 years' experience in the iron and steel industry in the United States and Canada.

Hal W. McClary, previously general superintendent for Washington Veneer Co., Olympia, Wash., has been named general manager of the company to succeed E. E. Westman, president and founder of the firm who recently retired. Mr. McClary has been in the plywood industry since his graduation from the University of Washington.

Harold A. Robinson who has been doing research work for the last 15 years in the physical research laboratory of the Dow Chemical Co. at Midland, Mich., has been appointed to supervise research at a new laboratory opened by the company to expand its metals and cathodic protection research program.

T. P. Sands has joined Monsanto Chemical Co. at St. Louis, where he is engaged as automotive engineer in the research department of the organic chemicals division.

Maurice L. Tainter, director of the Sterling-Winthrop Research Institute has been elected a vice president of the Sterling Drug Co.

William F. Talbot has been appointed technical director of the Sun Oil Corp. and president of the fine chemicals division of the company. He formerly served as secretary of the corporation.

Paul Logue of Monsanto Chemical Co., St. Louis, was elected president of the American Association of Cereal Chemists at the annual meeting recently held in Niagara Falls.

William S. Major has been appointed development engineer for Bituminous Coal Research, Inc., Pittsburgh, where he will be responsible for promoting various research projects that have progressed far enough to justify commercial trial and use.

Harry Price, formerly a lieutenant colonel in the U. S. Army Air Forces, has resumed the practice of patent and trademark law in association with Dean, Fairbank & Hirsch in New York.

Harold G. Osborn, manager of the manufacturing department of Continental Oil Co., New York, has been elected vice president in charge of manufacturing.

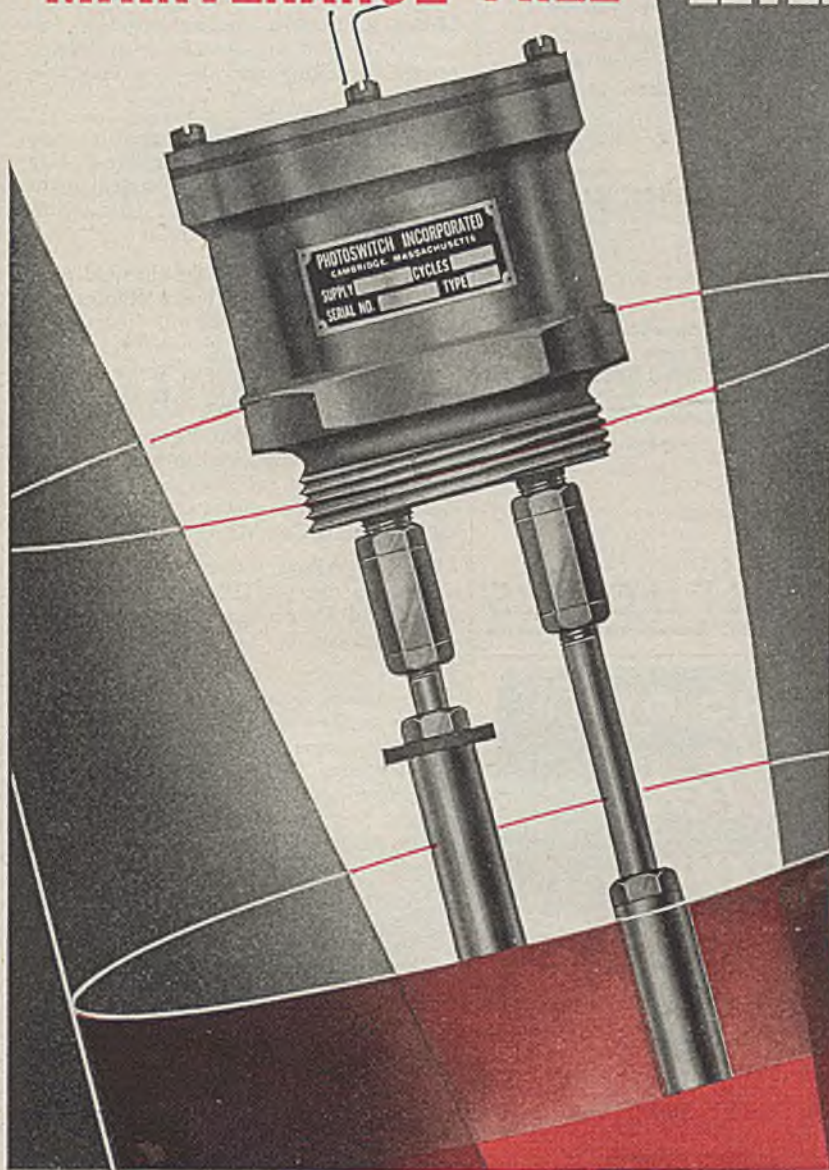
D. A. Rhoades has recently been elevated to the position of vice president and general manager of Permanente Metals Corp.'s Aluminum Division, a new Kaiser operation at Mead and Trentwood, Wash.

Everett C. Gosnell, formerly manager, chemical division, Lukens Steel Co., has joined the Colonial Iron Works Co. as manager, chemical and process equipment division.

R. E. Elliott and C. W. Burdette have joined the chemical products department of Standard Oil Co. (Indiana). Mr. Elliott, for the past ten years has been in develop-

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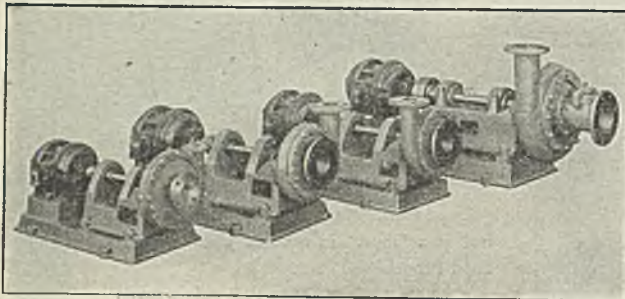


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ment work with Ideal Roller and Manufacturing Co. He is a graduate in chemical engineering from Ohio State University. Mr. Burdette was formerly a lieutenant in the Navy, and prior to the war was employed by Monsanto Chemical Co.

Brooks Darlington, formerly sales promotion manager of the DuPont Co.'s Nylon Division and for the past three years an official of the Office of War Information has returned from his overseas assignments.

Milton R. Beasley, chemical engineer, formerly with Bird and Son, Inc., has entered private consulting work as a roofing specialist.

Edgar S. Thompson, who received his master's degree in chemical engineering at Harvard University, has been appointed to the rubber and plastics machinery sales organization of Farrell-Birmingham Co.

C. P. Joslyn, manager of the chemical products division, Goodyear Tire & Rubber Co., was recently presented with a 20-year service pin marking the completion of two decades with the company.

Crawford H. Greenwalt, assistant general manager of the DuPont Pigments Department, has been appointed to succeed Jasper E. Crane as vice president and member of the Executive Committee of E. I. du Pont de Nemours & Co. Mr. Crane has retired.

Carroll L. Wilson, formerly executive assistant to the director, Office of Scientific Research and Development, has been elected vice president of the National Research Corp.

Roger Adams, recently special advisor to the deputy military governor of the American occupation zone in Germany, has received the Theodore William Richards Medal of the American Chemical Society's North-eastern Section. While abroad, Professor Adams received the Davy Medal of the Royal Society of London.

Harry G. Drickamer has been appointed assistant professor of chemical engineering and Joel O. Hougen instructor in chemical engineering at the University of Illinois. Dr. Drickamer was formerly with the engineering and development department of Pan American Refining Corp. Mr. Hougen was formerly with the Union Oil Co. of Calif.

Joel O. Hougen instructor in chemical engineering at the University of Illinois. Dr. Drickamer was formerly with the engineering and development department of Pan American Refining Corp. Mr. Hougen was formerly with the Union Oil Co. of Calif.

William C. McIndoe, chemical engineer, recently returned from active duty in the army to resume his duties with the Bonneville Power Administration, Portland, Oregon.

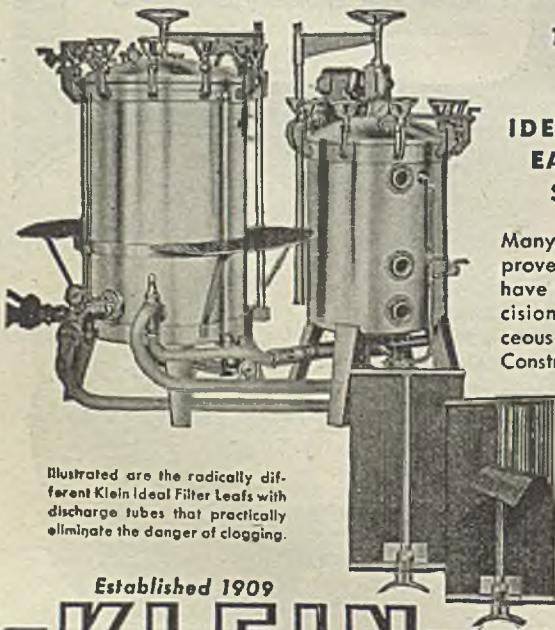
E. T. Lessig has been named general manager of textile control of the Tire Division of B. F. Goodrich Co. Dr. Lessig received his bachelor's degree in chemical engineering from Penn State University and his doctor's degree from the University of Wisconsin.

W. D. Parrish, technical service manager for synthetic rubber, for the B. F. Goodrich Chemical Co., Cleveland, has assumed the

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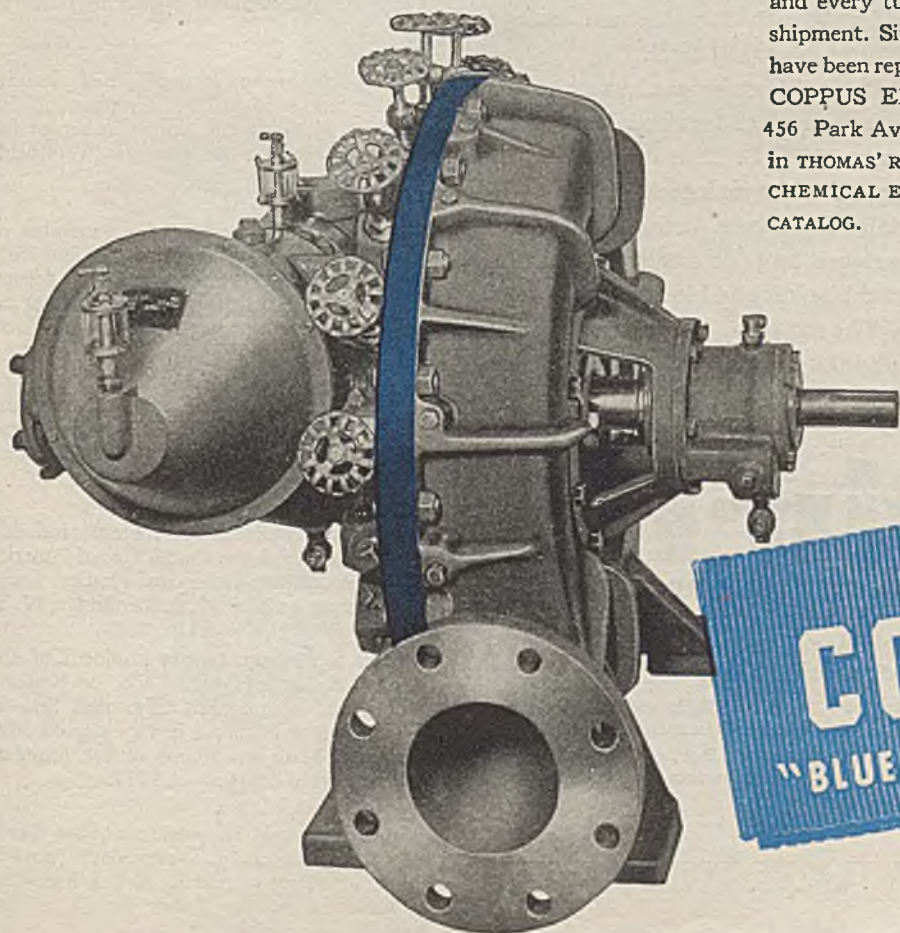
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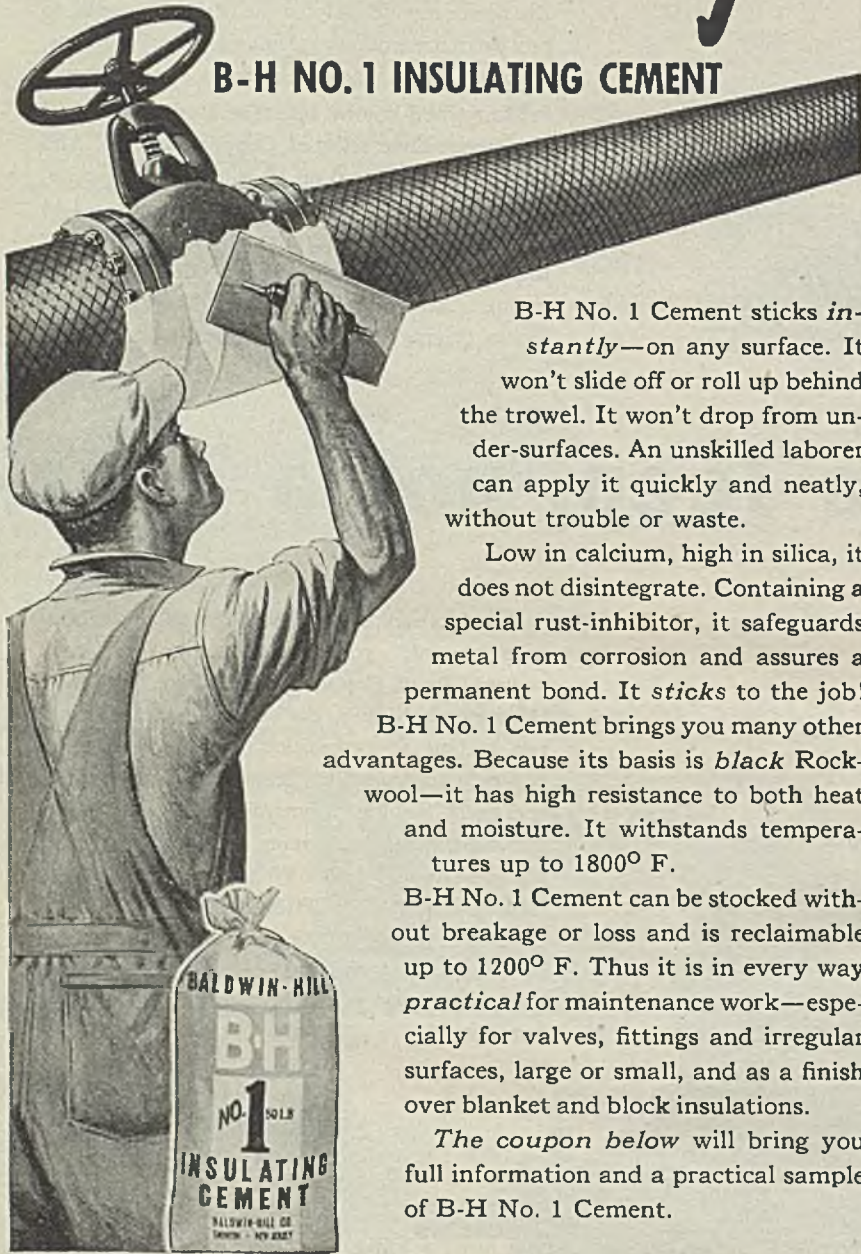
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additional duties of technical service manager for rubber chemicals.

John J. Conroy, III, discharged after serving 44 months in the U. S. Coast Guard, has resumed his position as president of National Magnesium Corp., New York.

T. Ivan Taylor, research chemist formerly with the University of Minnesota has been named associate professor of chemistry at Columbia University.

W. H. Holstein, who has been assistant manager of the Sabine River Works being built near Orange, Tex., by E. I. du Pont de Nemours & Co., has been named assistant manager of the Du Pont ammonia department. Clark Barrett, formerly general production superintendent of the Belle, W. Va., works is now assistant manager of the Texas plant.

Howard F. MacMillin has been elected vice president of Bryant Machinery & Engineering Co., Chicago.

OBITUARIES

Clement Leath Speiden, 52, vice president of Innis Speiden & Co., and past president of the New York Junior Board of Trade died in the University of Virginia Hospital, Charlottesville, Va., on June 2.

Maximilian Toch, 81, president and chief chemist of Toch Brothers, Inc., chairman of the board of Standard Varnish Works and nationally-known lecturer and writer on chemistry and chemical engineering, died in New York May 28.

Elford D. Streeter, formerly chief chemist of the Staten Island, N. Y., plant of the Gulf Oil Refining Co., which he served for 25 years, died at his home in Westfield, N. J. May 28.

Howard W. Starkweather, 55, a member of the executive staff of the Jackson Laboratory of the DuPont organic chemicals department, died unexpectedly of a heart attack on Saturday, May 18. He has been at Jackson Laboratory since 1934.

Arthur E. Frankel, 28, chemical engineer and member of a prominent Cleveland family, died May 17 at Michael Reese Hospital, Chicago.

Henry V. Dunham, 70, chemist, formerly vice president of the Casein Co. of America and director of American Plastics Corp. passed away on May 11, at Bainbridge, N. Y.

Joseph J. Mangin, former president of the United Color & Pigment Co. of Newark, N. J., and who retired from that firm in 1937, died at his home in that city on May 11. Mr. Mangin was one of the founders of the United company in 1917.

Vere B. Edwards, 56, president of the Dravo Corp., passed away Wednesday, May 8, while attending a meeting of the Executive Committee in the Board Room at the Neville Island plant.



Selection of factory-assembled Limitamp control for this plant made it possible to install a single compact group, instead of a number of separate devices, in a small amount of floor space.

Here's **FAST, "PACKAGED"**
Short-circuit Protection
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OPERATES WITHIN A SPLIT CYCLE

● You can give your motors sure short-circuit protection by specifying G-E Limitamp control. Faster than any breaker, this "all-in-one-unit" control, with its EJ-2 fuses, clears fault currents in a half cycle.

When a short occurs, the fuses cut off the rise in current in less than a quarter cycle. And the short is cleared long before the current has time to harm the contactors or motor.

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Completely co-ordinated control—Limitamp is "packaged" in a single unit which is easy to install and attractive in appearance.

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Years of service—Air-break contactors, good for millions of operations, meet the most severe requirements of high-voltage motor-control service. Contact-tip life is many times that of comparable oil-immersed tips.

Safety for operators—And because it is totally enclosed in an all-metal case, Limitamp control provides protection for all operating personnel.

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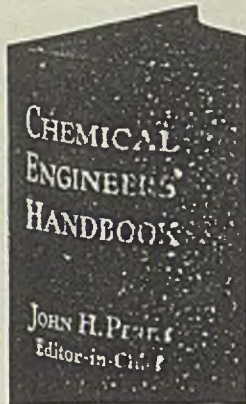
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INDUSTRIAL NOTES

Van Norman Co., Springfield, Mass., has purchased substantially all the outstanding stock of the Morse Twist Drill & Machine Co., New Bedford, Mass. The company will be operated as a separate corporation, and will remain in New Bedford. The new officers are James Y. Scott, president; James A. Wright, vice president and general manager; E. C. Adams, vice president and assistant general manager; M. J. Rainey, general sales manager, and L. H. Stanton, treasurer.

Ohio Rubber Co., Willoughby, has appointed R. Dean Thomas to be plant manager of the new plant the company is about to open at Long Beach, Calif. At the same time A. Schade was made chief chemist and Louis Kotich was made general engineer. L. E. Budnick is now assistant treasurer and assistant secretary of the California plant.

Filter Paper Co., Chicago, moved into their new and larger quarters at 2426 S. Michigan Ave., on June 1.

Hammond Iron Works, Warren, Pa., has appointed B. W. Rogers, P. O. Box 1030, Akron to represent the company in the Akron district.

B. F. Goodrich Co., Akron, recently created an electronic applications development department. William L. Jenkins has been named to the post of manager.

Hercules Powder Co., Wilmington, recently announced the return of Frank H. Crymes who was recently discharged from Army service. Mr. Crymes will serve as district manager of the synthetic department in San Francisco.

Rust Engineering Co., Pittsburgh, has been awarded a contract for construction of buildings and facilities which will increase the plants of American Viscose Corp. at Meadville, Pa. by 50 percent.

Ajax Flexible Coupling Co., Inc., Westfield, N. Y., has purchased an 11 acre site and, pending permission from the CPA, plans to erect a new factory to increase production of conveyors and screens.

Container Testing Laboratories, Inc., New York, has elected E. A. Throckmorton to the position of president.

Pemco Corp., Baltimore, Md., has completed its fifth continuous smelter unit. The new unit along with improvements in the four continuous units now in operation is expected to increase the capacity of the plant more than 50 percent.

B. F. Goodrich Chemical Co., Cleveland, has made Ray E. Bitter sales representative on the Pacific Coast with headquarters at 1248 Wholesale St., Los Angeles. Howard E. Anderson is now the midwestern territory



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ANNEALED SILICA products have an inner strength and endurance that silica ware never had before. Amersil trays, and other products by Amersil, don't start with two

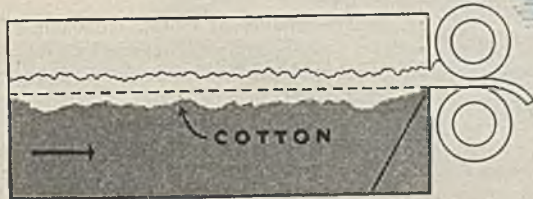
strikes against them. They have: (1) uniform wall thickness, (2) all strains and stresses removed—thus they are better able to withstand the shattering effect of repeated thermal shock. For silica ware that endures—specify Amersil. Write for interesting bulletin.

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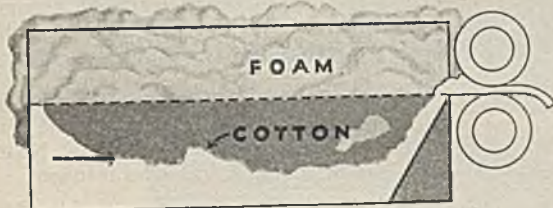
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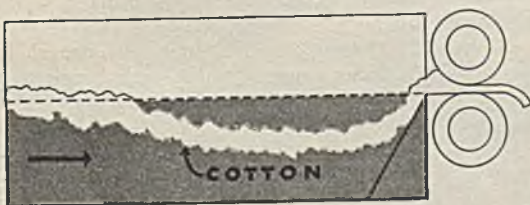
A problem of controlled penetration in a continuous process . . .



Without an efficient wetting agent cotton floats on surface all the way to the squeeze rolls. Uniform and effective penetration of fireproofing salts is impossible.



Uncontrolled penetration . . . usually accompanied by wasteful foaming . . . may cause cotton to sink to bottom of tank thereby impeding processing.



Controlled penetration with Victawet 35B produces practically no foaming. Cotton sinks just below surface . . . machine operates at maximum efficiency . . . rejects are eliminated.

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Problem—Because raw cotton is hard to wet, surface-active agents or penetrants which work effectively in the presence of fireproofing salts are required. During the war several plants experimented with various penetrants for this type of work. Some proved unsatisfactory because of excessive foam which wasted solution and made working conditions difficult. Others failed to control speed of penetration resulting in imperfectly fireproofed cotton and subsequent rejections.

Solution—Use of Victawet 35B was recommended by Victor's Research Laboratory. In practical tests, proper concentrations of this new Victor surface active agent provided efficient wetting with practically no foaming. Penetration was controlled so that the cotton sank just below the solution surface without collecting at the bottom of the tank. Speed of processing was stepped up as much as 25%. Production was perfect, and uniform results were demonstrated by flame tests on the finished goods.

Many other penetration problems have been solved with Victor surface-active agents. If you have a problem, think first of a phosphate from Victor.

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The INDOPOLS are synthetic high molecular weight mono-olefins. They are light in color—stable—compatible with waxes, natural and synthetic rubbers, solid polybutenes, etc.—miscible with hydrocarbon and chlorinated hydrocarbon solvents—miscible with many ethers and esters—insoluble in the lower alcohols and ketones. Uses include electrical insulating compositions, adhesive products, coating and laminating compositions for paper and other films.

Brand Name	Indopol L-10	Indopol H-100	Indopol H-300
Mean molecular weight	330	780	940
Viscosity S.U. seconds			
	at 100°F.	114	—
at 210°F.	40.6	942	3330
Specific gravity 60°/60°F.	.831	.881	.894
Refractive index (20°/d)	1.4655	1.4918	1.4959
Color, N.P.A.	2	2	3
Pour point (ASTM)°F.	-65	+20	+35
Weight, lbs./U.S. gallon	6.92	7.34	7.44

Intermediate grades are also available.

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technical service engineer. His headquarters are in the company's Chicago offices.

American Mineral Spirits Co., Chicago, has returned Karl F. Giloth to the Columbus, Ohio sales office. He will cover Ohio, Indiana, Michigan, Kentucky, West Virginia and western Pennsylvania. Mr. Giloth recently completed two years of duty with the Navy.

Iron & Steel Products, Inc., Chicago, has made Charles A. Marshall general manager.

National Radiator Co., Johnstown, Pa., has appointed David M. Ramsay to be manager of the industrial division.

Hammel-Dahl Co., Providence, has named Wayne B. Farley to the position of district manager of the Pittsburgh Office.

Vilter Mfg. Co., Milwaukee, Wis., has promoted Albert O. Vogel to the position of general sales manager. Erich J. Kocher has been promoted to chief engineer. Donald F. Ahlswede has been appointed production control manager.

Brooks Equipment Corp., Hoboken, N. J., has consolidated the executive and sales offices and production facilities at the new headquarters in Hoboken.

Permutit Co., New York, has appointed H. L. Bechner and A. D. Way, technical manager and chief mechanical engineer, respectively. Mr. Bechner will be responsible for the company's technical policy. He will also serve as chairman of the engineering committee. Mr. Way will administer the engineering department and supervise the mechanical design and layout of equipment.

H. K. Porter Co., Inc., Pittsburgh, has opened a new district office in the Paul Brown Building in St. Louis. R. E. Nelson is the St. Louis district sales manager.

St. Joseph Lead Co., New York, has made Charles R. Ince manager of metal sales. Malcolm Bonyng has returned to the company as assistant manager, Dwight Marshall was also named assistant manager.

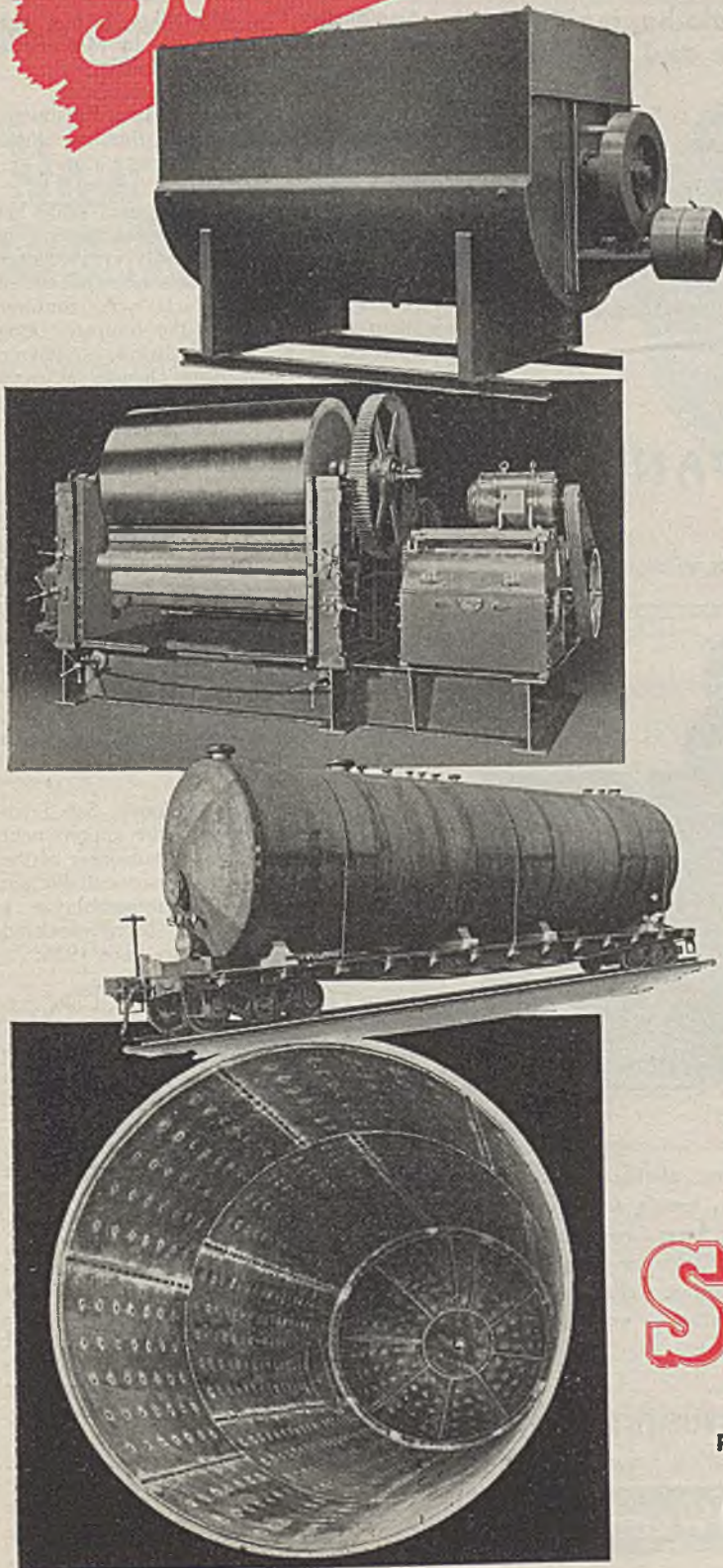
Detrex Corp., Detroit, has named L. C. Kroes manager of the central regional sales. His headquarters will be in Detroit.

American Cyanamid Co., New York, has appointed Arthur A. Rauchfuss to the position of assistant sales manager of the Calco Chemical Division. He will be in charge of sales of dyestuffs and intermediates to the dry color manufacturers.

Acme Rubber Mfg. Co., Trenton, N. J., has appointed L. J. Amsdell to the post of western territory sales manager. His headquarters will be in the Chicago office.

Upjohn Co., Kalamazoo, Mich., has made the following changes in its sales organization: W. G. Freeman has become assistant general sales manager with supervision over the three southern branches at Atlanta, Memphis, and Dallas. His headquarters are in Atlanta. J. J. Canon also became assist-

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ant general sales manager. He will supervise the Kalamazoo and San Francisco branches with headquarters at Kalamazoo. W. G. Sugg has been named sales manager of the Atlanta branch. J. W. Schma is now sales manager at Kalamazoo.

Hercules Powder Co., Wilmington, has made James T. Skelly, Jr. assistant director of sales of the Cellulose Products Department. He recently returned to the company after receiving his discharge from the army.

Alen-Bradley Co., Milwaukee, is now represented in the Seattle area by Muth-Richards Co., 1426 Broadway, Seattle.

Bituminous Coal Research, Inc., Pittsburgh, has moved to 912 Oliver Building, Pittsburgh.

Byron Jackson Co., Los Angeles, Calif., has merged with Patterson-Ballagh Corp., in which it has held a minority interest since its formation. The manufacture and sale of Patterson-Ballagh products will continue under that name with the company being operated as a separate division of Byron Jackson. No immediate changes in management, personnel or sales distribution are planned.

Turco Products, Inc., Los Angeles, Calif. has recently appointed Robert K. Yeck as technical service representative for the State of New Mexico. Recently discharged from the Army Air Forces, Mr. Yeck will have offices in Albuquerque at 200 Korber Building.

Eitel-McCullough, Inc., San Bruno, Calif. has increased its sales engineering staff by the appointment of Winfield Wagener, formerly associated with Heintz & Kaufman and the Litton Engineering Laboratories.

Standard Oil Co. of California, San Francisco, recently announced the appointment of W. C. Lane as assistant manager of the company's foreign trade department. Former president of California Commercial Co., a subsidiary, Mr. Lane has been associated with Standard of California since 1926.

Denver Equipment Co., Denver, Colo., has advanced T. S. Bailey, Jr., former sales manager, to the newly created office of vice president. Mr. Bailey will be concerned with the company's United States expansion as well as its foreign manufacturing subsidiaries. A graduate of the University of Colorado, Mr. Bailey has been associated with the company since 1933.

United States Rubber Co., San Francisco, Calif., has appointed Walter C. Burns district sales manager of the mechanical goods division, with supervision over northern California and most of Nevada. A graduate of the University of California, Mr. Burns returned recently to the company after four years of service in the armed forces.

American Gilsonite Co., Salt Lake City, Utah, has established headquarters in the Utah Oil Building. The company was formed by a recent consolidation of the Utah operations of Barber Asphalt Corp.,

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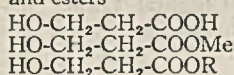


Now...1 Molecule

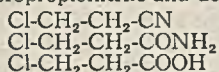
Combining Alcohol and Nitrile

This new compound combines the chemical and physical properties of alcohol and nitrile, producing an intermediate that can be used for the production of many other organic chemicals. Among those you can prepare, the following are typical; however, samples are not available at the present time.

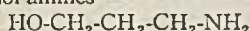
β -hydroxy propionic acid, its salts and esters



β -chloropropionitrile and derivatives



Propanol amines



POSSIBILITIES AS A SOLVENT

The presence of hydroxyl and cyano groups makes this compound potentially valuable as a solvent. It is soluble in

water, acetone, ethanol, chloroform and diethyl ether, and can be used as a solvent for many inorganic salts. This may be valuable in solvent extraction operation.

PROPERTIES

Aero Ethylene Cyanohydrin is a straw colored liquid, 96-98% pure, and weighs 8.7 pounds per gallon. The boiling point is 227-8°C. (with decomposition). Under reduced pressure it can be readily refluxed or distilled without decomposition at neutral pH's. It is available for immediate delivery in commercial quantities.

If you have a problem in the field of organic nitrogen chemicals, call or write

us. Address Section ND, Synthetic Organic Chemicals Department, American Cyanamid & Chemical Corporation, 30 Rockefeller Plaza, New York 20, N. Y.

Other Organic Nitrogen Chemicals

Acrylonitrile	$\text{CH}_2=\text{CH-CN}$
Guanidine compounds	$\begin{array}{c} \text{NH} \\ || \\ \text{H}_2\text{N-C-NH}_2 \end{array}$
Guanylurea sulfate	$(\text{H}_2\text{N-C}(:\text{NH})\text{-NH-C}(:\text{O})\text{-NH}_2)_2\text{H}_2\text{SO}_4$
Glycolonitrile	$\text{HO-CH}_2\text{-CN}$
Lactonitrile	$\text{CH}_3\text{-CHOH-CN}$
Dicyanidiamide	$\text{H}_2\text{N-C}(:\text{NH})\text{NHCN}$

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 Rush copy of technical data sheet

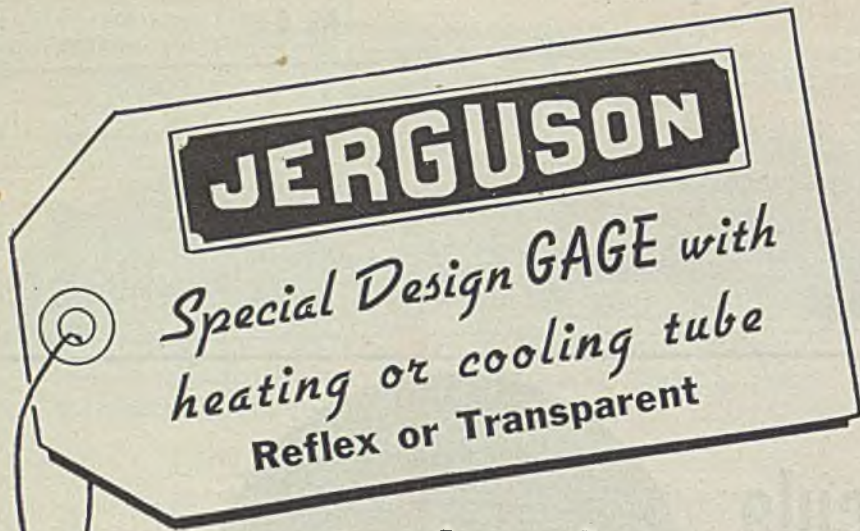
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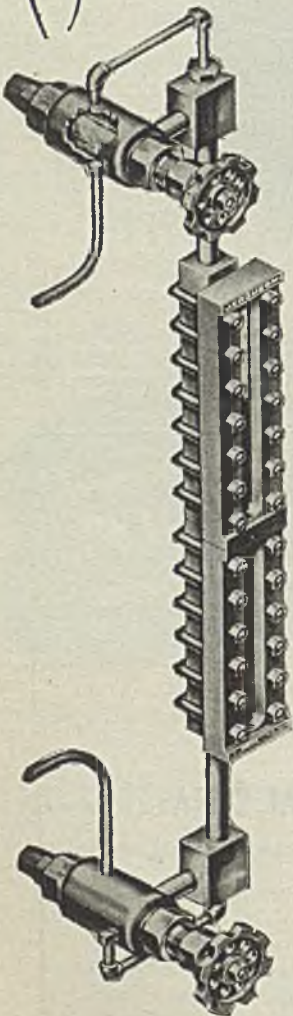
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CINCINNATI, OHIO	MARSHALLTOWN, IOWA	PORTLAND 8, OREGON	MEXICO, D. F.
DENVER, COLORADO	MEMPHIS 3, TENN.	PORTLAND, MAINE	MONTREAL 13, P. Q. CANADA
DETROIT 4, MICH.	MINNEAPOLIS, MINN.	SAN FRANCISCO 4, CALIF.	

and a division of Standard Oil of California. C. F. Hansen, president and C. F. Morris, secretary-treasurer, will maintain headquarters in Salt Lake.

Speedways Conveyors, Inc., Buffalo, N. Y., has appointed Jess Keville to be exclusive representative in Southern California and adjacent territory. His office will be in Pomona.

Bird Machine Co., South Walpole, Mass., has elected F. K. Becker to the presidency of the company.

Fluor Corp. Ltd., New York, has appointed Kenneth D. Demarest to be district engineer at New York headquarters.

Godfrey L. Cabot, Inc., Boston, has made Donald Simonds assistant sales manager.

Mercury Glass Co., Pleasantville, N. J., has named Garfield C. Burrows and John C. Shipley to managerial posts.

Norton Co., Worcester, Mass., has appointed Fred H. Paulson and Curtis H. Weissinger to the post of sales engineers in the refractories division. They will make their headquarters in the Worcester office.

Delta-Star Electric Co., Chicago, has appointed the Florida Electric Supply Co., Tampa, to be representatives in the state of Florida except the northeast portion west of the Apalachicola River.

Empire Chemical Corp., New York, has moved to new and larger quarters at 21 West St.

Witco Chemical Co., New York, has consolidated the Marshall Dill organization, San Francisco, with the Pacific Coast activities of Witco. Mr. Dill has been elected a vice president of the company in charge of the California division.

Foote Bros. Gear & Machine Corp., Chicago, has appointed Irving C. Maust to their West Coast sales engineering staff. He will be located in Pasadena.

Liquid Conditioning Corp., New York, has been organized by S. B. Applebaum, H. L. Tiger and Norman E. Brice, who were formerly connected with the Permutit Co. in executive positions. The present offices are at 423 West 126th St. Plans have been laid for the construction of a plant at Linden, N. J.

International Nickel Co., New York, has placed R. M. Wilson, Jr. in the technical service section of the development and research division of the company. Mr. Wilson is chairman of the New Jersey Section of the American Welding Society.

Virginia-Carolina Chemical Corp., Richmond, Va., has returned the following men to their former positions with the company following their return from the armed forces. Colonel Edwin Cox, Lt. Commander William T. Thomax, Lt. Homer Moomaw, Capt. Wortham Spilman Jr., and Fred Tucker. The following men have returned to their work in the technical service and

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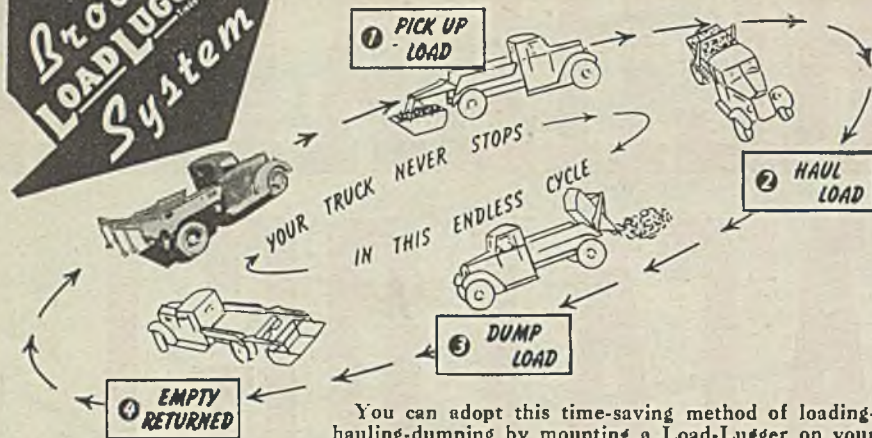
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It offers big economies for industries where materials must be loaded by hand labor. Hauling supplies, ash disposal, moving stock piles, removing waste, distributing parts or products in the plant, construction and repair work, general hauling of bulk materials.

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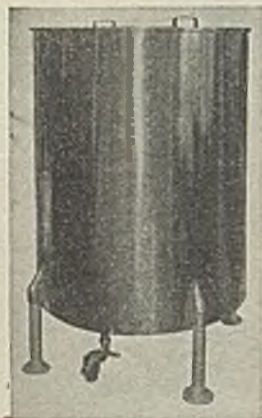
Order a Load Luger for your truck.
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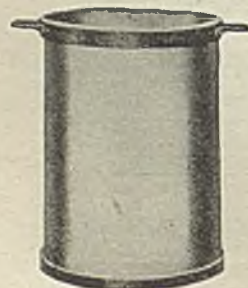


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BATCH CANS

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development branch: Capt. Raymond J. Lakcy and Lt. Edward F. Smith. Major John Y. Mason is now with the production branch. All who served during the war have returned to their positions for peacetime production.

Carbide and Carbon Chemicals Corp., New York, has moved its Buffalo district office to the Liberty Bank Building at 424 Main Street. R. C. Boltz is in charge of the district.

Pittsburgh Plate Glass Co., Pittsburgh, has appointed Robert Wardrop as assistant manager of glass advertising and promotion. He recently completed his terminal leave as a Lieutenant Colonel after four years with the Army.

Monsanto Chemical Co., St. Louis, Mo. has promoted Robert E. Holmes to fill the position of divisional export manager for the Merrimac division at Everett, Mass. Roy T. Cowing will handle Merrimac sales in the Philadelphia area, Ralph E. Nelson has been moved to the Chicago Office. Edwin L. Hobson has been appointed to the sales staff of the Plastic Division.

Eli Lilly & Co., Indianapolis, has just announced the purchase of government owned facilities and the Stokely Foods buildings at West Morris Street and Kentucky Avenue. The buildings will be known as the Kentucky Avenue plant and will give an additional million square feet of floor space.

John A. Roebling's Sons Co., Trenton, has appointed Ferdinand W. Roebling, 3rd, to the position of vice president in charge of engineering.

General Electric Co., Chemical department, Pittsfield, Mass., has appointed Harold L. Aldrich district representative in the New York Office. He will handle glyptal alkyd resins.

American Heater Co., Philadelphia, has promoted Colonel R. W. McClenahan. He was elected vice president recently. During the past war he served with the Army Air Forces. He has been decorated with the Legion of Merit, Bronze Star and the Order of British Empire.

Consolidated Products Co., New York, has purchased the Thermoid Rubber Plant at S. Clarence Street, Los Angeles. It comprises about three acres of ground, with 100,000 sq. ft. of manufacturing space. Negotiations are under way to reopen the plant under new ownership, but should these plans fail undoubtedly the machinery will be liquidated and distributed to other rubber plants.

Fairbanks, Morse & Co., Chicago has recently appointed C. L. Richard special representative of its sales division with headquarters at Chicago. For the past three years he served in the Ordnance Bureau of the U. S. War Department.

Davidson & Serner, New York, is a new firm organized for the sale of special equipment in process engineering. W. H. Davidson and H. E. Serner have organized the

YOU CAN REDUCE

MAINTENANCE COSTS

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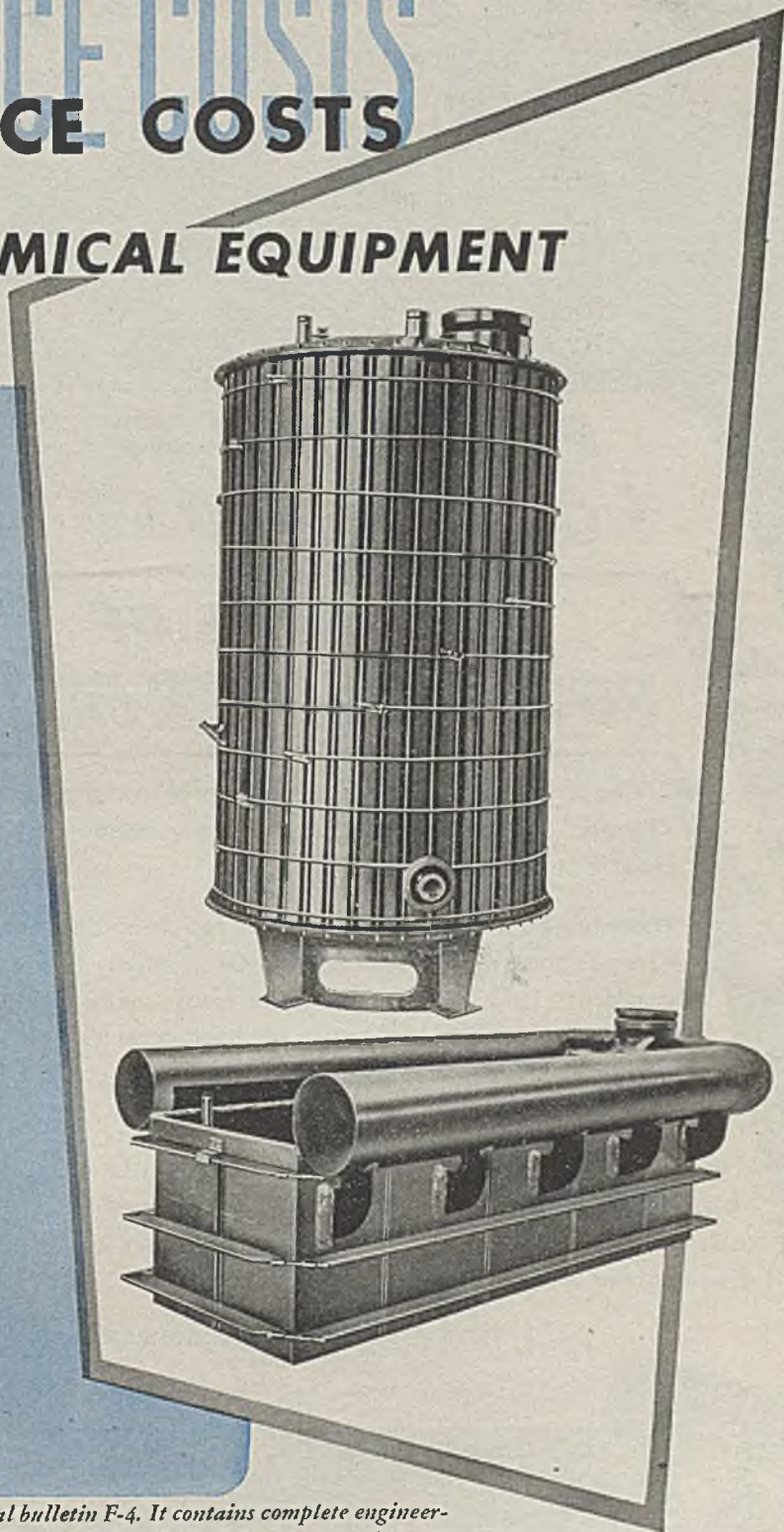
HAVEG chemical equipment is completely resistant to most acids, solvents and alkalis, even at boiling temperatures.

You can break production bottlenecks and reduce maintenance costs by replacing leaky tanks with Haveg tanks which will stand up under your chemical conditions . . . by replacing pipe lines and fume duct with Haveg which is mechanically strong and is unaffected by thermal shocks . . . by designing Haveg chemical equipment into every process or handling problem involving acids, solvents, or alkalis.

Haveg chemical equipment is of molded plastic construction throughout. Its entire mass is resistant to corrosion. Gouges in the surface do not affect Haveg's corrosion resistance. It is unaffected by sudden temperature changes. One piece seamless units are molded as large as 12 feet high by 10 feet in diameter.

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You should plan now to use Haveg equipment wherever you are reconverting plant layout and procedure . . . wherever chemicals are handled or processed.



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FACTORY - MARSHALTON, DELAWARE

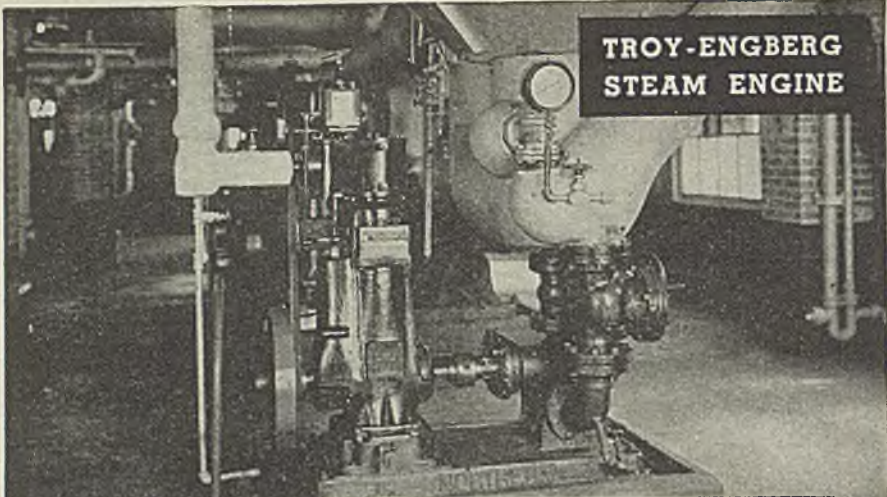


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DETROIT 11 2832 E. Grand Blvd

LOS ANGELES 13 601 W. Fifth St



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If you have need for the following combination in your plant—processing or heating steam and equipment that requires a drive—you probably have a perfect setting for a Troy-Engberg Steam Engine.

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Established 1870

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TROY-ENGBERG
STEAM ENGINES • GENERATING SETS • GENERATORS

company, which will have offices at Commercial Trust Building, Philadelphia, and 342 Madison Ave., New York.

Sam Tour & Co., Inc., New York, has added a department of mechanical engineering to the chemical engineering, metalfinishing, metallurgical engineering and physical metallurgy facilities. E. V. Crane is head of the new department.

Hagan Corp., Pittsburgh, Pa., has transferred Gerald G. Lipke to Denver, Colo., as district field engineer. Mr. Lipke recently returned from the army.

Hewitt-Robins, Inc., Buffalo, N. Y., is the new name of the Hewitt Rubber Corp. The name was changed to bring in the identity of its wholly owned subsidiary, Robins Conveyors Inc. The Passaic, N. J. plant will now be known as the Robins Conveyors division.

National Starch Products, Inc., New York, has promoted Donald D. Pascal to the position of assistant vice president.

Reliance Electric & Engineering Co., Cleveland, will break ground shortly for a new plant in Ashtabula, Ohio. The 25-acre site is located on the west side of the town between the New York Central R. R. and route 20.

Mathieson Alkali Works, New York, has opened a new dry ice service center and started construction of a new warehouse in Long Island City.

Conversions and Surveys, Inc., New York, has been organized recently. Principal offices of the new company are located at 90 Broad Street. John H. Warden is president.

Kieley & Mueller, Inc., North Bergen, N. J., has appointed the Ryder Equipment Co. of St. Louis to be representatives in Missouri and southern Illinois.

Mimex Co., Brooklyn, N. Y. has moved its offices, laboratory and plant to 37th St. and 12th Ave.

Dampney Co. of America, Hyde Park, Mass., has assigned Kenneth E. Greene to its Chicago office and William T. Campbell to the Philadelphia office. Both men will be working with the sales engineering force.

Detrex Corp., Detroit, has promoted S. H. Bivins to the position of manager of western regional industrial sales. Headquarters will be in Chicago.

Yale & Towne Mfg. Co., New York, has elected Robert Ten Brock Stevens to its board of directors.

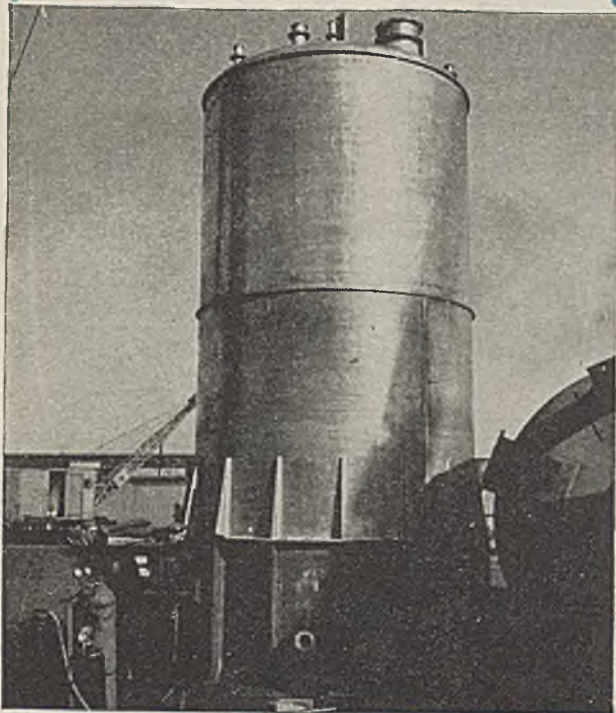
Vapor Recovery Systems Co., Compton, Calif., has appointed E. S. Powell, sales manager for the Great Lakes territory. His offices are located at 122 S. Michigan Ave., Chicago.

Iron & Steel Products, Inc., Chicago, has made George L. Bladholm special representative with headquarters in the Chicago offices.



“Seems like everybody’s asking about Aluminum Alloy equipment”

Assembling an aluminum processing tank
at John Nooter Boiler Works Co., St. Louis



“Surprising how our alloy department has grown. There were three more inquiries in the mail today for aluminum tanks alone.” The speaker was Sales Engineer for John Nooter Boiler Works Company of St. Louis. His observation checks with that of Alcoa and many others supplying the processing industries.

Chemical producers, synthetic rubber manufacturers, processors of petroleum products have all learned these facts about equipment made of Alcoa Aluminum Alloys: Processes are made more efficient. Products are higher in quality. Operations are speeded up. Products are protected when stored and shipped in Alcoa Aluminum containers.

For help in designing your equipment in aluminum alloys best suited to each use, call the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 2151 Gulf Building, Pittsburgh 19, Pennsylvania.

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CONVENTION PAPER ABSTRACTS

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reaction occurred in all of the media in which the pH could be maintained below 3. With higher pH values the metal generally became passive again after a short time, even in the deaerated solutions. Weight change values were obtained for the active chromium and it was shown by microscopic examination that the type of attack could be related to the medium the concentration, and the relative period of immersion. Short exposures in acid media showed that attack first appeared along the crack network system of the chromium plate and that typical acid etch patterns were observed for sufficiently long exposures. In alkaline NaCl solutions, isolated points of attack were found which were not related to the crack system. NaOH solutions produced no noticeable change.

Norman Hackerman and D. I. Marshall, University of Texas, before The Electrochemical Society, Birmingham, Ala., April 1946.

CORROSION STUDIES ON ELECTROLYTIC CHROMIUM

ELECTROLYTIC chromium stripped from its basis metal, was immersed in aqueous solutions of NaOH, HCl, H₂SO₄, HC₂H₃O₂, and NaCl at various concentrations with the last being studied over a pH range from 0 to 11. The metal was used in both the active and passive state and the solutions, saturated either with air, nitrogen, or hydrogen, were maintained at 35 deg. C. The passive metal showed only isolated instances of attack, while in the active state


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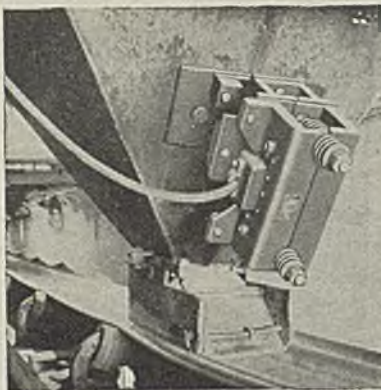
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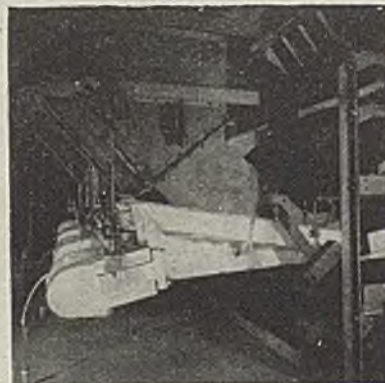
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VIBRATORY FEEDERS

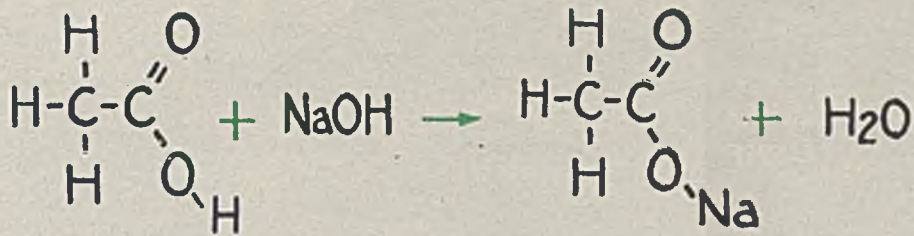


Controlling the feed of bulk materials—hot or cold, dry or damp, a fine powder or big lump—to processing equipment.

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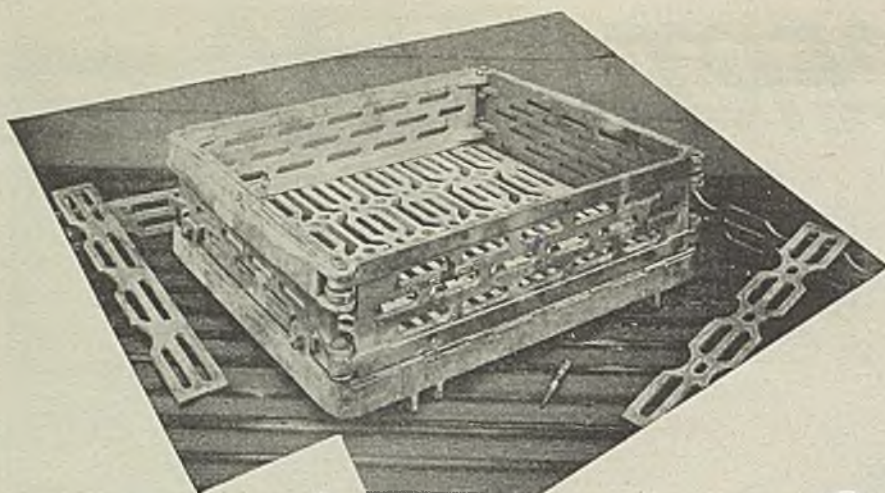
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structure as it affects petroleum products we will increase our reserves.

The layman looking at the petroleum and natural gas industry at the beginning of the war would have had ample reason to feel that the acme of perfection in techniques had been reached. However, when considering the great advances made in the industry in the war years only, opportunities for the further future advancement in the art of refining and utilization can be realized. The potentialities of catalysts alone in the industry represent an entire new era in technology. They will not only give us better fuels but will expand and extend the products and values of hydrocarbons.

Research and development opportunities do not stop here. They go on into improved methods of transportation and distribution as well as the engineering of the processing plants. Greater efficiency will be expected through new techniques, new processes, and new materials tailored to more perfectly meet the trying and special conditions of these processing plants.

It is well, then, that we are concerned with extending the life of usefulness of these extremely important natural resources—petroleum and natural gas—for the supply is limited and we cannot add to it. The day is undoubtedly coming when we will have expended our petroleum and natural gas resources and can then turn only to our coal deposits to meet hydrocarbon needs—a matter for the contemplation and study of our children and their children. We owe it to ourselves and those who will follow us to do the very best with what we have and make the supply go as far as possible. Technology and free enterprise alone will meet these problems.

Harold Vagtborg, Midwest Research Institute, before Interstate Oil Compact Commission, Tulsa, Okla., April 13, 1946.

NEW PROCESS FOR ETHYLBENZENE

A LIQUID phase process developed by Socony Vacuum for ethylbenzene production uses ethylene and aluminum chloride as in many of the older processes to convert benzene to ethylbenzene; but by operating at a slightly higher temperature, 212 deg. F. instead of 150 to 190 deg. F. and applying pressure to the ethylene, the yield of ethylbenzene is increased considerably.

For example, using eight parts of benzene to one of ethylene, which usually gives about 48 to 64 percent yield, the new process has given at least 80 percent yield in one step. In this case only 28 percent of the benzene was converted. A higher percentage, 46 percent, can be processed to ethylbenzene in one step, but this time only 66 percent of the ethylene goes to form the desired product.

Another advantage of the new process is a much faster reaction. The experiment giving an 80 percent yield took only 3 min. compared with at least 2 hr. for the previous liquid phase operations. This faster rate makes the process more adaptable for continuous operation. It also makes possible the use of dilute ethylene, down to about 10 percent. This is a large saving in cost, since it is expensive to concentrate the low percentage of ethylene found in refinery gas up to the nearly pure form usually used for making ethylbenzene. The benzene can even

Payoff inside a pulverizer!

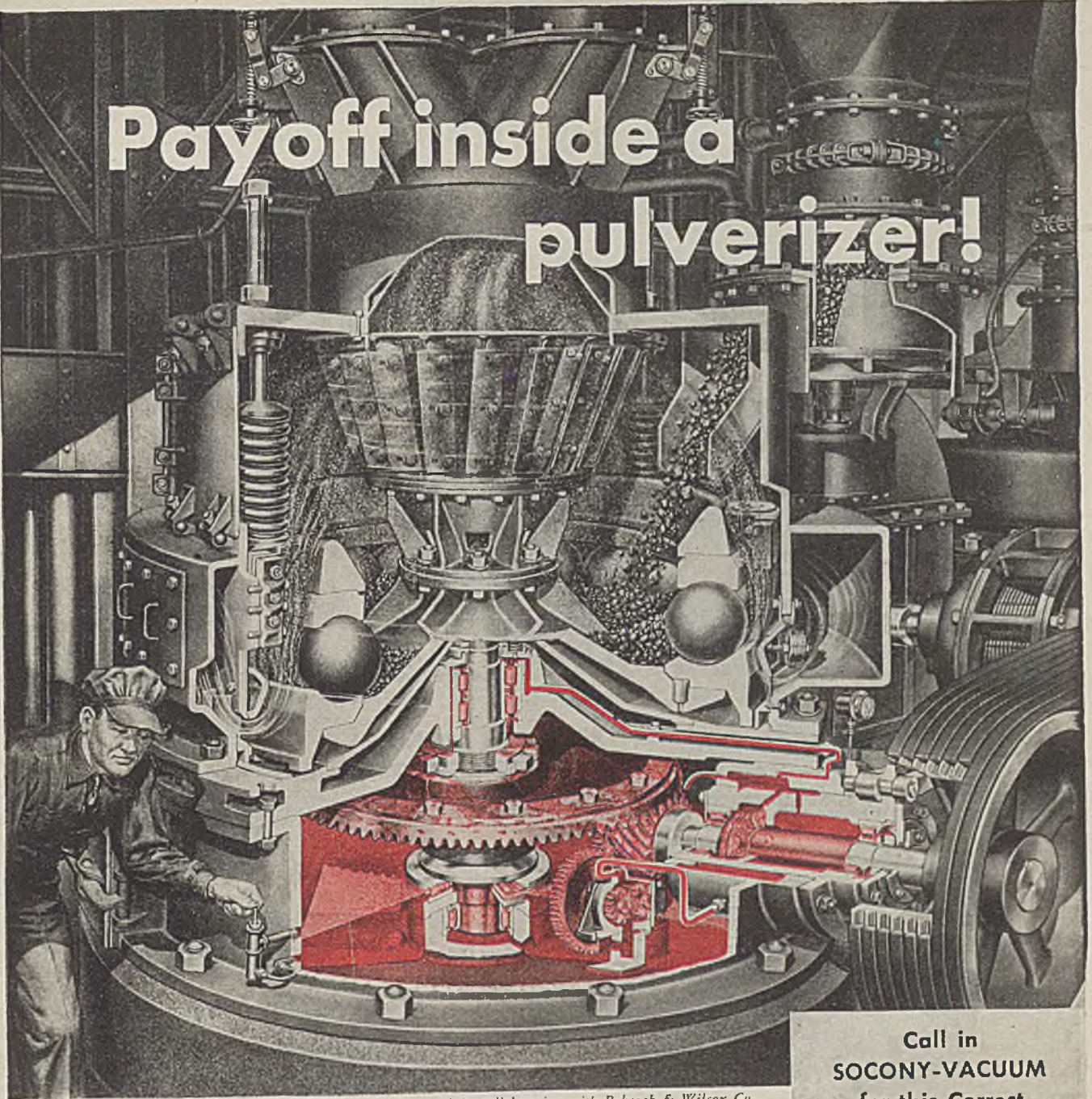


Illustration prepared in collaboration with Babcock & Wilcox Co.

FOLLOW those hefty steel balls shown grinding coal lumps to fine dust inside this big pulverizer. Imagine the loads that lubricating oil has to carry on the bearings and gears.

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Socony-Vacuum Oil Co., Inc.

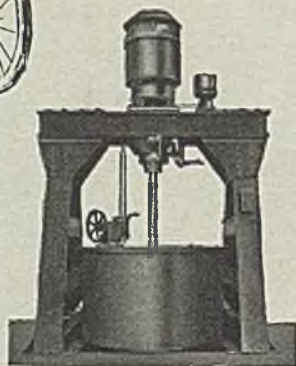
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be used in 25 percent concentration in gasoline, and still get pure ethylbenzene by simple distillation of the product.

The vapor phase process employs the same catalysts which are used in commercial cracking. These catalysts are durable and not easily poisoned. The reaction which takes place at high temperature deposits small amounts of carbon on the catalyst. Occasionally this must be burned off with air, making the catalyst as good as new.

With a temperature of 925 deg. F. and 50 lb. pressure and a five-fold excess of benzene, 80 percent of the ethylene is converted to monoethylbenzene in one step, the rest going to polyethylbenzene. By increasing the excess of benzene to ten fold the yield of ethylbenzene is increased to 85 percent. All products of the reaction are easily separated by distillation. The unreacted benzene is then available to be used again. The process is readily adaptable to continuous cyclic operations.

A. W. Francis, E. E. Reid, A. A. O'Kelly, John Kellett and J. B. Plucker, Socony-Vacuum Oil Co., before the Petroleum Division, American Chemical Society, Atlantic City, April 10, 1946.

ECONOMICS OF CHLORINE CELL OPERATION

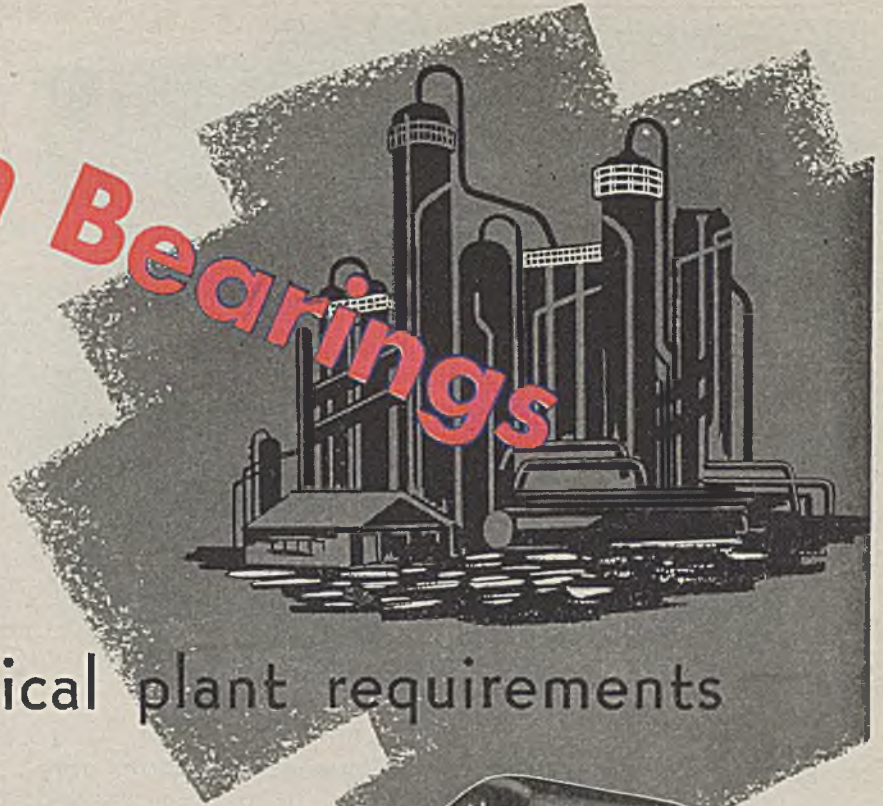
For the present study 18 cylindrical cells were installed and operated for the duration of their anode lives. Cell house operating conditions were, of course, maintained as constant as possible during this period. One group of 6 cells was run with the normal three diaphragms. That is, the cells were installed with new anodes and diaphragms and were run for one-third of the anticipated life of their anodes (120 days). Their diaphragms were then renewed. A renewal was again made after another 120 days. Then the cells were run till failure of the anodes.

A second group of 6 cells was run with two diaphragms. In their case only one renewal was made, and this at an assumed half-life of the anodes (about 160 days). The cells were then run until the anodes failed. The third group of six cells was run with only one diaphragm. That is, it was installed and simply run until the anodes wore out.

The cells were all tested a few days after being installed and then about every three weeks thereafter during their anode life period. Tests consisted of measuring voltage drop and ampere load on the cell while collecting a sample of its cell liquor. A liter graduate was used for this collection, and the flow time (about 3 min.) accurately measured. The volume and specific gravity of the sample were then noted. The rate of flow was determined twice on each test, and if there was more than 1 percent difference in the two determinations, another flow rate was taken. If there was still considerable discrepancy, the cell was assumed to be out of equilibrium and allowed to run for a day or two and was then tested again. A sample of feed brine was also taken during the tests.

The above data were sufficient to enable determination of voltage and ampere efficiencies. Also from these data we could check the ampere efficiency vs. cell liquor caustic strength, salt vs. cell liquor caustic strength, and cell liquor caustic strength vs.

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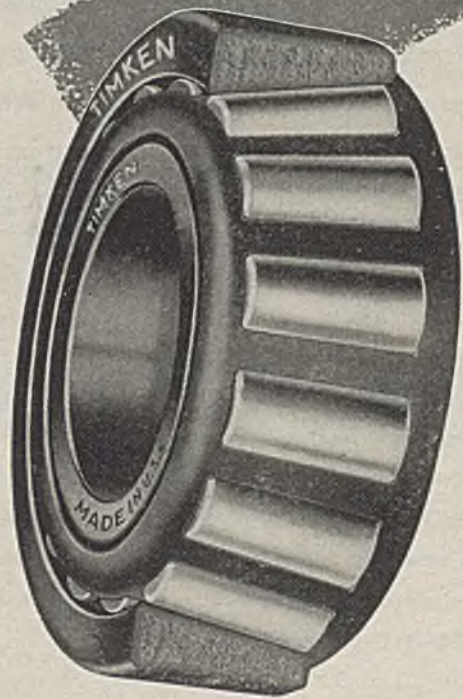


meet all chemical plant requirements

The elimination of friction and wear; the ability to carry radial, thrust and combined loads; and the holding of moving parts in constant alignment; are just as important in chemical plant equipment as they are in industrial machinery of every kind. Timken Tapered Roller Bearings provide all these necessary qualities.

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diaphragm age relationship which had been obtained in our previous study. Results of the study were:

1. The existence of a straight-line relationship showing the decline of ampere efficiencies with increasing cell liquor caustic strengths was reaffirmed.
2. There is a decided trend for increased anode life with higher ampere efficiencies.
3. With the operating conditions and unit costs which were used, it would be cheapest to run the cells with only two diaphragms (one renewal) per anode life. However, there appears to be little difference in running with one, two or three diaphragms.
4. The total cell product costs obtained from each of the one-, two- and three-diaphragm groups were still declining at the termination of their anode lives.

J. P. Wenzell, P. J. Stuber and S. Cottrell, Monsanto Chemical Co., before The Electrochemical Society, Birmingham, Ala., April 1946.

GEIGER-COUNTER X-RAY SPECTROMETER

SINCE the bulk of materials in nature are crystalline aggregates, it follows that a study of the crystal structure will divulge a great deal of information. X-ray diffraction is employed for such studies and can give answers that are unequivocal.

So called soft x-rays as are presently employed in x-ray diffraction techniques are very high frequency electromagnetic waves of essentially monochromatic frequency. Because of the regularity of structure in a crystal it can be regarded as being a three dimensional diffraction grating that will diffract these rays much the same as light is diffracted by an optical grating.

This, of course, will enable the dimensions between parallel planes of atoms to be determined by studying the relationship between wavelength and diffraction angle.

If the crystal is rotated it follows that all planes will be irradiated and reflections given off by all such planes. These reflections are known as intensity maxima, and if a piece of sensitized photographic film is situated radially about the crystal, they will blacken the film at the angle of reflection. From this can be determined the angle of reflection from every plane in the crystal and consequently the "d" value. In nature, however, crystals occur as agglomerates, but this does not make any difference to the method.

Each individual substance present in a mixture will give off reflections upon being irradiated as though it alone were present. This fact makes possible the qualitative and quantitative analysis of complex materials in a simple fashion because the information obtained is a series of "d" values with different intensities. These data are listed, and by comparison with tables, composition of the unknown materials can be determined. Relative intensities of the maxima from each material determines the amount of each present.

This is known as the powder method of identification. The sample is in the form of a powder coated on a fine fiber about 0.5 mm. in diameter. This sample is situated centrally inside a short closed cylinder and a fine pencil of monochromatic radiation bathes the fiber. Situated radially around the sample is a photographic film. Diffrac-



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tion cones of radiation are given off by the sample and cut the film in arcs. These arcs appear on the developed film and are measured and computed in terms of relative intensity and equivalent "d" values.

This procedure, however, is subject in practice to several errors that can be partially compensated for.

Recently a new type of instrument has become commercially available that makes use of a Geiger-Muller counter instead of film. This instrument is known as a Geiger Counter X-ray Spectrometer and largely eliminates the errors that occur in the employment of the film technique.

Instead of the customary camera geometry, a focussing condition is employed, where a flat powder layer is irradiated by a divergent beam instead of a fine pencil.

The diffracted beam converges from the specimen to an acceptance slit at the mouth of a Geiger tube situated on an analyzer arm that move radially around the specimen. The arm is driven by a motor and is electrically connected to the chart drive system of a fast strip chart recorder so that the angular displacement of the arm is laid out along the chart length.

Radiation received by the Geiger tube is electrically modified so that the pen displacement of the recorder is proportional to the radiation intensity received. Thus the finished chart will represent an automatic record of intensity distribution versus angle, which of course can be converted to "d."

Using the Geiger-Counter Spectrometer it is often possible to determine as little as 1 percent of a substance in a sample and the quantitative accuracy can also be 1 percent or better. This, of course, is better than most wet or other analytical methods making it a useful tool for plant control or research.

N. T. Farinacci, Scien-Tech, and F. G. Firth, North American Phillips Co., before Scientific Section, Tenth Annual Convention Toilet Goods Association, New York, May 17, 1946.

**WARTIME DISCOVERIES WITH
IMPORTANT APPLICATIONS**

It is a seemingly irrational commentary on human achievements to note that some of our greatest blessings have been the product of war. The recent conflict should be no exception, and the great crop of military developments of World War II must be recognized as containing inherent benefactions which their martial purpose had concealed.

Though it is difficult for the non-expert to appreciate the derivation of peacetime benefits from the tools of war, such things can have important technical and other professional application. Consider the medical aspects of chemical warfare developments, for example:

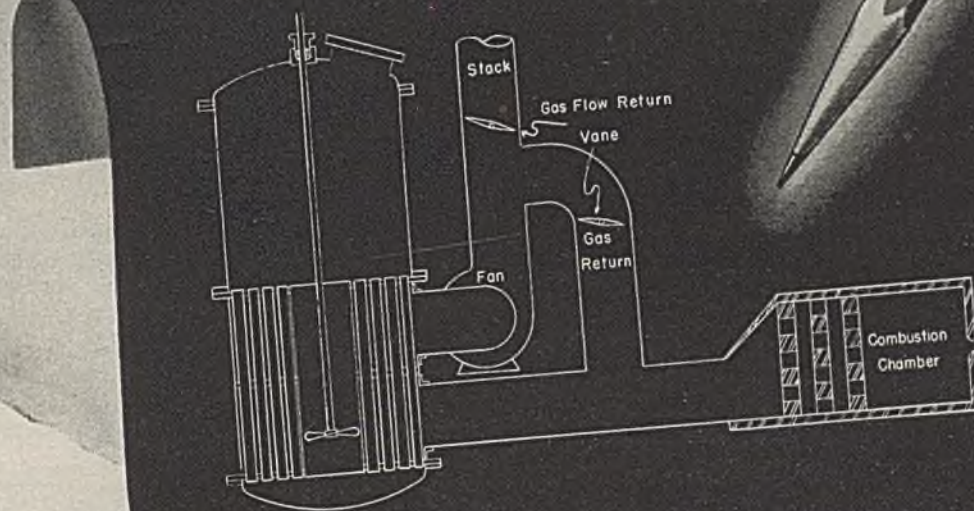
There were five wartime discoveries in this line, made possible by research chemists and biological investigators, which have long range and important humane application.

The first and foremost find involves BAL, which takes its name from British development of its anti-lewisite action. It has been found to be a life-saving medication in treatment of persons poisoned with arsenic or mercury.

This compound was discovered by the

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British and manufactured in the United States by the Du Pont company. As a result of chemical skill, a pure compound was made available which could be injected into the human body. Large stocks furnished the Army for protection against heavy metal poisoning from potential war gases will now be made available to the civilian economy and will be invaluable in treatment by physicians.

Second group of chemical compounds synthesized by the chemists of National Defense Research Committee for the Chemical Warfare Service, known as the nitrogen mustards, have been shown by military and civilian medical investigators to have such positive effects on certain forms of cancer that further vigorous study will be pushed.

Third medical contribution concerns diisopropyl fluorophosphate which was produced by NDRC chemists. Physicians working for CWS have found probable beneficial effects of this compound in the treatment of the eye condition, glaucoma. It is also being investigated for the treatment of myasthenia gravis.

The fourth discovery holds promising medical application in cases of poisoning from cyanide. The medical research staff of CWS has shown that this concoction seems to counteract cyanide and may serve as an effective remedy.

A fifth compound developed and produced by NDRC chemists is the rodenticide 1080. It was by far the best rat poison tested by the Fish and Wildlife Service.

Robert P. Patterson, Secretary of War, before the American Chemical Society, Atlantic City, April 8, 1946.

IMPURITIES CATALYZE ISOMERIZATION

IMPURITIES that lurked unsuspected in butane and pentane, and in the catalysts with which they were treated, were real though unrecognized heroes in the wartime aviation gasoline production program.

Isomerization was one of the big three processes upon which the success of the aviation gasoline program depended. The others are catalytic cracking and alkylation. The function of the isomerization process in the war program was two-fold: first, conversion of normal butane to its isomer as charge stock for alkylation; second, isomerization of normal pentane to increase the octane rating and improve the front end boiling range of the aviation motor fuel.

The attack on Pearl Harbor placed on the research chemists, development engineers and production men of the oil industry the sudden duty of producing fantastic quantities of 100-octane gasoline and in the shortest possible time. The problem was to convert butane into its isomer in sufficient quantity to keep the alkylation plants built and building, operating at top capacity. The isomerization process took on new importance.

Working on the isomerization reaction in laboratory and pilot plant, the inventors had not waited to obtain chemically pure materials but had made use of the commercial normal butane with the aluminum chloride and hydrogen chloride which were immediately available.

The process worked; a number of isomerization plants were rushed to completion to

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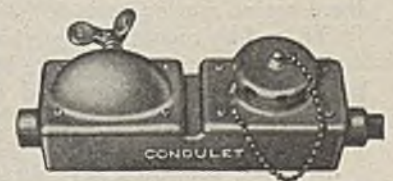
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convert butane and pentane to their isomers as components of aviation gasoline.

A laboratory study of the reaction with the view to improving its performance was made. Chemically pure materials were obtained and careful experiments were made in high vacuum equipment. The reaction did not work. It was discovered that the process would not go unless the materials entering into the reaction contained minute traces of impurities. Presence of oxygen from the air in proportions less than 1 part in 10,000, a trace of olefins or water, make all the difference between success and failure. The manner in which the impurities operate was determined by the use of deuterium as a tracer.

Herman Plies and R. C. Wackher, Universal Oil Products Co., before the American Chemical Society, Atlantic City, April 12, 1946.

BUTYL INNER TUBE PERFORMANCE

OVER-THE-ROAD tests being run at San Antonio, Tex., on Stanco test cars using passenger size tires under conditions of 10 percent overload and operating at 60 m.p.h., 24 hr. per day, 5 days per week reveal the following fact: butyl inner tubes are approximately eight times better than natural rubber tubes in their air-holding capacity under these severe test conditions.

Because of this property of butyl inner tubes new test procedures have been developed, making it possible to study the effect of maintenance of proper inflation pressure on tire performance. Results indicate that the maintenance of proper inflation pressure, afforded by butyl tubes because of their superior air retention, will result, under these severe test conditions, in an increase in tread life of approximately 10 percent. Results have been obtained at both 60 and 40 m.p.h.

The superior retention of physical properties of butyl compared with natural rubber under severe laboratory aging conditions has been translated to service aging in actual over-the-road performance. Road tests indicate that the superior retention of properties on aging of butyl yields an inner tube exhibiting increased puncture and blow-out resistance.

I. E. Lightbown and L. S. Verde, Stanco Distributors, and J. R. Brown, Jr., Esso Laboratories, before Division of Rubber Chemistry, American Chemical Society, Atlantic City, April 11, 1946.

HYPOTHESIS ADVANCED FOR CRUDE OIL FORMATION

MANY attempts have been made to explain the manner in which petroleum is formed in the earth. Early research indicated that most petroleum originates in the remains of plants and animals which have been deposited on the ocean bottom and which have then been buried by layers of mud or sand. High temperatures and pressures were originally thought to contribute the energy required to convert this material into oil. Investigations about ten years ago proved, however, that oil is formed at temperatures too low to permit this conversion.

Recently, it has been proposed that bacterial action or the energy from the high-speed particles released by radioactivity may play an important role in converting proto-

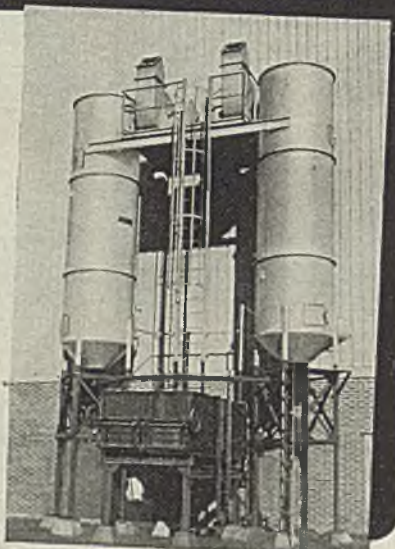
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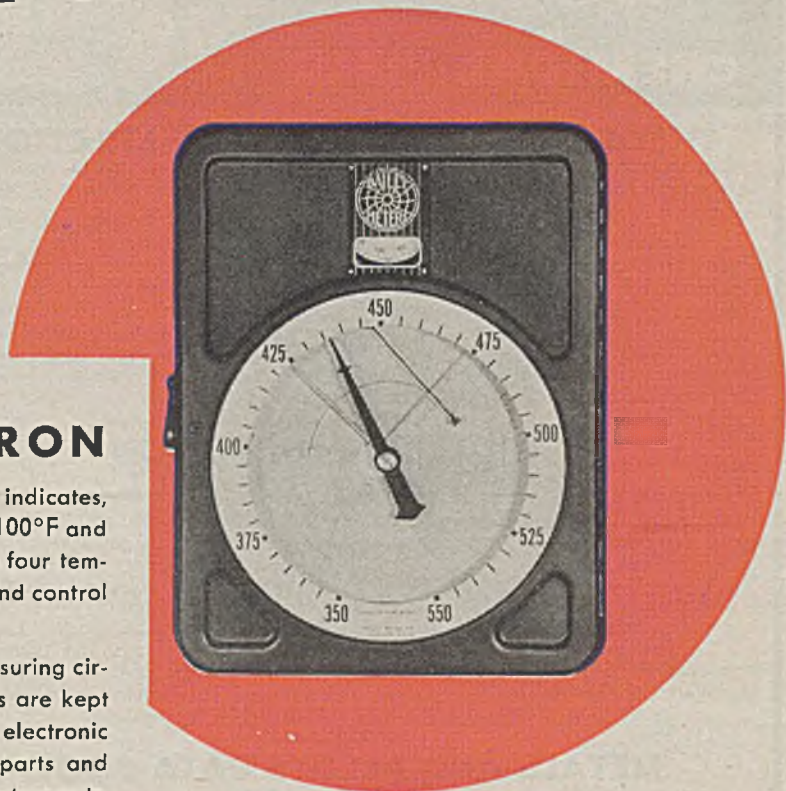
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P.5

For details, request Bulletin 230-A "Bailey Pyrotron Electronic Resistance Thermometer".

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By **E. W. R. STEACIE**, *National Research Laboratories, Ottawa*
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plasm, proteins, fats, and other complex substances into the constituents of crude oils. Research by the Geology Department at MIT has shown that there may be sufficient radioactivity in the materials of oil fields to effect this conversion over a period of ten million to one hundred million years.

Among the compounds isolated from ocean bottom muds have been a number of fatty acids. When certain of these acids were exposed to bombardment by alpha particles from radioactive disintegration in the laboratory, they were converted into straight chain hydrocarbons which make up the greatest proportion of naturally occurring petroleum.

The research has shown that not only straight chain but even cyclic hydrocarbons can be produced by the effects of radioactivity. Work is now in progress to determine the manner in which complex organic substances are transformed by means of radioactivity.

These changes in organic compounds have been brought about by bombardment or radiation under laboratory conditions. Whether similar conversions may take place in the organic material present in oil fields to form appreciable quantities of petroleum is as yet unknown. The radioactivity of earth materials is now being measured and in time, as this study progresses, some definite idea will be obtained as to the quantitative importance of radioactivity in the formation of crude oil.

I. A. Breger, C. W. Sheppard and V. Burton, Massachusetts Institute of Technology, before the Organic Division, American Chemical Society, Atlantic City, April 8, 1946.

DESALTING SEAWATER

BASIC process involved in the Permutit Seawater Desalting Kit developed for the armed forces is a combination of cation exchange and precipitation in which the principal chemical ingredient is a silver aluminosilicate. This insoluble substance exchanges its silver ion for the sodium ion in solution, the released silver reacting with the chloride ion to produce the insoluble AgCl precipitate. Thus, both the cation and anion of the NaCl are insolubilized and retained in the mass of material which is then strained out of solution by a special cotton filter sealed into the bottom of the reaction bag.

H. L. Tiger, V. J. Callse, S. Sussman and M. Lane, The Permutit Co., before the Division of Water, Sewage and Sanitation Chemistry, American Chemical Society, Atlantic City, April 9, 1946.

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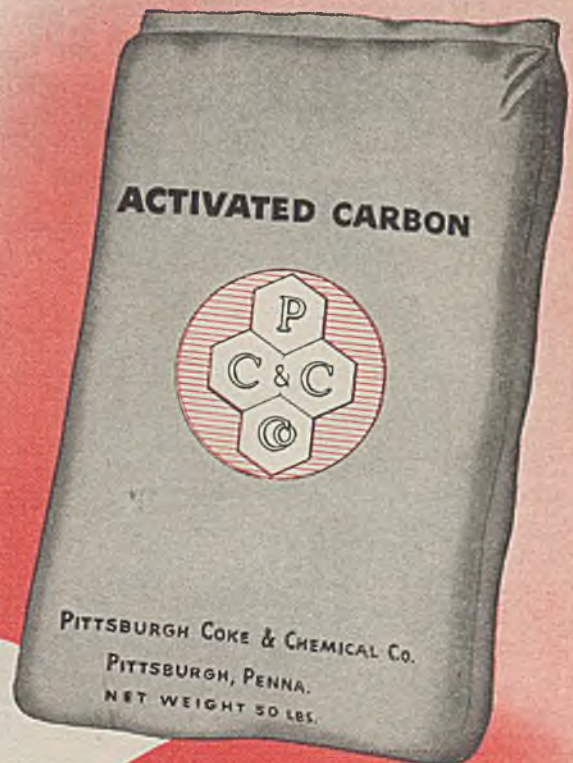
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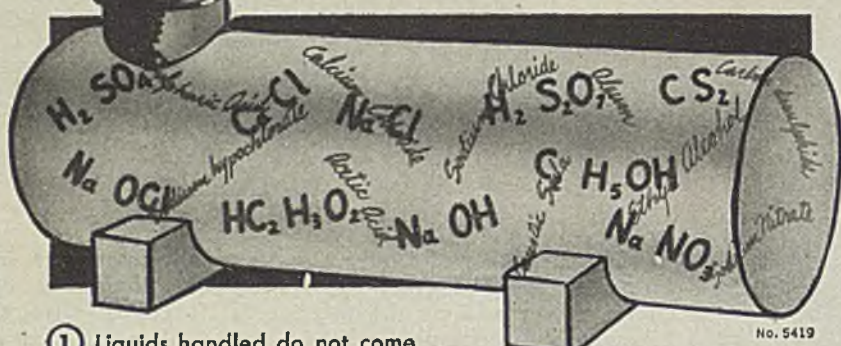
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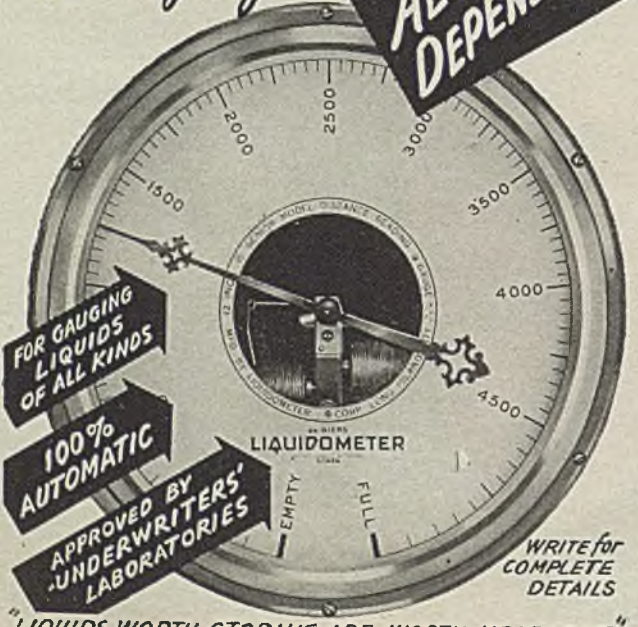
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V. Haensel and V. N. Ipatieff, Universal Oil Products Co., before the American Chemical Society, Atlantic City, April 11, 1946.

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R. P. Dinsmore, The Goodyear Tire and Rubber Co., at automobile industry's Golden Jubilee celebration, Detroit, May 28, 1946.

COMMERCIAL NITRATION OF NATURAL GAS

NITROPARAFFIN developments of the past ten years have shown that the first member of the series, nitromethane, has many uses for which the higher homologues are unsuited. For example, it is the only mononitroparaffin which can be detonated with a cap. It is a high explosive much more powerful than TNT but even harder to explode by accidental shock. It has three replaceable hydrogen atoms while the others have two, one, or none.

Nitromethane has been more available than the other members of the series since 1872, when it was first made from acetic acid by chlorination, neutralization and treatment with sodium nitrite. Therefore, it has been more widely studied and more of its derivatives are known than of its homologues. Also, nitromethane is an excellent selective solvent for doing such jobs as separating petroleum oils into good and poor lubricating fractions.

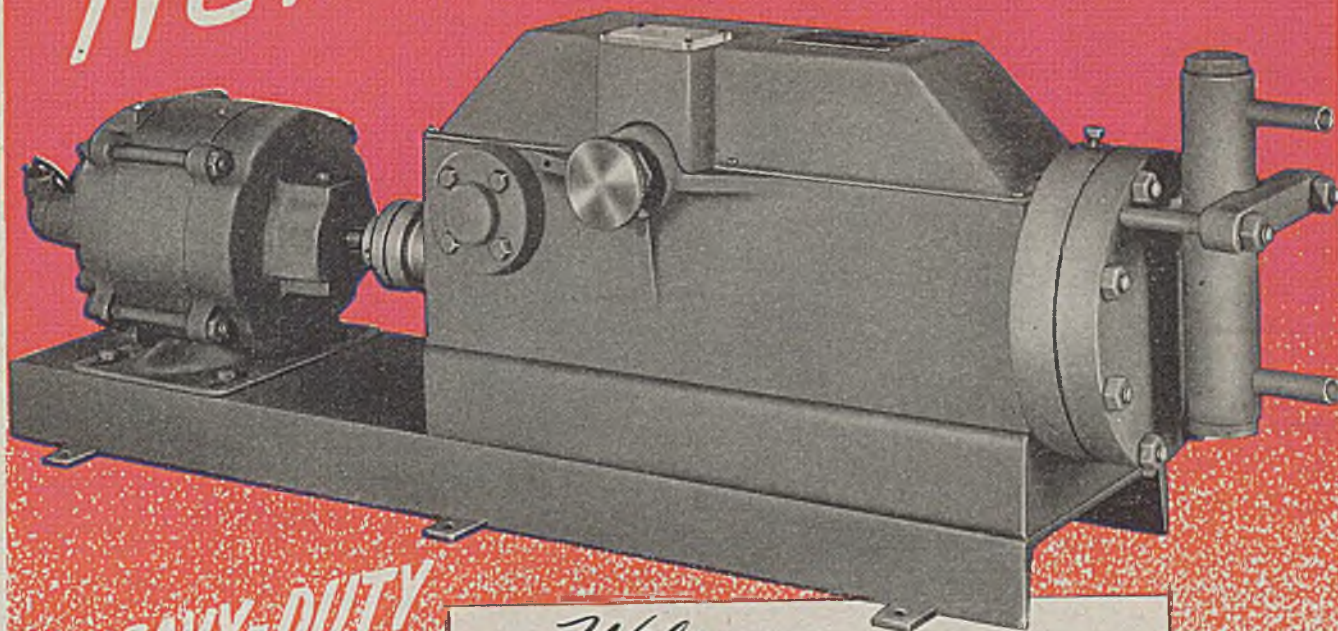
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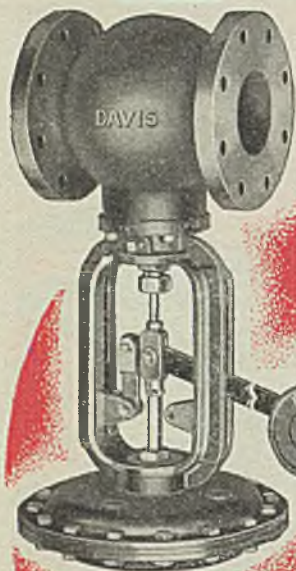
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relatively small amounts of nitromethane. This process has provided sufficient material for experimental studies in the use of nitromethane for such purposes as launching flying bombs. It has long been evident, however, that the best way to produce nitromethane in large quantities would be by the action of nitric acid on natural gas, which consists of approximately 85 percent methane. These cheap gases are available at a cost of about \$2 per ton (3c. per M cu. ft.) in Texas. Plants constructed during the war to produce nitric acid for the manufacture of TNT are now standing idle because the peacetime demand for this acid is not nearly so great.

The difficulty in the production of nitromethane has been that yields have always been low when methane is treated with nitric acid. By employing moderate pressure, 100 psi., the yield was very considerably increased, and brought up to about 80 percent that obtained with propane.

As a result of this research, nitromethane is potentially available commercially on any scale desired and at a relatively low production cost.

H. Shechter, H. B. Hass, L. G. Alexander and D. B. Hatcher, Purdue University, before the Division of Industrial and Engineering Chemistry, American Chemical Society, Atlantic City, April 11, 1946.

SIGNIFICANCE OF GERMAN ACETYLENE DEVELOPMENTS

ADVANCES in the field of acetylene were among the most striking wartime achievements of German industry. In addition to synthetic fibers, the Germans obtained from acetylene many products which have important potential uses in the manufacture of plastics and plasticizers and in the rubber industry.

The reason the Germans relied on acetylene to provide raw materials for a large part of their chemical industry was the country's lack of petroleum and natural gas. In the United States, where petroleum and natural gas are plentiful, it has not been so necessary to utilize acetylene for chemical production. Where we have built up a large part of our organic industry based on ethylene from petroleum, the Germans were forced to obtain ethylene by hydrogenating acetylene made from coal.

Although economical processes for producing acetylene have been the goal of many research efforts, only two methods are in large-scale use at present, namely, production through calcium carbide and electric arc cracking of light hydrocarbons such as methane and ethane. Little interest has been shown in the arc process in the United States, although it has been thoroughly studied, because it has not appeared attractive commercially. Even in Germany, the apparent cost of acetylene by this process was substantially the same as by the use of carbide. Power consumption was just as high and purification equipment and costs were very large. This latter difficulty is inherent in all processes so far proposed for acetylene manufacture from petroleum sources.

In Germany, the number of chemical compounds made from acetylene was very large. Many of these are essentially made from ethylene produced by hydrogenating acetylene and hence are of little interest to



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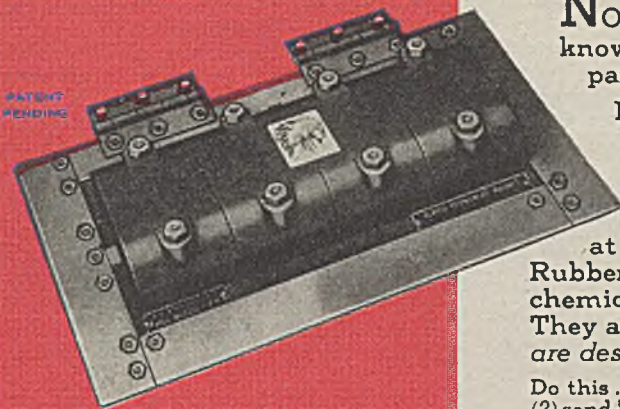
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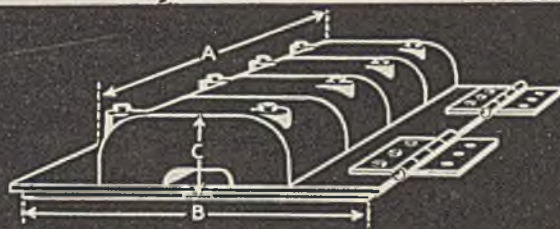
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us. Such products as glycols, styrene, etc., can be made more cheaply here from petroleum ethylene. Similarly we have relatively little interest in the manufacture of butadiene from acetaldehyde or from formaldehyde and acetylene, as we have much cheaper processes available from petroleum. Some of the intermediates produced in these processes, however, are of definite interest for the manufacture of other, and in some cases new, products.

The following are some of the more interesting German developments:

1. Direct vinylation reactions. These involve the reaction of acetylene with alcohols, acids, sulphides and amines to produce vinyl ethers, esters, sulphides and amines. These products have many potential uses, particularly in the manufacture of plastics, plasticizers and rubber tackifiers.

2. Direct carbon-carbon linkage, inserting acetylene into molecules such as aldehydes, ketones, etc. This yields highly unsaturated and reactive compounds which can be processed further to produce butadiene,

acrylic acid, acrylonitrile, adipic acid, mono, di and trihydroxy aliphatics, etc.

3. Carbon monoxide addition to such materials as acetylene, tetrahydrofuran, etc., to give adipic and acrylic acids.

4. Development of new synthetic fibers and methods for producing intermediate products.

5. Manufacture of a number of rather new intermediates on a large scale, such as propargyl alcohol, butynediol, tetrahydrofuran, dihydrofuran and butyrolactone.

Of these many developments, it appears probable that interest in this country will center around vinyl ethers, carbon monoxide addition, synthetic fibers and the manufacture of new products from the various intermediates. However, in many cases, alternate and more economical methods of production of the intermediates will be found using petroleum or farm products as raw materials.

Carl C. Monrad, Carnegie Institute of Technology, before the Chicago Section, American Chemical Society, April 26, 1946.

FOREIGN LITERATURE ABSTRACTS

ELECTROLYTIC POLISHING OF CADMIUM

IN ELECTROLYTIC polishing of cadmium the electrolyte used is an aqueous solution of potassium cyanide (120 g. per liter) with cadmium hydroxide (20 g. per liter) added. The process is carried out at ordinary temperature without agitation. The cathode is an iron plate of 10 sq. cm. or, better still, two iron plates of 5 sq.cm. each located on either

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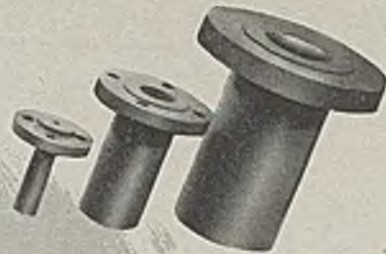
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several moments without current in the tank before resumption. Electrolysis can be continued as long as necessary. When the polishing is completed, the anode is withdrawn without interrupting the current, washed in a stream of water and dried. A satisfactory polish is obtained by operating under a tension of 4 to 5 volts, current density being from 12 to 25 amperes per sq.dm. The brilliant appearance of the surface is obtained from the beginning of the electrolysis, and 00 emery scratches are totally eliminated in 15 min. The operation can also be conducted with liberation of gas and in that case the distance of the electrodes can vary much more, a distance of 20 to 30 mm. between cathode and anode giving good results. The different factors which affect the result of the operation of electrolytic polishing of cadmium are: tension applied and current density, concentration, distance of the electrodes, agitation, influence of the carbonates, influence of dissolved cadmium.

Digest from "Electrolytic Polishing of Cadmium", *Bull. Soc. Chim. France* 11, No. 11-12, 568-572, 1944; *Chimie et Industrie* 55, No. 2, 121, 1946. (Published in France.)

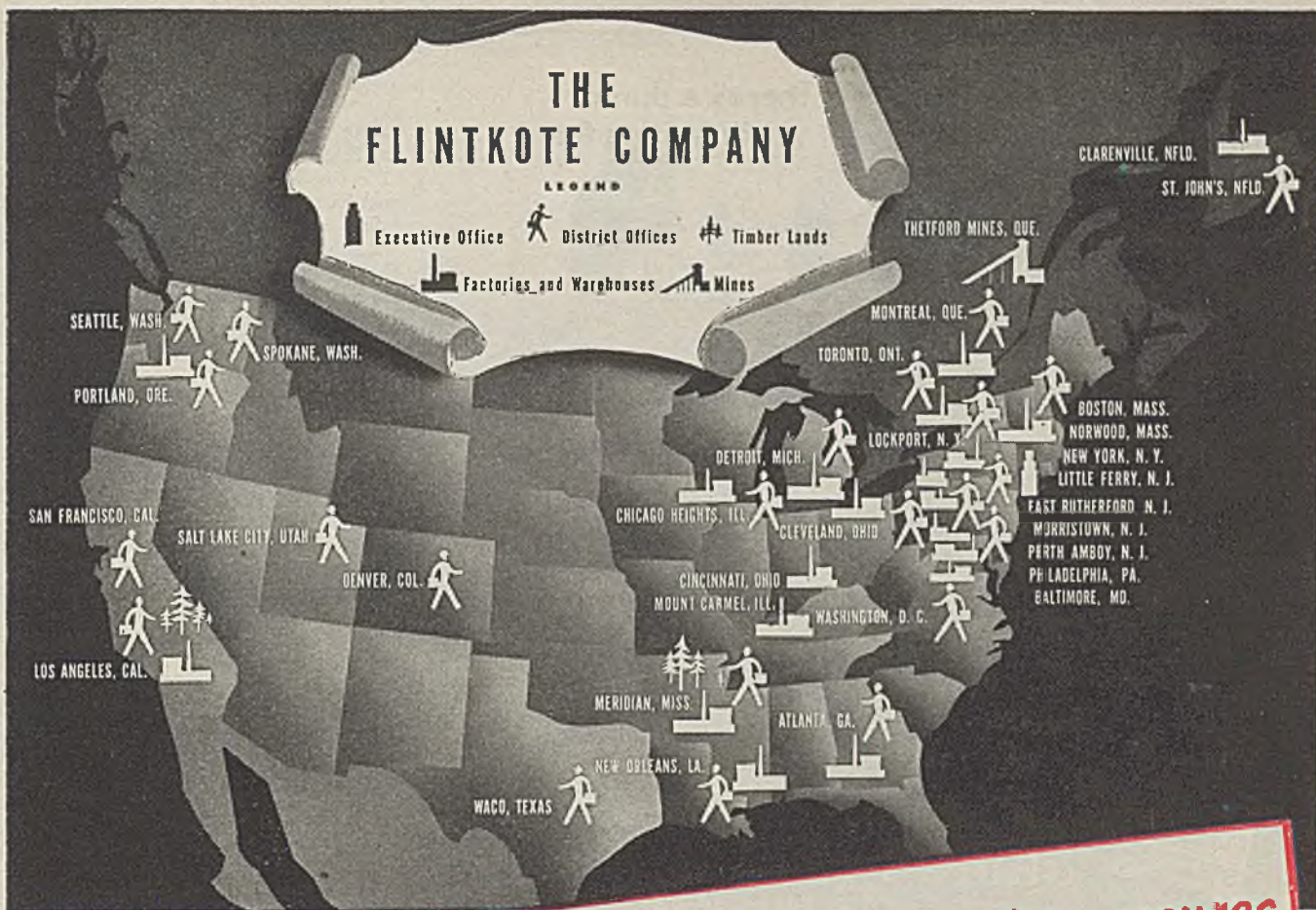
NITRO COLORING MATERIALS FOR RAT POISON

Use of nitro coloring materials for extermination of rats is a recent development and it is now known that such coloring materials are far more powerful than any of the other materials in present use for this purpose, such as strychnine, phosphorus, thallium salts, arsenic and its compounds, squill, barium carbonate, fluorine compounds and sodium nitrate. Non-sulphonated nitro coloring materials are of more or less toxic nature. The presence of the sulpho group ($-SO_3H$) takes all physiological activity from the molecule. The physiological activity of di-nitrated phenols in the 2,4 position is far greater than that of the mono- or tri-nitrated analogs. Particular interest was therefore taken in the following compounds and detailed laboratory experiments were conducted to determine their action and effectiveness: 2,4-dinitrophenol, 2,4-dinitrocresol, 2,4-dinitro-alpha-naphthol and 2,4-dinitro-alpha-naphthol sulpho acid.

Digest from "Nitro Coloring Materials and Their Special Applications. III. Rat-killing Coloring Materials" by I. A. Pastac, *Chimie et Industrie* 53, No. 1, 19-26, 1945. (Published in France.)

CLAYS FOR GASOLINE DESULPHURIZATION

TWELVE samples of clays from four different regions on the Apsheron peninsula in the USSR were tested for suitability for catalytic desulphurization of gasoline, and optimum conditions for the process were determined. Three of the samples were found capable of reducing the sulphur content of gasoline from 72 to 75 percent in a continuous run lasting 15 hours at 300 deg. C. At 400 deg., almost 85 percent desulphurization was achieved on gasoline having an initial sulphur content of 0.059 percent. A temperature of 300 deg. was considered preferable, however, since partial cracking may take place at the higher temperature. Activation of the clay by heating at 400 deg. for 3 hrs. did not affect its desulphurization action. The same clay samples were found to remove sulphur from different gasolines in varying degrees, as shown by experiments conducted



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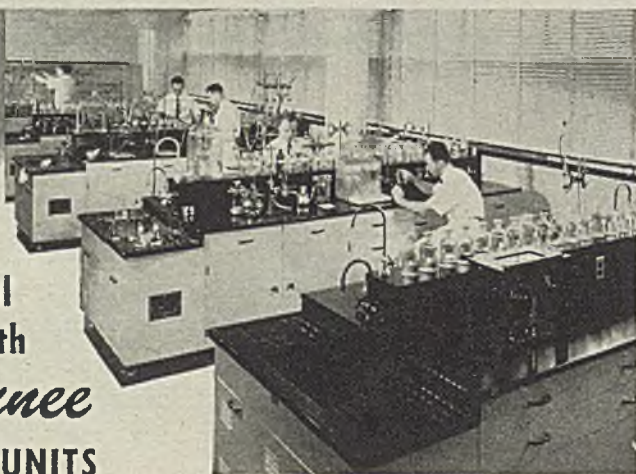
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at 300 deg. C., atmospheric pressure and an hourly space velocity of 1 volume of gasoline per volume of clay. Only 30-50 percent sulphur removal was achieved, in the gasoline having a low sulphur content originally (0.0118 to 0.0175) while those containing 0.059-0.093 percent sulphur underwent from 72 to 75 percent desulphurization. The difference also may have been due partly to the sulphur compounds present in them. The octane number of the gasoline rises by one unit in the presence of 3 cc. TEL for every 0.01 percent sulphur removed.

Digest from "Catalytic Desulphurization of Gasoline" by I. M. G. Nemedli, *Zhurnal Prikladnoi Khimii* 18, 82-8, 1945. (Published in Russia.)

DESTRUCTIVE HYDROGENATION

EFFECT of structure on the rate of destructive hydrogenation of ten typical compounds is shown in the attached table, which gives the relative rates of decomposition of hydrocarbons in destructive hydrogenation in the presence of 5 percent molybdenum sulphide under an initial pressure of 80 atmospheres. Cyclic hydrocarbons without side chains decompose at considerably slower rates than aliphatics. Relative rates of decomposition of molecules having approximately equal numbers of carbon atoms decrease in the following order: normal paraffins, polynuclear naphthenes, partly hydrogenated fused-ring aromatics, fused ring aromatics, in other words, the rate of decomposition varies directly with the proportion of hydrogen in the molecule. Increase in the rate of decomposition with increase in the molecular weight (or number of rings in the molecule) was found to be characteristic for all the cyclic hydrocarbons studied. Each additional ring in the molecule accelerates the reaction 5 to 10 times in the case of aromatics and 16 times in the case of naphthenes. These regularities hold for the temperature range of 380-475 deg. Within 380-420 deg. the temperature coefficient of the rate of destructive hydrogenation is 1.85-2.05, the apparent energy of activation 55,000-65,000 cal. per mole. Within 420-475 deg. the corresponding values are 1.6-1.75 and 48,000-58,000. Although there are great differences between the absolute values of cracking velocity constants and destructive hydrogenation constants, relationships between rates of conversion of the various classes are qualitatively the same for both processes. The instability of normal dodecane, the exceptional stability of naphthalene, and the intermediate positions of decalin and tetralin are observed in both cases.

Digest from "Rates of Decomposition of Hydrocarbons in Destructive Hydrogenation. III" by A. V. Lozovoi and S. A. Sonyavin, *Zhurnal Prikladnoi Khimii* 18, 43-9, 1945. (Published in Russia.)

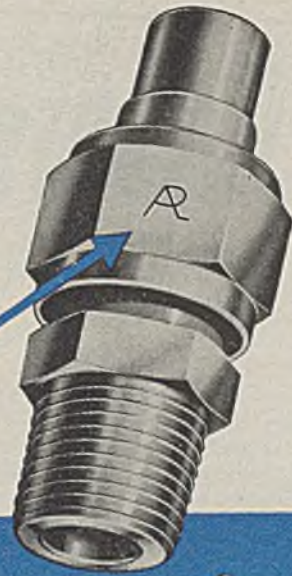
Relative Rates of Decomposition of Certain Hydrocarbons

Hydrocarbon	380 deg.	420 deg.	475 deg.	Mean value
Naphthalene.....	1.00	0.11	0.43	0.27
Tetralin.....	1.00	1.00	1.00	1.00
Decalin.....	2.99	1.52	2.28	2.27
Anthracene.....	3.13	1.71	1.70	2.18
9, 10-Dihydroanthracene.....	3.13	1.76	2.66	2.52
Octahydroanthracene.....	3.83	3.10	5.23	4.05
Perhydroanthracene.....	39.35	33.51	.....	36.43
Phenanthrene.....	3.75	2.46	3.11
1, 2-Benzanthracene.....	11.18	11.18
Normal dodecane.....	66.1	47.35	56.77

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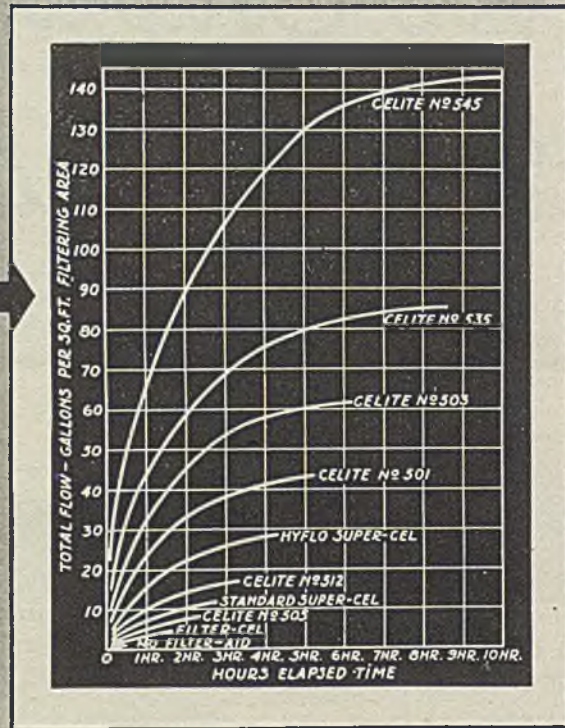
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CORROSION CONFAB

SYMPOSIUM ON STRESS-CORROSION CRACKING OF METALS. Edited by Carter S. Cole. Published jointly by American Society for Testing Materials and the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. 495 pages. \$5 to members, \$7.50 to non-members.

STRESS-CORROSION cracking has been the subject of research and speculation for three decades. It is a phenomenon of major engineering significance and considerable theoretical interest. Many puzzling and apparently contradictory facts have been uncovered, and the theories advanced to explain the phenomenon have been varied and frequently conflicting.

To meet the need for a thorough and critical review of the field, ASTM and AIME sponsored a joint symposium on stress-corrosion cracking. It was held in Philadelphia in November 1944. The present volume is a compilation of the papers and discussions presented there. An author index has been added.

The whole field of stress-corrosion cracking was thoroughly covered at the three-day meeting. There were papers on the theory of stress-corrosion cracking, test methods, brass and other copper-base alloys, light alloys, stainless steel, galvanized steel, bridge wire, and a series of other materials including nickel and nickel alloys, lead alloys, and low-carat gold. In all, 28 papers were presented.

It is generally recognized that these papers represent the most extensive existing compilation of present-day knowledge on the resistance of metals to conditions of combined stress and corrosion.

PLASTICS CATALOG

MODERN PLASTICS ENCYCLOPEDIA. *Plastics Catalog Corp.*, New York. 1,389 pages. Price. \$6.

THIS YEAR'S catalog is even more colorful and elaborate than its predecessors. This applies both to editorial material and advertisements. Certain of the sections are of particular interest to the chemical engineer: (1) Facts and figures of the industry for 1944 and 1945, (2) technical data includes a large volume of information on most of the plastic materials, (3) the usual articles on each of the resins, (4) synthetic resin coatings for textiles, paper, metals, etc., (5) recent developments in resin treatment of fibers, (6) the customary articles dealing with the various synthetic rubbers including silicone and cyclorubber, and (7) the appendix with its glossary, list of producers of materials and chemicals, equipment and supplies, list of courses in plastics, trade associations and list of trade words.

SOUND AND PRACTICAL

MODERN PLASTICS. By Harry Barron. *John Wiley & Sons*, New York. 680 pages. \$7.50.

Reviewed by Chaplin Tyler

HARRY BARRON is well known for his numerous contributions to the technical literature of synthetic resins and plastics and as the author of two earlier books "Modern Rubber Chemistry" (1937) and "Modern Synthetic Rubbers" (1942 and 1944). The present book "Modern Plastics" was published originally in 1945 in England.

"Modern Plastics" is neither an elementary text nor a handbook; it occupies an intermediate position and as such should have good acceptance among chemists and engineers concerned with the manufacture and application of plastics. Part I is concerned with the scope of the plastics industry, the raw materials used, and the fundamentals of polymerization. Part II deals with thermosetting resins and their formulations for various applications such as varnishes, cements, molding compositions, castings, and laminates. Part III deals with the cellulose plastics. Under Part IV, entitled "Vinyl Plastics," various materials are discussed including polyethylene, polystyrene, polyvinyl chloride and copolymers, polyacrylics, polyvinyl acetate, polyvinyl alcohol, and polyvinyl acetals. Part V is a catch-all section which covers polyamides, alkyds, and protein materials. Part VI covers high-frequency heating techniques, analytical procedures, and physical testing techniques.

As is the case with all books in extremely fast-growing and fast-moving fields, coverage cannot be complete nor strictly up-to-date, since important progress takes place in a matter of months. Nevertheless, Dr. Barron has handled the subject well. The book has a practical flavor yet is sound theoretically.

REPORTING EVIDENCE

ATOMIC AND FREE RADICAL REACTIONS. By E. W. R. Steacie. *Reinhold Publishing Corp.*, New York, 548 pages. \$8.

Reviewed by F. C. Nachod

ALL who have been concerned with problems concerning the kinetics of gas phase reactions will have been disappointed at one time or another about the fact that information on this subject is widely scattered throughout the literature and may be found under such headings as kinetics, photochemistry, catalysis, pyrolysis and so forth. In the author's own words: "This book is an attempt to bring together such data, and to treat the reactions of atoms and radicals in their own right, rather than as an incidental part of the mechanism of more complex changes." To call it an attempt speaks very much for Dr. Steacie's modesty. In the reviewer's opinion this goal has been achieved very successfully.

Dr. Steacie starts out with an introductory chapter, followed by a chapter on experimental methods. This bespeaks the mature experimenter and expert in the field. Graduate students and industrial investigators can learn much about technique in these sixty-odd pages. The next three chapters are devoted to free radical mechanisms in thermal decomposition, polymerization, and photochemistry respectively. The balance of the text (chapters 6 to 14) deals with specific systems. A reaction index, a table of activation energies and author and subject indexes are appended.

In a field such as the present there is ample space for controversial issues. It is much to Dr. Steacie's credit that he does not attempt to take sides but assumes the rôle of the reporter and concerns himself only with the experimental evidence. Yet he is not uncritical but points out (see for example p. 290 ff.) where questionable technique may lead to conclusions which are open to challenge.

The text is indeed a fine piece of workmanship and a painstaking assembly of facts, collected by an expert who knows his field well. Dr. Steacie must be congratulated for having rendered such a service to chemistry.

REFERENCES

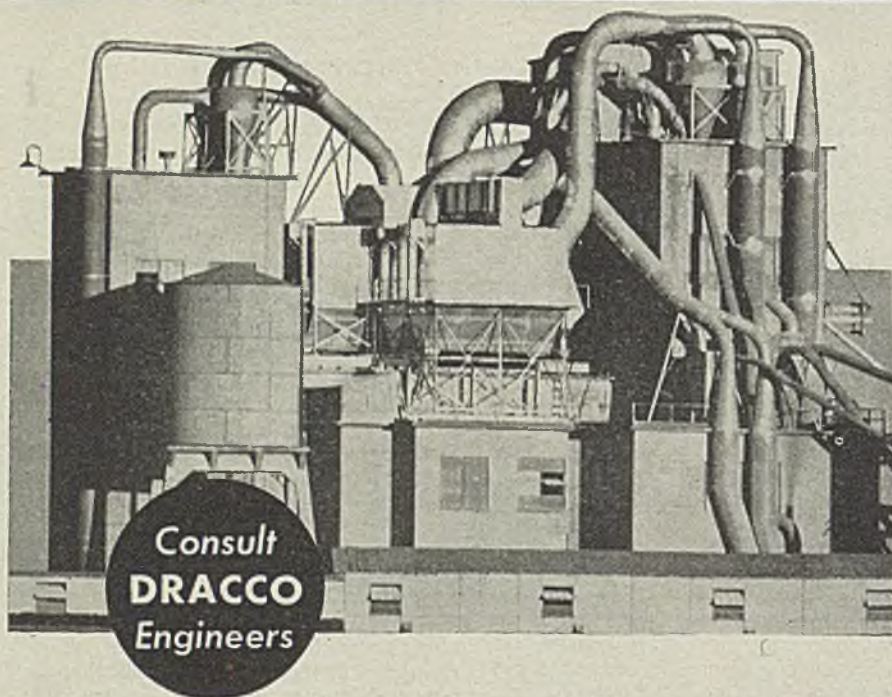
BIBLIOGRAPHY ON THE PETROLEUM INDUSTRY. By E. DeGolyer and Harold Vance. *Bulletin 83, School of Engineering, Texas Engineering Experiment Station, Agricultural and Mechanical College of Texas, College Station, Texas.* 725 pages.

This bibliography on the petroleum industry, containing references arranged chronologically under some 900 different subjects, is

RECENT BOOKS RECEIVED

- Chemotherapy.** Ed. by W. H. Powers. *Reinhold.* \$3.25.
Encyclopedia of Hydrocarbon Compounds; C₁ to C₆. By J. E. Faraday. *Chemical.* \$15.
German for the Scientist. By P. F. Wiener. *Chemical.* \$3.50.
Introduction to Emulsions. By G. M. Sutherland. *Chemical.* \$4.75.
Luminous Tube Lighting. By H. A. Miller. *Chemical.* \$3.50.
Personality and English in Technical Personnel. By P. B. McDonald. *Van Nostrand.* \$3.75.
Physical Methods of Organic Chemistry. Vol. II. Ed. by A. Weissberger. *Interscience.* \$8.50.
Research and Regional Welfare. Ed. by R. E. Coker. *University of North Carolina Press.* \$3.
Rubber in Engineering. *Chemical.* \$5.50.
Textbook of Biochemistry. By P. H. Mitchell. *McGraw-Hill.* \$5.
Vapor Adsorption. By E. Ledoux. *Chemical.* \$8.50.

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probably the most exhaustive compilation of its kind. Although the authors make no claims for completeness, some subjects are believed to be complete. The number of pages devoted to listings under each of the ten major subject classifications indicates the relative importance of geology and exploration, production, transportation, refining and utilization: General data (20); geographical distribution of petroleum and oil fields (116); physical and chemical properties and methods of testing (28); geology, exploration and prospecting (224); development of deposits (76); production of petroleum, natural gas and related hydrocarbons (92); transportation and storage (46); oil refineries and refining practice (42); utilization of petroleum and its products (6); economics of the petroleum industry (46).

PHOSPHATES

THE BOOK "Phosphates and Superphosphate," by A. N. Gray, was reviewed on these pages in October 1944 (p. 199). Copies are now available in this country and may be obtained from Interscience Publishers, 215 Fourth Ave., New York 3, N. Y. Price is \$7.

RECENT BOOKS and PAMPHLETS

Industrial Tacoma. Published by Tacoma Chamber of Commerce, Tacoma Bldg., Tacoma, Wash. 24 pages. Pamphlet of industrial information, including transportation; freight, water and power rates; taxes and licenses. Contains list of firms engaged in chemical and allied operations in the Pacific Northwest.

The San Francisco Bay Region as a Factory Location. Published by San Francisco Chamber of Commerce, 333 Pine Street, Zone 4. 28 pages. A survey of the Bay Region geography, climate, transportation, raw materials, markets, labor, power and fuel, and other pertinent data for manufacturers. Contains graphs, charts, maps.

California Mineral Production and Directory of Mineral Producers for 1944. Bulletin 132, published by Division of Mines, Department of Natural Resources, Ferry Bldg., San Francisco. 224 pages; 75 cents. A statistical report containing detailed data on the amount and value of metallic and non-metallic minerals, subdivided as to fuels, metals, structural materials, industrial materials and salines, both by substance and by counties. Treats briefly on the properties and uses of commercial minerals of the state and includes a directory of all producers (except those of natural gas and petroleum).

Selected List of Publications. Western Regional Research Laboratory, Albany 6, Calif. 20-page mimeographed bulletin listing available mimeographed material, including journal articles, on freezing preservation and dehydration of foods; enzyme and pharmacological research; fruit and vegetable chemistry and byproducts. Also lists patents.

A Guide to the Literature on the History of Engineering. Published by The Cooper Union, New York 3, N. Y. Listing of books in The Cooper Union Library.

Engineers' Council for Professional Development. Published by the ECPD, 25-33 West 39th St., New York 18, N. Y. 56 pages. Thirteenth annual report.

Opportunities for Productive Work Through Mineral Industries Research. Circular 20, published by School of Mineral Industries, Pennsylvania State College, State College, Pa. 32 pages. Gratis. Illustrated description of the functions of the Mineral Industries Experiment Station.

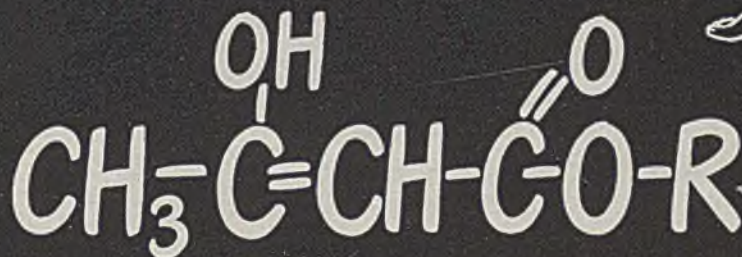
The Economic Advantages of Integrated Sea-Air Transportation. By A. E. Burns. Published by Sea-Air Committee of National Federation of American Shipping, Inc., 2660 Woodley Road N. W., Washington 8, D. C. 14 pages. Advantages are improved service to the consumer of transportation and lower unit costs.

How to Find a Short. By Jack Steele. Published by The Norman W. Henley Publishing Co.,

Chemicals of New Industrial Importance

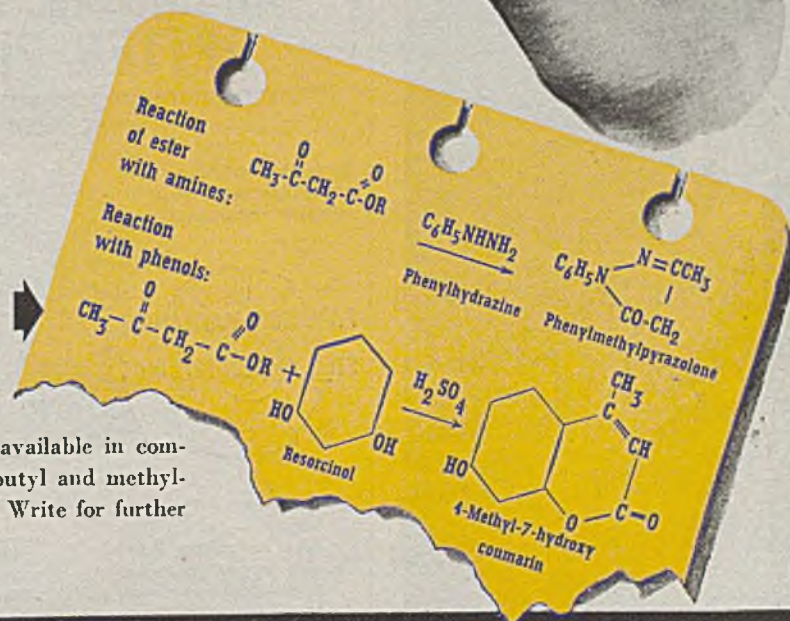
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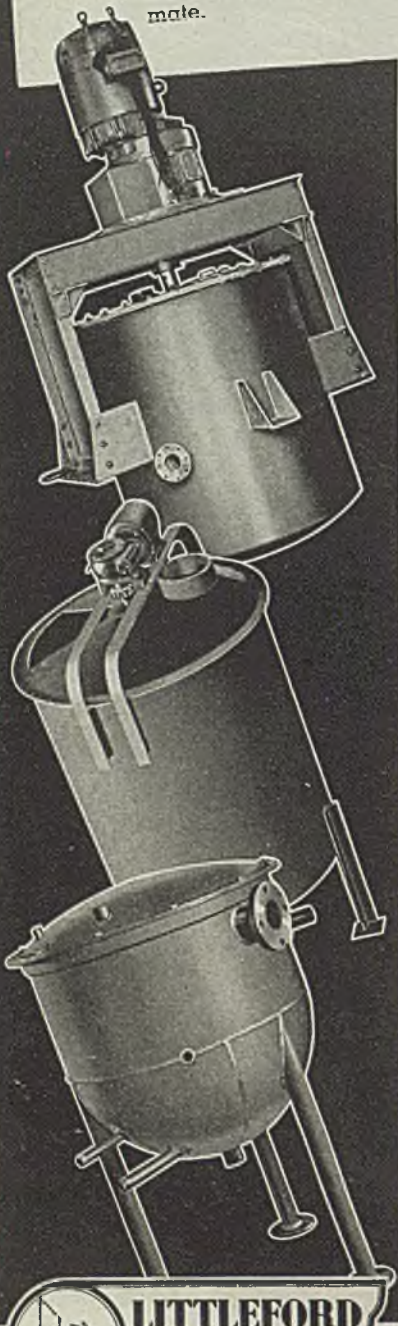
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17-19 W. 45th St., New York 19, N. Y. 209 pages; \$2. Shorts and other automobile wiring troubles.

Why OPA Should be Ended. By J. Howard Pew, president, Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa. 16 pages. A statement before House Banking and Currency Committee.

Shell Soldier and Civilian. Published by Shell

Oil Corp. and Associated Companies. A large illustrated book telling the story of Shell's wartime achievements in lubricants, fuels, toluene, rubber, etc.

Steel In the War. By Douglas A. Fisher. Published by United States Steel Corp., 71 Broadway, New York 6, N. Y. 164 pages. The record of a basic industry's war accomplishments. A well-told and well-illustrated story.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available at prices indicated from Superintendent of Documents, Government Printing Office, Washington 25, D. C. In ordering publications noted in this list always give complete title and the issuing office. Remittances should be made by postal money order, coupons, or check. Do not send postage stamps. All publications are in paper covers unless otherwise specified. When no price is indicated, pamphlet is free and should be ordered from the Bureau responsible for its issue.

Mineral Investigations of the Geological Survey in Alaska in 1943 and 1944. By John C. Reed. Geological Survey Bulletin 947-A. Price 5 cents.

Bibliography of North American Geology 1942 and 1943. By Emma M. Thom. Geological Survey Bulletin 949. Price 70 cents.

Chromite-Bearing Sands of the Southern Part of the Coast of Oregon. By Allan B. Griggs. Geological Survey Bulletin 945-E. Price 55 cents.

Minerals of the Montmorillonite Group, Their Origin and Relation to Soils and Clays. By C. S. Ross and S. B. Hendricks. Geological Survey Professional Paper 205-B. Price 35 cents.

Fires, Gases, and Ventilation in Metal Mines. Metal-Mine Accident-Prevention Course, Section 5. Bureau of Mines, Miners' Circular 55. Price 20 cents.

Wetting-Agent Concentration in Water Solution Determined by the Drop-Number Method. By John P. Harmon. Bureau of Mines, Information Circular I. C. 7351. Mimeographed.

Safe Practices in Mine Hoisting. By D. Harrington and J. H. East, Jr. Bureau of Mines, Miners' Circular 61. Price 15 cents.

Minerals Yearbook 1944. Price \$3.00. Cloth-bound. Bureau of Mines has now published the bound volume of 1944 minerals resources data and the various chapters as separates. In general the separates are 5 cents or 10 cents each.

Exploration, Composition, and Washing, Burning, and Gas-Producer Tests of a Coal Occurring Near Coaldale, Esmeralda County, Nev. By Albert L. Toeiges, et al. Bureau of Mines, Technical Paper 687. Price 30 cents.

Concentration of Manganese Ores from Gila, Greenlee, and Graham Counties, Ariz. By G. M. Potter, A. O. Ipsen, and R. R. Wells. Bureau of Mines, Report of Investigations R. I. 3842. Mimeographed.

Continuous Hydraulic Classification: Constitution of the Teeter Column Throughout Its Depth. By G. Dale Coe, I. L. Feld, M. F. Williams, Jr., and Will H. Coghill. Bureau of Mines, Report of Investigations R. I. 3851. Mimeographed.

Exploration of the Piedmont Manganese Belt, McCormick County, South Carolina, and Wilkes County, Georgia. By William A. Beck. Bureau of Mines, Report of Investigations R. I. 3858. Mimeographed.

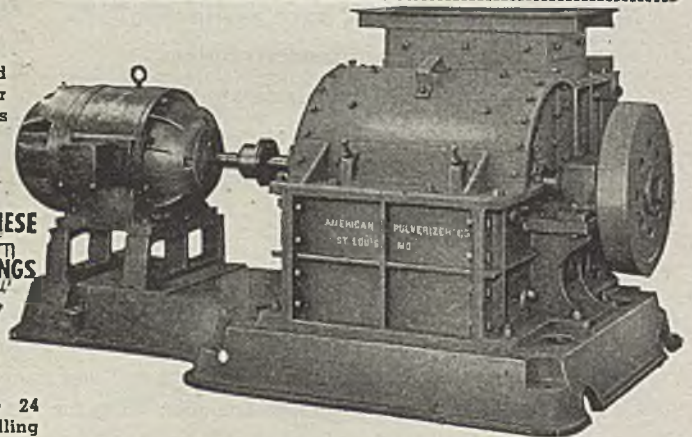
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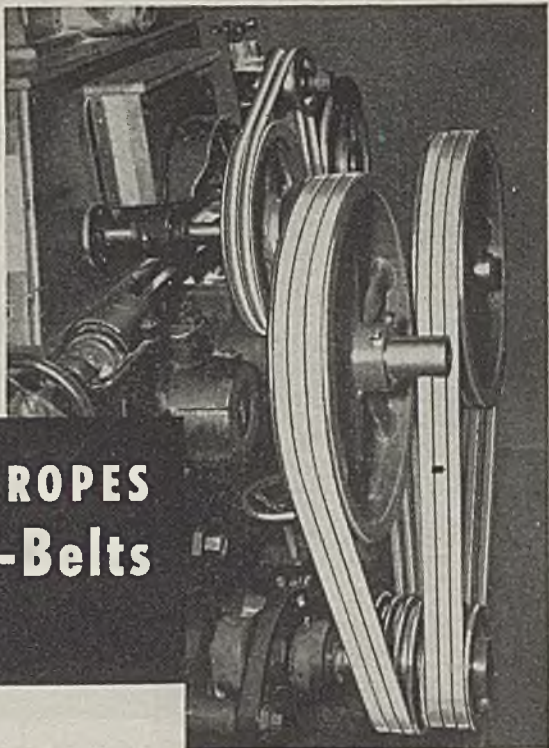


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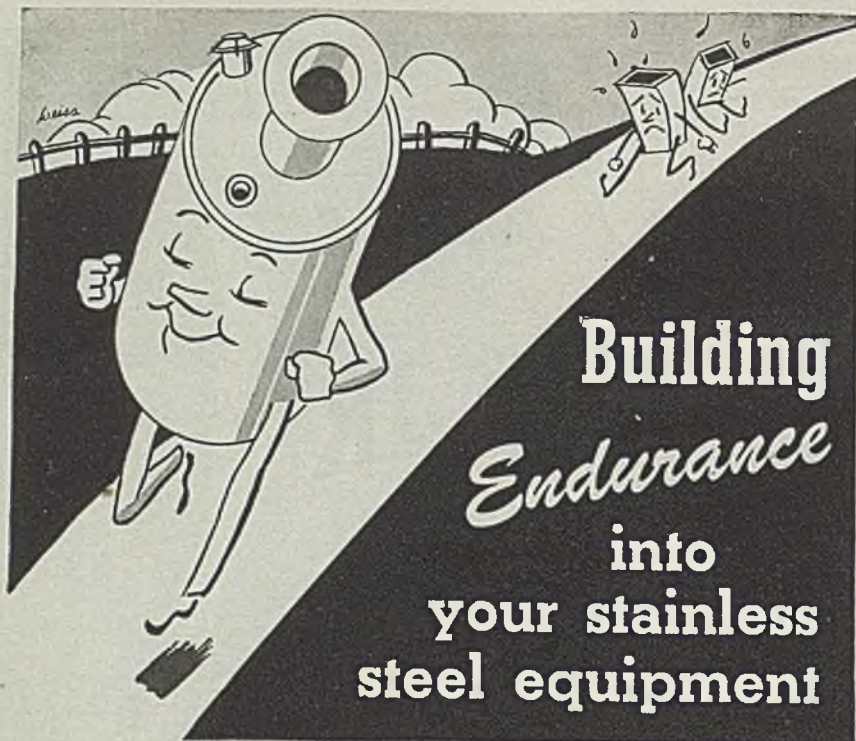
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of Mines, Report of Investigations R. I. 3859. Mimeographed.

Examination and Treatment of Industrial Magnesium Foundry Wastes. By O. C. Garst. Bureau of Mines, Report of Investigations R. I. 3860. Mimeographed.

Investigation of the Miami-West Palm Beach Belt of Silica Sand in Florida. By W. C. Hudson. Bureau of Mines, Report of Investigations R. I. 3865. Mimeographed.

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Exploration at the Cline Mine, Cabarrus County, N. C. By William A. Beck. Bureau of Mines, Report of Investigations R. I. 3873. Mimeographed.

Exploration of the Bear Lodge Fluorite Property, Crook County, Wyo. By W. C. Dunham. Bureau of Mines, Report of Investigations R. I. 3877. Mimeographed.

Electronic Chronoscope for Measuring Velocities of Detonation of Explosives. By C. R. Niswanger and F. W. Brown. Bureau of Mines, Report of Investigations R. I. 3879. Mimeographed.

Exploration of the Big Four Zinc-Silver Mine, Summit County, Colo. By R. B. McCulloch and W. P. Huleatt. Bureau of Mines, Report of Investigations R. I. 3884. Mimeographed.

Census of Pulp Mills and of Paper and Paperboard Mills 1945. Bureau of the Census, Facts for Industry, Series 24-1-4. Processed.

The Social Impact of Science: A Select Bibliography. Subcommittee Monograph No. 3. Senate Committee on Military Affairs. Price 15 cents.

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Effect of Variety, Location, and Season on Oil, Protein, and Fuzz of Cottonseed and on Fiber Properties of Lint. By O. A. Pope and J. O. Ware. Department of Agriculture Technical Bulletin 903. Price 10 cents.

Bibliography on Construction, Design, Economics, Performance, and Theory of Portable and Small Stationary Gas Producers. By Janina Nowakowska and Richard Wiebe. Northern Regional Research Laboratory, Peoria, Illinois. AIC-103. Mimeographed.

Production, Concentration, Properties, and Assay of the Antibiotic, Subtilin. Western Regional Research Laboratory, Albany, California. AIC-106. Mimeographed.

World Trends in Major Oil Crops. By Peter L. Hansen. Bureau of Agricultural Economics. FM 54. Processed.

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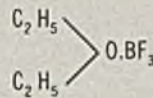
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1

Adhesives. Paisley Products, Inc., Chicago, Ill.—8-page illustrated folder cataloging the various types of adhesive products made by this company and the services available to adhesive users.

2

Alloys. Ampco Metal, Inc., Milwaukee, Wis.—Bulletin 69. 8-page bulletin illustrating and describing the continuous cast bronze rod and tubing available from this company. A method of manufacturing by the continuous cast process is described and the advantages of continuous casting over other methods are shown. Specifications and properties are given. Bulletin 80. 4-page leaflet featuring Ampco metal bushings. Includes price list of standard sizes. Also bulletin No. 140 and 141 featuring the uses of this company's alloys in large industrial presses.

3

Aluminum Alloys. Aluminum Alloys Corp., Detroit, Mich.—10-page illustrated catalog describing this company's complete facilities for production of aluminum alloy castings. Contains tables on the chemical and physical properties of aluminum alloys plus a section on the general characteristics and uses of aluminum.

4

Barometric Condensers. Schutte & Koerting Co., Philadelphia, Pa.—Bulletin 5-AA. 20-page bulletin illustrating and describing the four types of barometric condensers manufactured by this company. Multi-colored sketches are used to illustrate the operation of these condensers. Sizes, capacities, specifications and applications are discussed and some typical installations are illustrated.

5

Bearings. Split Ball Bearing Corp., Lebanon, N. H.—Catalog No. 84. 30-page catalog giving specifications on sizes, load-ratings, etc. for the complete line of divisible race, ball, roller and thrust bearings manufactured by this company. Various applications are illustrated.

6

Belting. Hewitt Div., of Hewitt-Robins, Inc.,

Buffalo, N. Y.—Loose-leaf illustrated booklet featuring this company's line of conveyor, transmission, and elevator belting.

7

Boilers. John Phillips Badenhausen, Inc., Philadelphia, Pa.—Bulletin 110. 4-page illustrated leaflet featuring this company's steam boilers.

8

Boiler Equipment. Strong, Carlisle & Hammond Co., Cleveland, Ohio—Catalog 102. 4-page booklet illustrating and describing the continuous blow-down valves and blow-down assemblies manufactured by this company. Includes also a supplement to this catalog describing the operation of this system.

9

Bushings. Bushings, Inc., Royal Oak, Mich.—8-page bulletin illustrating and describing the Vibro-Levelers for use in mounting machinery and equipment. Sizes, capacities, and prices are given.

10

Castings. Lebanon Steel Foundry, Lebanon, Pa.—2-page leaflet featuring the Circle L9 steel castings available from this company.

11

Centrifuges. Bird Machine Co., South Walpole, Mass.—6-page leaflet illustrating and describing the centrifugals built by this company. Cross-sectional diagram shows the various parts as well as the features of construction.

12

Centrifuges. Centrifuge Mechanical Equipment Inc., Hoboken, N. J.—2-page leaflet describing and illustrating the CME continuous centrifuge for separation of liquids from solids in various operations of dewatering, classifying, fractionating, degritting, thickening, and extracting. Also shows this company's CME continuous demulsifier for breaking emulsions.

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Chemicals. Armour & Co., Chemical Div., Chicago, Ill.—3 technical booklets describing the Arneens (aliphatic amines), the Armids (ali-

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Fig. 2125
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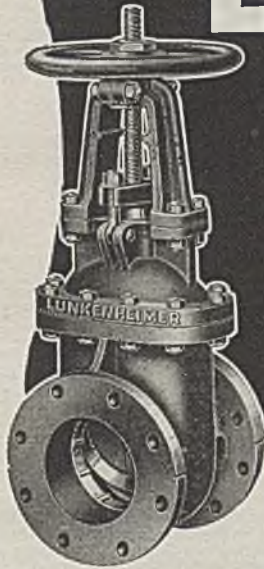


Fig. 1430
Iron Body Gate

Fig. 16-P
"Renewa" Globe



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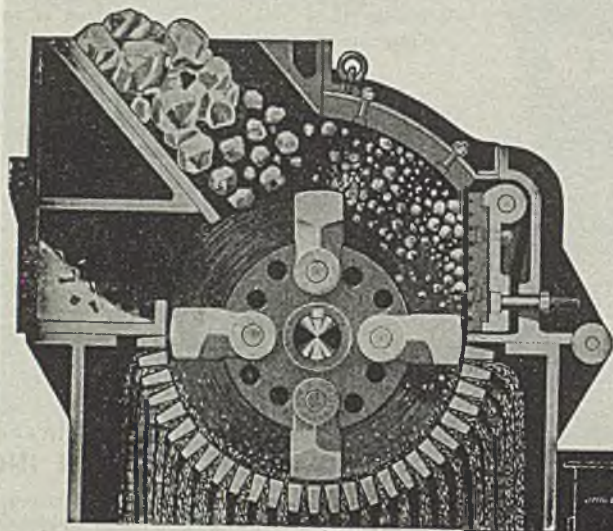
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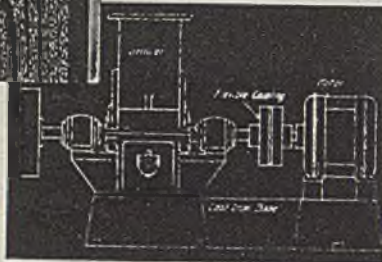
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phatic amides), and the Arneels (aliphatic nitriles). Composition, constants, chemical properties and typical uses of these organic chemicals are listed.

14

Chemicals. A. R. Maas Chemical Co., Dept. H, 4570 Ardine St., South Gate, Calif.—A catalog containing technical information on phosphates and photographic chemicals manufactured by this company, with a description of the firm's research laboratory facilities. Includes reference tables.

15

Chlorination. Pennsylvania Salt Mfg. Co., Philadelphia, Pa.—50-page instruction booklet on the use of Perchlaron in swimming pool sanitation, water purification, sewage disposal and as a bactericide in the food industry. Also a 6-page leaflet featuring the use of Perchlaron as a bleach for use by laundries.

16

Cleaning Compounds. Northwest Chemical Co., Detroit, Mich.—24-page catalog featuring the cleaning and drawing compounds available from this company. Five general classifications of cleaners are covered, namely: electrolytic, immersion, solvents, spray and water wash compounds for spray booths. The Lo-Hi pH process of cleaning metal preparatory to enameling or plating is discussed.

17

Compressors. Clark Bros. Co., Inc., Olean, N. Y.—8-page leaflet entitled "Natural Gas and Natural Gasoline." Features the use of this company's compressors.

18

Computer. Consolidated Engineering Corp., Pasadena 4, Calif.—4-page folder illustrating and describing the Consolidated 12 Equation Electrical Computer. Applications, specifications, operating principles, etc., are discussed.

19

Condenser Equipment. Condenser Service & Engineering Co., Inc., Hoboken, N. J.—8-page illustrated booklet describing Flowrites, metal inserts for inlet ends of condenser tubes. These are used to prevent tube end erosion. Booklet contains report of tests, with tables, graphs and data showing the use of Flowrites in condenser operation.

20

Consulting Service. W. H. & L. D. Betz, Philadelphia, Pa.—Booklet describes the facilities and services available from this company's consulting division in water, waste and sewage plant work. Contains flow diagrams of plants for softening water for industrial use, for waste treatment, for sewage disposal and for pretreatment of water for boiler purposes and other industrial uses.

21

Conveyors. Process Engineers, Pittsburgh, Pa.—2-page leaflet featuring the Convair pneumatic conveying system manufactured by this company.

22

Corrosion. United States Steel Corp., Chicago, Ill.—16-page booklet entitled "Corrosion of Steels." Corrosion resistant alloys are discussed as are corrosion resistant coatings for steels.

23

Cosmetic Chemicals. Givaudan - Delawanna, Inc., New York, N. Y.—10-page booklet describing sunscreens, agents, with charts for various tanning and sunburning rays. Includes formulas to meet the requirements of suitable suntan preparations.

24

Couplings. John Waldron Corp., New Brunswick, N. J.—Catalog No. 57. 20-page booklet illustrating and describing the Series A flexible couplings manufactured by this company. Includes tables of ratings for the various size couplings for different types of service.

25

Crushers. Traylor Engineering & Mfg. Co., Allentown, Pa.—Bulletin 4112. 22-page bulletin illustrating and describing the Type TV reduction crusher manufactured by this company. General specifications are given and a detailed parts list together with drawings are included. Contains complete instructions for the assembly, erection, lubrication, operation and repair of this crusher. Bulletin 4637. 38-page booklet featuring this company's crushing rolls. Sizes and specifications of the various types of crushing rolls are included and other pertinent information is given. Bulletin 2105. 14-page bulletin illustrating and describing the type H Blake jaw crusher. The improvements made in this equipment are covered in an addendum to this bulletin, which was published in 1941.

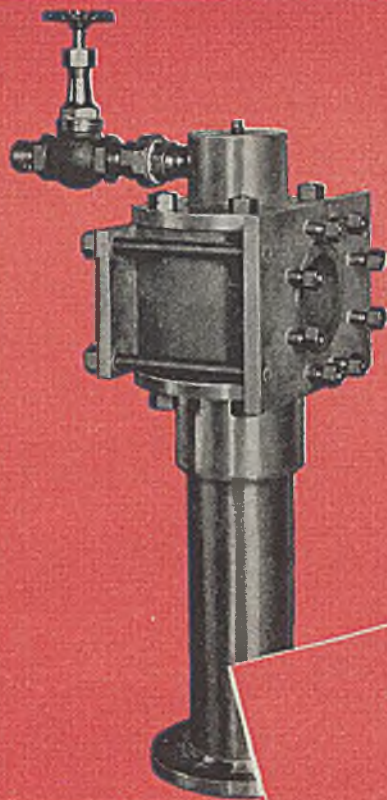
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Dryers. H. K. Porter Co., Inc., Pittsburgh, Pa.—16-page booklet featuring the Devine vacuum chamber dryers manufactured by this company. Construction details are illustrated and specifica-

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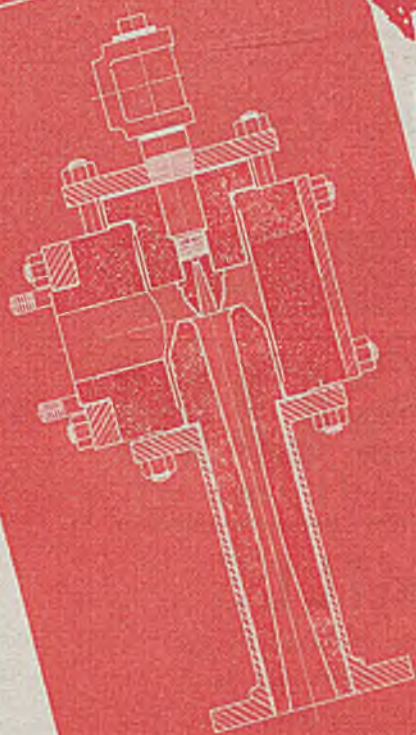


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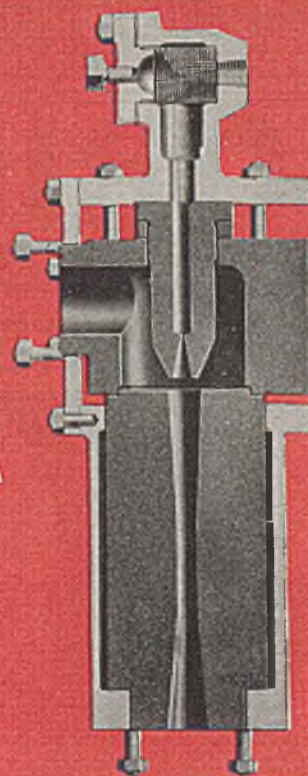
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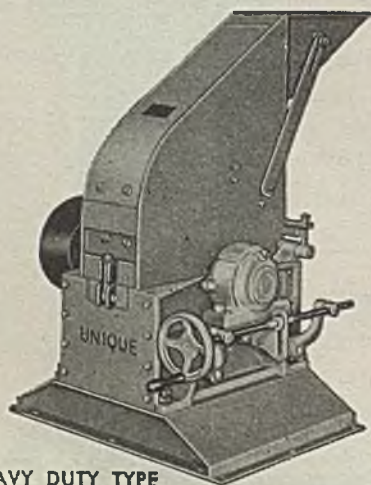
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tions for the various types and sizes are given. Includes data on hot water circulating systems, unit surface condensers, reciprocating vacuum pumps and jacketed pump fittings made by this company. Several engineering tables and curves are given throughout the book.

27

Dust Collectors. Aget-Detroit Co., Ann Arbor, Mich.—Catalog A-350. 8-page booklet illustrating and describing the Dustkop dust collectors made by this company.

28

Dust Collectors. American Air Filter Co., Inc., Louisville 8, Ky.—Bulletin No. 270-A. 34-page booklet illustrating and describing this company's Roto-clone dust control equipment. Contains many installation photographs, tables, charts, and a discussion of a simplified procedure for designing a Roto-clone exhaust system. Included also is an explanation of pressure relationships in an exhaust system together with methods of measurement.

29

Dust Collectors. American Foundry Equipment Co., Mishawaka, Ind.—2-page leaflet featuring this company's Dustube dust collectors.

30

Dust Collectors. Ideal Industries, Inc., Sycamore, Ill.—4-page leaflet illustrating and describing the Ideal dust collector for use on grinders, buffers, sanders, and other similar equipment.

31

Excavator. Trackson Co., Milwaukee, Wis.—4-page leaflet featuring the Model IT4 Traxexcavator used in excavation work. The advantages of this equipment are given, along with specifications.

32

Ejectors. Elliott Co., Jeanette, Pa.—Bulletin D-9. 4-page illustrated bulletin describing this company's type G impervious graphite ejectors for handling extremely corrosive vapors. Cross sectional views show the construction details of this ejector which is machined from a special high density graphite.

33

Electric Motors. Crocker-Wheeler Div., Joshua-Hendy Iron Works, Ampere, N. J.—4-page illustrated leaflet featuring the Crocker-Wheeler protected type motors manufactured by this company. Illustrates and describes the important features of this motor.

34

Electrical Switches. General Control Co., Boston, Mass.—Catalog No. 100. 8-page booklet illustrating and describing the manually-operated foot switches manufactured by this company. Specifications are included.

35

Electric Tools. Syntron Co., Homer City, Pa.—Catalog 464. 40-page pocket size booklet illustrating and describing this company's complete line of electric tool equipment which includes portable electric hammers, drills, screw drivers, etc.

36

Emulsion. Atlas Powder Co., Industrial Chemicals Dept., Wilmington 99, Del.—55-page booklet entitled "Drug and Cosmetic Emulsions." Contains information on surface activity and surface active agents, emulsion formulation and manufacture, oil and water cosmetic formulation, water and oil cosmetic formulation, medicated ointment formulation, and specialties formulation. A final chapter lists all of the Atlas products used in drug and cosmetic formulation. Price, \$1 per copy.

37

Engineering Service. Southwestern Engineering Co., Los Angeles, Calif.—8-page booklet describing the services available from this company in designing and constructing industrial plants.

38

Equipment. American Machine & Foundry Co., New York, N. Y.—28-page reprint of an address given by Dr. Roland P. Soule entitled "The Problem Children of Technology and Banking."

39

Equipment. Elliott Co., Jeannette, Pa.—Bulletin Q-12. 20-page booklet featuring this company's equipment for power plants and industrial processes. Includes information on equipment such as steam turbines, turbine generators, mechanical drive turbines, motors and generators, feed water heaters and deaerators, condensers and auxiliaries, steam jet ejectors, centrifugal blowers, and other accessories and equipment.

40

Equipment. Fansteel Metallurgical Corp., North Chicago, Ill.—4-page booklet entitled "A Production Plant in Miniature." This booklet

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Behind the Glycerine

Shortage

AS everybody knows, the war and the widespread disruptions following it have caused a serious world-wide shortage of fats and oils, from which glycerine is derived.

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features the pilot plant equipment made by this company.

41

Evaporators. The Grisco-Russell Co., New York, N. Y.—Bulletin 364. 26-page bulletin illustrating and describing the various types of G-R Ventube evaporators for various capacities and pressures. Contains several sections of special interest to plant engineers and executives including an explanation of the functions of evaporators, benefits obtained by their use, etc. Contains photographs and diagrams of various types of evaporators including details of design. Contains heat flow diagrams of plants equipped with evaporator systems.

42

Filters. General American Process Equipment, Div. of General American Transportation Corp., New York, N. Y.—Bulletin 102. 4-page booklet illustrating and describing the Conkey rotary disc vacuum filter manufactured by this company. Contains diagrammatic sketches showing the principles of operation. Includes data on applications, and includes a table of sizes and dimensions of the various filters available.

43

Fire Protection Equipment. Grinnell Co., Inc., Providence, R. I.—12-page booklet illustrating and describing the spray nozzles for use in extinguishing oil and flammable liquid fires with water.

44

Flexible Couplings. Thomas Flexible Coupling Co., Warren, Pa.—Pocket size folder illustrating the various flexible couplings manufactured by this company.

45

Flexible Hose. Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.—Export bulletin printed in English, French, Spanish and Portuguese, which illustrates and describes the complete line of flexible metallic hose and couplings manufactured by this company.

46

Flooring. Walter Maguire Co., Inc., New York, N. Y.—Bulletin 601. Illustrated bulletin describing a heavy duty non-skid, non-absorbent and acid resistant industrial flooring available from this company.

47

Heat Exchangers. H. K. Porter & Co., Inc., Pittsburgh, Pa.—18-page booklet featuring the Devine heat exchangers made by this company. Includes diagrammatic sketches showing the principle of operation of this equipment, also sketches of the various types of heat exchangers available. Also contains a 2-page section on explanation of terms used in heat exchange work and several pages are devoted to the fundamentals of heat exchanger design.

48

Hydrocarbon Thermodynamics. Foster-Wheeler Corp., New York, N. Y.—19-page reprint entitled Hydrocarbon Thermodynamics summarizes the fundamental concepts of thermodynamics and reviews some of the important contributions made in the application of thermodynamics to hydrocarbon problems.

49

Industrial Locomotives. H. K. Porter Co., Inc., Pittsburgh, Pa.—44-page booklet featuring the diesel electric locomotives made by this company. Many of the important features of these locomotives are illustrated and described.

50

Injection Molding. The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio—Bulletin 4601. 6-page illustrated booklet describing the features of the Turbojector for injection molding of rubber.

51

Instruments. Bailey Meter Co., Cleveland, Ohio—Bulletin 232. 16-page booklet featuring the Pyrotron electronic potentiometer pyrometer manufactured by this company. Includes details of construction, specifications, and gives features of this instrument and its accessories.

52

Instruments. The Bristol Co., Waterbury, Conn.—2-page leaflet describing typical applications of Bristol continuous pH control in paper mills.

53

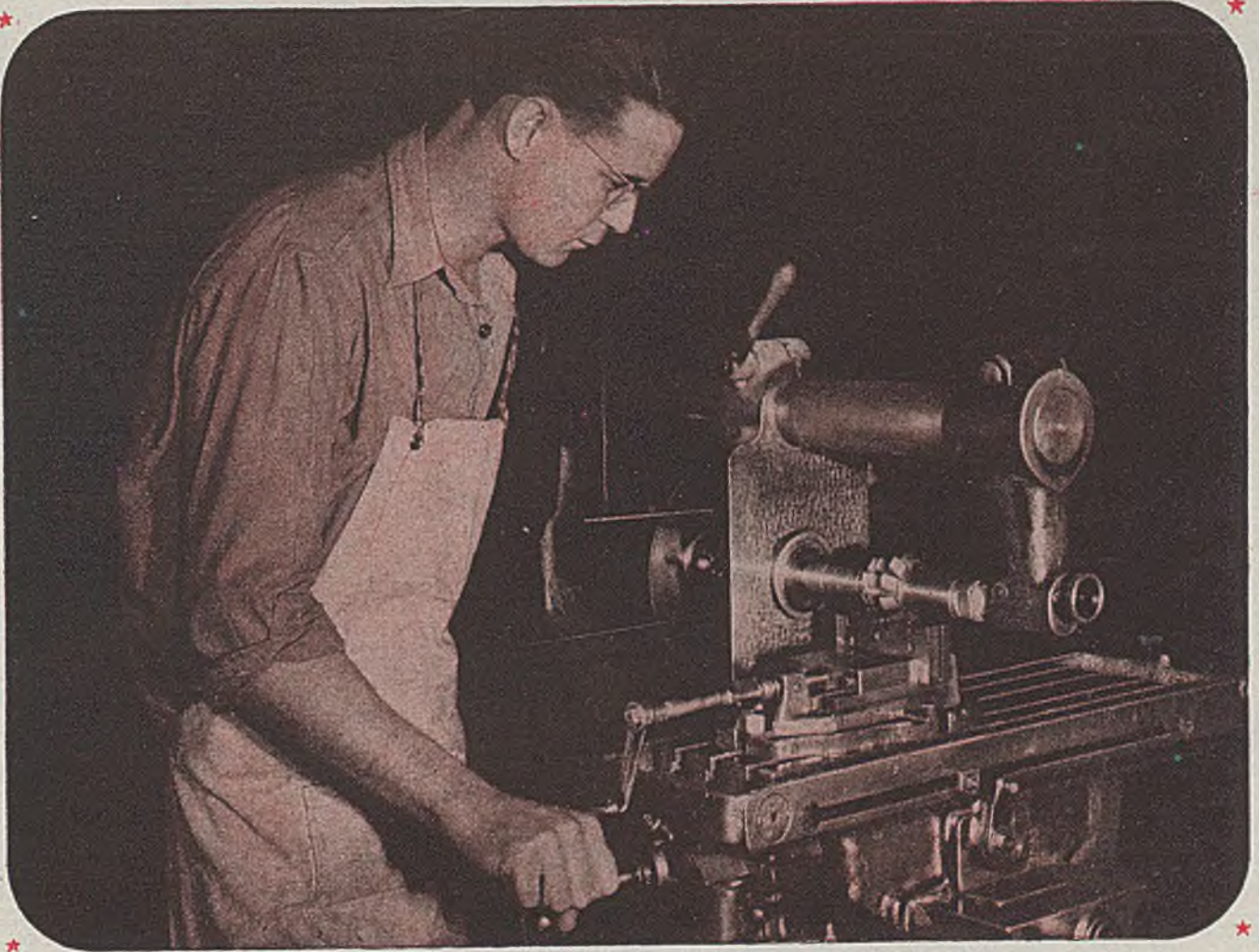
Instruments. Cambridge Instrument Co., Inc., New York, N. Y.—Bulletin No. 194-SA. 12-page bulletin illustrating and describing the portable surface pyrometers manufactured by this company. Applications are listed and illustrated.

54

Instruments. The Faxfilm Co., Cleveland, Ohio—10-page leaflet featuring the Faxfilm comparator together with its use and application. It is used for setting up inspection and roughness standards, and other similar applications.

55

Instruments. Fischer and Porter Co., Hatboro,



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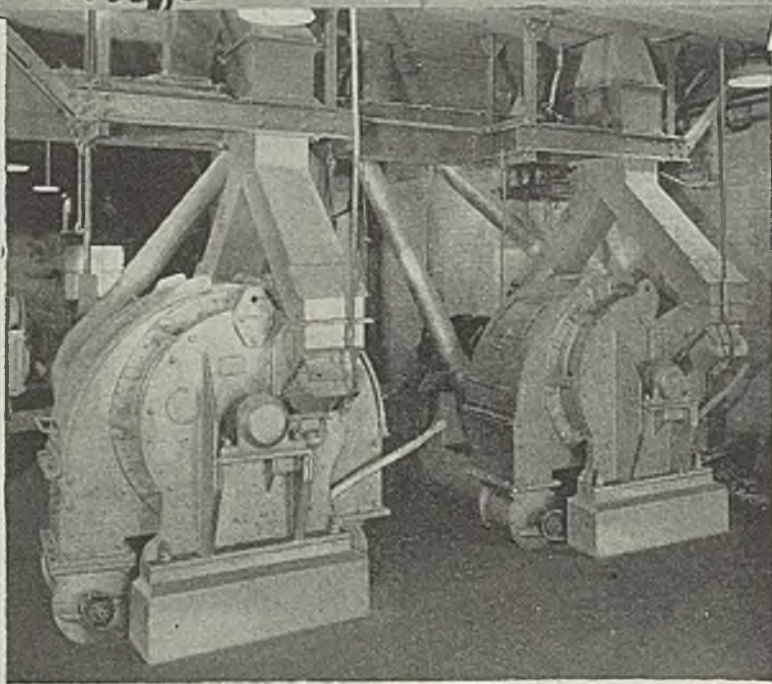


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Pa.—Catalog Section 52-A. 4-page catalog featuring the Rota-tronic for use with rotometers to indicate, record, totalize and control. Schematic wiring diagram is included, and the method of operation is described.

56

Instruments. Emil Greiner Co., New York, N. Y.—8-page pocket size leaflet describing the McLeod gages made by this company. Contains instructions for use.

57

Instruments. Gotham Instrument Co., New York, N. Y.—Catalog C-51. 18-page booklet illustrating and describing this company's line of etched stem thermometers and hydrometers.

58

Instruments. Industrial Instrument, Inc., Jersey City, N. J.—Catalog describing the conductivity cells for plant and laboratory use in checking conductivity of various liquids.

59

Instruments. Leeds & Northrup Co., Philadelphia, Pa.—Catalog ED. 38-page catalog featuring the galvanometers and dynamometers manufactured by this company. Includes complete specifications and prices for DC and AC galvanometers, both reflecting and pointed types, as well as the Astatic dynamometers. Various other parts and accessories are listed.

60

Instruments. Northern Equipment Co., Erie, Pa.—Bulletin 449. 4-page leaflet featuring the control of feed flow and water level with the Copes Flowmatic regulator, Bulletin 451. 8-page booklet describing Copes equipment.

61

Instruments. Photovolt Corp., New York, N. Y.—15-page bulletin illustrating and describing the Lumetron photoelectric colorimeter model 450 for Nessler tubes.

62

Instruments. United Electric Controls Co., Boston, Mass.—Catalog giving information and engineering details on the complete line of thermostats and pressure switches manufactured by this company.

63

Instruments. Weston Electrical Instrument Corp., Newark, N. J.—New house-organ entitled Weston Engineering Notes which provides pertinent application engineering information for users of electrical indicating instruments. The first issue of this publication appeared in February, 1946.

64

Instruments. Wheelco Instruments Co., Chicago, Ill.—Bulletin D4-2. 4-page booklet illustrates and describes the Multronic Capacitor, a multi-position electronic pyrometer controller. Lists applications and features of the new instrument and includes application diagrams.

65

Laboratory Service. Truesdail Laboratories, Inc., Los Angeles, Calif.—20-page brochure entitled "More Profits with Chemistry." This booklet features the services available from this company.

66

Materials Handling. Automatic Transportation Co., Chicago, Ill.—Two bulletins now available from this company describe the Transtractor, a push-pull type unit combining the features of the electrically propelled hand truck and the conventional warehouse tractor. The second bulletin describes the automatic selenium battery charger for recharging this company's electric trucks.

67

Materials Handling. Lamson Corp., Syracuse, N. Y.—20-page booklet illustrating and describing the overhead chain conveyors for use in manufacturing operations, in traveling stockroom procedures, in stockrooms and warehouses, and in packing and shipping departments. Typical layouts are shown and a number of industrial applications are illustrated.

68

Materials Handling. Revolvator Co., North Bergen, N. J.—Bulletin 95K2 describes the Red Giant Model G Lifttruck. Sizes, dimensions, and operating features are given. Bulletin 96-J illustrates and describes this company's hydraulic elevators. Bulletin No. 142 shows the carboy dispensers and barrel dumpers made by this company.

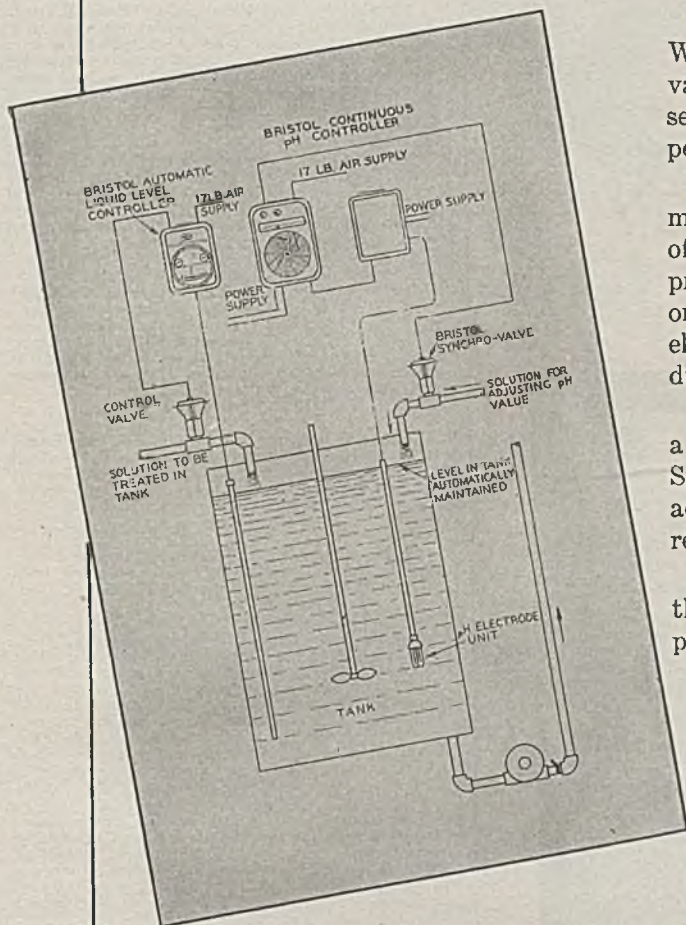
69

Microchemistry. Foster D. Snell, Inc., Brooklyn, N. Y.—8-page booklet describing the microchemical services available from this company.

70

Milling Equipment. Allis-Chalmers Mfg. Co., Milwaukee, Wis.—Bulletin No. B-6194-A. Bulletin

How to keep pH continuously OK

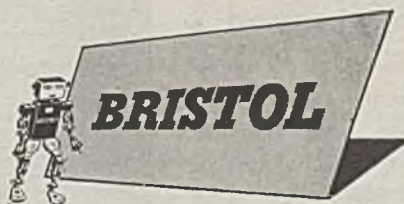


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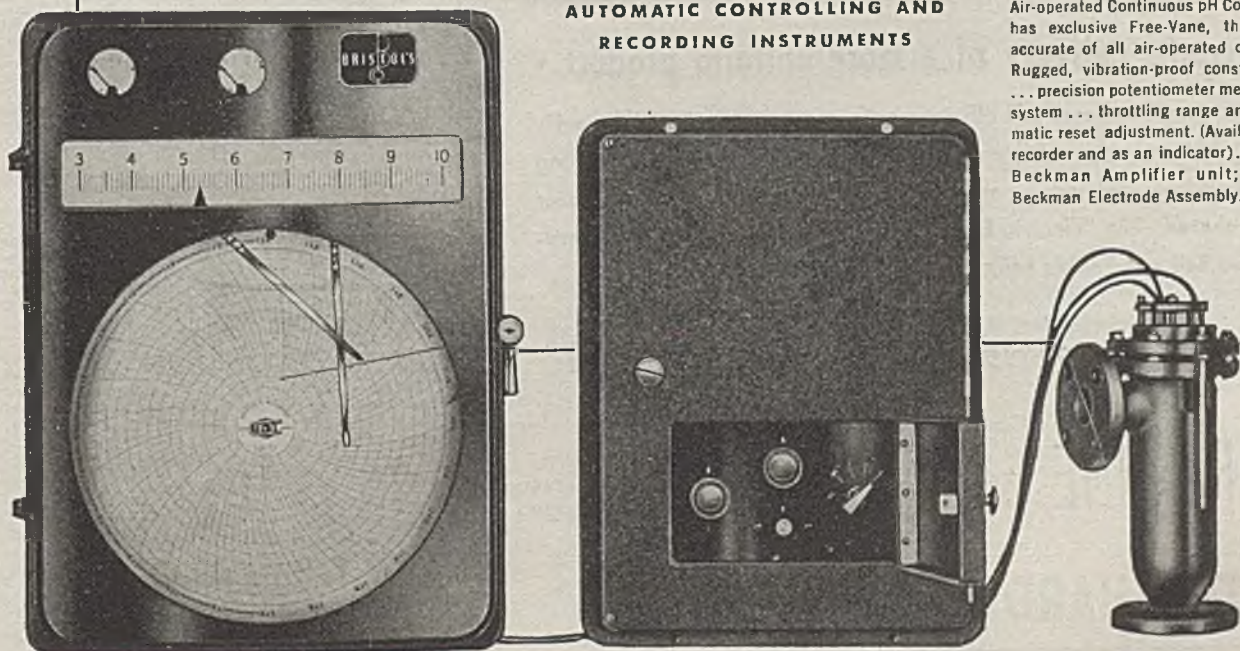
Bulletin pH 1302 gives further information on the complete system. Address The Bristol Company, 109 Bristol Road, Waterbury 91, Conn.



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tin, which describes the features and applications of milling equipment manufactured by this company.

71

Motor Starters. Allis-Chalmers Mfg. Co., Milwaukee, Wis.—Bulletin 14-B6410. New bulletin describes this company's Type H line of motor starters. The features of this motor starter together with other pertinent information are discussed.

72

Mycalex. General Electric Co., Chemical Dept., Pittsfield, Mass.—24-page booklet featuring G-E Mycalex, a stonelike product composed of mica and glass. Contains a table of properties together with information on types available, molded parts, fabricated parts, machining practice and how and where to order this material.

73

Nickel Alloys. International Nickel Co., Inc., New York, N. Y.—44-page pocket size booklet entitled "How to Find Long Life in Parts and Accessory Equipment." It describes 188 separate nickel alloy items listing the name and address of each manufacturer.

74

Oil Separators. Gale Oil Separator Co., Inc., New York, N. Y.—4-page leaflet entitled *Conserve the Life Blood of Industry*. Contains information on the oil separator which makes possible the reuse of water, oil and other liquids at low cost. The advantages of Gale oil separators are listed and the equipment illustrated.

75

Packaging. Remis Bros. Bag Co., St. Louis, Mo.—12-page booklet entitled "Seven Facts about Low Cost Protective Packaging." This booklet features the use of waterproof paper-lined textile bags manufactured by this company.

76

Paper Chemicals. Hercules Powder Co., Wilmington, Del.—4-page leaflet featuring this company's chemicals for the paper industry.

77

Physics Research. Philips Laboratories, Inc., New York, N. Y.—A new house organ entitled "Philips Research Report" is now being published by this company for the purpose of presenting the results of its research work. It will be published bi-monthly and will cover theoretical and experimental research, physics, chemistry, and other fields. It is edited by the research laboratory staff of this company.

78

Pipe Hangers. Grinnell Co., Inc., Providence, R. I.—3-page booklet illustrating and describing the Grinnell pre-engineered sway brace. Details of construction are shown and installation procedure is described.

79

Plastics. Celanese Plastics Corp., New York, N. Y.—Illustrated booklet showing the principal types of Celanese plastics, how these products are processed, ASTM testing methods, and other useful information.

80

Plastics. General Electric Co., Pittsfield, Mass.—12-page booklet entitled "Plastics for Light Conditioning." Illustrates the use of plastics for light reflectors.

81

Pneumatic Equipment. National Pneumatic Co., New York, N. Y.—Bulletin EC-102. 6-page folder illustrating and describing pneumatic equipment for operating sliding doors. Installation sketches are shown. Includes information on the adjustment and control of this equipment.

82

Portable Lighting Equipment. American Gas Accumulator Co., Elizabeth, N. J.—8-page booklet illustrating the portable lighting equipment and accessories available from this company. Contains a section on the facilities and services offered.

83

Precious Metals. The American Platinum Works, Newark, N. J.—4-page leaflet entitled *Platinum, Gold and Silver for Science, Industry and the Arts*. Discusses the increasing value of these metals to modern industry.

84

Process Equipment. Marco Co., Inc., Wilmington, Del.—20-page illustrated booklet illustrating and describing the Flow-Master line of equipment manufactured by this company. Includes data on pumps and homogenizers used in a wide variety of industries.

85

Process Equipment. Chain Belt Co., Milwaukee, Wis.—Bulletin 46-3. 44-page booklet featuring the complete line of Rex sanitation and liquid clarification equipment available from this com-

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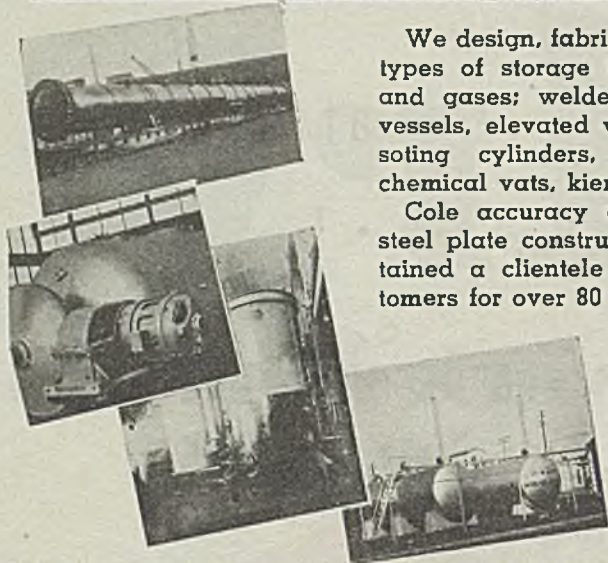
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pany. Includes data on conveyor sludge collectors, sludge removers, grit collectors and washers, thickeners, skimmers, filters, etc. The various types of equipment are illustrated with diagrammatic sketches and several flow diagrams show different applications.

86

Process Heating. Blaw-Knox Co., Pittsburgh, Pa.—12-page booklet featuring this company's Supertherm heating systems for use in the process industries. Include a discussion on the use of superheated water for process heating.

87

Protective Coatings. The Dampney Co. of America, Doylestown, Pa.—4-page leaflet describing how to protect metal surfaces in power and process equipment against temperature damage with Thur-Ma-Lox high heat-resistance coating.

88

Protecting Film. Better Finishes and Coatings, Inc., Newark, N. J.—10-page illustrated brochure featuring the present and potential applications of this company's liquid envelope, a plastic protecting film.

89

Proportioning Pumps. Lapp Insulator Co., Inc., Le Roy, N. Y.—Bulletin 242. 4-page illustrated booklet describing the Wilson Pulsafeeder proportioning pump manufactured by this company. Principles of construction and operation are given, and various applications are illustrated with diagrammatic sketches. The different types of pulsafeders are shown, together with a table of sizes, capacities, and shipping weights.

90

Protective Clothing. B. F. Goodrich Co., Akron, Ohio.—Catalog section 12000. 10-page catalog section on the complete line of industrial protective clothing for use in various industries. Includes several additions to this line of equipment made from new and improved plastic materials and synthetic rubber.

91

Pulp and Paper Machinery. Improved Paper Machinery Corp., Nashua, N. H.—16-page booklet describing the equipment used in the manufacture of pulp and paper. The booklet is well-illustrated with application layouts for various processes including bleaching. Manufacture of groundwood, sulphite, soda and sulphate pulp and for various other applications.

92

Pumps. Economy Pumps, Inc., Hamilton, Ohio—Catalog No. G-845. 16-page illustrated booklet describes this company's axial flow pumps for capacities up to 100,000 gal. per min., and for heads to 50 ft. Constructional details are shown by cross-sectional diagrams. Various applications are illustrated. Contains selection tables for axial flow pumps, as well as a section on typical special pump arrangement and installations.

93

Pumps. Marco Co., Wilmington, Del.—14-page booklet illustrating and describing the Flow-Master pumps manufactured by this company. Important features are listed, and dimensions and capacities are given for the various types of pumps offered.

94

Pumps. H. K. Porter Co., Inc., Pittsburgh, Pa.—12-page booklet featuring the Rotex pumps for moderate viscosity, low viscosity and medium pressure. Features of these pumps are shown and diagrammatic sketches show construction details. Specifications are included. Also 8-page leaflet featuring the Quimby Type CF and DS centrifugal pumps. Construction details and dimensions are given by cross sectional sketches and tables. Includes selection chart.

95

Pumps. Taber Pump Co., Buffalo, N. Y.—8-page booklet entitled "Inference Is a Dangerous Guide to Pump Selection." Various types of pumps manufactured by this company are illustrated and described. A discussion is presented on pump selection together with the various pumping problems and how they can be solved by use of the proper pumps.

96

Pumps. Worthington Pump & Machinery Corp., Harrison, N. J.—Bulletin W-350-B8. 16-page booklet featuring Worthite pumps for slurry handling. Various processes in which these pumps are used are discussed. Industries served by these pumps include byproduct coke, coal tar products, clay, glass, metal refining, petroleum refining, pulp and paper, sugar, and many others. Bulletin W-414-B50. 8-page folder featuring this company's Varifo triplex power pump. Details of construction are illustrated in multi-color drawings. Contains tables of sizes and ratings of the various size pumps. A list of some of the services for this pump is included.

97

Refractory Concrete. The Atlas Lumnite Cement Co., New York, N. Y.—24-page booklet

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containing basic information on materials and methods used in making refractory concrete for different temperature and insulating requirements. Illustrations show a wide range of applications of refractory concrete in construction of heat-treating furnaces, cooling pits, coke ovens and ceramic kilns.

98

Refrigeration. Worthington Pump & Machinery Corp., Harrison, N. J.—2-page leaflet featuring this company's compressors for use on refrigeration systems.

99

Rubber Products. Naugatuck Chemical Div. of United States Rubber Co., New York, N. Y.—2-page leaflet featuring Aminox anti-oxidant. Prices are included. Also 4-page bulletin describing the applications and use of Lotol, a compounded latex used in adhesives, coatings, binders, and other similar applications. Bulletin L.

100

Rubber Products. B. F. Goodrich Co., Akron, Ohio—New booklet entitled "Suspended on Rubber." Illustrates and describes the Torsilastic rubber spring and its commercial and industrial applications. Includes an 8-page section on the technical development of this type of spring. Also 18-page booklet illustrating and describing the properties and uses of Koroseal and Koroseal compounds.

101

Safety Equipment. Davis Emergency Equipment Co., Inc., Newark, N. J.—94-page catalog illustrating and describing the complete line of protection equipment for first-aid, respiratory protection, and general safety equipment for personal protection. Includes information on combustible gas indicators and other Davis instruments, together with electrical safety equipment. A 4-page alphabetical index makes it easy to find items of interest.

102

Safety Equipment. Eastern Equipment Co., Willow Grove, Pa.—Catalog section No. AWP-21. 4-page leaflet featuring Amcowed lenses for goggles, helmets and hand shields used in welding operations.

103

Seat Grinders. Elliott Co., Jeannette, Pa.—Bulletin Y-22. 4-page bulletin illustrating and describing this company's handhole seat grinder for use in grinding handhole seats in boilers and superheaters.

104

Separation Processes. American Cyanamid Co., New York, N. Y.—4-page leaflet featuring this company's heavy-media separation processes, flotation machines and separation reagents.

105

Sewage Treatment. Filtros, Inc., E. Rochester, N. Y.—30-page engineering bulletin entitled "Aeration Tanks and Diffuser Media in the Activated Sludge Process of Sewage Treatment." Information on the fundamental principles of this process, including various cross-sectional diagrams of the equipment used. Contains information on diffuser media and also a section on cleaning diffuser plates.

106

Silicones. Dow Corning Corp., Midland, Mich.—Bulletin No. 1A. 4-page leaflet featuring the properties and uses of Silastic, a Silicone rubber. Contains a table showing the chemical resistance of this material to various corrosive fluids.

107

Spray Painting. J. O. Ross Engineering Corp., New York, N. Y.—2-page leaflet illustrating the paint finishing system available from this company. Includes spray booths, ovens, etc.

108

Stainless Equipment. Allegheny Ludlum Steel Corp., Brackenridge, Pa.—36-page illustrated booklet entitled "Allegheny Metal in the Dairy Industry."

109

Stainless Steel Bellows. Chicago Metal Hose Corp., Maywood, Ill.—12-page booklet entitled CMH stainless steel bellows which illustrates and describes this product. Information is given on the use of stainless steel bellows as equalizers, compensators for expansion joints, flexible connectors, for flow control and vapor and steam traps, thermostatic instruments, electrical controls and other industrial applications.

110

Tachometers. O. Zernickow Co., New York, N. Y.—2-page leaflet illustrating and describing this company's line of hand tachometers.

111

Textile Chemicals. Dexter Chemical Corp., New York, N. Y.—Booklet entitled "A Study of the Mercerization Process" which contains three

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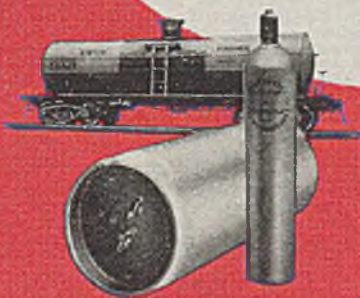
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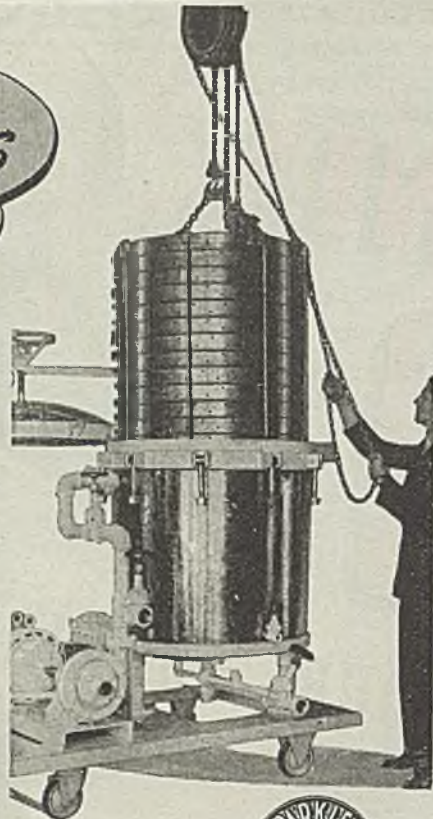
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parts covering: Effect of the mercerizing caustic soda concentrations; the effect of tension; the effect of caustic temperature.

112

Textile Resins. American Cyanamid Co., Textile Resins Dept., Bound Brook, N. J.—Bulletin No. 113 entitled "Resins for Textiles" describes the uses and applications to textiles of thermosetting and thermoplastic resins.

113

Tube Cleaners. Elliott Co., Jeannette, Pa.—Bulletin Y-23. 4-page leaflet featuring the Lagonda 2,000 Series tube cleaners, manufactured by this company. This water-driven type cleaner for straight and curved tubes is illustrated and described.

114

Tubing. The Carpenter Steel Co., Kenilworth, N. J.—Pocket-size slide-rule which summarizes the technical data to aid in the proper selection of the various grades of this company's stainless steel tubing.

115

Tubing. Trent Tube Mfg. Co., East Troy, Wis.—16-page booklet featuring Trentweld stainless tubes.

116

Vacuum Pumps. Schutte & Koerting Co., Philadelphia, Pa.—Bulletin 5-AA4. 4-page illustrated booklet featuring the hydro-steam vacuum unit available from this company. Detailed drawing shows the various dimensions and a table of sizes and capacities is included.

117

Valves. Alloy Steel Products Co., Linden, N. J.—Bulletin No. 2. 4-page booklet illustrating and describing this company's line of valves made with Alloyco-20. The various types of valves are illustrated and construction details, sizes and capacities given. A list of applications for these corrosion resistant valves is included. Also a 4-page leaflet illustrating the manufacturing processes used in making these valves.

118

Valves. Edward Valves, Inc., East Chicago, Ind.—New valve booklet illustrates and describes the principal operations used in the manufacture of Edward Valves.

119

Vapor Recovery. Vapor Recovery Systems Co., Compton, Calif.—Handbook and Catalog No. P.7. 188-page engineering catalog of this firm's line of tank equipment, gas control and safety devices for handling combustible or toxic liquids and gases in industry. Indexed into sections on engineering data, venting designs, gauges, swing lines, vapor recovery regulators, angle relief valves and miscellaneous items. Includes formulas, flow capacity curves and capacity tables, conversion tables, photographs and diagrams of equipment. Gives sizes, dimensions, weights and list prices.

120

Water Storage Heaters. The Patterson-Kelley Co., Inc., East Stroudsburg, Pa.—Catalog No. 17. 20-page illustrated catalog describing the hot water storage heaters and preheaters manufactured by this company. Construction details are illustrated and tables show capacities, dimensions, and specifications for the different types and models. Hot water consumption for various types of domestic and commercial building service is tabulated.

121

Welding. American Welding Society, New York, N. Y.—47-page booklet compiling the recommended practices for resistance welding, published by the American Welding Society. Price, 50c. per copy.

122

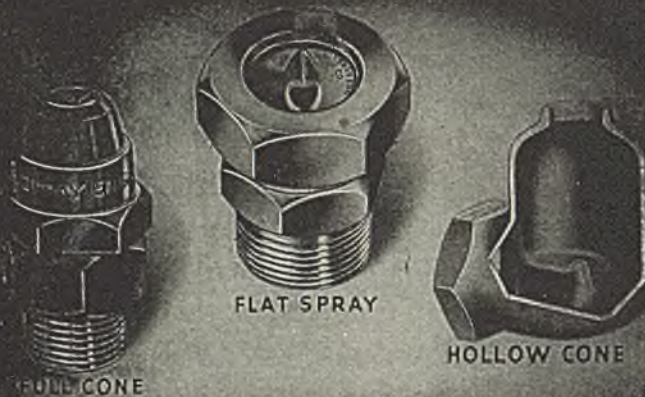
Welding. Metal and Thermit Corp., New York, N. Y.—16-page technical bulletin covering hard surfacing and the use of Hardex Electrodes in building up surfaces for resistance to shock and abrasion. Information is given on various factors such as effective temperature and cooling rates on deposited metal, selection of the proper grade of rod, and recommended welding techniques.

123

Welding Electrodes. Hollup Corp., Chicago, Ill.—6-page Selectrode chart for guiding electrode users in the choice of the correct electrodes for specific jobs. It specifies which electrode to use, suggests applications, gives currents, physical characteristics, and other information.

124

Wood Tanks. Acme Tank Manufacturing Co., 5402 South Soto St., Los Angeles 11, Calif.—Bulletin C-45-IML. 19-page booklet giving diagrams, photographs and specifications for special types and shapes of tanks for a diversity of industrial uses.



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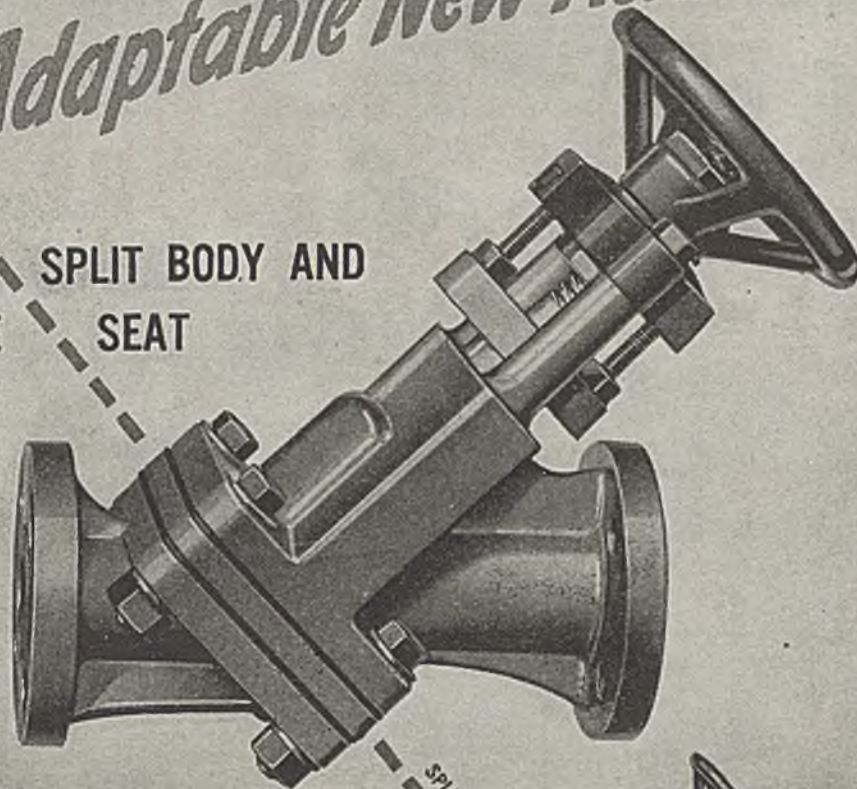
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Widely Adaptable New Acid Valve

FEATURES
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SPLIT BODY AND
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NATIONAL LEAD'S VERSATILE UNITED TYPE "R" VALVE SLICES INVENTORY AND MAINTENANCE COST

This ingenious new "many purpose" valve offers a combination of advantages unobtainable with valves where body and seat are cast as an integral unit.

For one thing, it can be installed either as a "Y" or Angle pattern, simply by reversing the position of the body section, as shown in the illustration at the right. This enables you to reduce your supply stock by standardizing on one valve with two uses.

Again, since the seat is removable, as well as the plug disc, both can be replaced easily at nominal cost, thereby effecting worthwhile economies in maintenance.

Moreover, seat and plug disc can be fabricated in any alloy you specify... "custom-made" to withstand abrasive or other particularly hard-to-handle fluids. For more normal applications the valve can be furnished three standard ways: 1. With lead plug disc and stem integral; 2. With removable lead plug disc; 3. With removable rubber plug disc.

It is fabricated not only in hard lead but also in lead lined 125 lb. cast iron and 150 lb. cast steel types.

Further information regarding the "United" Type "R" Split-Body Flanged Valves will be furnished gladly upon request.

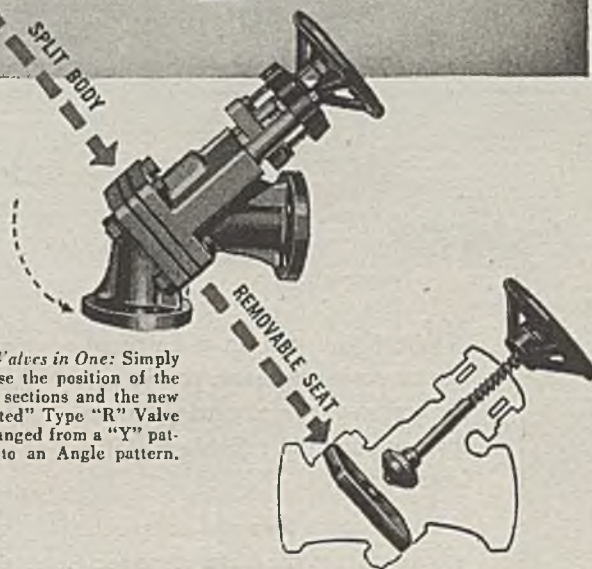
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Remember, National Lead also manufactures acid valves of many other types, both lead lined and hard lead, in all required sizes and styles... gate, angle, check, diaphragm and free-flow "Y" types... as well as special valves designed to specification.

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Consult our Technical Staff and benefit by years of experience with thousands of lead installations in every field handling corrosive solutions and gases.



Two Valves in One: Simply reverse the position of the body sections and the new "United" Type "R" Valve is changed from a "Y" pattern to an Angle pattern.

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Cars and Standpipes • Farm Equipment

CHEMICAL ECONOMICS

H. M. BATTERS, Market Editor

PRODUCTION OF CHEMICALS DROPPED IN MAY BECAUSE OF CURTAILMENT OF RAW MATERIALS

IN THE FACE of adverse conditions, production of chemicals made good progress throughout April but reports regarding activities in May are less favorable. While industry figures are not yet at hand, it is evident that the cutting down of raw material supplies forced a lowering of production schedules. The coal situation, in particular, was responsible for a good part of the slowing up. Even where stocks of coal were on hand, uncertainty about replacements made it desirable to move with caution and production was cut back in order to conserve stocks of coal and thus minimize the danger of total closing of entire units. Further complications were added by the limitations placed on transporting materials. The renewal of coal mining brought improvement but in most industries some weeks must elapse before full production can be reached.

The latest authority for measuring industry production is found in the index of the Federal Reserve Board for April and this reports a drop of three points from the March figure, the index numbers being 164 for March and a preliminary figure of 161 for April. From the partial reports already issued the decline in operations in May was more acute and more widespread. The April index of the Board for production of industrial chemicals was 397 which compares with revised figures of 389 for March and 383 for February. Thus the index continues to show a rising line for production of chemicals. Detailed figures for heavy chemicals show a mixed trend with April production of sulphuric acid registering a gain over March but a decline was noted in the case of chlorine and caustic soda with electrolytic surprisingly making a better relative showing than the lime-soda product. Production of sodium phosphates held up well in April with larger outputs for mono and tetra but a rather sharp drop was reported for tribasic.

Consumption of chemicals in May apparently followed the trend of general industry but oil refining was on a broader scale than at any time this year. The Chem. & Met. index for industrial consumption of chemicals moved down to 205.60 in April as compared with a revised figure of 206.27 for March. There were no radical changes in any of the consuming industries. Rayon figures for March have been revised and while shipments for that month were larger than those credited to April, they were aided by drawing from stocks. Production of yarn was almost identical in March and April but staple production moved up in April so that total rayon production for that month was slightly above the March total.

Production of vegetable oils was on a

smaller scale in April although some gains were made in outputs of coconut and linseed oils. However consumption of linseed oil exceeded production and stocks in the hands of producers were further reduced. Operations at eastern crushing mills in May varied according to the amount of seed received but in general the result was far from satisfactory and there does not seem to be hope for any change in the near future. The output of coconut oil has been aided by arrivals of copra from the Philippines in larger tonnage with reports that shipments from primary points for May approximated 32,000 tons. Official announcement has been made that the Copra Export Management Co., which was established about a year ago to aid the copra industry and supervise trading will be dissolved as of June 30. This means that trading will be returned to private companies but the creation of a free market

does not indicate that normal conditions have returned. Moderate increases in shipments are in prospect but it will take some time before supplies will grow up to the prewar level. Castor oil output in May was curtailed because of work stoppages at large producing plants.

While the permitted use of natural rubber was increased last March, the entire question of natural rubber supplies may be subject to revision depending on what steps are taken to replace the agreement which will expire at the end of this month. A meeting in London will determine whether Great Britain will continue to set the price or whether producers in the Far East may succeed in establishing a free market.

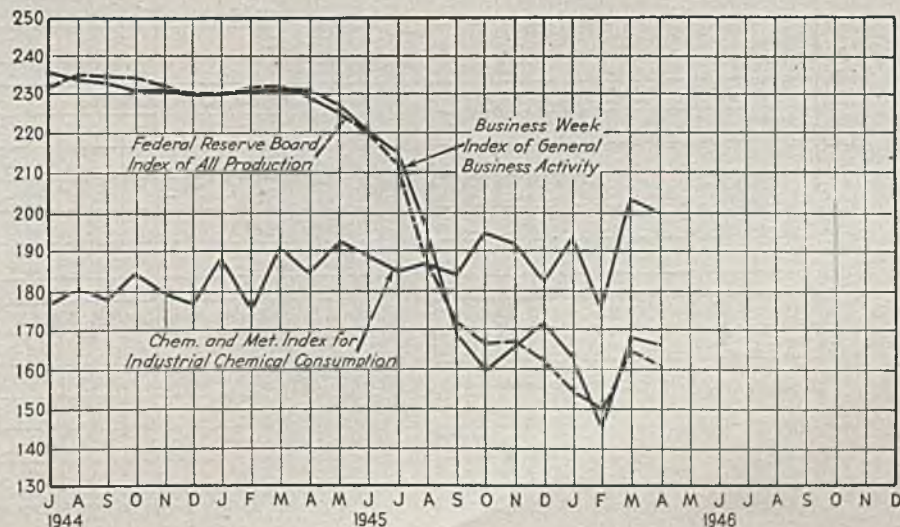
The Department of Commerce has given an encouraging report on new construction in May, placing the total of \$84 million or an increase of about 15 percent over the figure for April and 109 percent above the May 1945 total. This is favorable for an expansion in demand for paints but paint manufacturers are handicapped by the shortage in many important raw materials. The scarcity in lead pigments has been pronounced for some time and the outlook was further clouded by an announcement that one producing plant at East Chicago, Ind., would complete, as far as possible, its commitments for the second quarter and then would discontinue production permanently.

Of significance to future chemical production is the progress which has been made in recent weeks in increasing total capacity by turning government plants over to private operation. The most recent announcement was that the Jayhawk Ordnance Works, near Pittsburg, Kans., has been taken over by a private company and will produce a varied line of chemicals including nitric acid, ammonia, methanol, ammonium nitrate, and carbon dioxide.

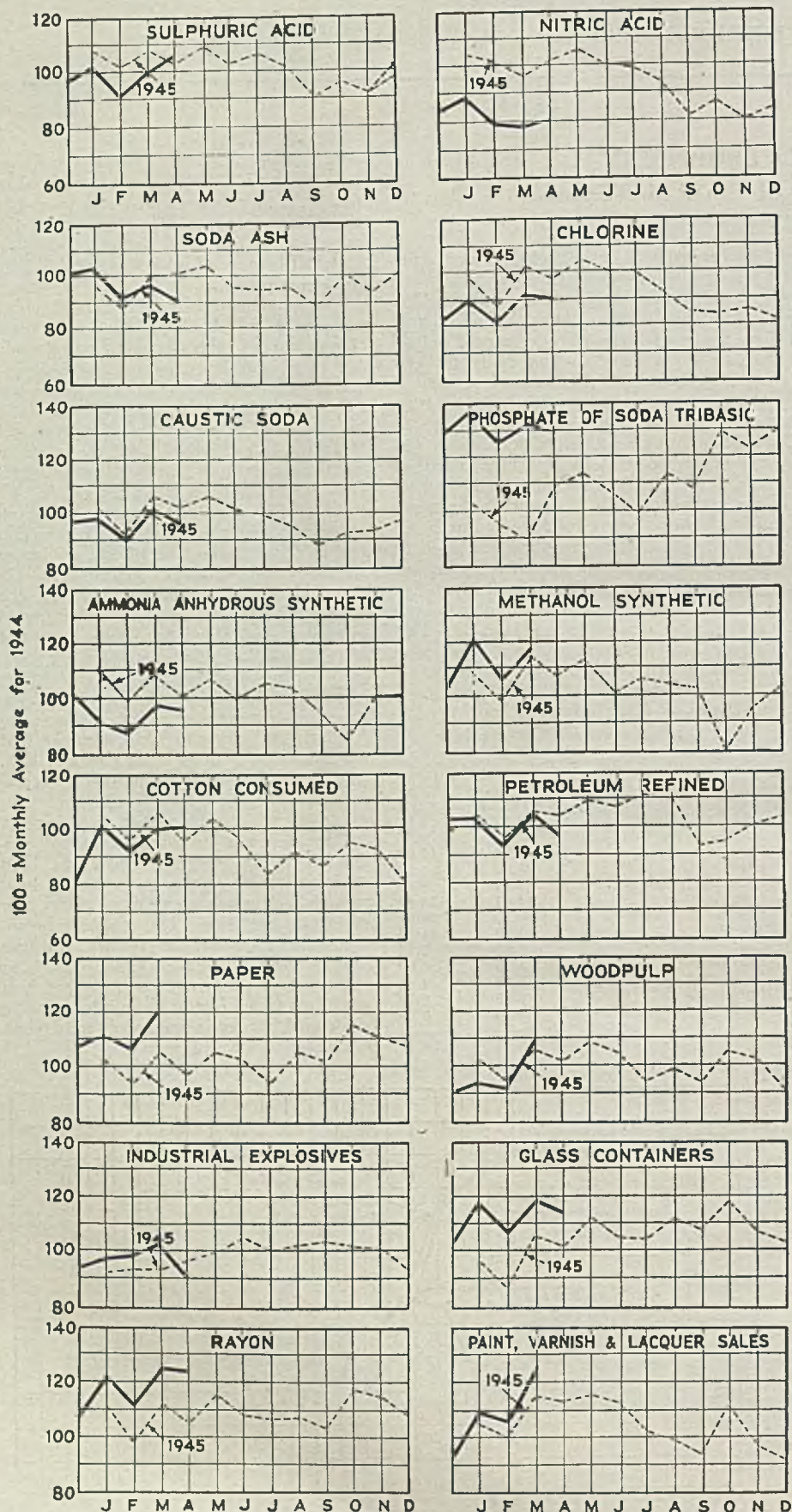
Chem. & Met. Index for Industrial Consumption of Chemicals

1935 = 100

	March Revised	April
Fertilizers	44.97	47.67
Pulp and paper	22.49	22.08
Petroleum refining	18.88	17.66
Glass	21.80	21.18
Paint and varnish	21.67	23.49
Iron and steel	11.67	10.84
Rayon	20.79	20.81
Textiles	11.29	11.19
Coal products	8.98	8.12
Leather	4.75	4.60
Industrial explosives	5.58	4.91
Rubber	6.95	6.90
Plastics	6.85	6.20
	206.27	205.60



PRODUCTION AND CONSUMPTION TRENDS



PRICES for chemicals throughout the war period were very firm with some upward revisions of sales schedules but with unchanged ceilings for the majority of items. The trend in recent months has been toward greater firmness and while actual changes have not been numerous this has been due to the maintenance of controls rather than the application of economic considerations. Strikes and work stoppages have increased the number of chemicals which are in small supply and have deferred the time when a balance might be expected between supply and demand.

In addition to the maladjustment between the volume of current offerings and requirements of consumers, there has been an appreciable increase in production costs as the result of higher wage scales and the marking up of prices for raw materials. In cases where higher prices for raw materials have been authorized, such as copper and lead, adjustments have been allowed on the metal salts but in other cases where chemical costs have been similarly affected, former ceilings for chemicals are maintained. It is evident, however, that prospective relaxation of controls will bring upward revisions in price schedules for some chemicals.

While the enforced drop in production rates in some consuming industries has eased the supply position of certain items, most of the larger tonnage chemicals are still scarce and some changes in distribution methods have been necessary. For instance, primary potash salts have again been placed under allocation controls in order to hold as closely as possible to the completion of the country's food program. It has been estimated that potash production will fall short by 100,000 tons of meeting full requirements and now there are fears that the shortage will reach an even higher total. Because of the shortage of lead, lead oxide for use in storage batteries has been placed under allocation and tighter controls have been decreed for its use in other industries. Although allocations for lead for ethyl fluid were raised to 4,160 tons for May as against 3,500 tons for April, the octane content of premium type gasoline has been cut in order to hold down consumption of tetraethyl lead.

Requests of producers for the establishment of higher export quotas for rosin did not meet with the approval of the Civilian Production Administration. The quotas had been established on estimates of the surplus of production over domestic consumption and on this assumption the export quota for the quarter ending June 30 was fixed at 100,000 drums with 150,000 drums as the quota for the quarter ending September 30.

Ethyl alcohol is another product over which strict controls are maintained. Production has taken a sharp drop since the end of the war with the use of grains reserved for foodstuffs and with only relatively small amounts of molasses available. This unfavorable raw material situation has affected all producers with the exception of those



Copper dome being fitted with sliding manhole cover



Rough-forming copper dome of a 16' kettle

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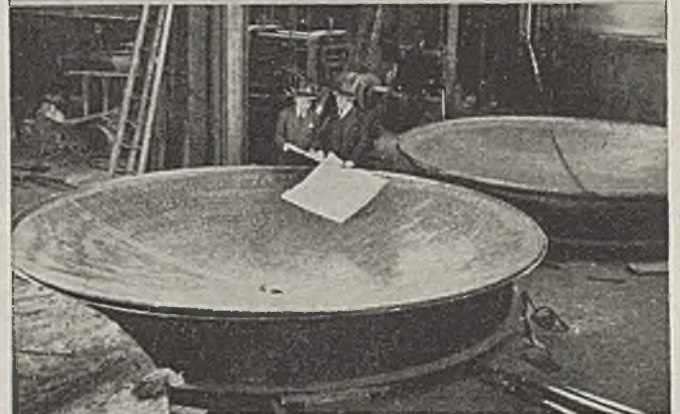
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Photos courtesy of Schock, Gusmer & Co. Inc., Hoboken, N. J. fabricators and installers of brewery, distillery and similar process equipment.



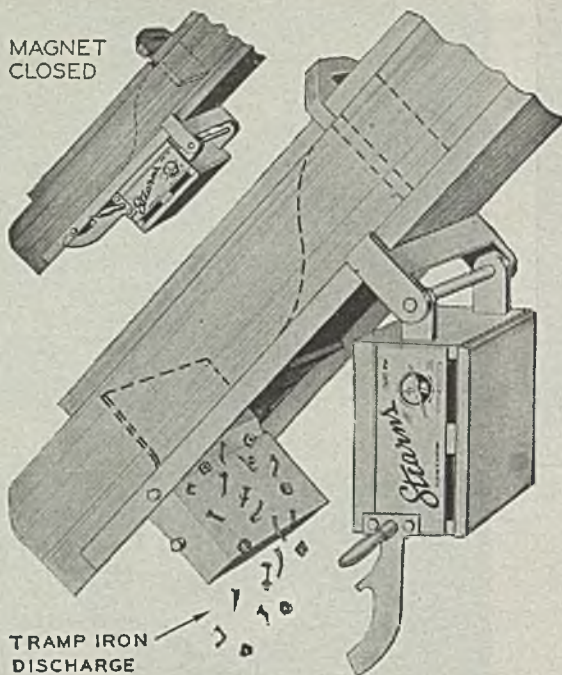
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turning out the synthetic product and deliveries to consumers are supplemented by drawing upon government stocks which are steadily being reduced. Consumption of ethyl alcohol this year is limited to 150,000,000 gal. and the Cuban molasses supply has been allocated on a basis of 37,000,000 gal. for ethyl alcohol; 18,000,000 gal. for butyl alcohol; 10,000,000 gal. for feed-stuffs; and 80,000,000 gal. for export or a total of 145,000,000 gal.

END USES FOR CHEMICALS

The Bureau of the Census has issued further reports on end uses for chemicals based on allocation records of the War Production Board. The following data are for 1944:

Normal Butyl Alcohol

Use	1,000 lb.	Per cent
Total allocations	167,991	100.0
Direct military ¹	—	—
Export	17,560	10.5
Other essential	150,431	89.5
Chemical manufacture	96,956	57.7
Butyl acetate	49,373	29.4
Dibutyl phthalate	29,041	17.3
Other butyl derivatives ²	18,542	11.0
Lacquer solvents	24,688	14.7
Aircraft coatings	12,831	7.7
Ammunition coatings	1,665	1.0
Textiles and leather	538	0.3
Dyes and penetrants	898	0.5
Other protective coatings	8,756	5.2
Other uses	28,787	17.1
Resins and plastics	4,209	2.6
Photography and films	1,455	0.8
Hydraulic brake linings	1,482	0.9
Miscellaneous ³	21,072	12.5

¹End-use data not available. ²Includes amount for butyl cellosolve and butyl amines. ³Includes amount used for cellulose acetate sheets, insect repellants, medicinals, flotation reagents, butyric acid, cleaners and dehydrating agents, and research.

Benzene

Use	1,000 gal.	Per cent
Total allocations	253,132	100.0
Direct military ¹	1,826	0.7
Foreign	65	—
Other uses	251,241	99.3
Aviation gasoline ²	129,933	51.3
Styrene	49,731	19.6
Phenol	25,489	10.1
Aniline	12,834	5.1
Chlorobenzene	5,421	2.1
Solvents	5,678	2.3
Diphenyls	2,593	1.0
Medicinals	1,492	0.6
Solvent blends ⁴	733	0.3
Nitrobenzene	1,217	0.5
Rubber chemicals	590	0.2
Trichlorobenzene	172	0.1
Miscellaneous ⁵	15,368	6.1

¹End-use data not available. ²Less than one-tenth of one percent. ³Includes military aviation fuel. ⁴As defined and controlled by Order M-150. ⁵Includes that used in nylon, phthalate plasticizers, maleic anhydride, camphor, anthraquinone, resorcinol, alcohol denaturant, small orders and other miscellaneous. Quantities used in nylon comprise a substantial part of this total. None was allocated for automotive fuel during this period.

Phthalic Anhydride

Use	1,000 lb.	Per cent
Total consumption	124,473	100.0
Exports	2,324	1.9
Other uses	122,149	98.1
Esters (plasticizers) ¹	68,793	55.3
Resins, principally alkyd	38,113	30.6
Dyestuffs	10,917	8.8
Food and drugs	3,114	2.5
Petroleum additives mainly demulsifying agents	565	0.4
Chemical intermediates	358	0.3
Rubber chemicals	144	0.1
Miscellaneous ²	145	0.1

¹Largely in form of dibutyl phthalate, but includes some methyl, ethyl and amyl esters. ²Includes use in paints, lacquers, enamels and resin softeners.

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OILS?

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SALTS?

WEATHER?

TEMPERATURE?

**VAPOR
PRESSURES?**

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Charles Engelhard, Inc.

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NEWARK, N. J.

U. S. Production of Certain Chemicals

March 1946, March 1945 and Three Months Totals for 1946 and 1945

Chemical and Basis	Units	March	March	Total, Three Months	
		1946	1945	1946	1945
Ammonia, synthetic anhydrous ¹	Tons	44,271	49,089	125,393	143,708
Ammonium nitrate (100% NH ₄ NO ₃)	Tons	42,860	.....	119,098	.....
Ammonium sulphate, synthetic (technical)	M lb.	18,363	.....	54,214	.....
Calcium arsenate (100% Ca ₃ (AsO ₄) ₂)	M lb.	1,478	3,200	3,569	6,004
Calcium carbide (commercial)	Tons	44,460	62,753	129,968	181,241
Calcium phosphate:					
Monobasic (100% CaH ₂ PO ₄) ²	M lb.	6,610	6,032	18,511	10,060
Dibasic (100% CaHPO ₄)	M lb.	7,233	3,607	23,066	10,909
Carbon dioxide:					
Liquid and gas	M lb.	17,681	19,022	51,078	52,470
Solid (dry ice)	M lb.	47,654	51,977	124,504	135,269
Chlorine	Tons	96,439	107,466	270,987	303,485
Chrome green (C.P.)	M lb.	1,981	525	5,532	1,717
Chrome yellow and orange (C.P.)	M lb.	4,739	3,610	13,496	9,944
Hydrochloric acid (100% HCl)	Tons	26,805	37,639	80,464	106,465
Hydrofluoric acid	M lb.	3,131	.....	8,590	.....
Hydrogen	Million cu. ft.	1,473	2,063	4,306	6,078
Lead arsenate (acid and basic)	M lb.	7,901	8,143	21,889	24,404
Molybdate chrome orange (C.P.)	M lb.	485	129	1,346	366
Nitric acid (100% HNO ₃)	Tons	30,887	37,963	96,779	118,906
Oxygen	M cu. ft.	951,418	1,476,364	2,373,338	4,216,095
Phosphoric acid (50% H ₃ PO ₄)	Tons	74,774	53,290	212,954	155,882
Soda ash (commercial sodium carbonate):					
Ammonia soda process (98-100% Na ₂ CO ₃)					
Total wet and dry ³	Tons	380,489	380,371	1,110,126	1,078,041
Finished light ⁴	Tons	183,038	218,540	548,743	575,855
Finished dense	Tons	140,500	103,639	395,855	336,382
Natural ⁵	Tons	16,175	15,156	50,368	43,163
Sodium bicarbonate (refined) (100% NaHCO ₃)	Tons	18,360	15,670	57,301	39,736
Sodium bichromate and chromate	Tons	7,777	7,466	22,646	20,467
Sodium hydroxide (100% NaOH):					
Electrolytic process:					
Liquid ⁶	Tons	93,335	101,332	260,859	287,288
Solid	Tons	15,427	19,304	47,897	50,885
Lime soda process:					
Liquid ⁶	Tons	66,674	66,111	196,747	187,510
Solid	Tons	19,365	19,976	68,844	59,233
Sodium phosphate:					
Monobasic (100% NaH ₂ PO ₄)	Tons	985	1,255	3,345	3,230
Dibasic (100% Na ₂ HPO ₄)	Tons	5,974	4,554	16,963	13,155
Tribasic (100% Na ₃ PO ₄)	Tons	9,165	6,015	27,810	19,346
Meta (100% NaPO ₃)	Tons	2,416	2,297	7,335	5,984
Tetra (100% Na ₄ P ₂ O ₇)	Tons	4,632	2,827	14,100	8,747
Sodium silicate (anhydrous)	Tons	32,182	37,105	99,210	109,077
Sodium sulphate:					
Anhydrous (refined) (100% Na ₂ SO ₄) ⁷	Tons	27,633	8,163	68,775	20,831
Glaubers salt and crude salt cake ⁸	Tons	43,820	66,929	127,563	189,926
Sulphuric acid (100% H ₂ SO ₄) ⁹					
Chamber process	Tons	262,135	275,135	736,211	849,711
Net, contact process ¹⁰	Tons	448,853	495,518	1,271,290	1,422,501

Data for this tabulation have been taken from "Facts for Industry" series issued by Bureau of the Census and WPB Chemicals Bureau. Production figures represent primary production and do not include purchased or transferred material. Quantities produced by government-owned arsenals, ordnance works, and certain plants operated for the government by private industry are not included. Chemicals manufactured by TVA, however, are included. All tons are 2,000 lb. Where no figures are given, data are either confidential or not yet available. ¹ Includes a small amount of aqua ammonia. ² Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense. ³ Not including quantities converted to finished dense. ⁴ Data collected in cooperation with the Bureau of Mines. ⁵ Figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such. ⁶ Includes oleum grades. Excludes spent acid. ⁷ Data for sulphuric acid manufactured as a byproduct of smelting operations are no longer included. This production by eight plants accounted for approximately four percent of the 1945 total production. ⁸ Method of reporting revised.

United States Production of Certain Synthetic Organic Chemicals

February 1946, February 1945, and Two-Month Totals for 1946 and 1945

Chemical	February	February	Total, Two Months	
	1946	1945	1946	1945
Acetanilid, technical and U.S.P.	488,658	490,965	1,171,913	.....
Acetic acid:				
Synthetic ¹	21,344,997	21,914,210	40,888,526	48,228,834
Recovered	85,976,699	.....	148,617,212	.....
Natural ²	1,798,494	2,793,514	3,696,027	6,005,055
Acetic anhydride ³	38,330,052	41,723,242	84,003,477	86,556,537

(Continued on page 308)

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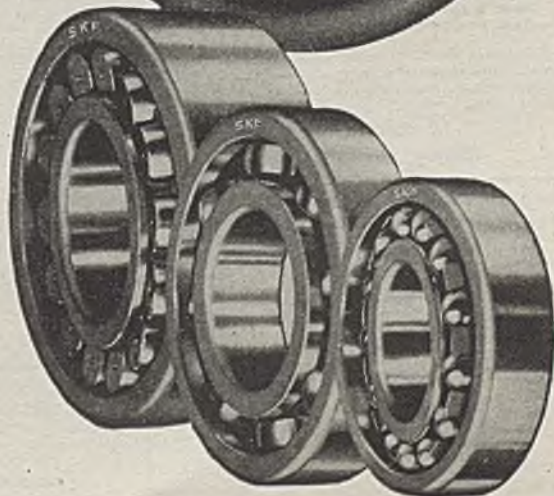


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U.S. Production of Synthetic Organic Chemicals (Cont. from page. 306)

Chemical	February 1946	February 1945	Total, Two Months 1946 1945	
Acetone.....	26,833,544	.....	52,679,975	.....
Acetylsalicylic acid.....	933,846	816,202	1,920,214	1,702,704
Aniline.....	6,411,349	.....	13,482,044	.....
Barbituric acid derivatives: ¹ 5-Ethyl-5-phenylbarbituric acid and salts (Phenobarbital).....	26,119	19,806	55,187	40,115
Benzene:				
Motor grade:				
Tar distillers ⁴	953,062	.....	2,017,681	.....
Coke-oven operators ⁴	1,470,881	.....	4,107,329	.....
All other grades:				
Tar distillers ⁴	1,960,576	.....	3,492,090	.....
Coke-oven operators ⁴	4,342,060	.....	11,107,801	.....
Butyl alcohol, primary, normal.....	7,709,950	.....	17,298,975	.....
Carbon bisulphide.....	23,278,743	.....	49,463,941	.....
Carbon tetrachloride.....	13,368,298	.....	25,010,961	.....
Chlorobenzene, mono.....	19,882,038	.....	41,868,579	.....
Creosote oil:				
Tar distillers.....	7,643,982	.....	17,459,201	.....
Coke-oven operators.....	798,841	.....	2,714,489	.....
Creosols: ²				
Meta-para.....	299,492	492,204	578,151	1,158,392
Ortho-meta-para.....	757,243	797,024	1,308,624	1,532,948
Creosylic acid, refined? ³	1,516,830	2,734,615	3,051,861	5,410,240
Dibutyl phthalate.....	1,452,979	.....	.....	.....
Dichlorodiphenyltrichloroethane (DDT).....	3,221,865	.....	8,711,453	18,172,524
Ethyl acetate (85%).....	6,411,541	9,145,083	12,832,143	14,730,497
Ethyl ether, technical and U.S.P.	2,571,031	7,109,254	5,854,078	.....
Formaldehyde (37% by wt.).....	38,253,895	.....	77,464,600	.....
Methanol:				
Natural ⁶	1,228,466	1,460,720	2,630,947	3,167,280
Synthetic.....	41,557,771	38,891,280	89,611,937	81,552,480
Naphthalene:				
Tar distillers (less than 79° C.) ⁴	10,074,249	15,825,833	26,059,916	31,213,188
Tar distillers (79° and over) ⁴	8,124,861	5,355,560	16,444,835	10,736,533
Coke-oven operators (less than 79° C.) ⁴	2,221,779	8,886,125	6,399,032	14,244,991
Penicillin ⁵	1,702,983	.....	3,215,988	.....
Phenol (synthetic and natural) ⁷	13,700,308	.....	29,515,828	.....
Phthalic anhydride.....	6,682,466	9,605,955	15,385,837	19,925,467
Styrene (government owned plants only).....	25,887,056	.....	52,927,584	.....
Toluene:				
Coke-oven operators ⁴	915,245	.....	2,210,422	.....
All other ^{8,10}	837,928	.....	1,969,118	.....

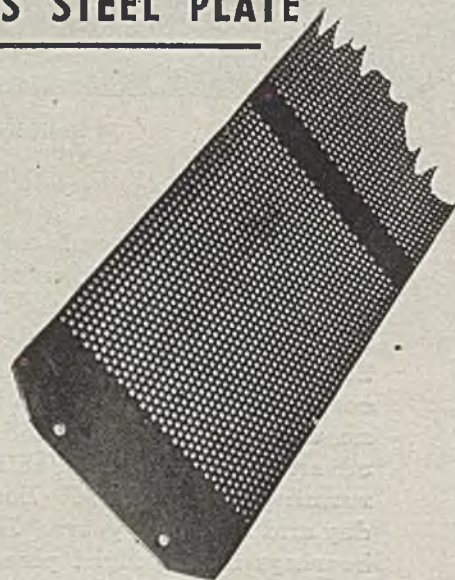
All data in pounds except benzene (gal.), creosote oil (gal.), toluene (gal.), and penicillin (million Oxford units). Statistics collected and compiled by U. S. Tariff Commission except where noted. Absence of data on production indicates either that returns were unavailable or confidential. ¹ Excludes the statistics on recovered acid. ² Acid produced by direct process from wood and from calcium acetate. ³ All acetic anhydride including that from acetic acid by vapor-phase process. ⁴ Product of distillers who use purchased coal tar only. ⁵ Statistics are given in terms of bulk medicinals only. ⁶ Statistics collected by Bureau of Mines. ⁷ Total production including data reported both by coke-oven operators and by distillers of purchased coal tar. ⁸ Reported to U. S. Bureau of the Census. ⁹ Reported in gal. by Bureau of the Census but converted to lb. for comparison with the production of synthetic methanol. ¹⁰ Includes toluene produced from petroleum by any process.

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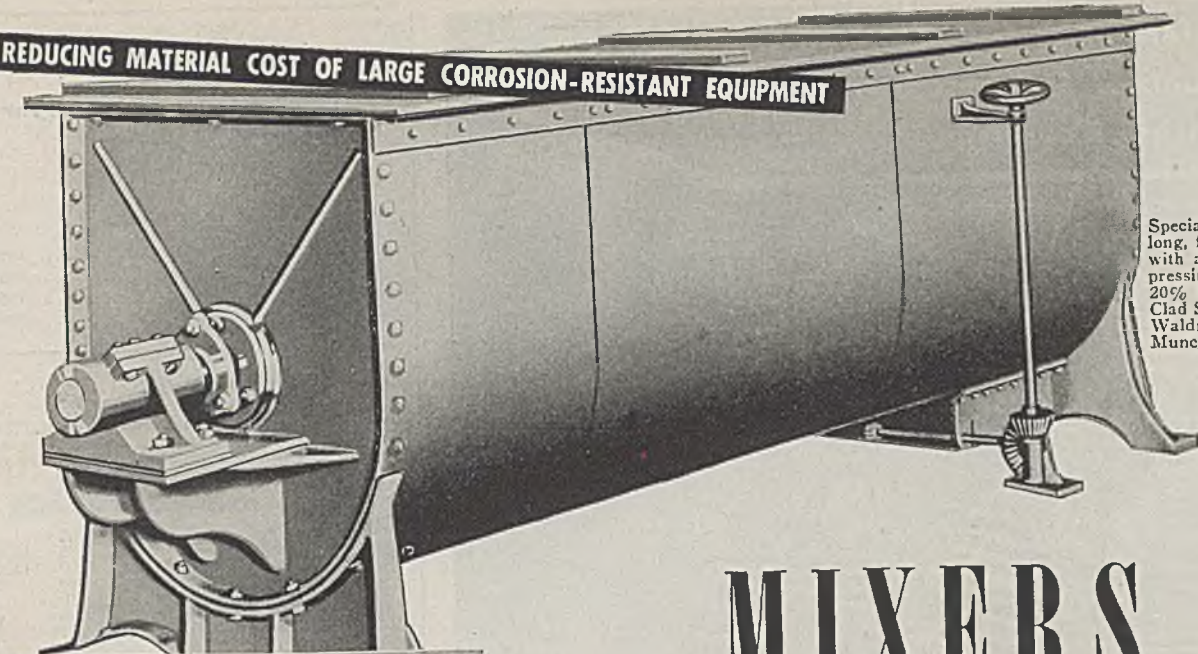
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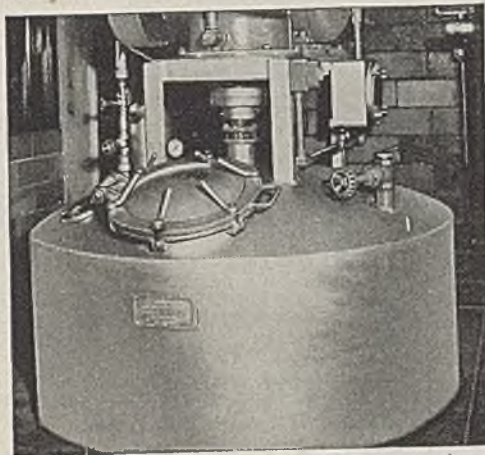


MIXERS

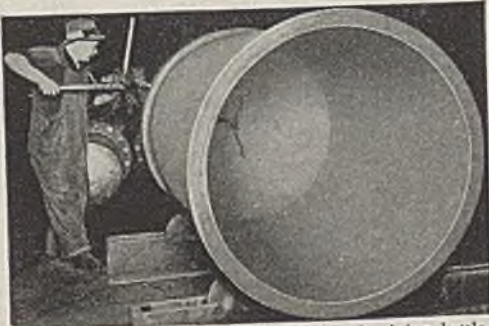
that saved \$30,000
in four years



Mixer used in the preparation of a sizing clay solution for the loading of magazine paper stock. It was fabricated of 20% Lukens Nickel-Clad Steel by the J. H. Day Co., Cincinnati, Ohio.



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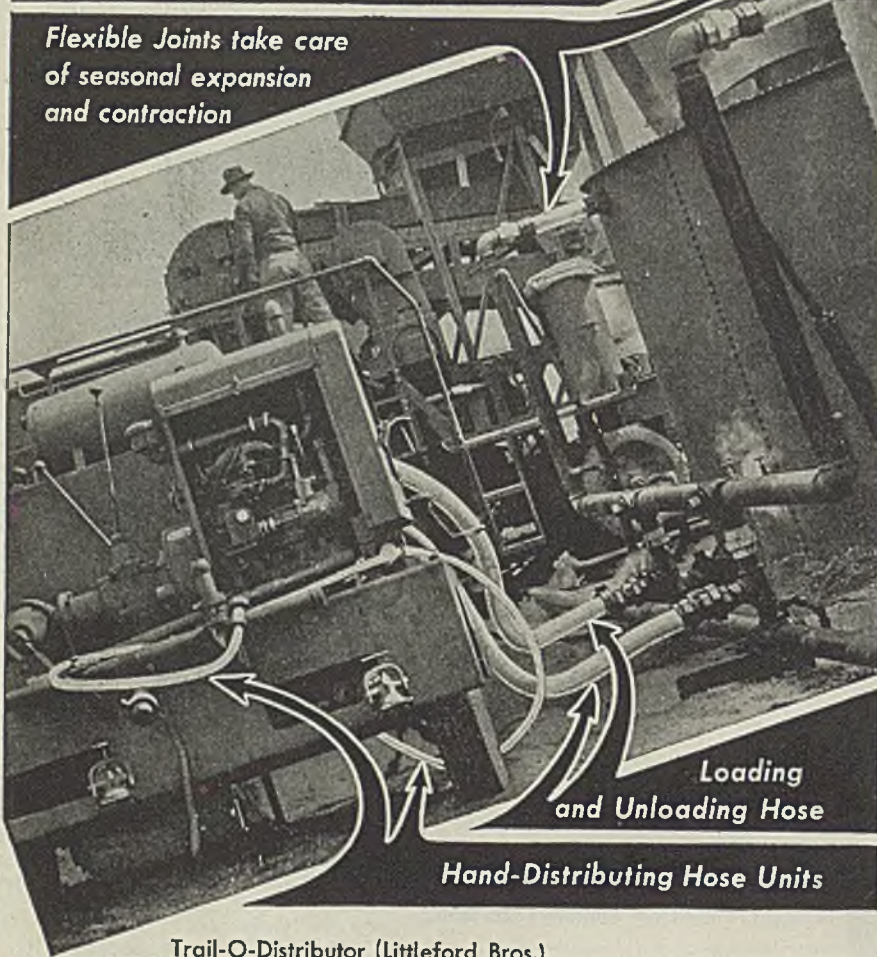
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Flexible Joints take care of seasonal expansion and contraction



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CHEM. & MET.

Weighted Index of Prices for

CHEMICALS

Base = 100 for 1937

This month.....	109.13
Last month.....	109.13
June, 1945.....	108.93
June, 1944.....	109.59

CURRENT PRICES

The accompanying prices refer to round lots. Where it is trade custom to sell f.o.b. works, quotations are so designated. Prices are corrected to June 11.

INDUSTRIAL CHEMICALS

Acetone, tanks, lb.....	\$0.06	.....
Acid, acetic, 28% bbl., 100 lb.....	3.38	\$3.63
Boric, bbl., ton.....	109.00	113.00
Citric, kegs, lb.....	.20	.23
Formic, chys, lb.....	.104	.11
Hydrofluoric, 30% drums, lb.....	.08	.085
Latic, 44% tech., light, bbl., lb.....	.073	.075
Muriatic, 18%, tanks, 100 lb.....	1.05	.....
Nitric, 36%, carboys, lb.....	.05	.051
Oleum, tanks, wks., ton.....	18.50	20.00
Oxalic, crystals, bbl., lb.....	.114	.124
Phosphoric tech., tanks, lb.....	.04	.....
Sulphuric, 60%, tanks, ton.....	13.00	.....
Tartaric, powd., bbl., lb.....	.62	.65
Alcohol, amyl from pentane, tanks, lb.....	.131	.....
Alcohol, butyl, tanks, lb.....	.104	.21
Alcohol, ethyl, denatured, No. 1 special, tanks, gal.....	.542	.....
Alum, ammonia, lump, lb.....	.041	.....
Aluminum sulphate, com. bags 100 lb.....	1.15	1.45
Ammonia, anhydrous, cyl., lb.....	.14	.....
tanks, ton.....	59.00	61.60
Ammonium carbonate, powd., casks, lb.....	.091	.10
Sulphate, wks., ton.....	28.20	.....
Amyl acetate, tech. from pentane, tanks, lb.....	1.45	.....
Aqua ammonia, 26%, drums, lb.....	.021	.03
tanks, ton.....	65.00	.....
Arsenic, white, powd., bbl., lb.....	.04	.041
Barium carbonate, bbl., ton.....	65.00	75.00
Chloride, bbl., ton.....	75.00	78.00
Nitrate, casks, lb.....	.091	.11
Blanc fix, dry, bags, ton.....	60.00	70.00
Bleaching powder, f.o.b., wks., drums, 100 lb.....	2.50	3.00
Borax, gran., bags, 100 lb.....	45.00	.....
Calcium acetate, bags, 100 lb.....	3.00	.....
Arsenate, dr., lb.....	.074	.08
Carbide, drums, ton.....	50.00	.....
Chloride, flake, bags, del., ton.....	18.50	25.00
Carbon bisulphide, drums, lb.....	.05	.05
Tetrachloride, drums, gal.....	.73	.80
Chlorine, liquid, tanks, wks., 100 lb.....	1.75	2.00
Copperas, bgs., f.o.b., wks., ton.....	17.00	18.00
Copper carbonate, bbl., lb.....	.194	.20
Sulphate, bbl., 100 lb.....	5.00	5.50
Cream of tartar, bbl., lb.....	.50	.52
Diethylene glycol, dr., lb.....	.144	.151
Epsom salt, dom., tech., bbl., 100 lb.....	1.80	2.00
Ethyl acetate, tanks, lb.....	.091	.114
Formaldehyde, 40%, tanks, lb. wks.....	.032	.....
Furfural, tanks, lb.....	.094	.....
Glaubers salt, bags, 100 lb.....	1.05	1.10
Glycerine, c.p., drums, extra, lb.....	.181	.19
Lead:		
White, basic carbonate, dry, casks, lb.....	.081	.....
Red, dry, ack., lb.....	.091	.....
Lead acetate, white crys., bbl., lb.....	.121	.13
Arsenate, powd, bag, lb.....	.114	.12
Lithopone, bags, lb.....	.041	.044
Magnesium carb., tech., bags, lb.....	.074	.08
Methanol, 95%, tanks, gal.....	.60	.....
Synthetic, tanks, gal.....	.24	.....
Phosphorus, yellow, cases, lb.....	.23	.25
Potassium bichromate, casks, lb.....	.104	.104
Chlorate, powd., lb.....	.094	.12
Hydroxide (caustic potash) dr., lb.....	.07	.074
Muriate, 60%, bags, unit.....	.531	.....
Nitrate, ref., bbl., lb.....	.08	.09
Permanganate, drums, lb.....	.191	.20
Prussiate, yellow, casks, lb.....	.16	.17
Sal ammoniac, white, casks, lb.....	.0515	.06
Salsoda, bbl., 100 lb.....	1.00	1.05
Salt cake, bulk, ton.....	15.00	.....
Soda ash, light, 58%, bags, contract, 100 lb.....	1.05	.....
Dense, bags, 100 lb.....	1.15	.....
Soda, caustic, 76% solid, drums, 100 lb.....	2.30	3.00
Acetate, del., bbl., lb.....	.051	.06
Bicarbonate, bbl., 100 lb.....	1.70	2.00
Bichromate, bags, lb.....	.071	.08
Bisulphate, bulk, ton.....	16.00	17.00
Bisulphite, bbl., lb.....	.03	.04

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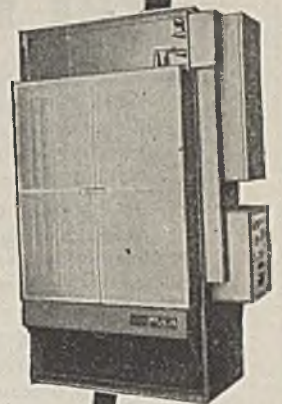
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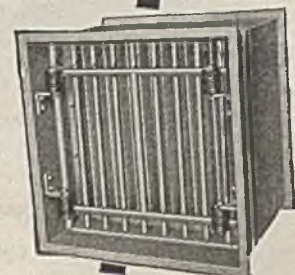
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CHEM. & MET.

Weighted Index of Prices for OILS & FATS

Base = 100 or 1937

This month	145.80
Last month	145.80
June, 1945	145.85
June, 1944	145.24

Chlorate, kegs, lb.	\$0.061	\$0.061
Cyanide, cases, doz., lb.	.14	.15
Fluoride, bbl., lb.	.07	.08
Hyposulphite, bags, 100 lb.	2.25	2.50
Metasilicate, bbl., 100 lb.	2.50	2.65
Nitrate, bulk, ton	27.00	
Nitrite, casks, lb.	.08	.07
Phosphate, tribasic, bags, 100 lb.	2.70	
Prussiate, yel, bags, lb.	.10	.11
Silicate, 40° dr., wks., 100 lb.	.80	.85
Sulphite, crys., bbl., lb.	.02	.02
Sphur, crude at mine, long ton	16.00	
Dioxide, cyl., lb.	.07	.08
Dioxide, tanks, lb.	.04	
Tin crystals, bbl., lb.	.39	
Zinc chloride, grain, bbl., lb.	.05	.06
Oxide, lead free, bags, lb.	.07	
Oxide, 5% leaded, bags, lb.	.07	
Sulphate, bbl., cwt.	3.85	4.00

OILS AND FATS

Castor oil, No. 3 bbl., lb.	\$0.14	\$0.15
China wood oil, tanks, lb.	.38	
Coconut oil, Ceylon, N. Y., lb.	.0885	
Corn oil crude, tanks (f.o.b. mill), lb.	.12	
Cottonseed oil crude (f.o.b. mill), tanks, lb.	.12	.12
Linseed oil raw, car lots, bbl., lb.	.155	
Palm, casks, lb.	.0865	
Peanut oil, crude, tanks (mill), lb.	.12	
Rapeseed oil, refined, bbl., lb.	nom.	
Soybean, tanks, lb.	.11	
Menhaden, light, pressed, dr., lb.	.13	
Crude, tanks (f.o.b. factory) lb.	.089	
Grease, yellow, loose, lb.	.08	
Oleo stearine, lb.	.09	
Oleo oil, No. 1, lb.	.11	
Red oil, distilled, bbl., lb.	.13	
Tallow extra, loose, lb.	.08	

COAL-TAR PRODUCTS

Alpha-naphthol, crude, bbl., lb.	\$0.52	\$0.55
Alpha-naphthylamine, bbl., lb.	.32	.34
Aniline oil, drums, extra, lb.	.11	.12
Aniline salts, bbl., lb.	.22	.24
Benzaldehyde, tech., dr., lb.	.45	.50
Benzidine base, bbl., lb.	.70	.75
Benzoic acid, USP, kegs, lb.	.54	.56
Benzol, 90%, tanks, works, gal.	.15	
Benzyl chloride, tech., dr., lb.	.22	.24
Beta-naphthol, tech., drums, lb.	.23	.24
Cresol, USP, dr., lb.	.10	
Cresylic acid, dr., wks., gal.	.81	.83
Diphenyl, bbl., lb.	.15	
Diethylamine, dr., lb.	.40	.45
Dinitrotoluol, bbl., lb.	.18	.19
Dinitrophenyl, bbl., lb.	.22	.23
Dip oil, 15%, dr., gal.	.23	.25
Diphenylamine, dr., f.o.b. wks., lb.	.25	
H acid, bbl., lb.	.45	.50
Hydroquinone, bbl., lb.	.90	
Naphthalene, flake, bbl., lb.	.07	.07
Nitrobenzene, dr., lb.	.08	.09
Para-cresol, bbl., lb.	.41	
Para-nitroaniline, bbl., lb.	.42	.43
Phenol, USP, drums, lb.	.10	.11
Picric acid, bbl., lb.	.35	.40
Pyridine, dr., gal.	1.55	1.60
Resorcinol, tech., kegs, lb.	.65	.70
Salicylic acid, tech., bbl., lb.	.26	.33
Solvent naphtha, w.w., tanks, gal.	.26	
Toluidin, bbl., lb.	.96	
Toluol, drums, works, gal.	.32	
Xylol, com., tanks, gal.	.25	

MISCELLANEOUS

Casein, tech., bbl., lb.	\$0.33	\$0.35
Dry colors:		
Carbon gas, black (wks.), lb.	.0365	.097
Prussian blue, bbl., lb.	.36	.37
Ultramarine blue, bbl., lb.	.11	.26
Chrome green, bbl., lb.	.23	.33
Carmine red, tins, lb.	4.00	4.75
Fara toner, lb.	.75	.80
Vermilion, English, bbl., lb.	2.50	2.60
Chrome yellow, C.P., bbl., lb.	.16	.17
Gum copal, Congo, bags, lb.	.09	.15
Manila, bags, lb.	.09	.15
Damar, Batavia, cases, lb.	.19	.22
Kauri, cases, lb.	.18	.60
Magnesite, calc., ton	61.00	
Pumice stone, lump, bbl., lb.	.05	.07
Rosin, H., 100 lb.	7.43	
Shellac, orange, fine, bags, lb.	.46	
Bleached, bonedry, bags, lb.	.42	
T. N., bags, lb.	.35	
Turpentine, gal.	.93	.94

AS sole agents for BETHLEHEM WEDGE ROASTERS, Nichols is now admirably equipped to furnish complete Roaster Service. The addition of BETHLEHEM WEDGE ROASTERS to the long established line of NICHOLS HERRESHOFF FURNACES makes available complete engineering facilities for the design, installation and maintenance of multiple hearth furnace equipment in the thermal processing of ores, concentrates, filtering clays, sludges and other materials.

The modernization of existing plants will be given the same careful attention as new projects.

Write for information soon.

OTHER NICHOLS PRODUCTS

NICHOLS HERRESHOFF MULTIPLE HEARTH SEWAGE SLUDGE INCINERATORS.

NICHOLS MONOHEARTH REFUSE INCINERATOR.

NICHOLS DUOHEARTH INCINERATOR—for the disposal of sewage sludge and refuse.

NICHOLS FREEMAN FLASH ROASTERS—for thermally processing materials in suspension.

NICHOLS FREEMAN VORTRAPs—for cleaning pulp and paper-making stocks;
for clarification of clay and pigment slurries, etc.

NICHOLS TUBULAR COOLER—for cooling fine and granular materials.

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NEW CONSTRUCTION

PROPOSED WORK

Ala., Childersburg—Coosa River Newsprint Co., c/o J. W. Brown, First Natl. Bank Bldg., Sylacauga, Ala., contemplates the construction of a newsprint manufacturing plant here. J. E. Sirmic & Co., Greenville, S. C., Milton Fies, Birmingham, Ala., and Polk, Powell & Hendon, Birmingham, Ala., Cons. Engrs. Estimated cost \$10,000,000.

Fla., Jacksonville—Union Bag & Paper Co., Lathrop Ave., Savannah, Ga., will not construct paper mill here on Trout River. Estimated cost \$2,500,000.

Md., Baltimore—C. M. Athey Paint Co., 500 South Hanover St., plans to construct a paint manufacturing plant. Henry P. Hopkins, 10 East Mulberry St., Archt. Estimated cost \$125,000.

Miss., Jackson—Armstrong Cork Co., Liberty and Mary Sts., Lancaster, Pa., plans to construct an asphalt tile plant here. H. A. Kuljian & Co., 1518 Walnut St., Philadelphia, Archt. Estimated cost will exceed \$100,000.

Miss., Natchez—Gulf Refining Co. and California Co., Jackson, plan to construct a cycling plant in this area. Estimated cost \$6,500,000.

N. J., Burlington—Hercules Powder Co., 900 Market St., Wilmington, Del., plans to construct a chemical plant here. Estimated cost \$1,500,000.

N. C., Acme—Riegel Paper Corp., 345 Madison Ave., New York City, and Bolton, N. C., plans to construct a paper plant on the Cape Fear River. Estimated cost \$6,300,000.

O., Cincinnati—Procter & Gamble Co., Spring Grove Ave., Ivorydale, Cincinnati, O., plans to construct an alcohol plant here. Day & Zimmerman, Inc., Packard Bldg., Philadelphia, Pa., Archts. Estimated cost \$150,000.

Ore., Portland—Western Waxed Paper Co., Public Service Bldg., plans to construct a 1 story addition to its plant. Whitehouse, Church, Newberry & Roehr, Builders Exchange Bldg., Archts. Estimated cost \$100,000.

Pa., Johnsonburg—Castanea Paper Co., Johnsonburg, plans to construct a 2 story laboratory addition. Estimated cost \$150,000.

Pa., Neville Island—Neville Island Glass Co., Olean, N. Y., plans to construct a 1 story plant here. Estimated cost \$150,000.

Pa., Philadelphia—Penn City National Oil Co., 82nd St. and Bartran Ave., plans to construct a processing and storage building. Estimated cost \$50,000.

R. I., Providence—Queen Dyeing Co., 589 Atwells Ave., plans to rebuild its factory. Lockwood-Greene Engineers, Inc., 40 Central St., Boston, Mass., Eng. Estimated cost \$175,000.

Tex., Carthage—Rogers Lacy & Associates, Longview, plan to construct a recycling plant in this area. Estimated cost \$4,500,000.

Tex., Dallas—Eastman Kodak Co., 1504 Young St., plans to construct plant here including color processing plant unit. Estimated cost \$225,000.

	Current Projects		Cumulative 1946	
	Proposed Work	Contracts	Proposed Work	Contracts
New England.....	\$175,000	\$1,191,000	\$715,000	\$3,784,000
Middle Atlantic.....	1,975,000	.....	3,111,000	6,644,000
South.....	22,900,000	.....	50,560,000	34,487,000
Middle West.....	150,000	115,000	11,368,000	37,815,000
West of Mississippi.....	7,225,000	3,547,000	78,180,000	36,023,000
Far West.....	100,000	1,000,000	2,355,000	9,207,000
Canada.....	.....	380,000	405,000	15,243,000
Total.....	\$32,525,000	\$6,233,000	\$146,694,000	\$143,203,000

Tex., Lamesa—Texas Co., Magnolia Petroleum Co., Honolulu Corp. and Stanolind Oil & Gas Co., Fair Bldg., Fort Worth, plan to construct a natural gasoline manufacturing plant in Slaughter Field. Estimated cost \$2,000,000.

Tex., LaPorte—E. I. du Pont de Nemours & Co., LaPorte, plans to construct additional chemical plant facilities. Estimated cost \$500,000.

CONTRACTS AWARDED

Ark., El Dorado—Lion Oil Co., El Dorado, has awarded the contract for a catalytic cracking unit to Lummus Co., Esperson Bldg., Houston, Tex. Estimated cost \$1,250,000.

Ark., North Little Rock—Buckeye Cotton Oil Co., North Little Rock, has awarded the contract for a warehouse to Grady & Garms, Little Rock, at \$41,500.

Calif., Pasadena—Allied Products, Inc., Suffern, N. Y., has awarded the contract for a cosmetic factory here to Wm. Simpson Construction Co., 816 West 5th St., Los Angeles. Estimated cost \$500,000.

Calif., Richmond—Standard Oil Co. of California, (California Research Corp.), 225 Bush St., San Francisco, has awarded the contract for a laboratory and industrial relations building and office, to M. & F. Corp., 200 Financial Center Bldg., San Francisco, at \$696,000.

Calif., San Francisco—American Marine Paint Co., 311 California St., has awarded the contract for the construction of a warehouse to Dinwiddie Construction Co., 211 Crocker Bldg. Estimated cost \$50,000.

Conn., Waterbury—Waterbury Ready Mixed Port Co., 94 Benedict St., will construct a storage plant. Work will be done by owner. Estimated cost \$40,000.

Ia., Dubuque—Virginia-Carolina Chemical Corp., Dubuque, has awarded the contract for a fertilizer plant to Ulrich Willys, Dubuque. Estimated cost \$145,000.

Mass., Everett—Monsanto Chemical Co., Chemical Lane, Everett, has awarded the contract for the construction of a laboratory to William M. Bailey Co., 88 Broad St., Boston. Estimated cost \$234,000.

Mo., Sedalia—Pittsburgh Corning Corp., 632 Duquesne Way, Pittsburgh, Pa., has awarded the contract for design and construction of two plants here for the production of glass block and Foamglas, a cellular glass insulating material, to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. Estimated cost \$2,000,000.

N. H., Berlin—Brown Co., 650 Main St., has awarded the contract for the construction of a factory including sulphate mill and dryer plant to Rust Engineering Co., Clark Bldg., Pittsburgh, Pa., at \$917,491.

O., Cleveland—Compressed Gases, Inc., 3620 Superior Ave., has awarded the contract for a factory and office building to Hadlock-Krill Co., 2169 East 33rd St., at \$60,000.

O., Toledo—Libbey Glass Div. of Owens-Illinois Glass Co., Ash St., has awarded the contract for a second story room within existing building to Myron Miller, Elm St. Estimated cost \$55,000.

Ore., Portland—Pennsylvania Salt Manufacturing Co., 6400 N. W. Front Ave., has awarded the contract for two masonry and steel buildings to house electro-chemical manufacturing facilities to Roy T. Earley & Co., 321 Middle Waterway, Tacoma, Wash. Estimated cost \$300,000.

Tex., McQueeney—Seguin Brick & Tile Co., 702 American Hospital & Life Bldg., San Antonio, will construct a kiln unit. Work will be done by force account and subcontracts. Estimated cost \$55,000.

Utah, Salt Lake City—Bennett Glass & Paint Co., 65 West First South St., has awarded the contract for a warehouse to Jacobsen Construction Co., 724 South 3rd East St. Estimated cost \$150,000.

Wis., Kaukauna—Thilamany Pulp & Paper Co., Kaukauna, has awarded the contract for a 1 story, 37x200 ft. addition to its plant to Permanent Construction Co., 4100 North Third St., Milwaukee.

B. C., New Westminster—Westminster Paper Co., Ltd., 16th St. and 5th Ave., has awarded the contract for a new finishing building to Dominion Construction Co., Ltd., 150 West First Ave., Vancouver, B. C. Estimated cost \$140,000.

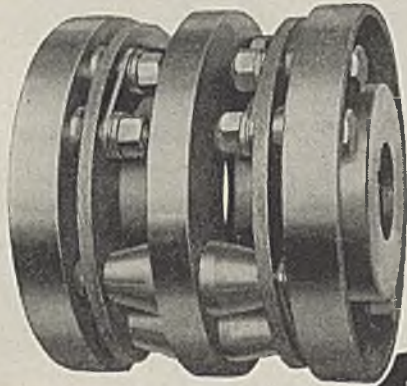
B. C. Woodfibre—B. C. Pulp & Paper Co., Ltd., 602 West Hastings St., Vancouver, B. C., has awarded the contract for three chip storage bins to Dominion Construction Co., Ltd., 150 West First Ave., Vancouver. Estimated cost \$75,000.

Ont., Toronto—Acme Paper Products, Ltd., 388 Carlaw Ave., has awarded the contract for an addition to its plant to Bardford-Hoskal, Ltd., 1170 Vonge St. Estimated cost \$65,000.

Ont., Toronto—Drug Trading Co., Ltd., 6 Ontario St., has awarded the contract for an additional story to its plant to Dickie Construction Co., Ltd., 17 Yorkville Ave. Estimated cost \$100,000.

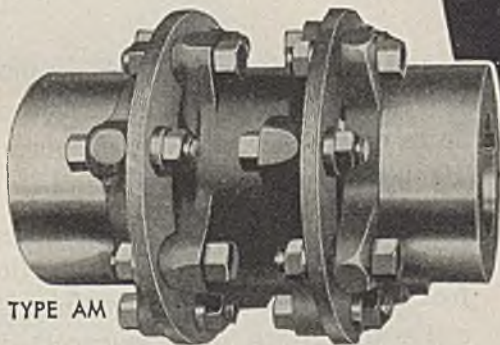
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... proven 100% dependable on crushers, agitators, centrifugal pumps, mixers, compressors, blowers, filters, mills and many other heavy duty installations.



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Thomas "ALL-METAL" Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull. Perfect balance under all conditions of misalignment... No Lubrication is Required.



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REQUIRE NO LUBRICATION
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ARE ELIMINATED
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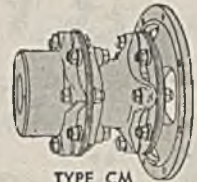
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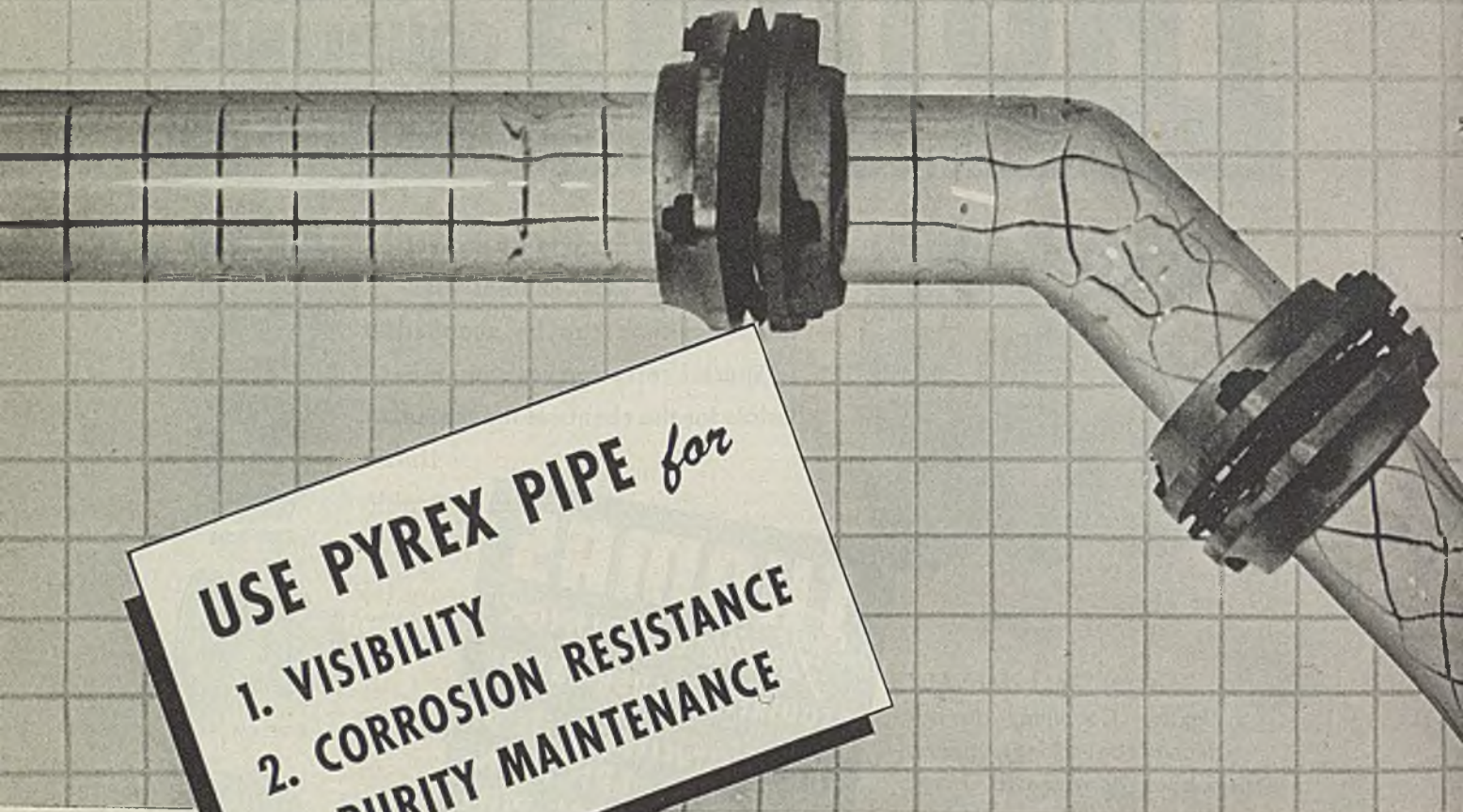


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Costs Go Down . . .



USE PYREX PIPE for

1. VISIBILITY
2. CORROSION RESISTANCE
3. PURITY MAINTENANCE

Pyrex Pipe Data . . .

EASE OF INSTALLATION. Your own men can install a PYREX brand Glass Pipe Line. No special tools or special training are required. The pipe, the fittings and the hardware come to your installation point ready for assembly. There's no cutting to lengths, no threading necessary on the job. Stock adaptor flanges are available to connect PYREX Pipe to metal pipe and other plant equipment.

SIZES AND FITTINGS. PYREX Brand Glass Pipe is now available in 1", 1½", 2", 3" and 4" i.d. A complete line of standard PYREX fittings includes ells, tees, return bends, laterals, and reducers. Special fittings can be readily made to your specifications.

PRESSURES AND TEMPERATURES. Operating temperatures as high as 250°F. are not unusual

—and temperatures as high as 400°F. can be considered. Most installations operate at pressures up to 50 p.s.i.—but pressures as high as 100 p.s.i. can be considered.

VISIBILITY. The crystal clear transparency of PYREX Pipe permits visual inspection of every foot of your pipe line at any time. This feature serves to forwarn you of unexpected trouble in your pipe lines. In some cases it has saved the entire amount of the investment in PYREX Pipe in a single instance.

MAINTAINING PRODUCT PURITY.—PYREX Pipe is resistant to all acids (except HF) and moderate alkalis. There is no heavy metal pick-up or danger of metallic contamination. PYREX Pipe lines assure the ultimate in obtaining product purity.

when you install

GLASS PIPE

Whether you figure piping costs in terms of initial outlay or in terms of over all costs—spread over the length of service it will give you—PYREX Pipe is your best bet.

PYREX Pipe (accessories included) costs about the same or less than full weight copper or brass pipe in comparable sizes. It is lower in cost than most other corrosion resistant alloy pipe. But when you take into consideration length of service, elimination of replacements due to corrosion and the savings in shut-down time, PYREX Pipe can be considered a permanent investment.

That is why, in plant after plant, when PYREX Pipe is installed on a tough service job, piping costs have gone down.

Corning Engineers will gladly cooperate in applying it to your particular requirements. For complete details, write to the Industrial Sales Dept. CM-6.

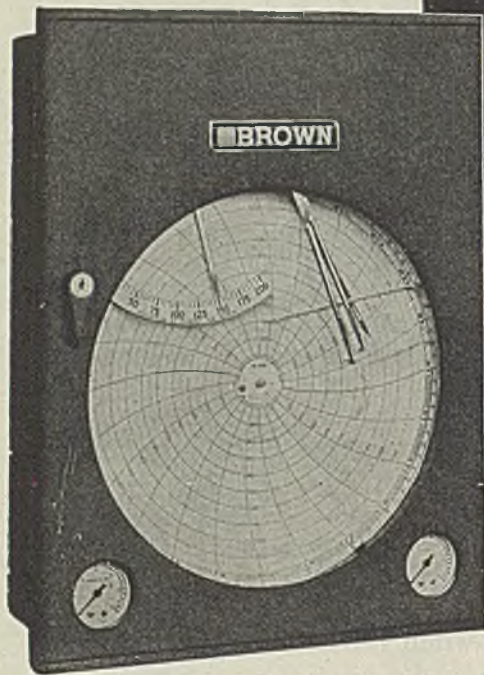
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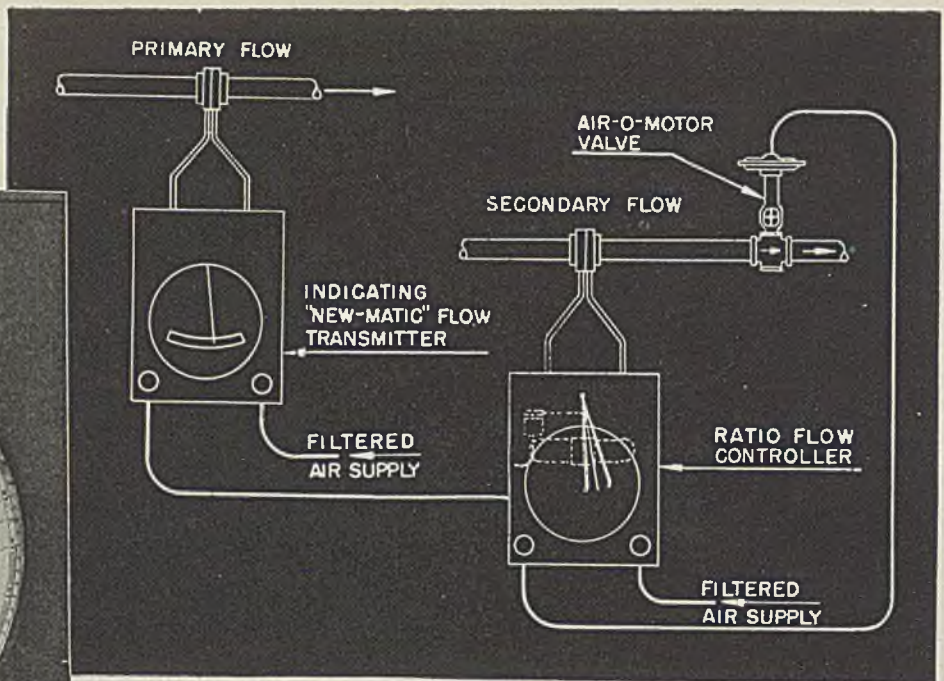
INDUSTRIAL SALES DEPT., CM-6
Corning Glass Works, Corning, New York

Please send me IA-1 "PYREX Pipe" for the Process Industry

Name.....Title.....
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Recording Ratio Flow Controller



FOR MIXING OPERATIONS

Maintains Ratios of Process Variables

Continuous processes often require the holding of a fixed ratio between two variables, usually flows or liquid levels. The Brown New-Matic Ratio Control System solves this problem.

Illustration above shows method of controlling two varying flows.

The *uncontrolled primary flow* is measured by a Brown Indicating New-Matic Transmitter which develops a specific air pressure for each pointer position.

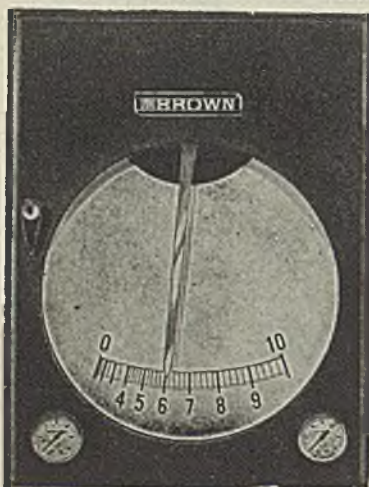
The air pressure in turn positions the Control Index of the secondary Flow Controller which in turn maintains the desired ratio between the two flows.

Provision is made for a wide range of ratios. A simple turn of the ratio setting knob is all that is necessary.

Brown Ratio Flow Controllers are available in two forms of transmission, Mechanical and Pneumatic.

The secondary flow controller makes a chart record of both flows giving the process department a complete story of the mixing operation.

Write for bulletin. THE BROWN INSTRUMENT COMPANY, a division of Minneapolis-Honeywell Regulator Co., 4478 Wayne Ave., Philadelphia 44, Pa. Offices in all principal cities, Toronto, Canada—London, England—Stockholm, Sweden—Amsterdam, Holland.



Indicating New-Matic Flow Transmitter

BROWN *NEWMATIC* TRANSMISSION SYSTEM



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GASOLINE Without THINKING
of SULPHUR**

Transport planes every day are bringing some new corner of the world within our reach, as the network of airways grows. These planes depend on high-octane gasoline to carry out their missions safely and successfully.

Sulphur is a vital ingredient in producing the high-octane gasoline essential in the flight of these man-made birds. Sulphuric acid as an alkylating agent contributes to the production of this necessary fuel. This use is the newest of major roles Sulphur is playing in the petroleum industry. Sulphur in various forms is also a principal chemical tool in refining gasoline, diesel oils and lubricating oils as well as producing cutting oils and extreme pressure lubricants. Freeport Sulphur Company has Sulphur supplies sufficient to meet all anticipated needs. In addition, underground reserves coupled with the most modern mining methods assure an unflinching flow of this vital mineral.

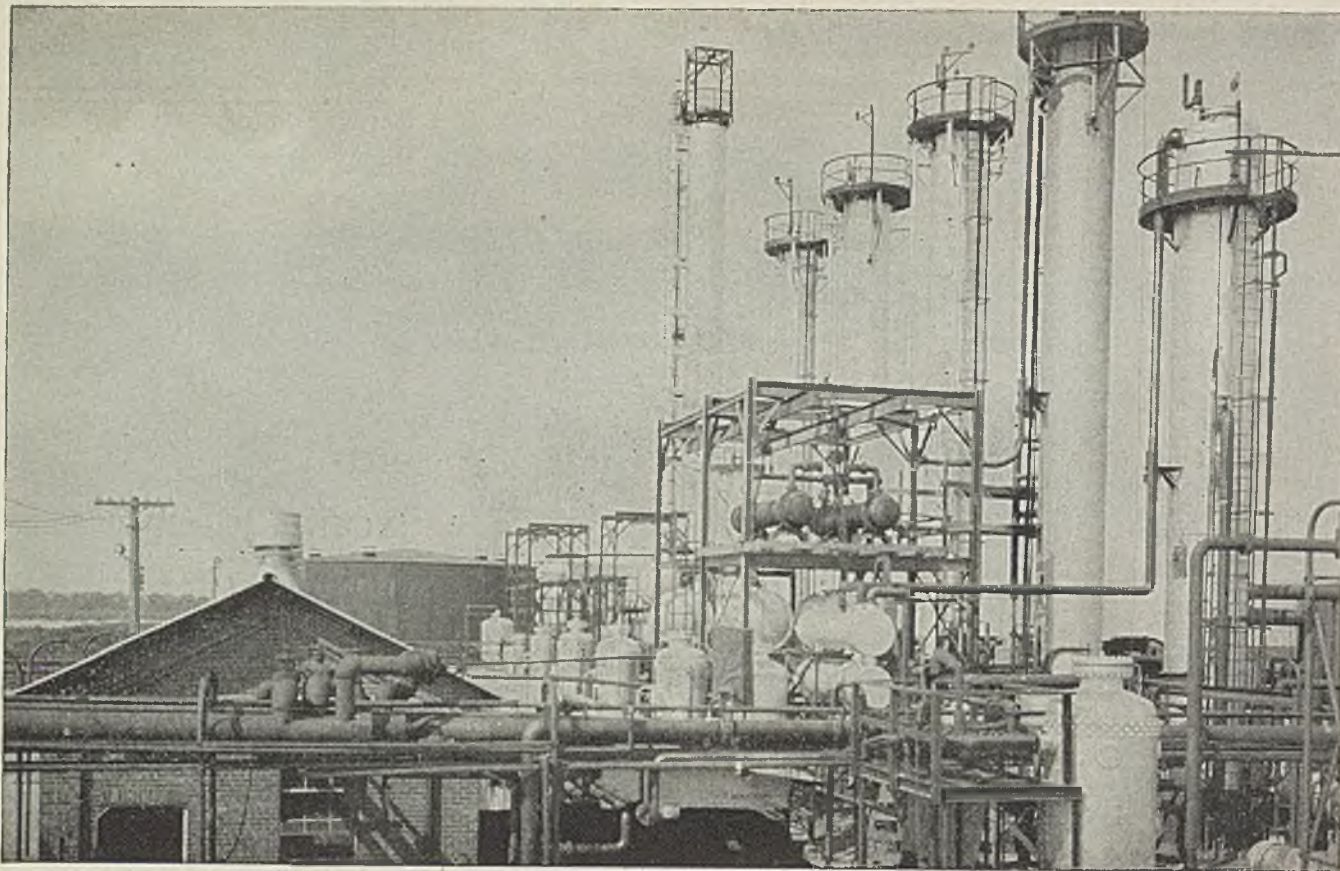
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GASOLINE	SYNTHETIC RUBBER
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Jobs like these are handled exactly to plan and to the complete satisfaction of all concerned by men whose time is devoted solely to the fields of construction and erection. Graver's wide and varied experience includes: new construction . . . alteration . . . dismantling . . . and re-erection.

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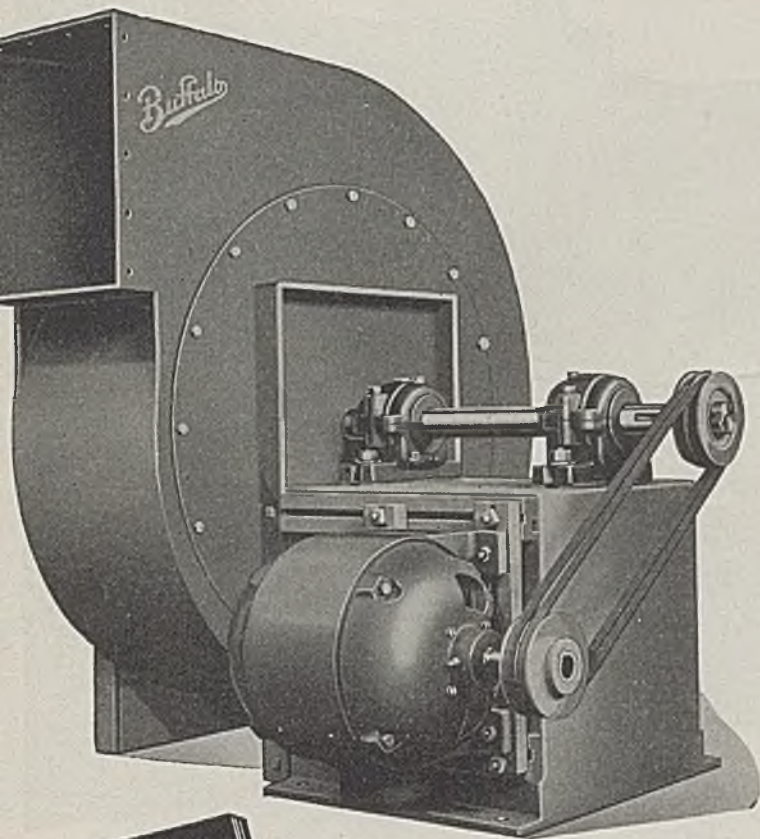
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hauster.

Many plant superintendents will welcome the new Buffalo Industrial Exhauster when they see HOW it is built. Here is a fan to take the hardest kind of industrial service without let-up. Heavy all-welded housing, heavy shaft, oversize bearings, two efficient new all-welded rotors, one for air handling, one for material handling—a complete range of sizes for direct connection to electric motor or belt drive—you can put this fan

on the "headache-job" with assurance that your troubles are over.

Bulletin 3576 gives complete details.

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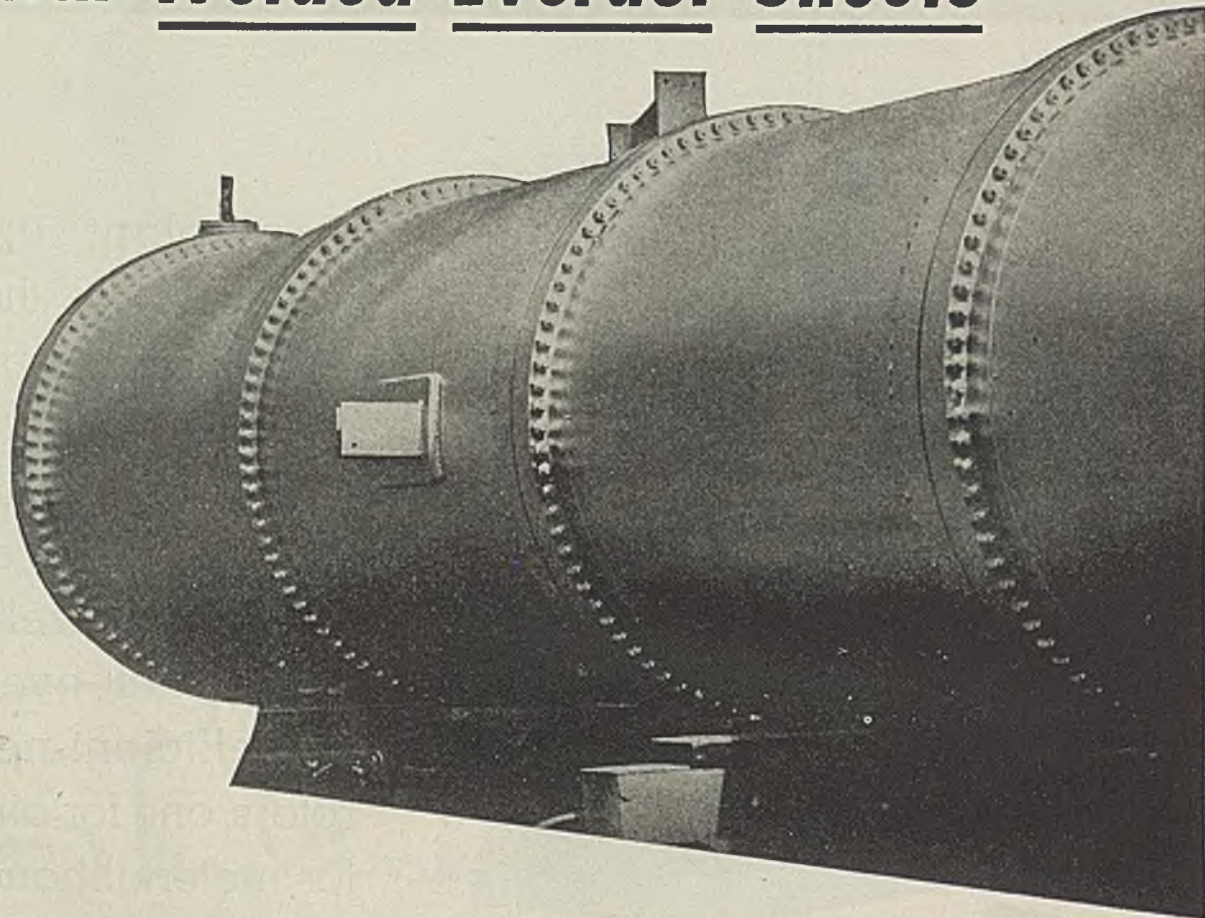
Canadian Blower and Forge Co., Ltd., Kitchener, Ont.

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INDUSTRIAL EXHAUSTERS

One of Five 50-Ft. "Percolators" lined with Welded Everdur Sheets



THIS LARGE VESSEL is part of a complete plant designed and engineered by The Vulcan Copper and Supply Company, Cincinnati, Ohio, to produce 190 proof ethyl alcohol from wood waste. This plant is the first of its kind in the United States and the largest in the world.

Among the numerous equipment items especially designed for this plant were five steel percolators 96" I.D. x 50'3" high, which were fabricated by the Southwest Welding and Mfg. Company of Alhambra, California. Everdur* Metal was used for the linings and also for the slotted screens.

The welds in the Everdur lining had to develop 85% of the tensile strength of the annealed sheets, with elongation of at least 60% on free bend test. Fabrication reports show that these requirements

were substantially exceeded.

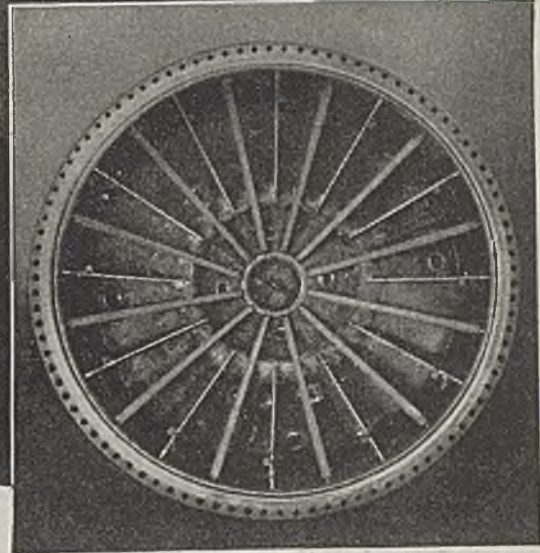
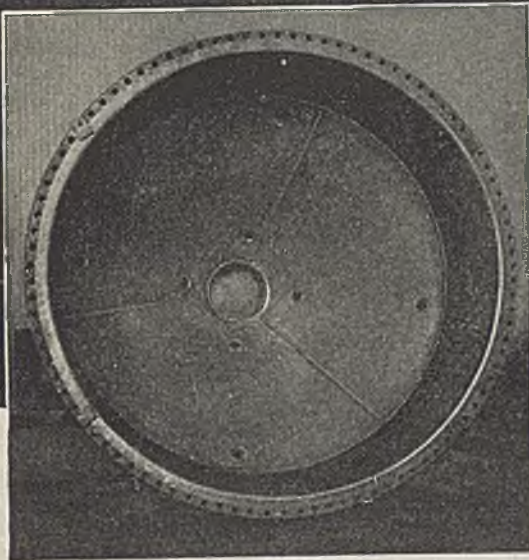
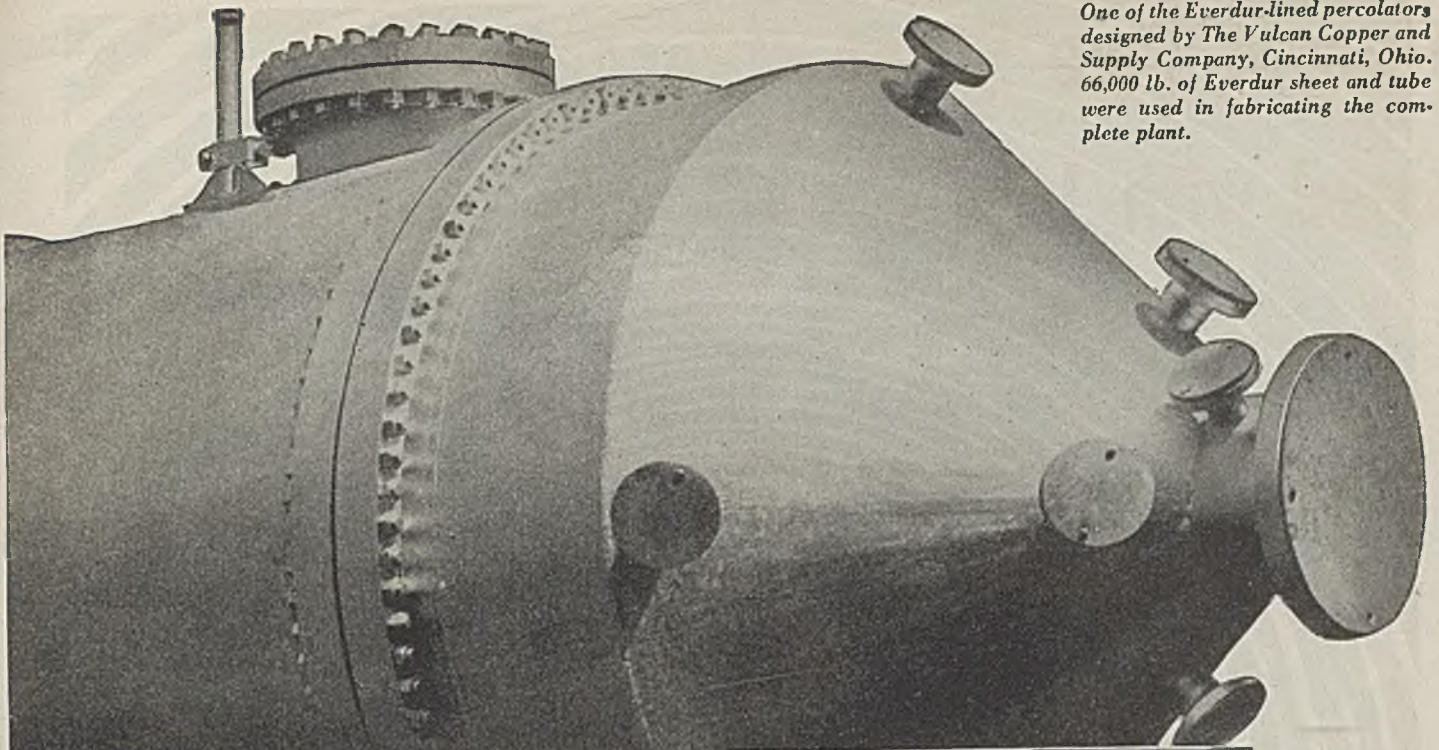
Weldability is only one reason for the increasing use of Everdur Copper-Silicon Alloys for process equipment. These alloys combine high strength with the corrosion resistance of copper. They are available in plates, sheets, rods, tubes and casting ingots. Standard compositions are manufactured for hot or cold working, machining, or recasting. The availability of these forms makes possible the economical fabrication of a wide range of process equipment.

Consult our Technical Department for advice on the use of Everdur under special conditions.

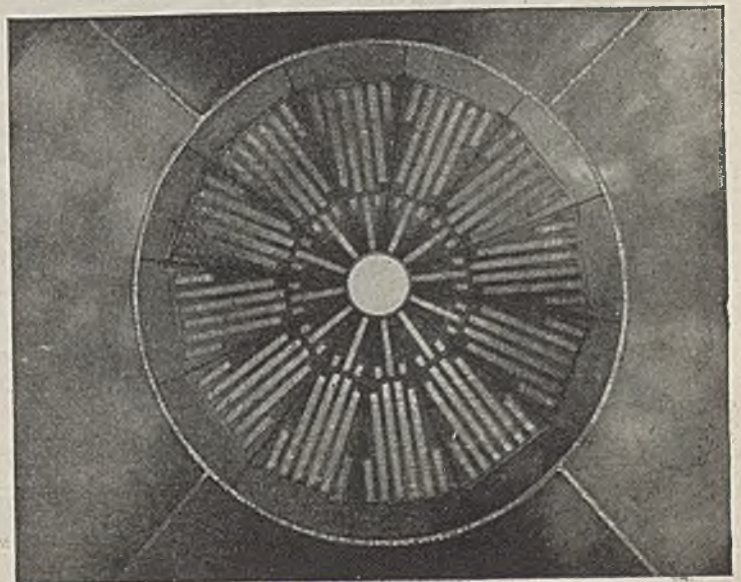
40220

*Reg. U. S. Pat. Off

One of the Everdur-lined percolators designed by The Vulcan Copper and Supply Company, Cincinnati, Ohio. 66,000 lb. of Everdur sheet and tube were used in fabricating the complete plant.



Above: Welded Everdur lining in conical section of the percolator. (Above) right: Everdur supporting frame assembled over lining. At right: Slotted Everdur screen and part of the Everdur lining in the cylindrical section of the percolator.



Anaconda

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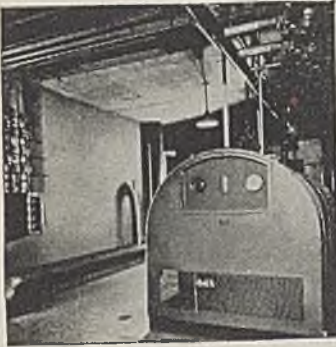
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For agitating, blending, or pressure displacement. Where a process requires air it may be insured against contamination with a Nash Compressor, because only clean air, free from dust, heat, or oil, is delivered. One moving part, no pistons, no internal lubrication. Ask for Bulletin No. 236.

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has broadened the Scope
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Typical Examples of
Cardox Fire Fighting Equipment



(1) **Cardox Fixed Systems.** Provide 500 pounds to 125 tons of liquid carbon dioxide. (2) **Cardox Fire Trucks.** Tons of CO₂ on wheels for application through hose lines or standpipe systems. (3) **Cardox Airport Fire Truck.** Uses mass attack to overwhelm vicious crash fires fast. (4) **Cardox Transitank.** Portable unit with a capacity of 750 pounds of carbon dioxide. Now available in certain parts of the country in hand propelled, and motorized models.



Expert fire fighters, who have seen Cardox Fire Fighting Equipment in action against fires normally hard to stop, rate the Cardox method of control and application of carbon dioxide a *significant* contribution to the whole field of fire protection.

As a result of this unique Cardox method, Cardox can engineer many types of fire extinguishing equipment utilizing *low pressure* liquid carbon dioxide in pounds or tons to provide protection for hazards indoors or out. As a result, the applications for which the recognized advantages of carbon dioxide are now practicable have been multiplied.

For example, Cardox methods of application and control have made it entirely practical to use this fast, non-damaging medium, (1) To provide tons of Cardox CO₂ on a high speed truck to guard widely scattered hazards, (2) To provide a single system capable of protecting multiple hazards throughout large plants, (3) To equip factories, hangars, etc. with a *portable unit* with sufficient wallop to deal with relatively large fires, (4) To protect banks of large transformers outdoors, (5) To overwhelm vicious airplane

crash fires fast anywhere on large air-fields . . . making possible speedy rescue of plane personnel and salvage of costly equipment.

All Cardox Fire Fighting Equipment has one characteristic: *The distinctive Cardox method of control and engineered application of carbon dioxide stored at 0° F. and 300 p.s.i. in a single storage unit containing from ¼ ton to 125 tons of fire-destroying Cardox CO₂ . . . enough to handle even large fires and leave an ample reserve for new emergencies.*

Mail coupon today for details on how Cardox's broadened application of carbon dioxide can best be utilized to increase the protection of your specific operation. Write for Bulletin 1766.

CARDOX CORPORATION
BELL BUILDING • CHICAGO 1, ILLINOIS

District Offices in New York • Philadelphia
Washington • Pittsburgh • Cleveland • Detroit
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Los Angeles • San Diego

CARDOX CORPORATION
Bell Building, Chicago 1, Ill.

Send Bulletin No. 846 and full details on
Cardox _____

Name & Title _____

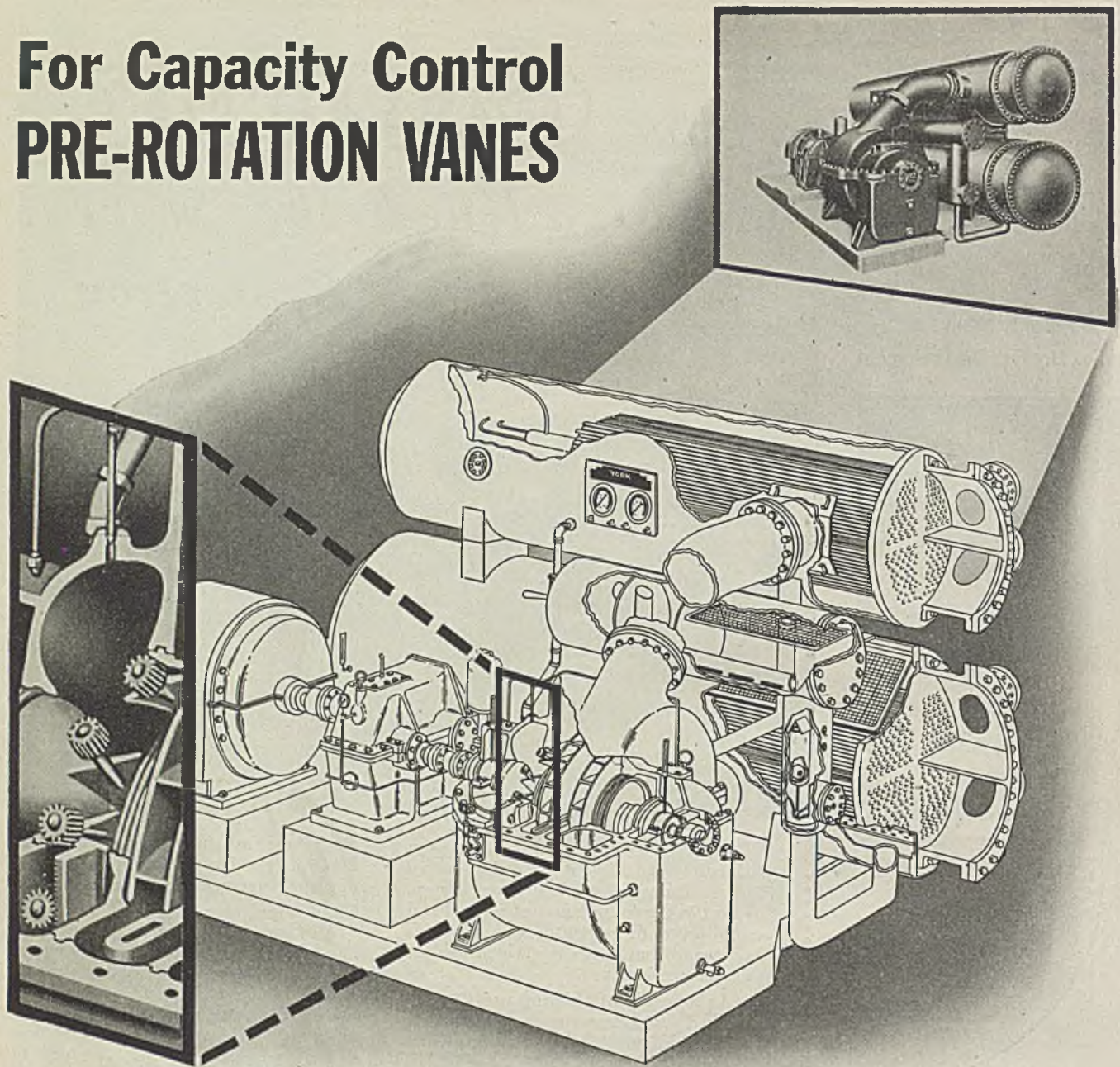
Firm Name _____

Street _____

City _____ State _____



For Capacity Control PRE-ROTATION VANES



The YORK Allis-Chalmers Turbo REFRIGERATION Compressor

Capacity control to extremely low limits—approximately 10% of load—is achieved by the incorporation of Pre-Rotation Vanes in the construction of the York Allis-Chalmers Turbo Compressor. Such control is accomplished by changing the direction of the rotation of the suction gas entering the first stage wheel. Each change produces the same results as would be obtained from a separate machine of smaller size.

York Corporation, York, Pennsylvania.

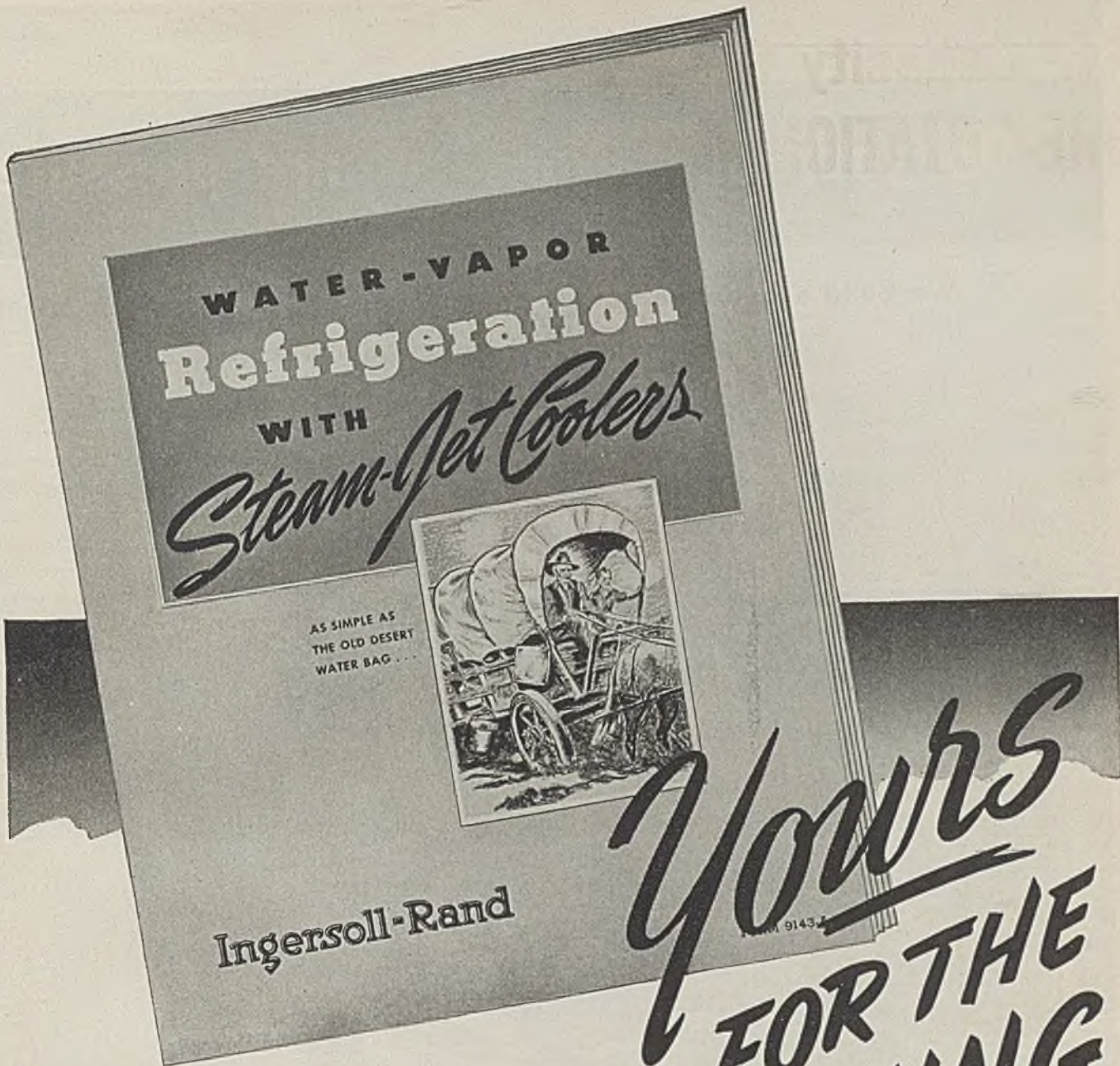
Other Outstanding Features

1. Low center of gravity of compressor—permitted by trough type cooler—cuts vibration, provides accessible operation.
2. Stainless steel impeller blades resist erosion and corrosion assuring perfect wheel balance. Blade rivet heads are eliminated to provide unobstructed gas flow.
3. Balance piston to equalize wheel thrust makes necessary only a positioning thrust bearing, and results in less bearing friction losses.
4. Simplified refrigerant shaft seal.
5. Permanently silver-sealed condenser joints.

YORK REFRIGERATION AND AIR CONDITIONING

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885





Water-vapor refrigeration is the ideal method of cooling water down to temperatures as low as 35°F.

Operated by steam, such coolers are inherently simple, safe, quiet and clean.

If you have cooling problems in which 20 or more tons of refrigeration are required, you should have a copy of this bulletin.

Ingersoll-Rand
11 Broadway, New York 4, N. Y. 13-825

**Yours
FOR THE
ASKING**



Ingersoll-Rand Company
11 Broadway, New York 4, N. Y.

Please send me a copy of your Water-Vapor Refrigeration Bulletin, Form 9143-A.

Name _____
 Title _____
 Company _____
 Street _____
 City _____ Zone _____ State _____

Do your operations require pressure

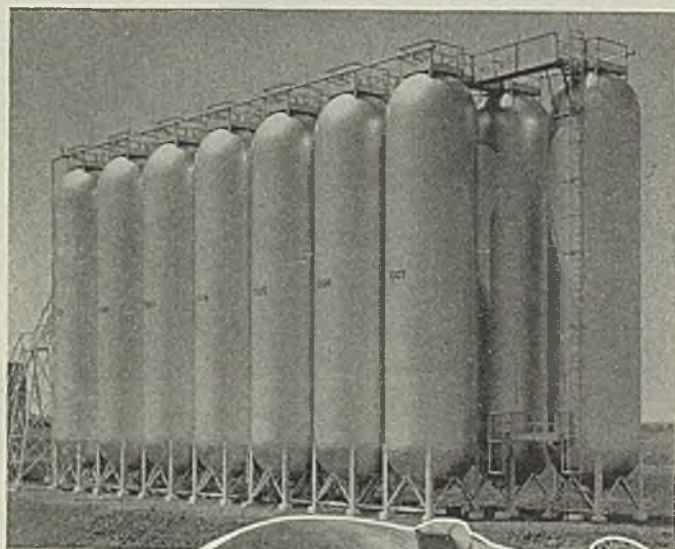
We build a complete line of pressure vessels of all types to meet the requirements of chemical and process plants

The illustrations on these pages show typical examples of the types of pressure vessels we build for process industries. For maximum economy and efficiency during the manufacture, processing and storing of volatile liquids and gases—vessels like these are used extensively.

We are equipped to design and fabricate these vessels to meet ASME Specifications, API-ASME Specifications

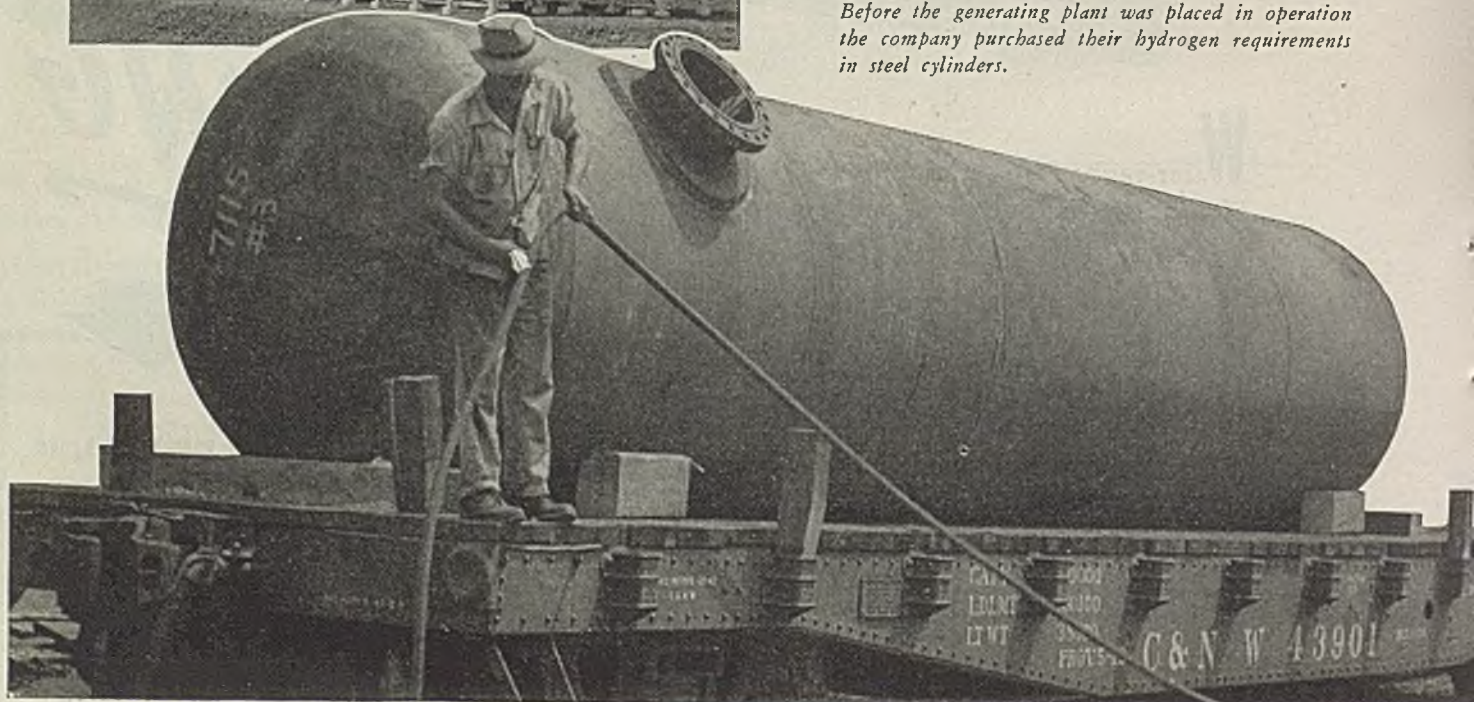
or to your own requirements. We have facilities for installing special linings in new or existing vessels to combat highly corrosive conditions in your plant. We also build Hortonspheroids, Hemispheroids, Horton Double Deck Floating Roofs and all types of flat-bottom storage tanks.

Address our nearest office for quotations on welded-steel pressure vessels or steel storage tanks to meet your requirements. There is no obligation.

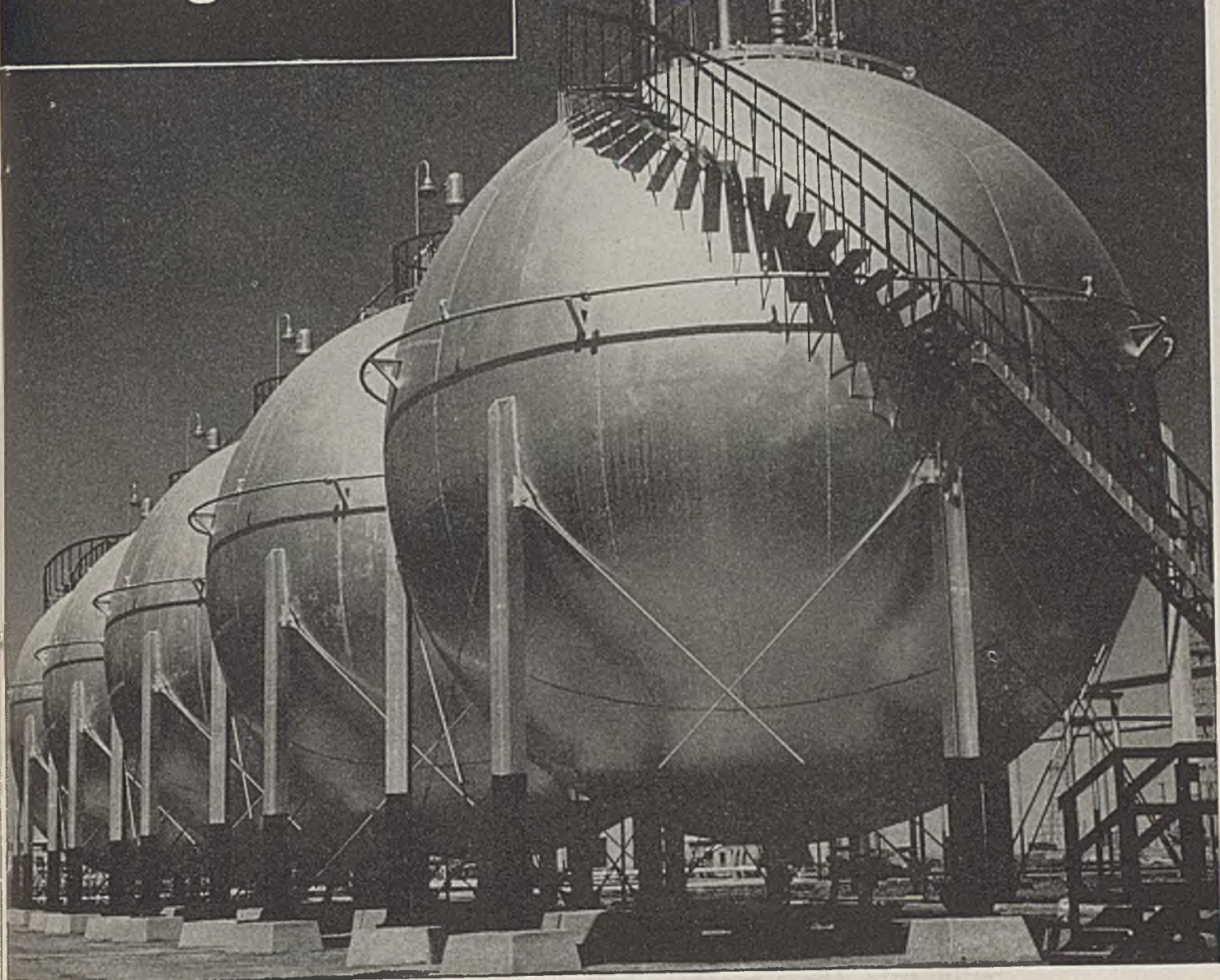


• The fifteen 1,000-bbl. butane tanks shown at the left are located in Oklahoma. They are 12 ft. in diam. by 54 ft. high. Tanks of this type can be moved to new locations without dismantling in case they are no longer needed at original location, due to changes in operations.

The 6-ft. diam. by 28-ft. 3-in. hydrogen tank shown below is one of four which we built for the San Francisco, Calif. plant of The Best Foods, Inc. They are used in conjunction with a hydrogen generating plant. The hydrogen gas is stored in the tanks at working pressures up to 475 lbs. per sq. in. and is fed from the tanks directly to the process as required. Before the generating plant was placed in operation the company purchased their hydrogen requirements in steel cylinders.



storage tanks?



HORTONSPHERES are spherical pressure vessels that are used to store highly volatile liquids and gases. They are built standard sizes for pressures up to 100 lbs. per sq. in. up to 43 $\frac{1}{4}$ ft. in diam., 150 lbs. up to 30 $\frac{1}{4}$ ft. in diam. and 200 lbs. up to 22 $\frac{1}{4}$ ft. in diam.

The five Hortonspheres shown above are used to handle and store natural gasoline and butane. They are 30 ft. 3 in. in diam. and have a capacity of 2,500 bbls. each. Two are designed to operate at 50 lbs. per sq. in. pressure and three to operate at 100 lbs. pressure.

CHICAGO BRIDGE & IRON COMPANY

New York 6.....3318-165 Broadway Bldg.
Chicago 4.....2124 McCormick Bldg.
Cleveland 15.....2220 Guildhall Bldg.
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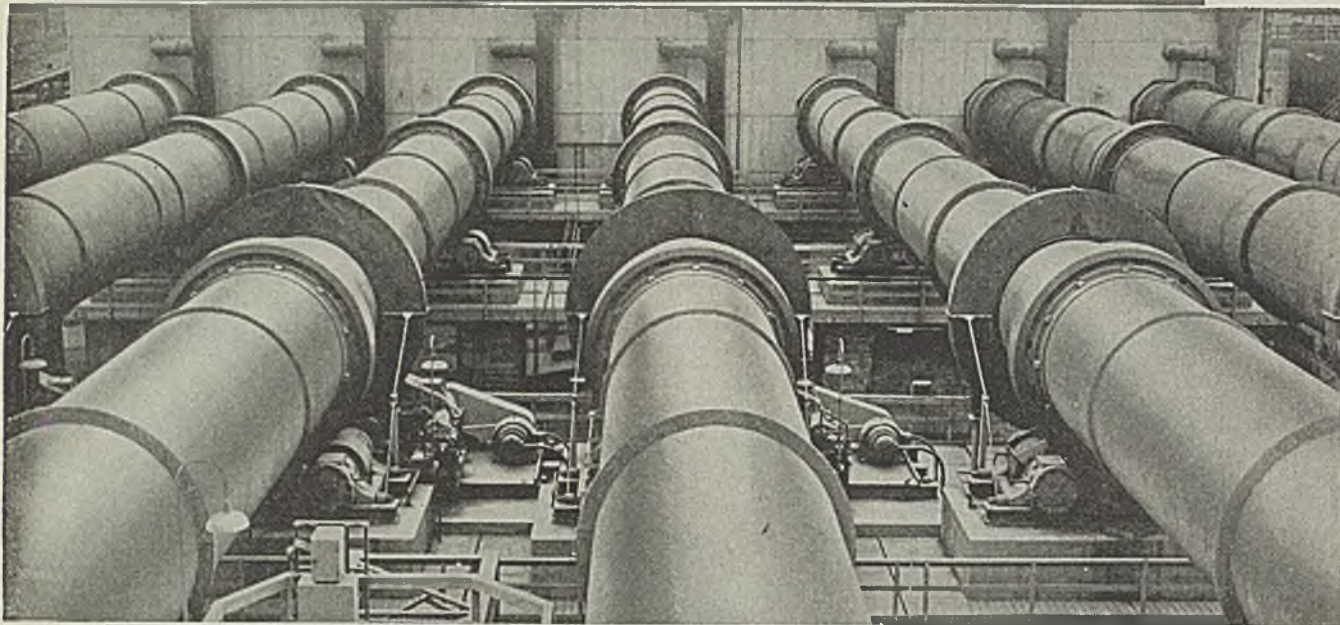
Birmingham 1.....1510 North Fiffieh St.
Atlanta 3.....2120 Healey Bldg.
Tulsa 3.....1623 Hunt Bldg.
Los Angeles 14.....1405 Wm. Fox Bldg.

San Francisco 5.....1222-22 Battery St. Bldg.
Washington 4.....703 Atlantic Bldg.
Houston 1.....5603 Clinton Drive
Detroit 26.....1503 Lafayette Bldg.

Plants in BIRMINGHAM, CHICAGO and GREENVILLE, PA.

In Canada: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

KNOWN EVERYWHERE



USED EVERYWHERE

WE BUILD

Kilns
Coolers
Dryers
Slakers
Scrubbers
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Ball Mills
Rod Mills
Wash Mills
Feeders

Whether in mining, cement, lime, chemical processing or any industry using rotary kilns—Traylor Kilns are known everywhere and used everywhere. Over 45 thousand feet of Traylor Rotary Kilns are in use in the United States and foreign countries.

Traylor engineers constantly build into these machines all the latest improvements that meet and often anticipate the requirements of operators for

increased efficiency and lower operating costs.

Our representative will be glad to call—at your convenience—to tell you in detail about . . . the all-welded steel shell . . . the high efficiency of design . . . the economy of operation . . . the single roll supports . . . and the many other features and advantages that are to be found in Traylor Rotary Kilns.

If you prefer, just ask for Bulletin #115.

TRAYLOR

ENGINEERING & MANUFACTURING CO.
MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

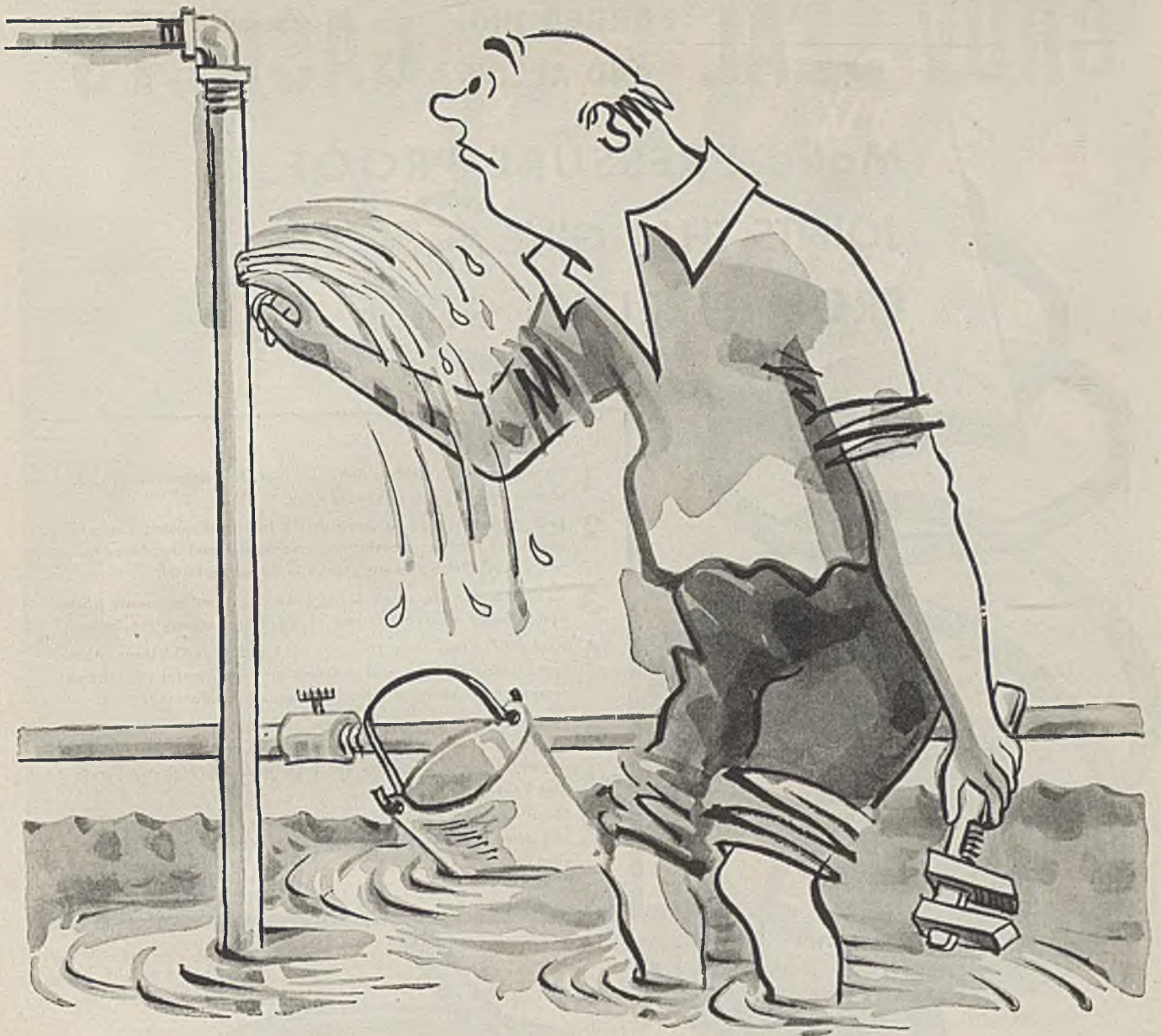
NEW YORK CITY
3416 Empire State Bldg.

EXPORT DEPARTMENT
104 Pearl St., New York City

CHICAGO
2051 One La Salle St. Bldg.

LOS ANGELES
919 Chester Williams Bldg.

CANADIAN MFRS.—CANADIAN-VICKERS, LTD.
P.O. Box 550 Place D'Armes Station, Montreal, Canada



Putting a finger on the trouble

Many firms, bothered by lagging production, have traced the trouble to moisture. For some processes there was too much in the air; for others too little. In both cases, the trouble was licked with the right kind of air conditioning—the Carrier kind.

Chemical plants, for example, have discovered that controlled humidity regulates the moisture in hygroscopic materials and permits minute amounts of these materials to be weighed accurately in any weather. Further, air conditioning quickly and easily removes the heat of reaction. Textile mills, on the other hand, need moisture.

Air conditioning supplies the humidity to prevent yarn breakage and controls temperature to keep machinery adjustments at a minimum. In almost every type of plant, scientific, year-round air conditioning increases the comfort and efficiency of employees.

The air conditioning industry was founded by Carrier. Its engineers have

been helping other industries boost output and improve quality for over 40 years. They know industrial processes. They have the answers to your questions about the right kind of air conditioning for your plant. Why not consult them about your needs? There's no obligation, of course. Carrier Corporation, Syracuse, New York.



**AIR CONDITIONING
REFRIGERATION
INDUSTRIAL HEATING**

GRUV-SEAL FORGED IRON AND ALLOY GASKETS

Make PRESSURE-PROOF JOINTS THAT GIVE *Relief* FROM PIPELINE GRIEF

- 1 Wrench pressure molds a tight seal that stays tight always; makes pressure-proof joints tight as a weld.
- 2 Each gasket is exact in every detail, true in diameter, circumference, and thickness; perfectly proportioned and machined to a fine smooth finish that fits groove in flange perfectly.
- 3 Adaptable for use at all flange connections, valve bonnet joints, and at joints where ready disassembly is a necessary requirement.
- 4 Available in two types, (Type O) Oval, and (Type X) Octagon; both types available in several different grades of metal for different services; wide range of sizes including all standard API sizes.
- 5 Special forging method eliminates porosity in metal and interlocks the metal fibre lines into a dense, tough structure that provides a greater factor of safety for high pressure, high temperature pipe lines.
- 6 Specify flanged connections grooved for Gruv-Seal Forged Iron and Alloy Gaskets. Write factory for name of supply house in your locality.



Diamond "S" Boiler & Tank Accessories provide a greater factor of safety in the operation of pressure vessels. Catalog No. 10 describes and lists complete line of forged steel handhole, manhole cover assemblies and similar accessories. Write for your copy now.



Gruv-Seal Forged Iron and Alloy Gasket Bulletin 45 available on request; contains descriptions of different grades of metal and complete list of sizes and other useful data. Write for your copy now.

DROP THE **STEEL IMPROVEMENT & FORGE CO.**
FORGINGS

972 East 64th Street

CLEVELAND, OHIO

Tulsa, Okla.—National Bank of Tulsa Bldg. • Los Angeles 28, Cal.—7046 Hollywood Blvd. • New York 7, N. Y.—225 Broadway

Drop, upset and press forgings from one-half ounce to 500 pounds of carbon, alloy and stainless steels and non-ferrous metals.



THERMAL EXPANSION AND CONTRACTION can break pipes, joints; cause leaks; fracture valves, fittings, boiler and tank heads, and disrupt production in *your* plant. To cushion the continual stretching and shrinking of *all* piping, MagniLastic builds the most *complete* line of expansion joints ever offered. Unusual design features and war-perfected metal joining techniques are incorporated into these simple, rugged units that require no maintenance, reinforcing rings, guide rods, packing or replacement.

COMPLETE range of PRESSURES . . . Five standard series cover ultra-vacuum to 1000 p.s.i.; special units have been supplied that double this limit.

COMPLETE range of TEMPERATURES . . . Applications from minus 300° F. to plus 1600° F. handled by standard joint materials, with Inconel available for use up to 2000° F.

COMPLETE range of PIPE SIZES . . . For the first time, all nominal pipe sizes from ½" to 24" can be selected from a single standard series. Units up to 60" I.D. are made to order.

COMPLETE coverage of CORROSIVE CONDITIONS . . . Copper, Monel and stainless steel are standard materials; Everdur, nickel and Inconel are optional, and special alloys are available for extreme conditions.

MagniLastic Expansion Joints are made by Cook Electric Company, the world's largest manufacturer of flanged-type metal bellows, and backed by Cook's 49 years of experience in electrical and mechanical engineering. For full details on the *one* expansion joint line that satisfies *all* requirements, see your local distributor, or write for illustrated booklet M542 direct to



division of

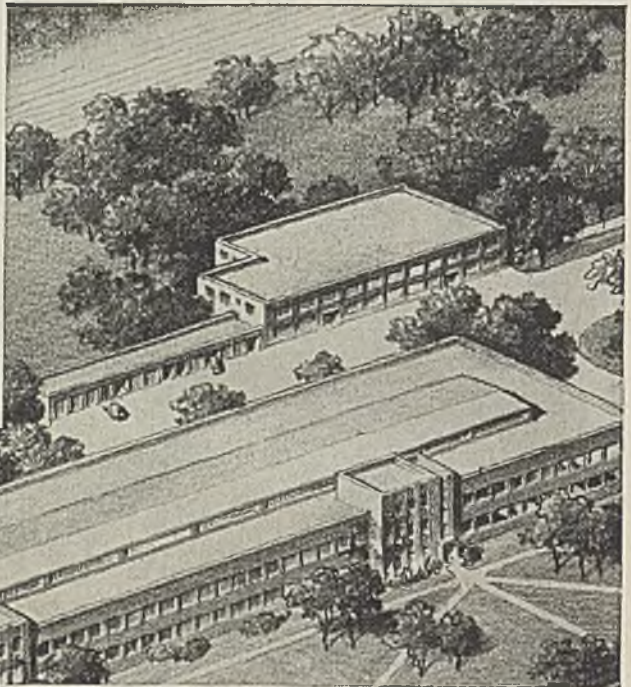
COOK ELECTRIC COMPANY

Chicago 14, Illinois. Regional engineering offices at Boston, New York (Greenwich), Buffalo, Philadelphia, Pittsburgh, St. Louis, Tulsa, Dallas, Los Angeles.

Johns-Manville Announces

Fifty Million Dollar

Multi-Million-Dollar "Test Tube" for actual experimental factory production, as well as fundamental research, now under construction near Bound Brook, N. J. The Johns-Manville Center ultimately will include six large buildings. Innovations in the first unit include ten experimental factories under one roof; a movable rear wall to permit temporary or permanent additions, or to accommodate extra-large machinery; a special system of interior construction to provide flexibility to meet changing needs for laboratory facilities.



Dr. C. F. Rassweiler, Vice-Pres. of Johns-Manville Corporation in charge of research and development, states:

"We are living in an era of scientific improvement unparalleled in man's history. One

single development stemming from social and economic needs can bring revolutionary changes throughout an industry. Today, we stand on the threshold of a new era, which has unlimited horizons for the development and improvement of new products for home and industry.

If this goal is to be achieved, some individual or group of individuals must have the imagination, courage and facilities to meet the challenge.

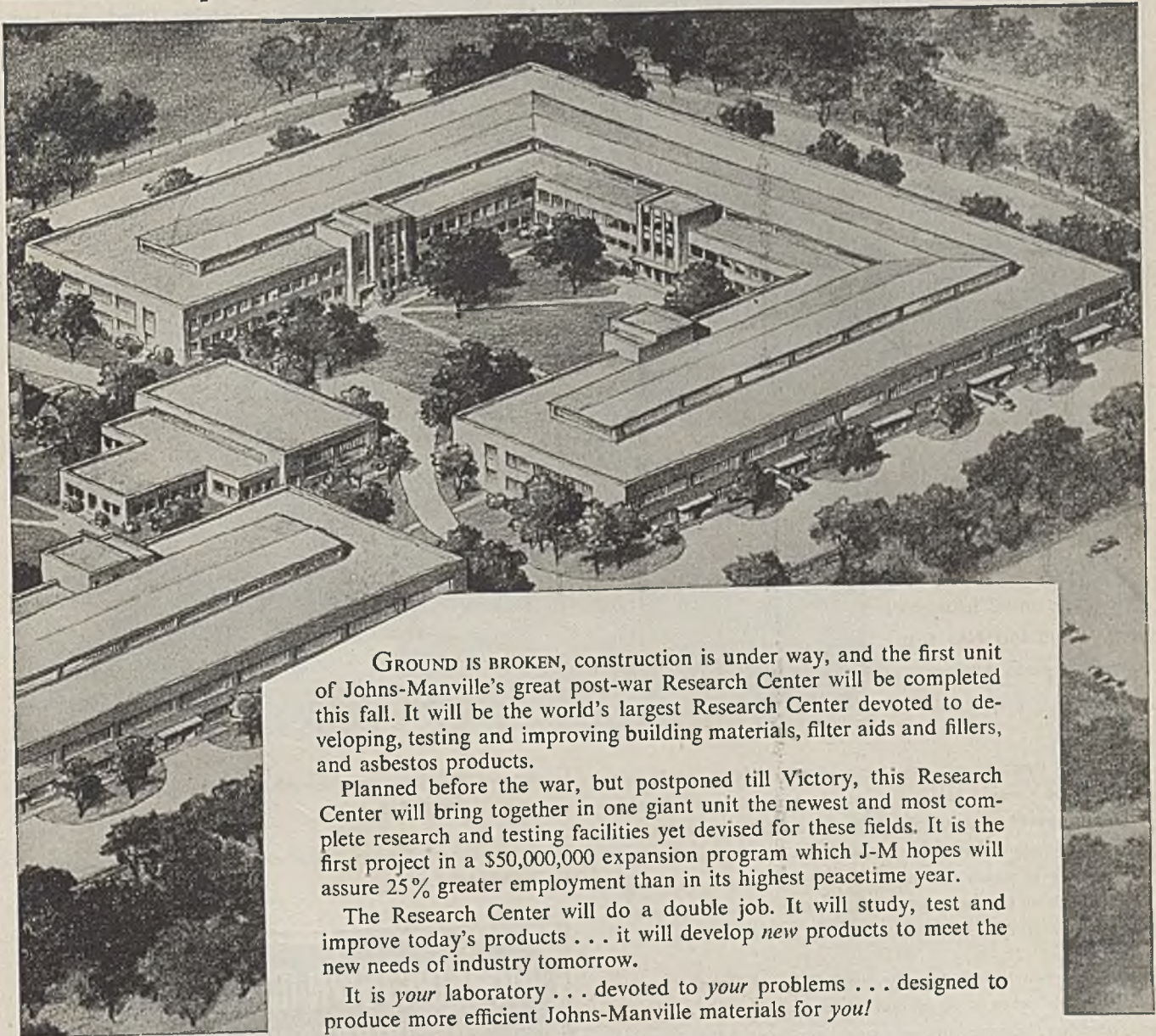
Johns-Manville has accepted this challenge and is now in the process of constructing the world's largest research laboratory devoted to service through science for better homes and greater industrial efficiency."



Johns-Manville

Expansion Program

to include World's Largest Research Center for Building Materials, Filter Aids and Fillers, and Asbestos Products



GROUND IS BROKEN, construction is under way, and the first unit of Johns-Manville's great post-war Research Center will be completed this fall. It will be the world's largest Research Center devoted to developing, testing and improving building materials, filter aids and fillers, and asbestos products.

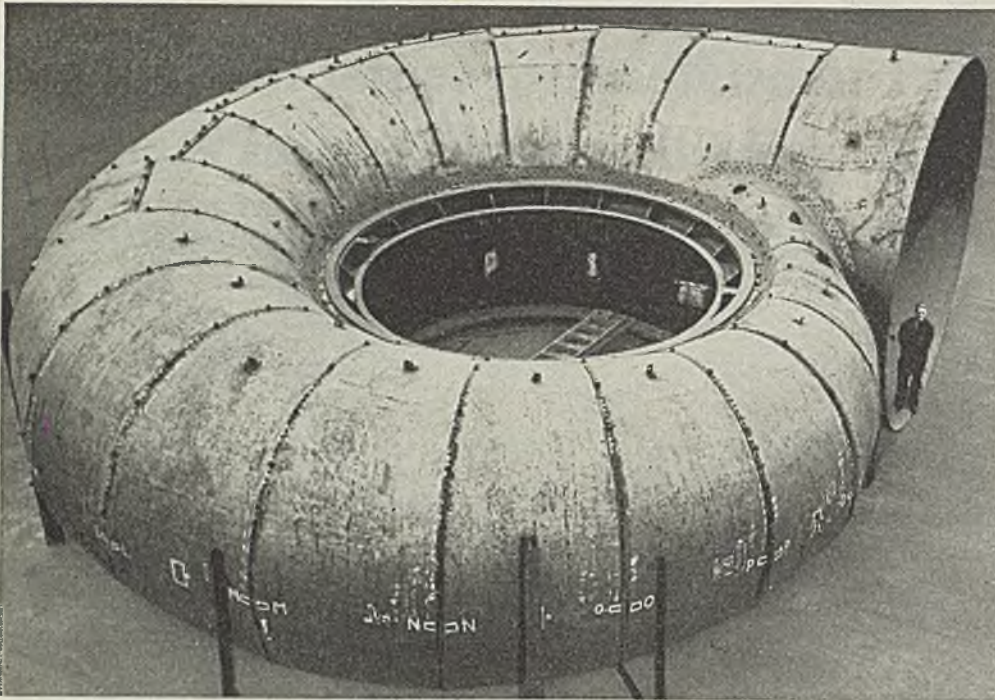
Planned before the war, but postponed till Victory, this Research Center will bring together in one giant unit the newest and most complete research and testing facilities yet devised for these fields. It is the first project in a \$50,000,000 expansion program which J-M hopes will assure 25% greater employment than in its highest peacetime year.

The Research Center will do a double job. It will study, test and improve today's products . . . it will develop *new* products to meet the new needs of industry tomorrow.

It is *your* laboratory . . . devoted to *your* problems . . . designed to produce more efficient Johns-Manville materials for *you!*

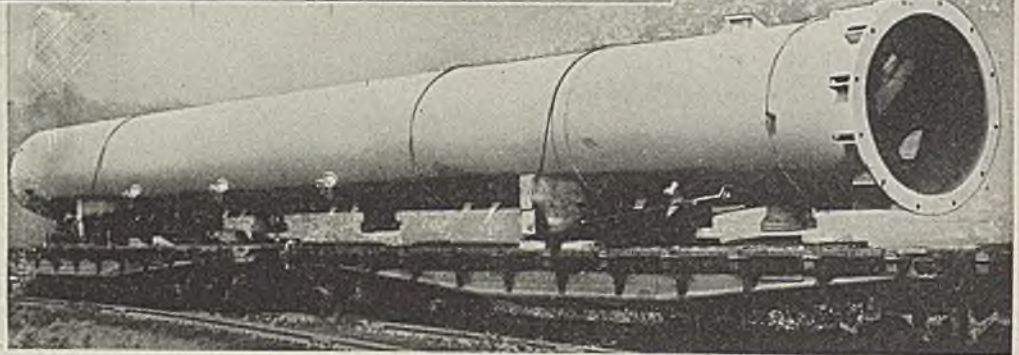
**Manufacturers of 1200 Products for
Home and Industry**

APPLY . . . DOWNINGTOWN VERSATILITY . . . TO YOUR FABRICATION PROBLEMS



← This Turbine Casing, built and completely fitted at our plant previous to shipment, involved intricate developments . . . exacting pressing and forming operations.

One of Two Debut- →
anizer Towers, 6' 6" diameter by 78' 6" long. A carbon steel fabrication, requiring two flat cars for each tank.



You can let Downingtown take entire charge of your fabrication work and be assured of good service and complete satisfaction. We are prepared to handle the design and fabrication of welded and riveted structures (or a combination of both) involving a wide variety of metals and alloys, including many types of carbon steel, silicon bronze, stainless steel, nickel, Monel and Inconel; also stainless-clad, nickel-clad, Monel-clad and Inconel-clad.

It will pay you to look into the possibilities of "fabrication by Downingtown" when in the market for accumulator tanks, sulfonators, absorber columns, air receivers, sterilizers, stills, heaters, coolers, waste heat boilers, equipment for storing butane and propane gas, etc.

Over thirty consecutive years' experience, adequate modern facilities, expert metallurgical consultation, careful selection of materials, conscientious workmanship and rugged construction, insure the safety, top performance and long life of the finished

fabrication; Hartford approved and in compliance with A.S.M.E. and A.P.I.-A.S.M.E. Codes.

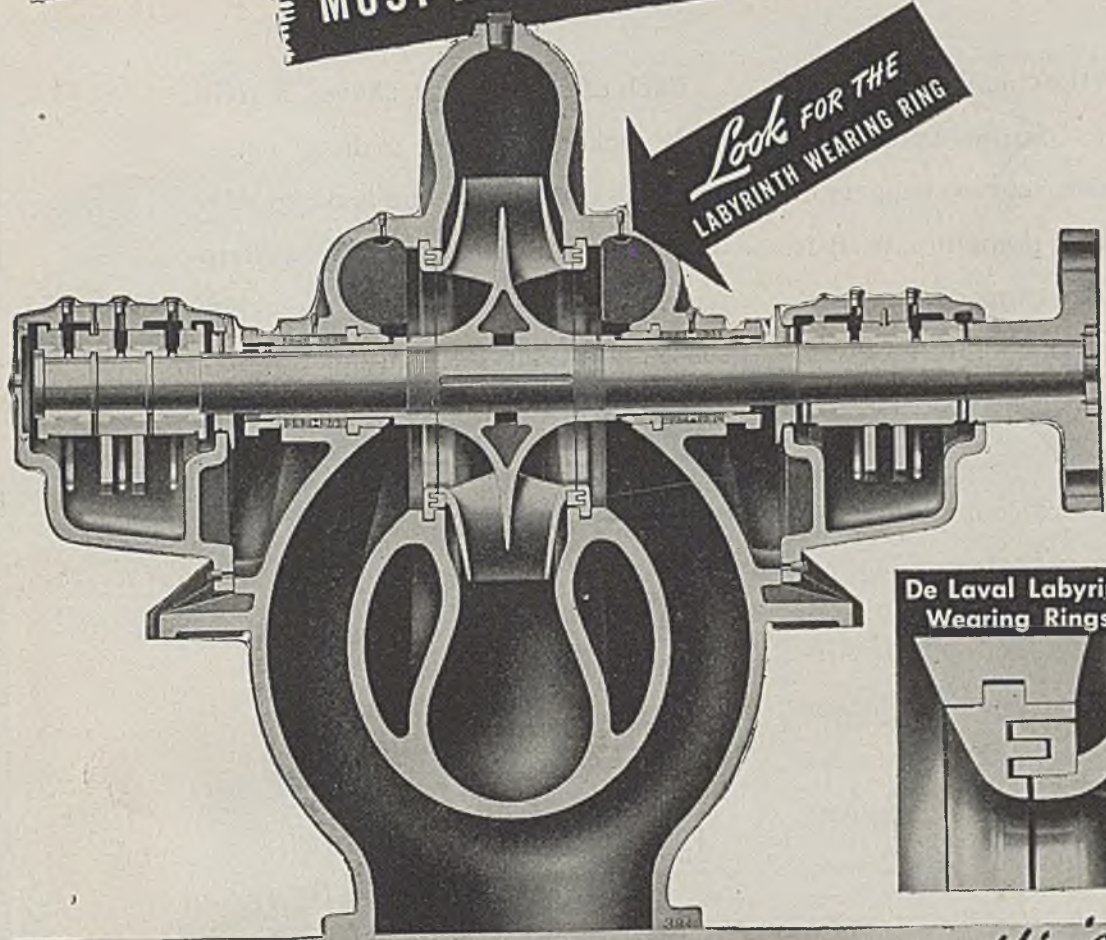
We invite consultation on preliminary plans and specifications for definite jobs.

DOWNINGTOWN IRON WORKS
DOWNINGTOWN, PA.
WELDED and RIVETED PRODUCTS

Downingtown also operates a Heat Transfer Division under the direction of men thoroughly experienced and trained in this field.



THE PUMP YOU BUY TODAY
 MUST HELP MEET COMPETITION TOMORROW



DE LAVAL LABYRINTH RINGS

*keep efficiency UP
 cost DOWN*

De Laval Labyrinth Wearing Rings minimize leakage from discharge back to suction. The sealing action of these rings is accomplished by the use of large clearance, tortuous labyrinth passages and does not depend upon close mechanical clearances, such as required for plain flat rings. Because of the larger clearances and reduced flow, the effectiveness of the De Laval labyrinth ring is but little diminished by wear, resulting in sustained efficiency for long periods. When selecting pumps for lowest ultimate cost, look for the De Laval Labyrinth Wearing Ring.

3237

TURBINES • HELICAL GEARS
 WORM GEAR SPEED REDUCERS
 CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS and COMPRESSORS • IMO OIL PUMPS

DE LAVAL
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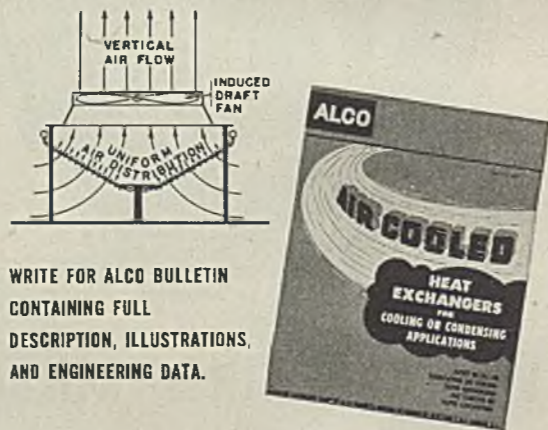
SALES OFFICES ATLANTA • BOSTON • CHARLOTTE • CHICAGO • CLEVELAND • DENVER
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 And Cities in Central and South America

ALCO Solves Another Major Problem

ALCO service to the chemical and process industries comprises numerous items, among which heat exchangers in one form or another predominate. It is natural, therefore, to think of ALCO particularly when you are confronted with any problem involving heat exchangers. Among the most difficult of such problems are those where cooling water is limited, expensive, or scale forming.

In such circumstances ALCO Air-Cooled Heat Exchangers do an efficient job of cooling jacket water, oil, process liquors, gases, vapors, or steam condensing. Moreover, a single ALCO Air-Cooled Heat Exchanger can be used to do several jobs simultaneously, and can be operated with practically any drive—electric motor, diesel or gasoline engine, steam turbine.

Each of the battery, shown at right, cools jacket water for a diesel engine pipe line compressor and is designed to operate at 100° F. maximum air temperature. The diagram below shows how the uniform air distribution, induced draft operation, and vertical air-flow principle in ALCO Air-Cooled Heat Exchangers permit high efficiency at all times, regardless of wind direction or velocity.



WRITE FOR ALCO BULLETIN CONTAINING FULL DESCRIPTION, ILLUSTRATIONS, AND ENGINEERING DATA.

American Locomotive Company, 30 Church Street, New York 8, N. Y.
Beaumont Iron Works, Beaumont, Texas

ALCO PRODUCTS FOR CHEMICAL AND PROCESS PLANTS

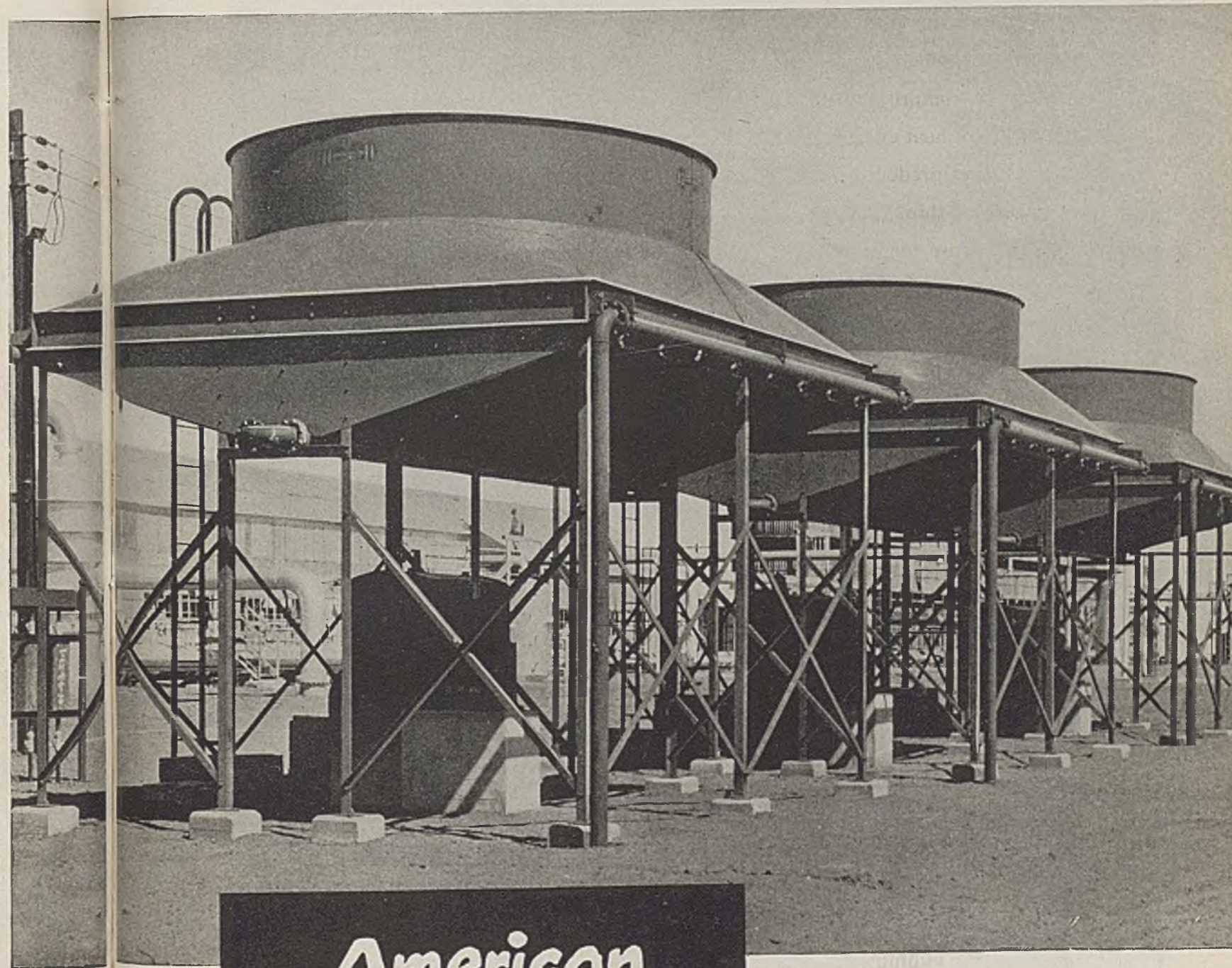
Evaporators • Shell and Tube Heat Exchangers • Air-Cooled Heat Exchangers • Pressure Vessels • Columns • Prefabricated Piping • Condensers • Calandrias • Digesters • Converters • Reactors • Kilns • Fuel Oil Heaters • Scrubbers • Diesel Engines.



BEAUMONT IRON WORKS COMPANY

Manufacturers of Electric Steel and Alloy Castings, Dreadnaught Rotary Drilling and Production Equipment, including: Draw Works, Crown Blocks, Traveling Blocks, Coring Reels, Tubing Heads and Well Heads.

for Chemical and Process Plants



American Locomotive



THE MARK OF MODERN ENGINEERING

library, auditorium, music room, gymnasium, door swimming pool. One complete wing will be devoted to hospital facilities.

ment troops within 90 miles of Mukden, vital rail center in the battle for Manchuria.

library, auditorium, music room, gymnasium, door swimming pool. One complete wing will be devoted to hospital facilities.

the separation were operating in Khamsen, armed with weapons which were distributed by unknown people.

business, particularly the Lehig service as first trip Sam could passenger "You" Sam. "Why" "They're they?" "Annie He was and let "Annie He st ward ad body sh "Guc today, edly. Jersey's look of across U The water b Commu in the Jersey C been fer this 300 30 years barges. rain and cold. N quit.

Model 4 Portable Handy for Lab Fires

Light in weight, simple to operate, the Kidde Model 4 Hand Portable Extinguisher is especially useful in fighting the small incipient blazes that may break out in plant laboratories, where flammable liquids are frequently used.

The simplicity of operation of the Kidde Model 4 is of special advantage for laboratory personnel, who may not have had as extensive fire-fighting training as the plant workers. With a Kidde 4, it is necessary only to raise the horn, aim the extinguisher at the

Do your employees KNOW HOW TO FIGHT FIRES?

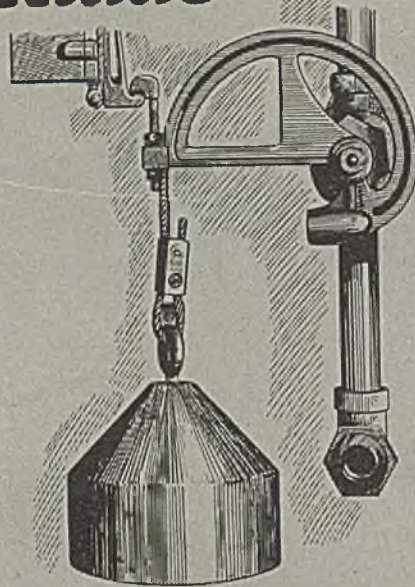


Don't take chances on their knowledge — teach them the sure way... by demonstration. "How to Teach Fire Fighting" tells exactly how to conduct demonstrations — write for your free copy.

Walter Kidde & Company, Inc. 628 Main Street, Belleville 9, N. J.

fire, and pull the trigger. Full details on the Model 4 are available from Walter Kidde & Company, Inc.

Kidde



Two-way protection from one bank of cylinders

Put *one* bank of carbon dioxide cylinders on guard over *two* fire hazards, by installing a Kidde built-in system with directional valves. Automatic valves direct the carbon dioxide discharge to the threatened area as soon as Kidde Heat Detectors signal the start of a fire. Manual valves are operated by a simple three-quarter turn. Write for full details.

"Go" says two c three nicke noth He into a ch gray "Aut softly. ness. D nowaday) Hardly speaking, this era c ator-phon tween 100 Mostly t road me But hou too, and the Cent York wh mile ups But in first took his fathe was not made a ing ou After for ne Mills years wher St silene weight around artific an aut He adn Surpl to close no occur even pai when t Gap ill Only th "You"

Kidde

HARD-HITTING FAST-STARTING EASY-TO-USE EXTINGUISHER



15 pounds of carbon dioxide — controlled by simple, foolproof trigger grip valve—that's the unbeatable combination you get in the Kidde 15 Hand Portable!

Mail and Phone Orders Filled

Kidde

FULL FIRE-FIGHTING RANGE... INSTANTLY!



The stream from a Kidde Water Extinguisher reaches its full range as soon as the discharge starts—maintains its range till extinguisher is empty.

Mail and Phone Orders Filled

The word "Kidde" and the Kidde seal are



Trade-marks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc.

628 Main Street, Belleville 9, New Jersey

Firm Rebuked

WASHINGTON 27.—The

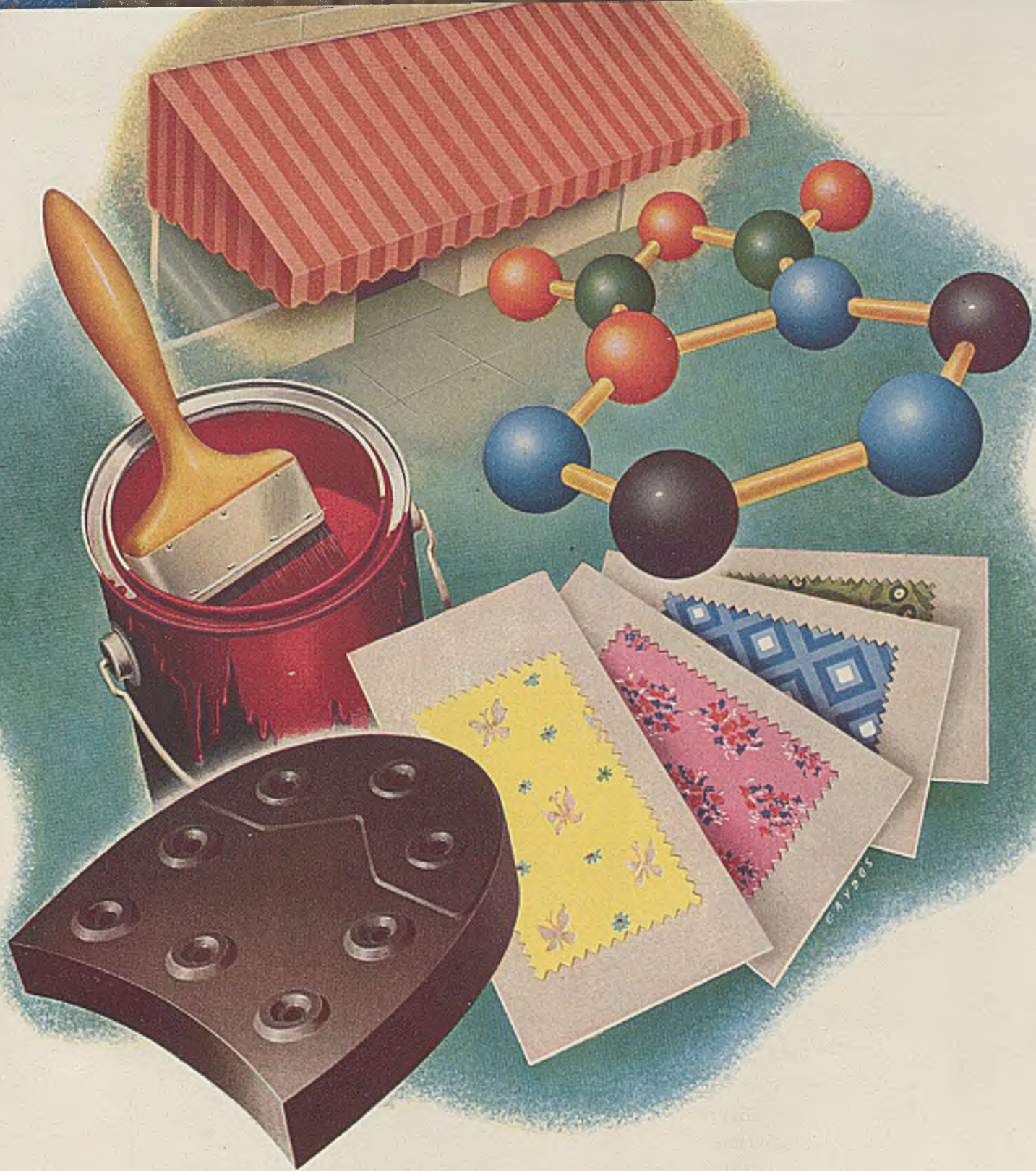
General output at factories and mines decreased 4 per cent in October, while in the first half of November output was 1.5 per cent below the same period last year.

Meat May Become

stationed in a little town in France for several months, wooed a French girl by telling her about

Major Army

Something was reported by the Board of City of monthly a cent exempl ary is semimor, \$1,041.86 Natura 343 cent.



New and interesting opportunities for organic synthesis and product improvement have been made possible by Niagara through the introduction of a fully chlorinated tetra chloro phthalic anhydride. This remarkably versatile chemical, for which Niagara has developed a special manufacturing process, possesses unique properties that can be put to practical advantage in the processing of dyes, esters, synthetic rubbers, pharmaceuticals, insulating materials, fungicides, protective coatings, lubricants, synthetic resins. Our research laboratories and technical staff are prepared to help you find ways to use this chemical formula practically and profitably.

*An Essential Part of America's
Great Chemical Enterprise*

Niagara Alkali Company

CAUSTIC POTASH • CAUSTIC SODA • PARADICHLOROBENZENE • CARBONATE OF POTASH • LIQUID CHLORINE • NIAGATHAL



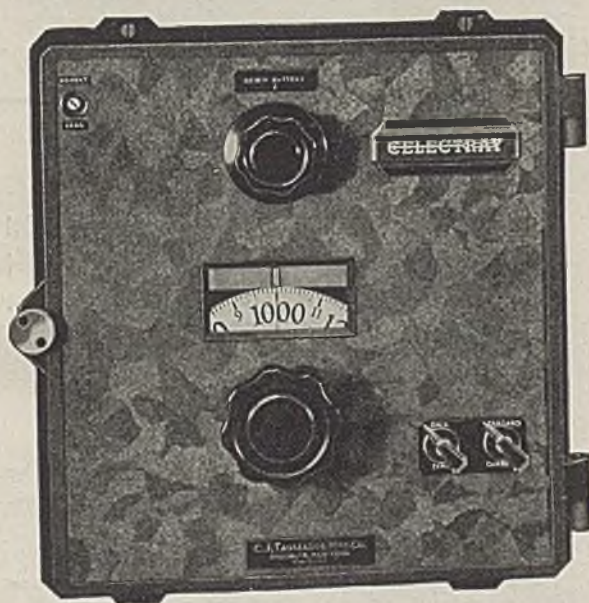
60 EAST 42nd STREET • NEW YORK 17, N.Y.

TAG INSTRUMENTS CAN HELP YOU SOLVE PROBLEMS LIKE THESE

Wherever the control of temperature presents a process problem, TAG Instruments offer competent solution. Accurate temperature control can help you speed production . . . eliminate rejects . . . make your products better. The way to get that control is to install the right TAG Instrument in the right place.

TAG engineers are anxious to help you with your temperature control problems. Write us for literature, or outline your needs in a letter so that we can make suggestions.

TAG CELECTRAY CONTROLLERS



The TAG method of photoelectrically (electronic) balancing a potentiometer or wheatstone bridge means higher accuracy and a temperature held steady. CELECTRAY Electric Throttling Indicating Controllers have no dead zone . . . they are rugged instruments, unsurpassed in sensitivity and speed.

INK MANUFACTURER

QUESTION: We manufacture a gloss ink, using a synthetic resin with a very high melting point. How can we reach required high temperatures without danger of overshooting?

ANSWER: TAG Celectray Controllers automatically vary heat input inversely with temperature. Thus end-point is reached with utmost speed without danger of overshooting.

PLASTICS MOLDER

QUESTION: In molding plastic pieces of intricate shape, how can I get away from mold damage, which has caused numerous rejects?

ANSWER: Eliminate hard cores by correct, uniform heating of the molding compound. You can get the uniform heating with TAG Celectray Controllers.

FOOD PROCESSOR

QUESTION: The spoilage rate in our fruit juice line is much too high. Some of this is due to over-heating and some, apparently, to temperature fluctuation during heating. Can it be corrected?

ANSWER: Temperature changes due to variations in load and fuel pressure are automatically corrected by the TAG Celectray Controller with automatic reset.

C. J. TAGLIABUE *Division* 542 Park Ave., Brooklyn 5, New York

PORTABLE PRODUCTS CORPORATION
MANUFACTURERS OF: LAWN MOWERS • ELECTRICAL APPLIANCES • PRECISION STAMPINGS
INDUSTRIAL INSTRUMENTS • RADIOS • SAFETY EQUIPMENT

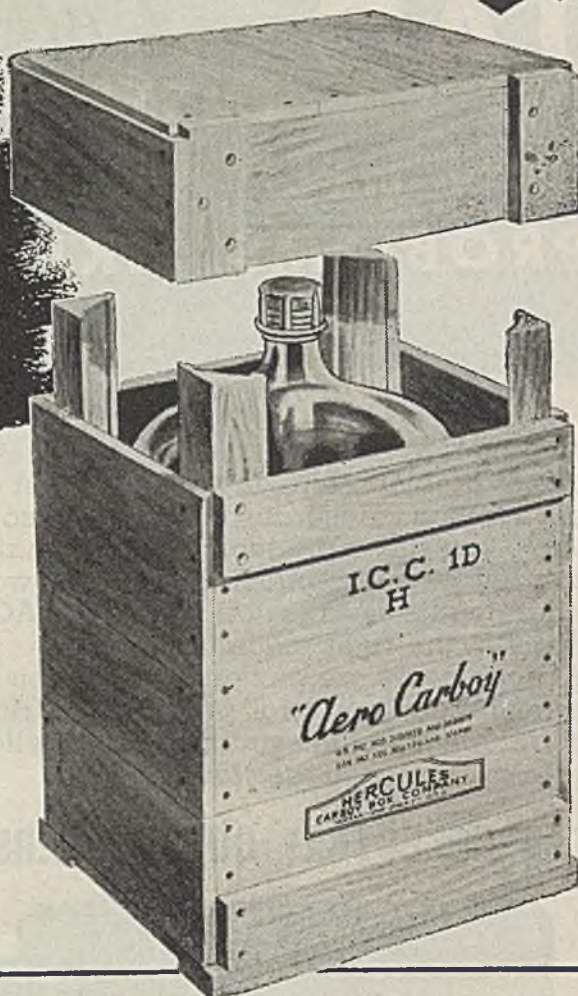
NOW

NATIONAL BRINGS YOU THE NEW



Aero

(RUBBER CUSHIONED)
CARBOY BOX



6½ gals. normal capacity (7 gals. overflow). Built to withstand an internal pressure of 10 lbs., this new rubber cushioned, completely enclosed, wooden carboy box has been approved by I.C.C. for transportation of the 3 principal mineral acids, Hydrochloric, Sulphuric, Nitric. Specific application should be made for other uses.



SPECIFICATIONS :

BOX SIZE: 13¾ x 13¾ x 22 Including Hood (I.D.)
WEIGHT: App. 26 lbs. (Box) App. 14 lbs. (Bottle)
CARBOY: 6½ gals. norm. cap. (7 gals. overflow)

Approved under classifications I.C.C. 1-D

These Features

1. Flat cover—no protruding neck—enables boxes to be piled one on top of other for convenient storage. (See illustration at left.)
2. Corner posts provide a convenient handle so that one man can handle carboy. (See illustration at left.)
3. Smaller size and lighter weight makes for easier handling and shipping.



NATIONAL BOX & LUMBER COMPANY

HOME OF HERCULES CARBOY BOXES • NEWARK 5, NEW JERSEY

Buflovak

RESEARCH and TESTING LABORATORIES

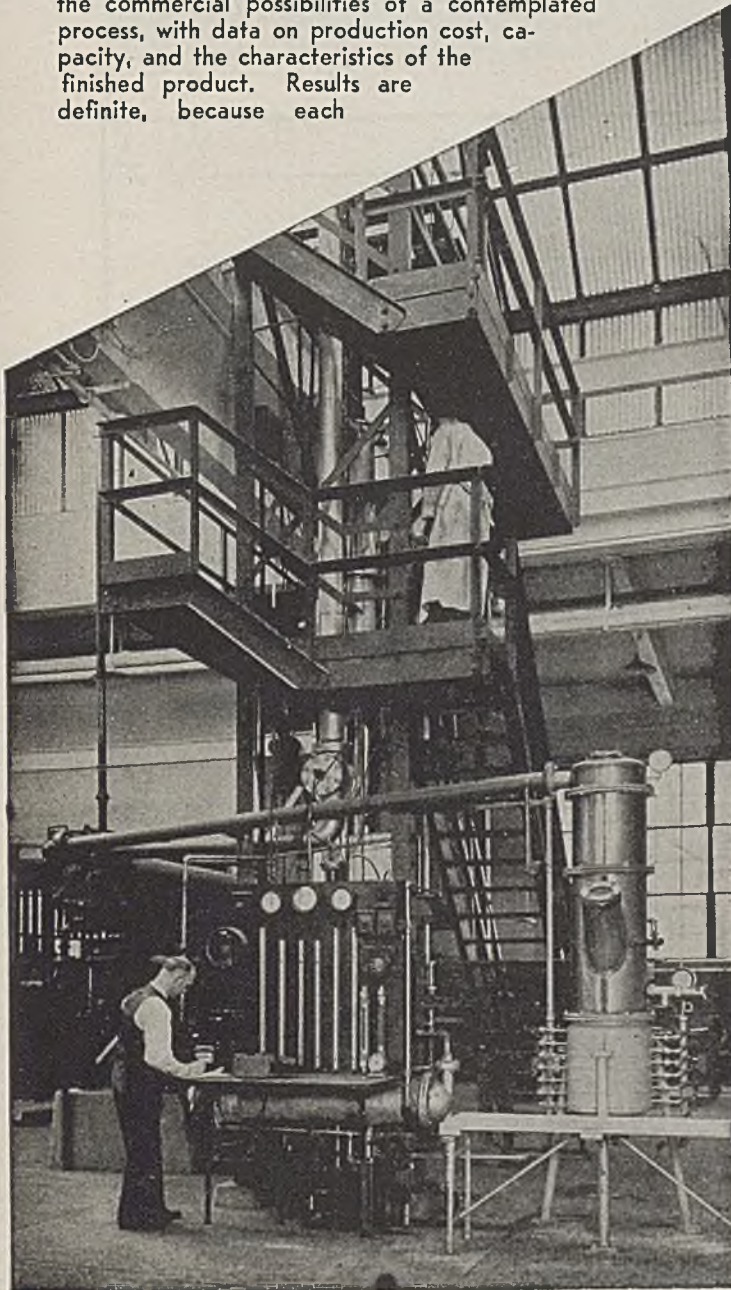
Can help solve your processing problems

TO ASSIST customers in the solution of processing problems and to develop more efficient production methods and improved finished products, BUFLOVAK maintains a Research and Testing Plant. New equipment has been recently installed. These modern, semi-plant units embody the latest and most advanced design. Here practical research is employed in the solution of processing problems involving drying, evaporation, extraction, impregnation, solvent recovery, crystallization and food processing.

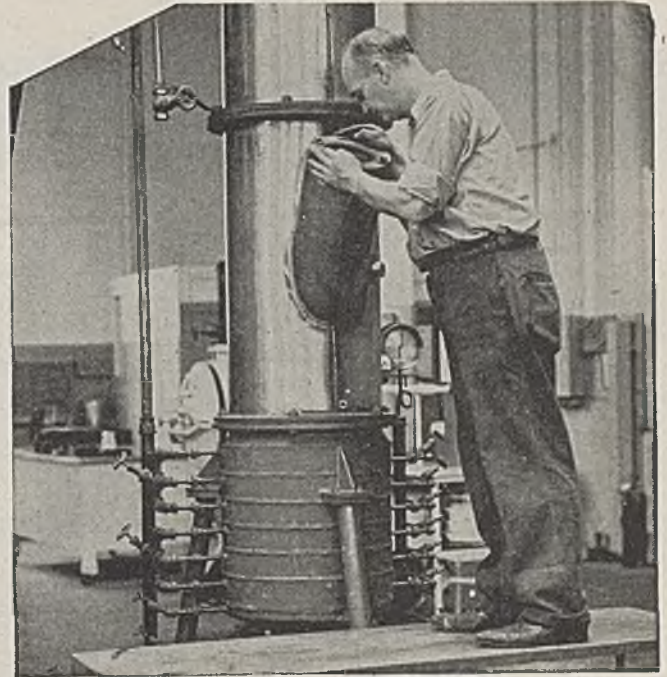
These facilities can save you time and money. They show the commercial possibilities of a contemplated process, with data on production cost, capacity, and the characteristics of the finished product. Results are definite, because each

test is conducted on a semi-plant scale, with equipment which gives accurate indexes of full production results.

These tests safeguard your investment in BUFLOVAK Equipment by showing unmistakably, right at the start, what will be obtained from a given process. It is your assurance of the most efficient type of equipment.



A special research evaporator scientifically equipped for the study of evaporator performance.



Evaporator or concentrating materials in sufficient quantities to give indexes of the characteristics of the finished product.

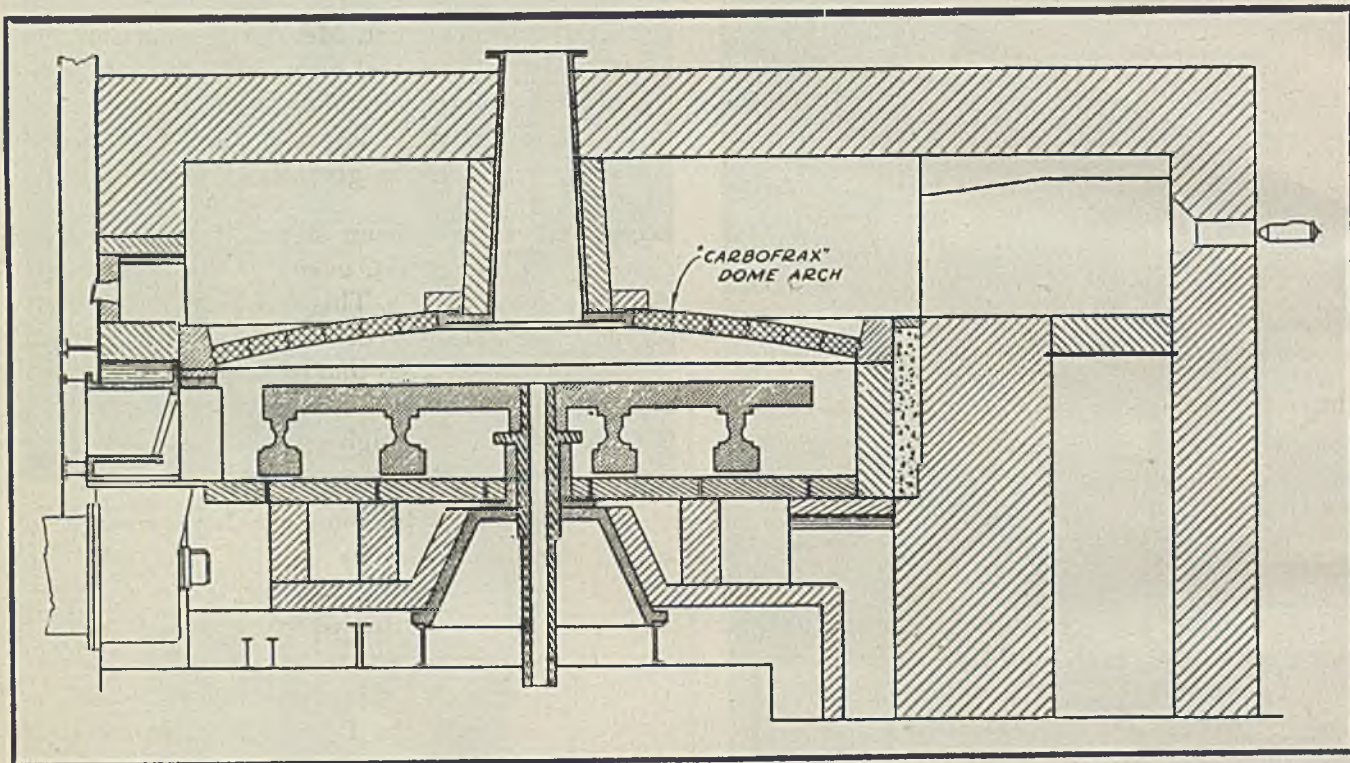
BUFLOVAK EQUIPMENT

DIVISION OF BLAW-KNOX CO.

1551 FILLMORE AVE.,

BUFFALO, 11, N. Y.

CARBOFRAX Arch doubles Furnace



★ Cross-sectional view of Manheim type muriatic acid furnace using a CARBOFRAX dome arch. Operating reports repeatedly show that the installation of a CARBOFRAX arch results in roughly doubled production with no increase in fuel costs, or the same rate of production as maintained with a fireclay arch with about 50% saving in fuel. The unusual properties of the CARBOFRAX arch assure long life with lower labor and material costs. ★

Capacity . . . halves Fuel Cost

... AND HERE'S A SPECIFIC EXAMPLE TO PROVE IT!

A MARKED increase in production and lower operating costs invariably follow the installation of Super Refractories by CARBORUNDUM.

This is well exemplified by the Manheim type muriatic acid furnace. When fireclay was first replaced with a CARBOFRAX silicon carbide dome arch its capacity remained the same. *But fuel consumption was cut 50%. After enlarging handling equipment furnace output was doubled. Fuel input was no greater than when using a fireclay arch.*

Think what this means in terms of initial furnace investment. Two furnaces equipped with CARBOFRAX arches will out-produce four identical furnaces utilizing fireclay domes. Consider the savings in maintenance and labor. Reflect on the drastic reduction in fuel cost.

Such results are made possible by several unique properties of the CARBOFRAX arch. It retains a large percentage of its cold strength even at extremely high temperatures. At 1350° C. the modulus of rupture of CARBOFRAX brick and shapes is well over 3000 psi. Shrinkage also is

practically non-existent. Measured cold after 1 $\frac{3}{4}$ hours at 1500° C. actual tests show 0 linear contraction. These exceptional characteristics prevent serious distortion and improve the life of dome arches having spans as great as 20 ft. or more.

Equally important from both production and cost viewpoints is fast, even heat flow through the arch to the charge. This results from the high thermal conductivity of CARBOFRAX shapes which is 11 to 12 times that of fireclay. Expressed another way, this heat conductivity approaches that of alloy steel at high temperatures.

Not limited to any one application (this is only a typical example of many case histories) the use of Super Refractories by CARBORUNDUM is well worth investigating. Our engineers welcome the opportunity to discuss their advantages as directly related to your operating problems. You will find such a discussion practical and informative. Write Dept. E-56, The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

SUPER REFRACTORIES

BY **CARBORUNDUM**

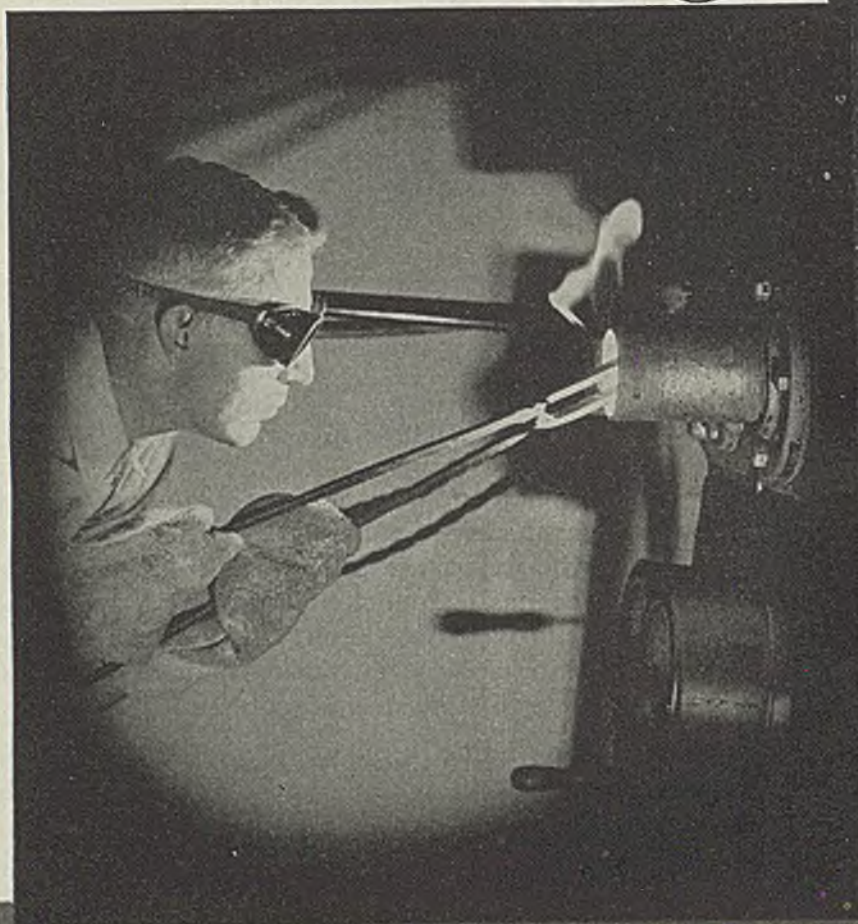
TRADE MARK



"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company

For Higher Temperatures—Pure Oxide Refractories

ALUNDUM TUBES



RECENT ADVANCES IN NORTON REFRACTORIES include the development of improved ALUNDUM furnace tubes classified as "Pure Oxide Refractories". These tubes which are essentially sintered alumina, without bond, greatly extend the utility of the ALUNDUM furnace tube line which in standard mixtures RA 98 and RA 1139 has met industry's needs for many years. The new mixtures RA 1191 and RA 1192, produced at temperatures up to 1775°C, will provide greater refractoriness and much longer life.

NORTON COMPANY — Worcester 6, Mass.

ALUNDUM—Trade-mark Reg. U. S. Pat. Off.

NORTON REFRACTORIES

Here's a sound tip: When replacing your present crystal analysis tube, specify the G-E Model CA-6 X-Ray Diffraction Tube. It provides higher intensity K-alpha radiation in the useful collimating direction because:

1. Tube window is pure; unalloyed beryllium. Transmission ratio of pure beryllium as compared with Lindemann type glass varies from twice for copper to twelve times for chromium K-alpha radiation.
2. The Model CA-6 focal spot size—0.8 mm by 13.0 mm—is optimum for conventional degrees of collimation of the beam.
3. Electron energy distribution on the focal spot area is demonstrably more uniform than that of other tubes manufactured with less precisely controlled cathode structure.
4. The target of the Model CA-6 tube is uncontaminated with tungsten or tantalum from filament or cathode sputtering. The low wattage characteristics of the filament maintain this purity over the tube's long, useful life.

ECONOMICAL OPERATION

Standard tubes available from stock have Tungsten, Molybdenum, Copper, Nickel, Cobalt, Iron, and Chromium targets. To meet special requirements, CA-6 tubes have been manufactured with Silver, Columbium, Zirconium, Manganese, and Titanium targets. These and other alloy targets will be built to your specifications.

Of the hundreds of G-E Model CA-6 tubes in service, less than 15 per cent failed from all causes. Many of them have established operating costs of less than four cents per hour.


For complete information about the G-E Model CA-6 X-Ray Diffraction Tube, address your inquiry to General Electric X-Ray Corporation, 175 W. Jackson Blvd., Chicago 4, Illinois, Department 2530.

For Higher Intensity K-alpha Radiation

Specify G-E Model CA-6

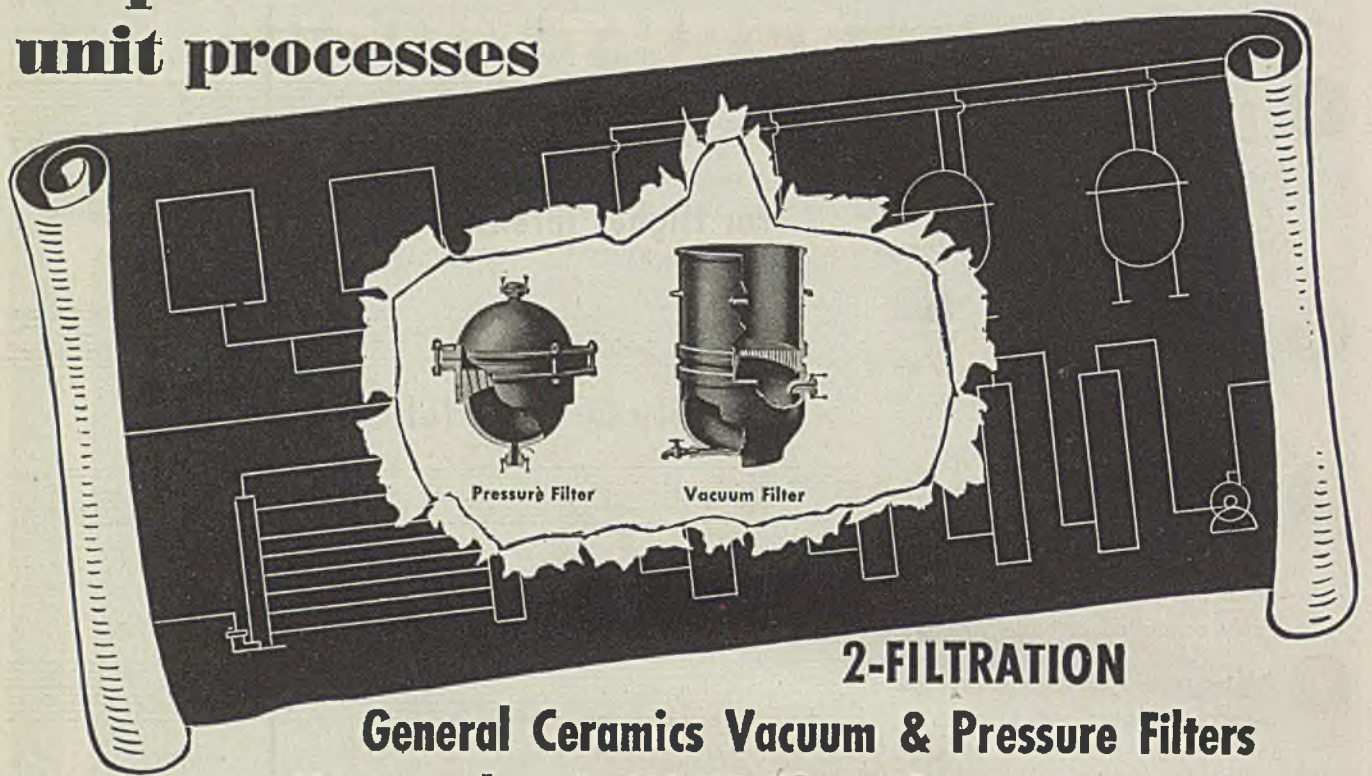
X-Ray Diffraction Tube



GENERAL  ELECTRIC X-RAY CORPORATION

CHEMICAL STONEWARE

its place in the
unit processes



2-FILTRATION

General Ceramics Vacuum & Pressure Filters Have a place in YOUR Flow Sheet

Filtration, especially of corrosive slurries, is one of the most difficult of the unit processes for which to choose equipment. Filtration apparatus should be designed with two main considerations in mind: chemical resistance to the slurry handled and simplicity of operation.

General Ceramics vacuum and pressure filters, satisfy both of these requirements. They are fabricated of chemical stoneware, a material which is not only corrosion resistant but corrosion proof with all acids except hydrofluoric. Their construction is simple, with no moving parts to corrode and cause breakdown.

The vacuum filter consists of two chambers, set one on top of the other and separated by a medial plate which acts as a support for the filtration medium. By applying vacuum to the bottom section the filtrate is forced through the medium leaving the filter cake in the top section. General Ceramics vacuum filters are made in various styles with integral plates,

separate plates, and other modifications that may be called for by any particular filtration operation. These filters are available in capacities ranging from one gallon to one hundred gallons per section.

The pressure filter is made up of two hemispherical sections with pipe connections at the apex and with a supporting plate for the medium clamped between each section. Liquid is pumped through the two sections, the solids remaining on the medium. This equipment is suitable for operation at pressures up to 30 psig.

If your filtration problems are slowing up your plant production, send for BULLETIN 171. It gives all necessary details for installation and operation of this equipment.

A General Ceramics engineer with experience in the filtration of corrosive slurries will be glad to discuss this subject with you. A letter to our main office or to one of our branch offices will bring you complete information.

1522



BUFFALO: 610 Jackson Bldg.
LOS ANGELES: 415 So. Central Ave.
NEW YORK: 30 Broad Street • **SEATTLE:** 1411 Fourth Ave. • **SAN FRANCISCO:** 598 Monadnock Bldg.
TACOMA: 417 Tacoma Bldg. • **HOUSTON:** 2015 Second National Bank Bldg.
MONTREAL: Canada Cement Bldg. • **TORONTO:** Richardson Agencies, Ltd., 454 King St., West
VANCOUVER, B.C.: Willard Equipment Ltd., 860 Beach Ave.

CHICAGO: 20 N. Wacker Drive
PORTLAND 5, ORE.: 410 New Fliedner Bldg.

**General
Ceramics**
AND STEATITE CORP.

**CHEMICAL EQUIPMENT
DIVISION
KEASBEY, NEW JERSEY**

In addition to the manufacturing facilities of the Chemical Equipment Division those of the Insulator Division are also available for handling ceramic problems in all branches of industry. General Ceramics & Steatite Corporation is therefore able to offer service covering all industrial applications of ceramic products.



Producers of
S U L P H U R

Large stocks carried at all times,
permitting prompt shipments . . .

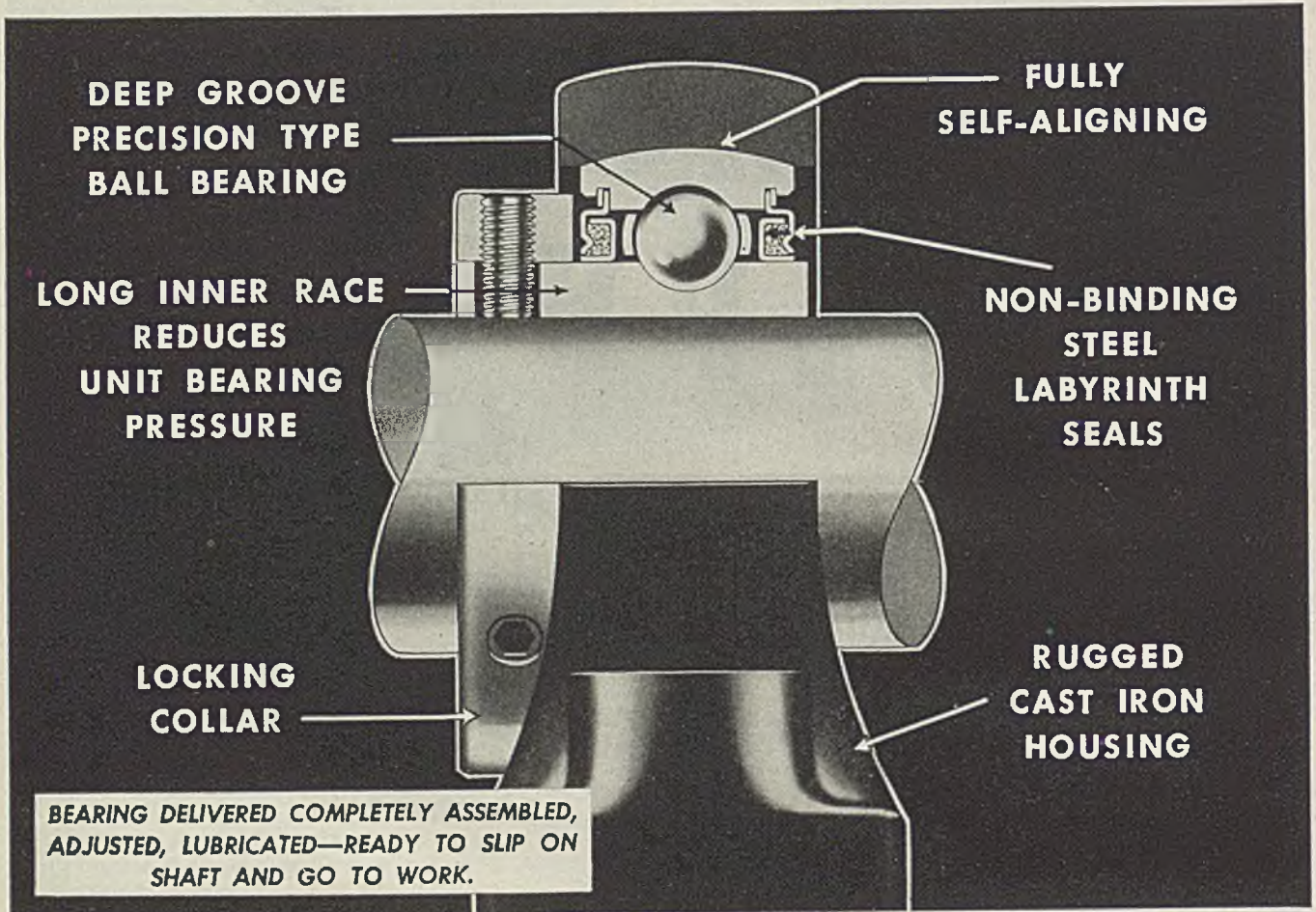
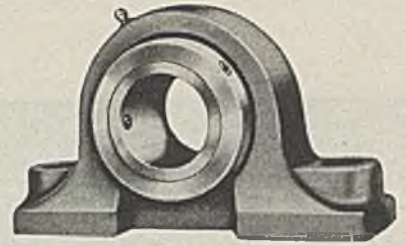
Uniformly high purity of 99½%
or better . . . Free of arsenic,
selenium and tellurium.



TEXAS GULF  **SULPHUR** **Co.**
75 E. 45th Street New York 17, N.Y.
Inc.
Mine: Newgulf, Texas

A NEW BALL-BEARING PILLOW BLOCK

*in the
Famous 30,000 Hour Line*



DODGE

MISHAWAKA

**THE SYMBOL THAT
CAME TO LIFE**

The man who walks into your factory wearing this symbol is the living embodiment of a service which gives you the correct answer to your problems in efficient mechanical transmission of power. He is the Dodge Transmissioneer.



Copyright, 1946, Dodge Mfg. Corp.

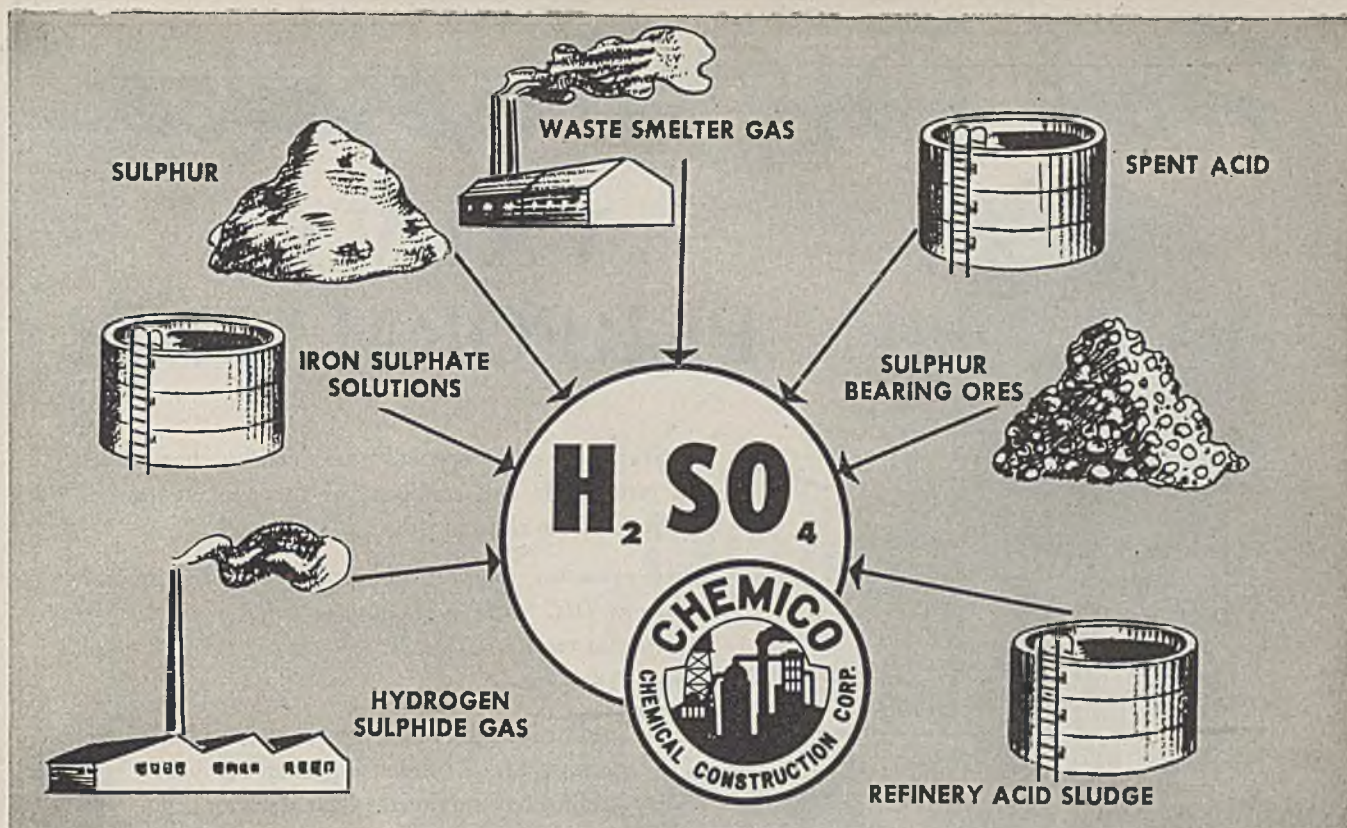
If you are looking for a practical anti-friction bearing for small shafts, operating under moderate load conditions, be SURE to investigate the new Dodge SC. It has everything—high precision, modern styling, rugged cast iron housing, locking collar, radial and thrust load capacity. Self-aligning and sealed against loss of lubricant or admission of dirt. It is a completely assembled, pre-lubricated, factory-adjusted unit which comes to you ready for installation and years of smooth, uninterrupted service.

This bearing is available from stock in shaft sizes ranging from 11/16" to 2-1/4". For prices and delivery call the Dodge Transmissioneer, your local Dodge distributor. Look for his name under "Power Transmission Equipment" in your classified phone book. Or write

DODGE MANUFACTURING CORPORATION, MISHAWAKA, INDIANA

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS



CHEMICO PROCESSES

use any of these sources for producing

STRONG, CLEAN SULPHURIC ACID

Practically any source of sulphur or sulphur compound available to a refinery or chemical process plant is "grist to the mill" for a CHEMICO sulphuric acid plant.

CHEMICO engineers select the process to suit available raw materials and local requirements, erect and initially operate the plant and train the operating crew.

With a single contract and a single responsibility, you receive a complete sulphuric acid plant, specially designed for your particular conditions and needs, and with an overall performance guarantee.

The CHEMICO organization has specialized in this field for over 30 years, and more than 600 installations all over the world have conclusively demonstrated that "CHEMICO Plants are Profitable Investments." Your inquiry is invited without obligating you in any way.

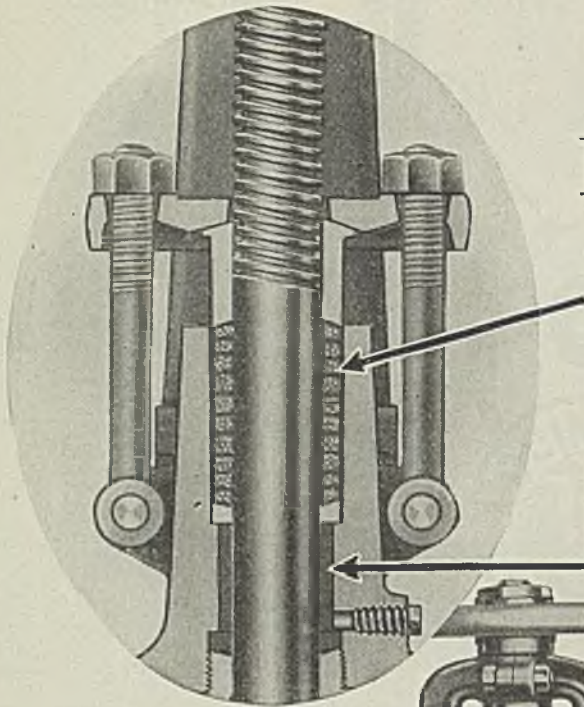
CHEMICAL CONSTRUCTION CORPORATION
 EMPIRE STATE BLDG., 350 FIFTH AVE., NEW YORK 1, N. Y.
 European Technical Repr.: Cyanamid Products, Ltd., Berkhamsted, Herts., England
 Cables: Chemiconst, New York

CC-110

CHEMICO PLANTS are PROFITABLE INVESTMENTS

How OIC Improves

VALVE PERFORMANCE



1—Stuffing box is especially designed so that packing retains life and resilience as the packing nut is tightened from time to time.

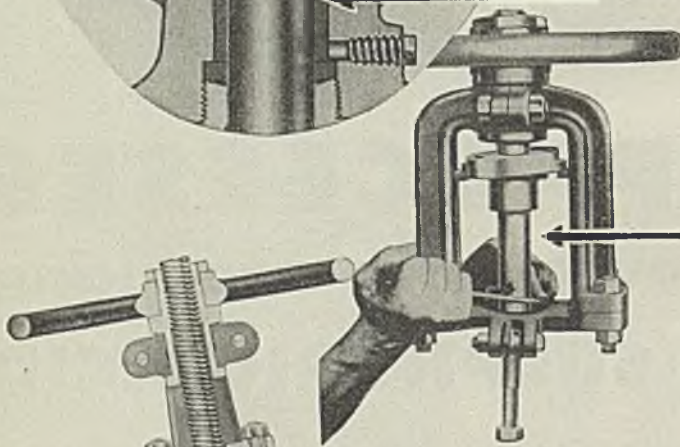
(The equalized compression provided by the special design of OIC packing glands can lengthen the life of packing as much as 10 to 20 per cent compared to other designs.)

2—For installations where heat is an enemy of packing life a condensing chamber below the stuffing box minimizes heat deterioration.

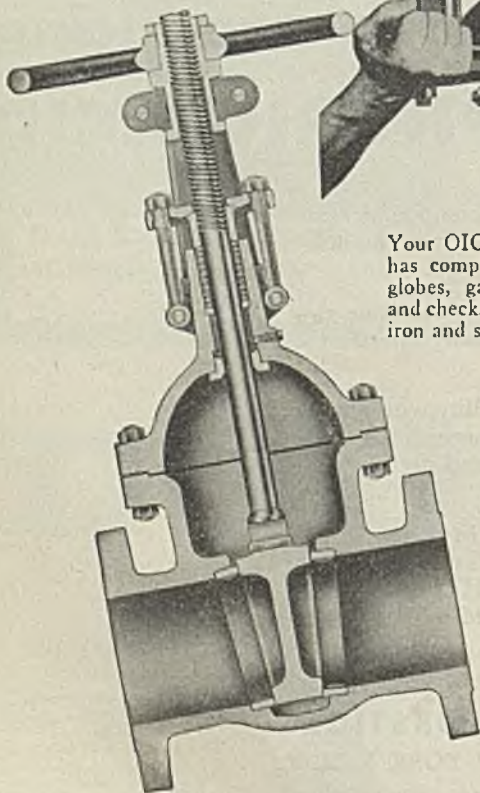
(Condensing chamber design is a special feature of OIC Valves for applications involving high temperatures.)

3—Simplified repacking eliminates lost motion, reduces time required for repacking when needed.

(The LIFT-LOK, exclusive with OIC, is a self-contained feature which automatically holds gland and follower out of the way while the valve is repacked.)



Your OIC distributor has complete lines of globes, gates, angles, and checks—in bronze, iron and steel.



OIC VALVES

THE OHIO INJECTOR COMPANY, WADSWORTH, OHIO

FROM THE CATALOG OF

BARRETT BASIC CHEMICALS...

CYCLOHEXANONE

A water-white ketone with exceptional solvent power. The industrial application of cyclohexanone is based largely on its powerful solvent action for a wide variety of materials including crude rubber, some of the synthetic elastomers, natural and synthetic resins and gums, cellulose ethers and esters, and especially for many vinyl chloride polymers and copolymers.

SPECIFIC GRAVITY: 0.941 to 0.945 at 25°C/15.5°C

REFRACTIVE INDEX: 1.446 to 1.451 at 25°C

DISTILLATION RANGE: 5% to 95%; 2.5°, including 155.6°C

COLOR: Water White

ACIDITY: Neutral

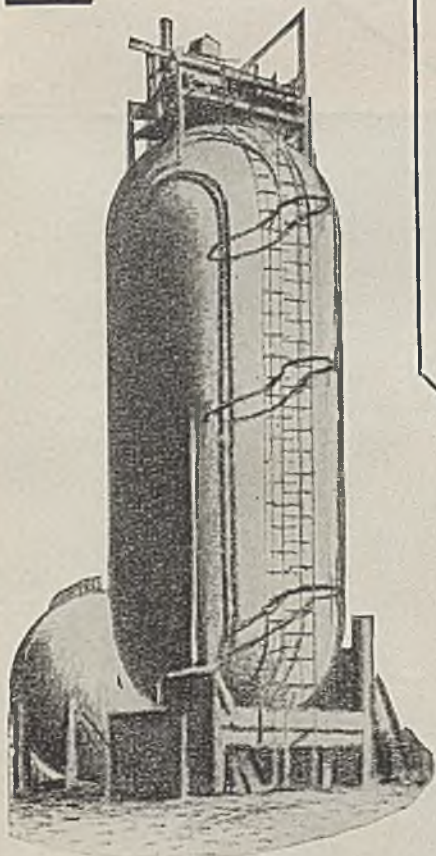
EFFECT ON METALS: Non-corrosive

RESIDUE FROM EVAPORATION: None

FLASH POINT (Approximate): 47°C (116.6°F)

SOLUBILITY IN WATER (Approximate): 8-9% at 20°C

CONTAINERS: Tank cars, 50-55 gallon non-returnable steel barrels and small containers.



THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.



Like the
RODIN
 SIGNATURE
on fine Sculpture...
KOVEN *has been*
the Hallmark of Superior
CHEMICAL EQUIPMENT
Since 1881



Fine craftsmanship is as essential in the field of industry as it is in art. During their 65 years manufacturing chemical equipment, KOVEN has upheld a reputation for the highest quality workmanship in equipment that is efficient and economical.

Since 1881 KOVEN has been designing and manufacturing individualized equipment made to specification for leaders in the chemical industry. Two large plants and a staff of trained KOVEN engineers are at your disposal for any assistance you may need. Call or write today to KOVEN for a consultation.

Among the many KOVEN pieces of equipment are: pressure vessels, extractors, mixers, stills, condensers, kettles, tanks, chutes, containers, stacks, coils.

L. O. KOVEN & BRO., INC.

154 OGDEN AVE.

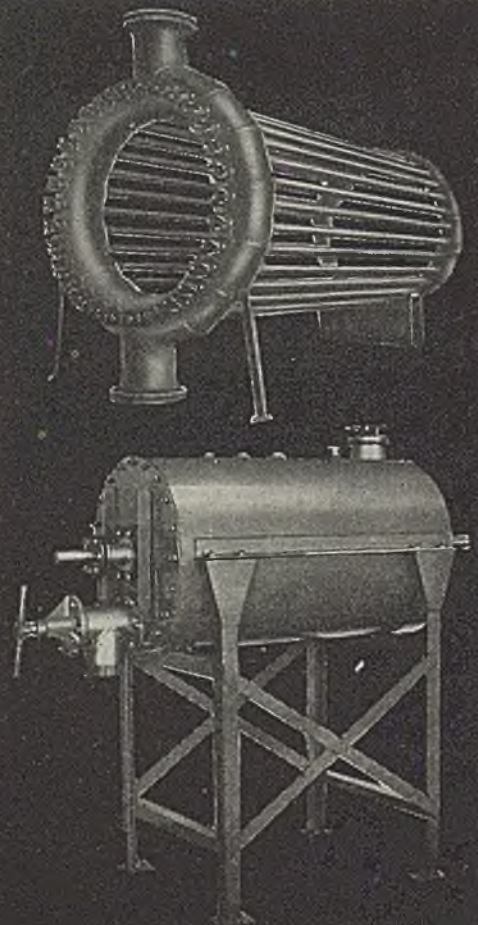
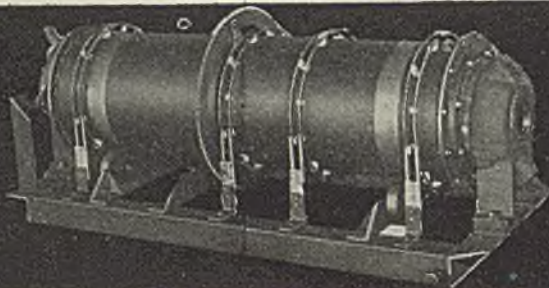
JERSEY CITY 7, N. J.



PLANTS:

Jersey City, N. J.

Dover, N. J.



Why
is
the

TREND TO GAS



for all
Industrial Heating?

FOR years the gas utility industry of America has proudly featured the slogan "The Trend is to Gas" for all industrial heating. There is sound logic in that statement. For instance, in the last ten years the use of Gas in industrial and commercial establishments has more than doubled—a surge that was definitely apparent even before the war called on this most modern fuel to join the production line of countless war plants.

A few of the reasons why Gas is preferred in the modern plant include: economy—reducing production costs in both unit and overall expenses; speed—Gas quickly attains desired heat and maintains that temperature; complete and accurate con-

trollability—no other source of heat in the industrial plant lends itself to such easy and precise modulation as does Gas.

Dependability—Gas is always there when you want it; cleanliness—Gas burns cleanly and its equipment is very easy to keep spotless; improved working conditions—men and women prefer Gas equipment because working conditions of a desirable nature are more readily attained.

The many advantages of Gas and Gas equipment with specific applications to your plant can best be explained by the Industrial Engineer of your local Gas Company. A grand chap to know—a mighty profitable acquaintance.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

THE TREND IS TO GAS

FOR ALL
INDUSTRIAL HEATING

Accurate Pressure Control with

GENUINE
STRONG
 IMPROVED
Regulating Valves
 STEAM • AIR • GAS

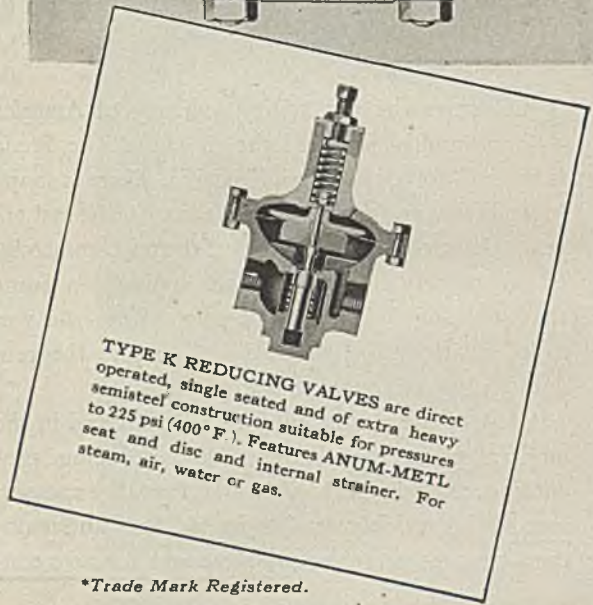
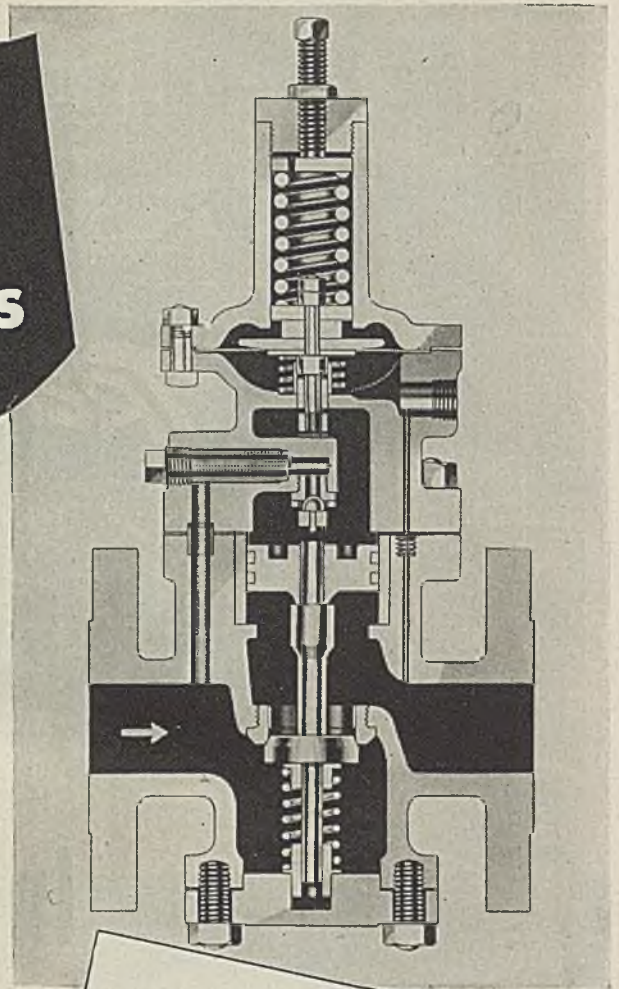
For Sensitive Pressure Regulation, Use This Single-Seated, Pilot-Controlled Valve!

Recommended especially for:

- Processes with intermittent or fluctuating demand;
- Processes requiring extremely sensitive control;
- Applications where dependability is essential.

STRONG Type C Valve, illustrated at right, available in semisteel or cast steel, for pressures to 400 psi (600° F.). With ANUM-METL* seats and discs, optional internal or external pilot control, this valve automatically adjusts itself to maintain accurate reduced pressure.

Completeness of the STRONG line—steam traps, vacuum traps, pressure regulating valves, strainers, separators, continuous blowdown valves and other steam specialties—enables us to recommend exactly the right type and size for your particular application. Write us about your problem and ask for the new STRONG Regulating Valve Catalog No. 155.



TYPE K REDUCING VALVES are direct operated, single seated and of extra heavy semisteel construction suitable for pressures to 225 psi (400° F.). Features ANUM-METL seat and disc and internal strainer. For steam, air, water or gas.

*Trade Mark Registered.



STRONG "Quick-Cleaning" Strainers

STRONG improved strainers, of semisteel or cast steel construction, protect reducing valves, steam traps, control equipment, etc., by taking out scale, dirt and sediment. Available in "T" or "Y" types.

STRONG, CARLISLE & HAMMOND COMPANY
 Cleveland 13, Ohio

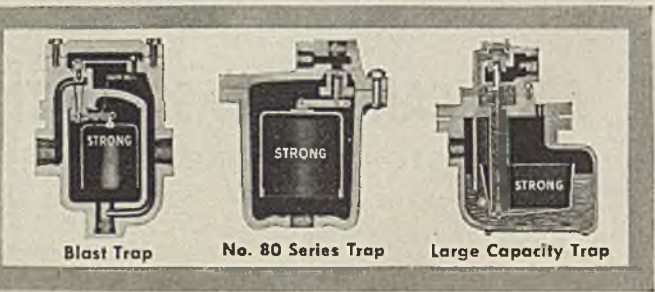
REG. TRADE MARK

OTHER

ANUM-METL
 Reg. Trade Mark

STRONG

STEAM SPECIALTIES



"I tore up our plans when an A.T.C. Specialist gave us 50% more FREE Storage Space



...AND CUT OUR HANDLING COSTS 30% IN THE BARGAIN!"

Yes, many a plant owner has saved himself the cost of a new warehouse because he let an A.T.C. material handling Specialist make a survey of his material handling costs.

Manual methods of storing raw and finished products often waste as much as 50% storage space. In the diagram to the left, see how much free storage space you can add to your present plant's capacity—how you take the work out of the job for your help, release more workers for more productive work.

An A.T.C. Specialist will show you how this can be done by efficient movement of your materials on Automatic Electric Trucks from receipt of raw materials through each successive handling procedure to storage and final shipment. These trucks are time-tested, brawny giants of electric power that lift, move and stack 1 to 30 tons with simple one-man operation.

They move through narrow aisles, turn sharp corners, go up and down grades whenever necessary. They speed up production, cut overall handling costs 30% to 60%, lighten labor's load.

Let an A.T.C. Specialist tell you what *your* handling costs are—what you can save with Automatic Fork Trucks. No obligation. Send coupon.



AUTOMATIC TRANSPORTATION COMPANY
 49 W. 87th Street, Dept. F, Chicago 20, Ill.
 Please mail me, without cost or obligation, complete facts about AUTOMATIC FORK TRUCKS.
 () Have an A.T.C. Material Handling Specialist call.

Company Name.....
 By..... Position.....
 Street Address.....
 City..... State.....

names worth remembering...

★★★★★

C. Watt

for first electrolytic process
using external current, 1851.

★★★★★

INTERNATIONAL

for graphite

anodes of uniform properties.

YOU CAN COUNT on unvarying performance from INTERNATIONAL Anodes in electrolytic cells—because their quality is consistent; their properties, uniform.

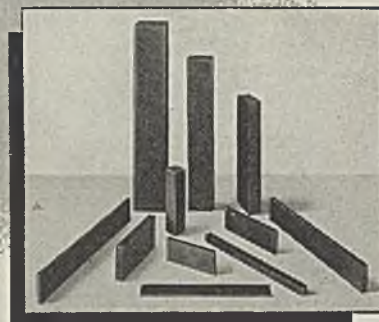
Only graphite of maximum purity is used in the manufacture of INTERNATIONAL Anodes. They contain less than 1% impurities— inert oxides and silicates that have no contaminating effect or *undesirable* reaction in the most exacting electrolytic processes.

Uniform physical properties of INTERNATIONAL Graphite Anodes insure *lasting* performance, too. Being dense masses of graphitic carbon, they resist disintegration during reactions because their low porosity means that minimum internal oxidation can occur. Their close-knit structure gives utmost freedom from breakage and mechanical wear.

The same care in selection of materials and in manufacturing that gives INTERNATIONAL Anodes their uniformity, also gives them the other properties listed here—properties that are so essential to low cost per unit of production.

OTHER ADVANTAGES

- Low porosity • High electrical conductivity
- High resistance to chemical disintegration
- Consistently uniform properties • Long service life
- Low ultimate cost per unit of production
- Ease of machining and assembly • Close dimensional tolerances.



**International
Graphite &
Electrode Corp.**

SAINT MARYS, PA.



WHEN

THEN

TRAPS AND AFTERCOOLERS

WON'T STOP AIR-LINE CORROSION



INSTRUMENT MAINTENANCE

IS RUNNING HIGH (ORIFICE TROUBLE)



AIR-MOTOR DIAPHRAGMS

DETERIORATE TOO RAPIDLY



a KEMP dynamic desiccating dryer will get both water and water vapor

If the compressed air you use for so many purposes were dry—really dry—you wouldn't have to worry so much about equipment corrosion, line freezing, contamination of product, clogging of orifices, deterioration of diaphragms, lubricant-loss in air tools, and such. But it isn't! The mere removal of *water* (with traps or aftercoolers) doesn't remove *water vapor*.

And that's where KEMP desiccation comes in.

A KEMP dryer chemically adsorbs *both* water and water vapor from air, as it passes through generous activated-gel towers. And along with the moisture, it stops water-borne dirt and oil (carried over from compressor or picked up in transit).

Compressed air is too valuable a tool in the chemical industries *when dry and clean* to allow to become a nuisance *through moisture and dirt*.

Let us help you do something about it.



REALLY DRY—TO -30°F DEW POINT

... for the protection of pneumatic instruments, valves and tools—however long the air line or cold its environment. The duty of this model is 100 cu. ft. per minute (free air) entering at 70°F and pressures up to 80 p.s.i. A simple throw of the lever, and set of the timer, starts automatic reactivation (by steam) without interrupting air flow. Economical, simple, and effective—all the way to -30°F dew point.

**KEMP
OF BALTIMORE**

PRECISION CARBURETION + ADAPTED COMBUSTION
FOR INDUSTRY'S HEAT-USING PROCESSES
ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS
FOR PROCESS CONTROL AND PROTECTION

DEPT. KFI-em

THE C. M. KEMP MFG. CO.

405 E. Oliver Street, Baltimore 2, Md.

Send me your new 48-page illustrated booklet on "Dynamic Dryers".....

Send a field-engineer to "talk turkey" (no obligation, of course).....

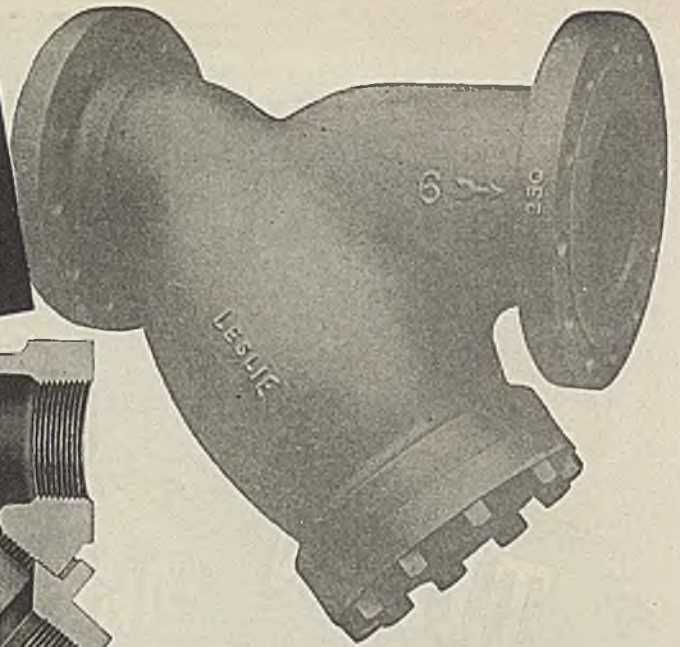
NAME.....

POSITION.....

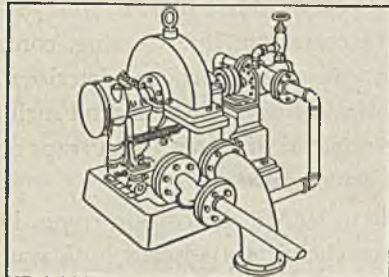
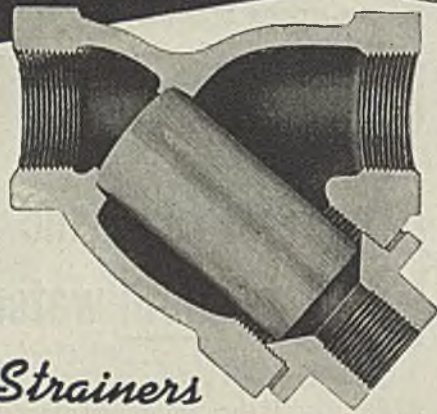
COMPANY.....

PLACE.....

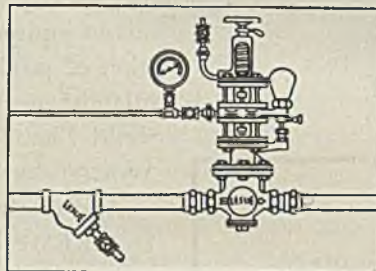
ON GUARD
against
RUST • DIRT • SCALE



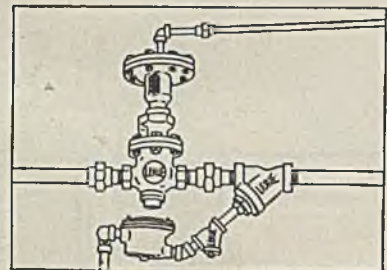
TRADE
LESLIE
 MARK
Self-Cleaning Strainers



1. TO PROTECT PROCESS MACHINERY



2. TO PROTECT REGULATORS



3. TO SEPARATE AND DRAIN

LESLIE Self-Cleaning Strainers provide the most inexpensive protection for valves, regulators, turbines, pumps, traps and similar equipment. They prevent costly shut-downs and heavy repair bills.

Self-Cleaning feature allows cleaning the screen without removal from strainer body or shutting-off the operating fluid.

Straight thread and gasket joint on all screwed end strainers permits easy removal of screen.

FOR ALL COMMERCIAL PRESSURES, they are available in the following body materials, connections and sizes.

Body Material	Connections	Size in Inches
Cast Iron Bronze Cast Steel	Screwed or Flanged	1/4—8
Forged Carbon Steel	Socket Welding Ends	1/2, 3/4, 1
Cast C-MO Steel		1, 1 1/4, 1 1/2, 2
Cast Stainless Steel*	Screwed	1/2, 3/4, 1

*Now available in stock.

SEND FOR Strainer Bulletin 465 containing new chart for computing steam pressure drops through strainers—no obligation.

LESLIE CO.

279 Grant Avenue • Lyndhurst, N. J.



Look for "LESLIE Regulators" in your classified telephone directory in these cities, for LESLIE factory-trained engineers to help you with your regulation problems:

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 Baltimore, Md.
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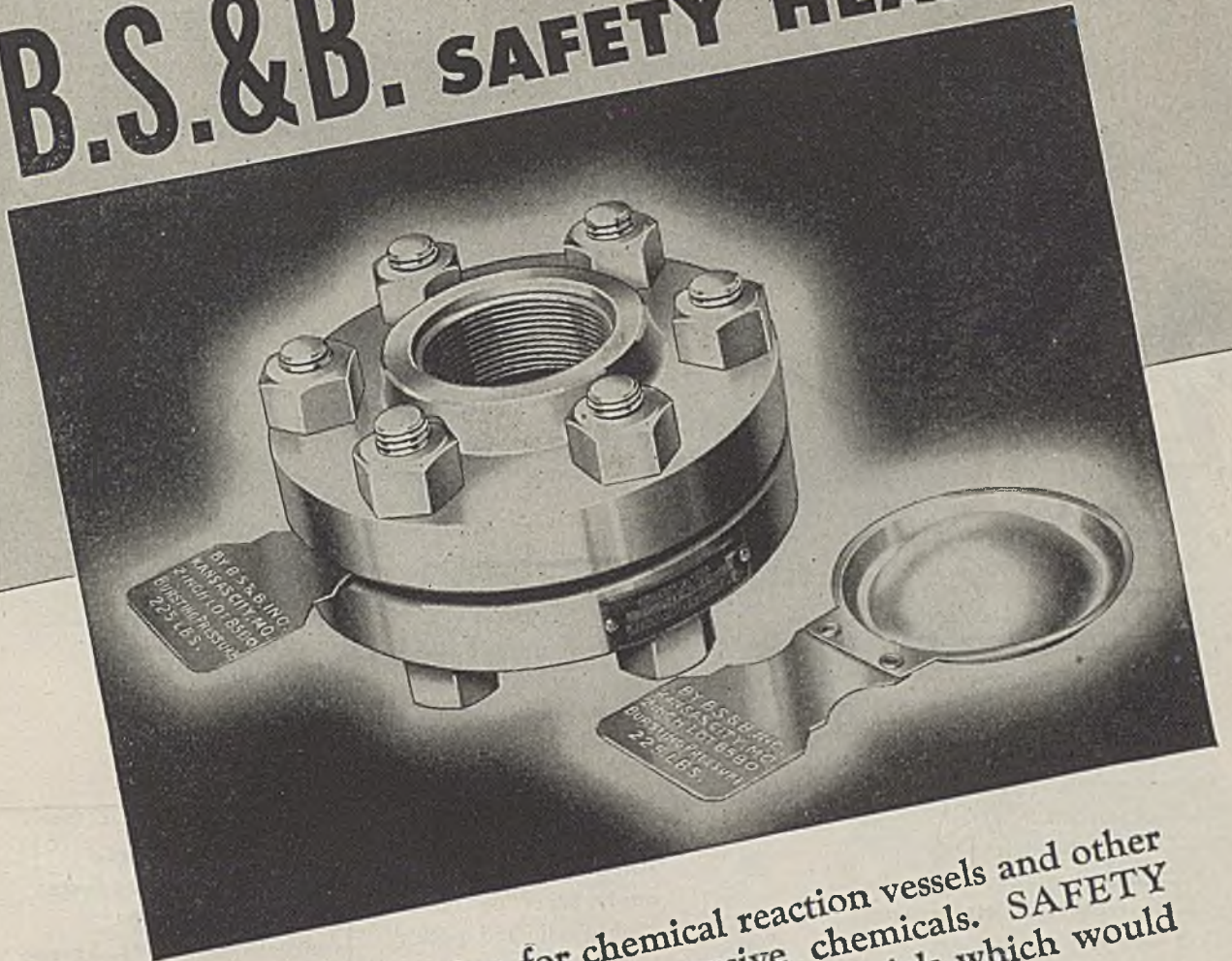
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PRESSURE REDUCING VALVES
TEMPERATURE REGULATORS

PUMP GOVERNORS
SELF CLEANING STRAINERS

PRESSURE CONTROLLERS
LESLIE-TYFON WHISTLES

B.S.&B. SAFETY HEADS



RECOGNIZED protection for chemical reaction vessels and other pressure equipment containing corrosive chemicals. SAFETY HEADS isolate relief valves from gummy materials which would otherwise render valve inoperative.

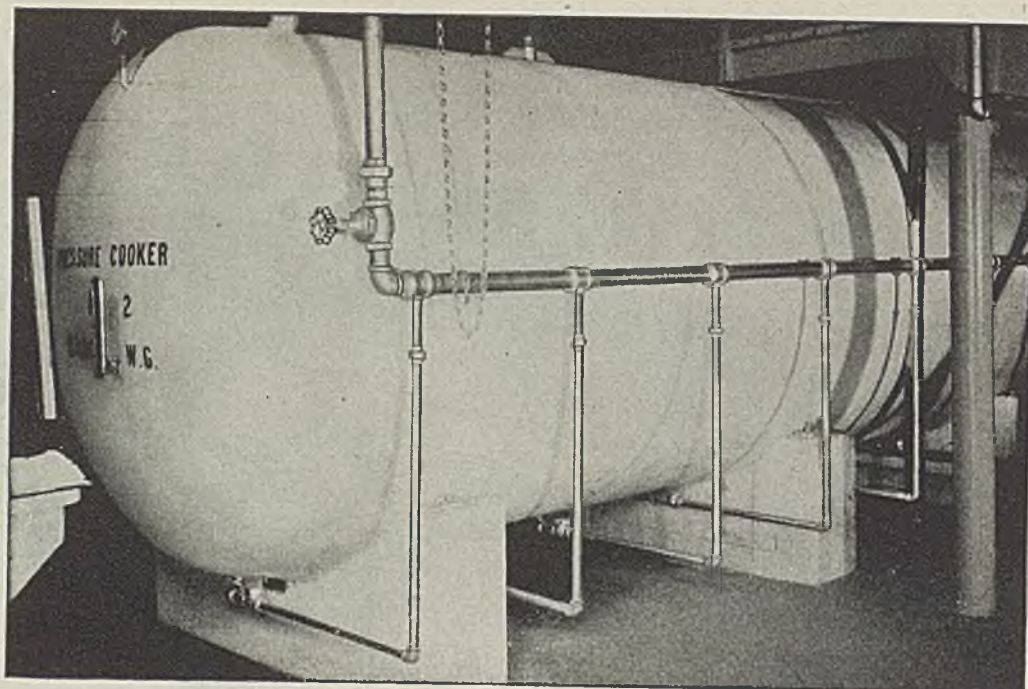
Obviously there can be no leakage through a SAFETY HEAD rupture disc, such as is often experienced with a relief valve.

BUT, the important feature is the great capacity. When the SAFETY HEAD rupture disc breaks from over-pressure, you have a full size, straight through relief opening.

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The high Rust Inhibition of Eagle Super "66" Insulating Cement pays you an extra dividend!

Yes, Eagle Super "66" Insulating Cement gives you an important "extra"—a rust inhibitive quality that helps prolong the life of your heated metal equipment, thus saving costly repairs and replacements. Extensive tests have proved that in addition to doing a tremendously efficient job of insulating, Super "66" actually inhibits rust!

"Springy Ball" structure. "Springy Ball" Super "66" is made up principally of "Springy Ball" Mineral Wool pellets, literally honeycombed with dead air cells. These dead air cells effectively block the escape of heat—give Super "66" extremely low thermal conductivity.



Structure



Super "66" withstands a full range of temperatures up to 1800° F., and if

not used at temperatures above 1200° F., can be removed, remixed and re-used!



All-purpose — easy to apply. Super "66" can be applied easily and quickly to most any size or shape surface. Just mix with water, spot over surface and trowel to desired thickness.

High coverage. As high as 65 sq. ft. per 100 lbs. wet. Shrinkage, which occurs in thickness only, is less than 15%.



Send for data sheets. They contain complete technical information about Eagle Super "66." Available on request.

FREE Manual! Gives examples of how industrial insulation effects large fuel savings. Includes Heat Loss Estimate Sheet for your use. Write for your copy.



Other Eagle Industrial Products include:

EAGLE INSULSEAL. A protective coating for insulation. Trowels on — dries to a hard finish. Withstands up to 450° F.

EAGLE SWETCHEK (black). A prepared, asphaltic base, rust-inhibitive anti-condensation compound.

EAGLE DRYCOTE (white). A dry, ready-to-mix, rust-inhibitive anti-condensation compound.

EAGLE "43" FINISHING CEMENT. A hard white finish coating for all types of indoor insulation within a range from 70° F. to 800° F.

Combat inflation with
MORE U. S. Savings Bonds!

EAGLE-PICHER INSULATIONS High and Low Temperature



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Eagle Super "66" Insulating Cement • Eagle L-T and M-2 Felt • Eagle Supertemp Black • Eagle Blankets • Eagle Pipe Covering
Eagle Insulseal • Eagle Loose Wool • Eagle Insulstic • Eagle Swetchek • Eagle Drycote

*Pittsburgh Lectrodryers protect
the Cruiser Pittsburgh. It can be
returned to an active status quickly.*



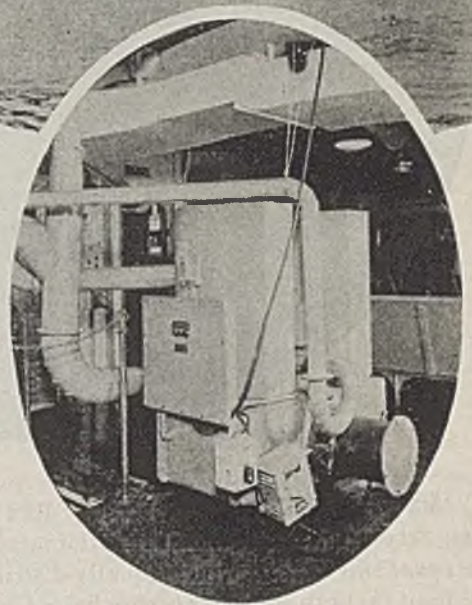
U.S.S. Pittsburgh; one of some 2,700 ships to be kept in readiness.
Official U. S. Navy Photograph

Gone are the days of ineffective red-lead-and-grease protection of World War I. Today, as ships are put on the inactive list, they're being scientifically held in readiness to be returned to duty fast. Dehumidification plays a vital part in this program.

A ship's hull is sealed against outside moisture. Automatically controlled DRYing machines, like the Lectrodryer pictured here, then hold the relative humidity at 30% or less. Thus, the ship becomes a DRY storehouse for its own equipment, preventing corrosion of metals, mold, mildew and general deterioration of the equipment aboard.

Years of research proved to the Navy that materials so stored are preserved indefinitely against the ravages of atmospheric moisture. You can profit by this knowledge. Safeguard your processing and warehousing operations by controlling humidities with Lectrodryers.

Our engineers will assist you in planning such installations. Write Pittsburgh Lectrodryer Corporation, 303 32nd Street, Pittsburgh 30, Pennsylvania.



Typical Lectrodryer installation in the Navy's "Keep the Fleet" program.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sydney.



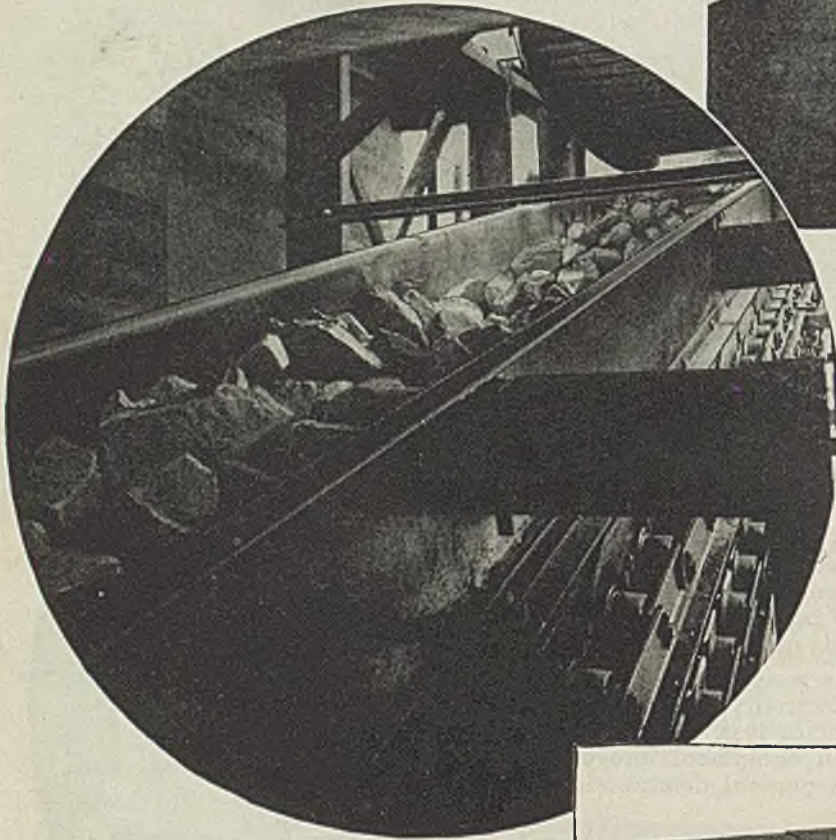
LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

P I T T S B U R G H
LECTRODRYER
C O R P O R A T I O N

Eng. E. L. H. H.

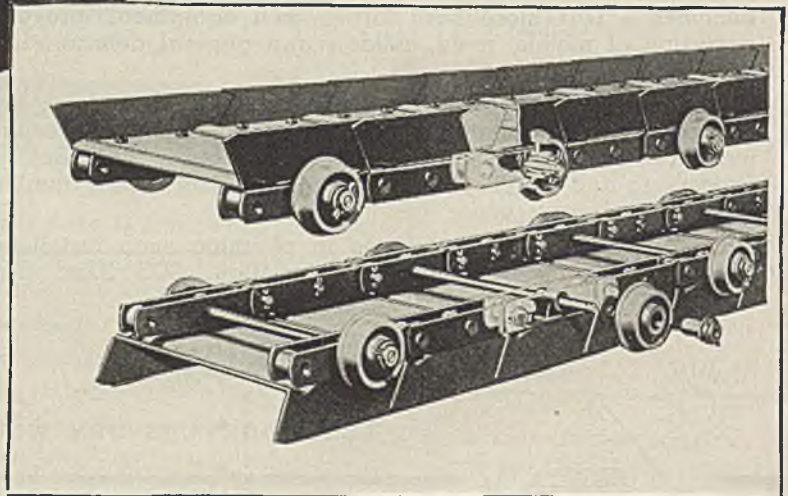
TO "PULL OUT THE STOPS" ON PRODUCTION . . .

① YOU NEED heavy duty conveying equipment that eliminates excessive maintenance and costly shut-downs. And one way to accomplish that effectively and economically is by installing Rex Apron Conveyors.



② REX APRON CONVEYORS may not be the most economical in first cost but they're a good example of the old saying, "you get what you pay for"! Their exclusive features assure maximum service life and minimum replacement costs. Just figure how much money that you can save . . . not only in actual maintenance but in elimination of costly shut-downs. You'll find Rex the best buy—the most economical ultimately . . . as did this plant where they are used to carry limestone and coke.

③ THIS CUTAWAY shows the secret of Rex success. Eccentric chain loads are eliminated by the *equalizing saddles* which equally distribute the load on both side bars of the chain. Chains themselves are on the underside of the *leak-proof pans* and are thus protected from the material carried. The *outboard rollers* and through rods assure maximum load handling ability and minimum friction. They all add up to long life. Write for the complete story.

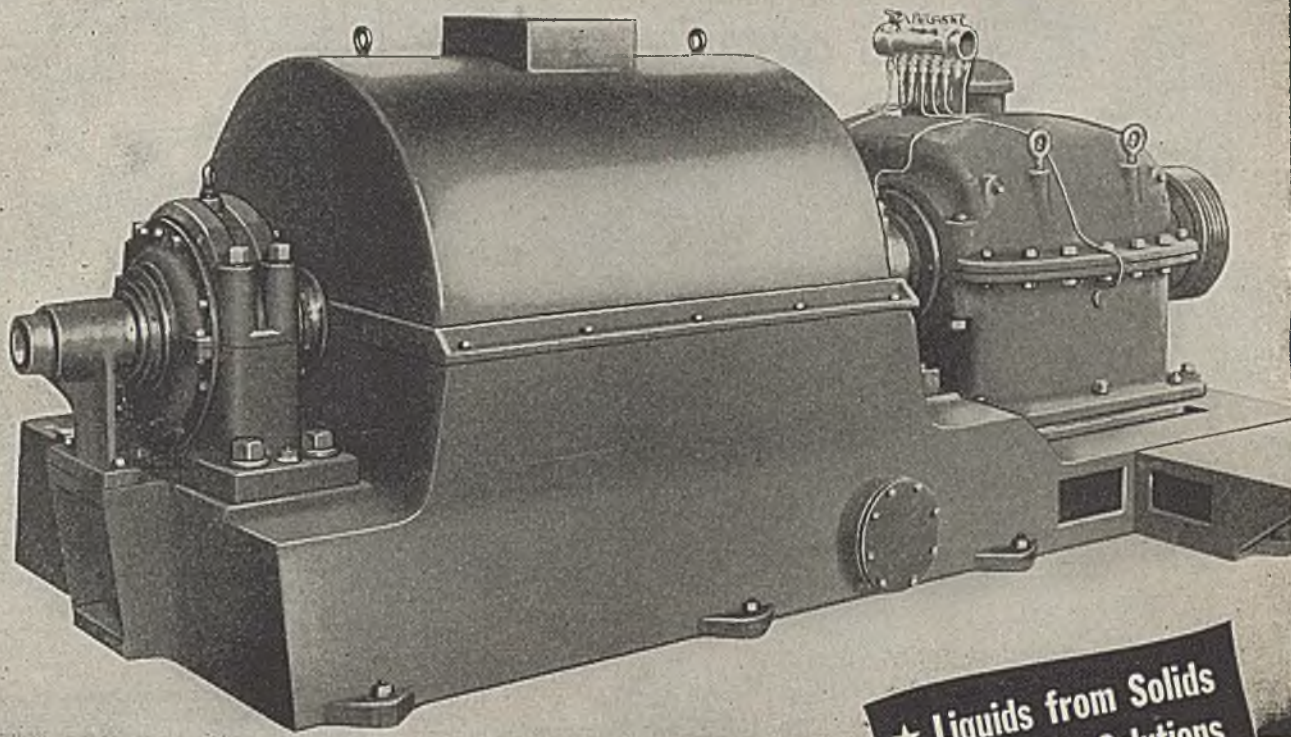


REX APRON CONVEYOR and FEEDERS

for the efficient heavy-duty handling of bulk materials

CHAIN BELT COMPANY OF MILWAUKEE • 1648 W. Bruce Street, Milwaukee 4, Wis.

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★ Liquids from Solids
★ Immiscible Solutions

For Fast, Continuous Separation

The new CME Continuous Centrifuge sets new standards in centrifugal filtration. It extracts solids from liquids and separates immiscible liquids of unequal specific gravity at lower cost than with any other type equipment. There are no filter elements to renew or service. Operation is continuous, uninterrupted, and automatic. The unit is entirely self-contained and requires little floor space.

CME Continuous Centrifuges are available in a variety of sizes and models to meet different requirements. Granular, amorphous, and crystalline materials such as caustic recoveries, salts from brine solutions,

sugars, coal, scrap rubber, ground cork, cut sponge, and pulps are separated and washed at from 2 to 15 tons per hour. For separating fines or mixed sizes fractionated to particle size or specific gravity, for refining or degritting clays or non-metallics, and for treating slimes, crystalline and fibrous matter, metal salts, fish reductions, and fine chemicals models of 1 to 6 tons per hour capacity are available.

CME Continuous Centrifuges are designed and built by pioneers in this modern, efficient, low cost type of filtration. Our engineering analysis of your problem will not obligate you. Send for full details.

Continuous

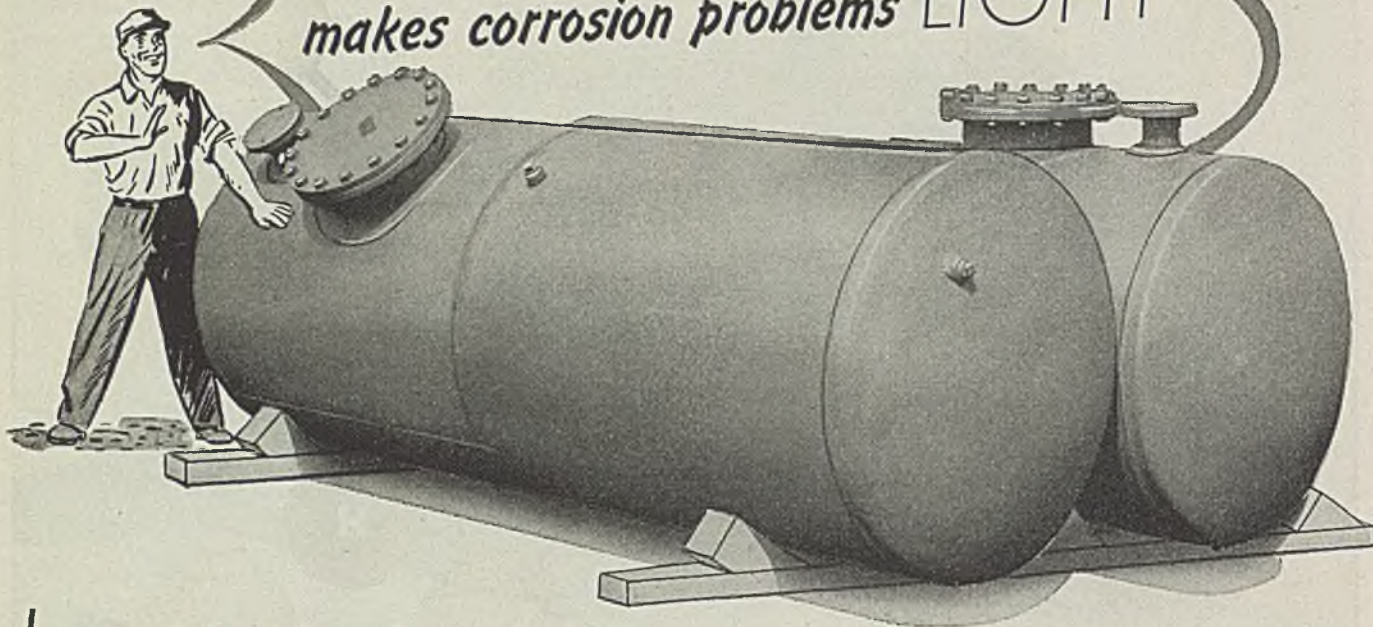
- ★ Dewatering
- ★ Classifying
- ★ Fractionating
- ★ Degritting
- ★ Thickening
- ★ Extracting

CENTRIFUGE MECHANICAL EQUIPMENT, Inc., N. J.

Specialists in centrifugal separation

95 River Street, Hoboken, N. J.

For **HEAVY** equipment that
makes corrosion problems **LIGHT**



In your battle for product purity, corrosion is a constant enemy.

But it's an enemy that can be overcome . . . with Monel* equipment.

The tanks and vessels illustrated here, for example, were constructed of Lukens Monel-clad steel by The Downingtown Iron Works, Downingtown, Pa. Used by The Atlantic Refining Company in the manufacture of their synthetic detergent, *Atlantic Ultrawet*, this equipment was made after tests had demonstrated Monel's excellent resistance to corrosion and its ability to safeguard product purity.

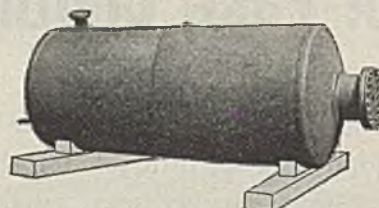
For heavy equipment like this, Lukens Monel-clad steel offers all the corrosion-resistant properties of Monel — all the strength, toughness and other characteristics of the solid metal — at considerably lower cost.

By the Lukens process, a layer of Monel (usually equal to 10% of the total plate thickness) is bonded to a heavier layer of steel. Forming, bending, flanging, welding and similar fabrication operations do not cause buckling or cracking. *The bond is permanent.* No separation of the layers occurs under normal conditions of temperature change, pressure, vacuum or mechanical shock.

Further information concerning the advantages of this cost-saving construction material is contained in the illustrated booklet, *Lukens Clad Steels*. Refiners interested in minimizing corrosion and metallic contamination will find it helpful. A request on your business letterhead will bring your copy promptly. Write today.

*Reg. U. S. Pat. Off.

THESE 1,000-GALLON process tanks are constructed of 10% Monel-clad steel. They were made by The Downingtown Iron Works for The Atlantic Refining Company. Photos on this page by courtesy of Lukens Steel Company.



MONEL-CLAD STEEL PROTECTS purity of Atlantic Ultrawet, a synthetic detergent made from petroleum in this 2,000-gallon batch still.



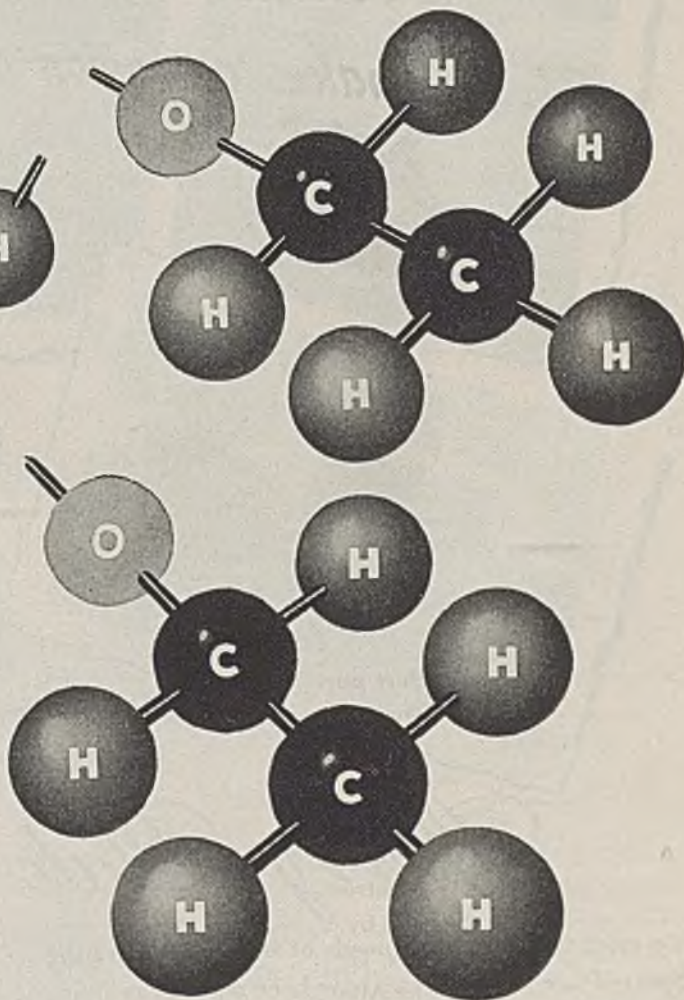
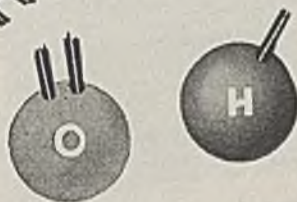
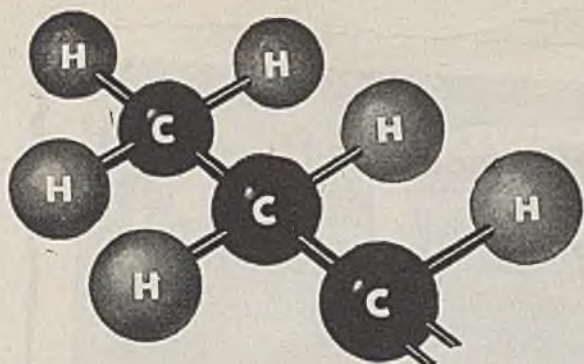
800-GALLON AGITATOR MIXER. Fabricated of 20% Monel-clad steel by The Downingtown Iron Works, it will serve long and dependably under highly corrosive conditions.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N. Y.

Monel

NICKEL  ALLOYS

MONEL* • "K" MONEL* • "S" MONEL* • "R" MONEL* • "KR" MONEL* • INCONEL* • NICKEL • "L" NICKEL* • "Z" NICKEL*



Porocel as catalyst in acetal formation

The production of acetals by the reaction of alcohols with aldehydes has been successfully catalyzed by Porocel. Typical of these reactions is that of ethyl alcohol with propionaldehyde by the simple liquid phase percolation of the reactants through Porocel.

The ability of Porocel to promote dehydration reactions has been noted in many applications. Alcohols react with ammonia in its presence to produce amines. Porocel may also be used to convert glycerol to acrolein, acetone to mesitylene and fatty acids to esters or nitriles.

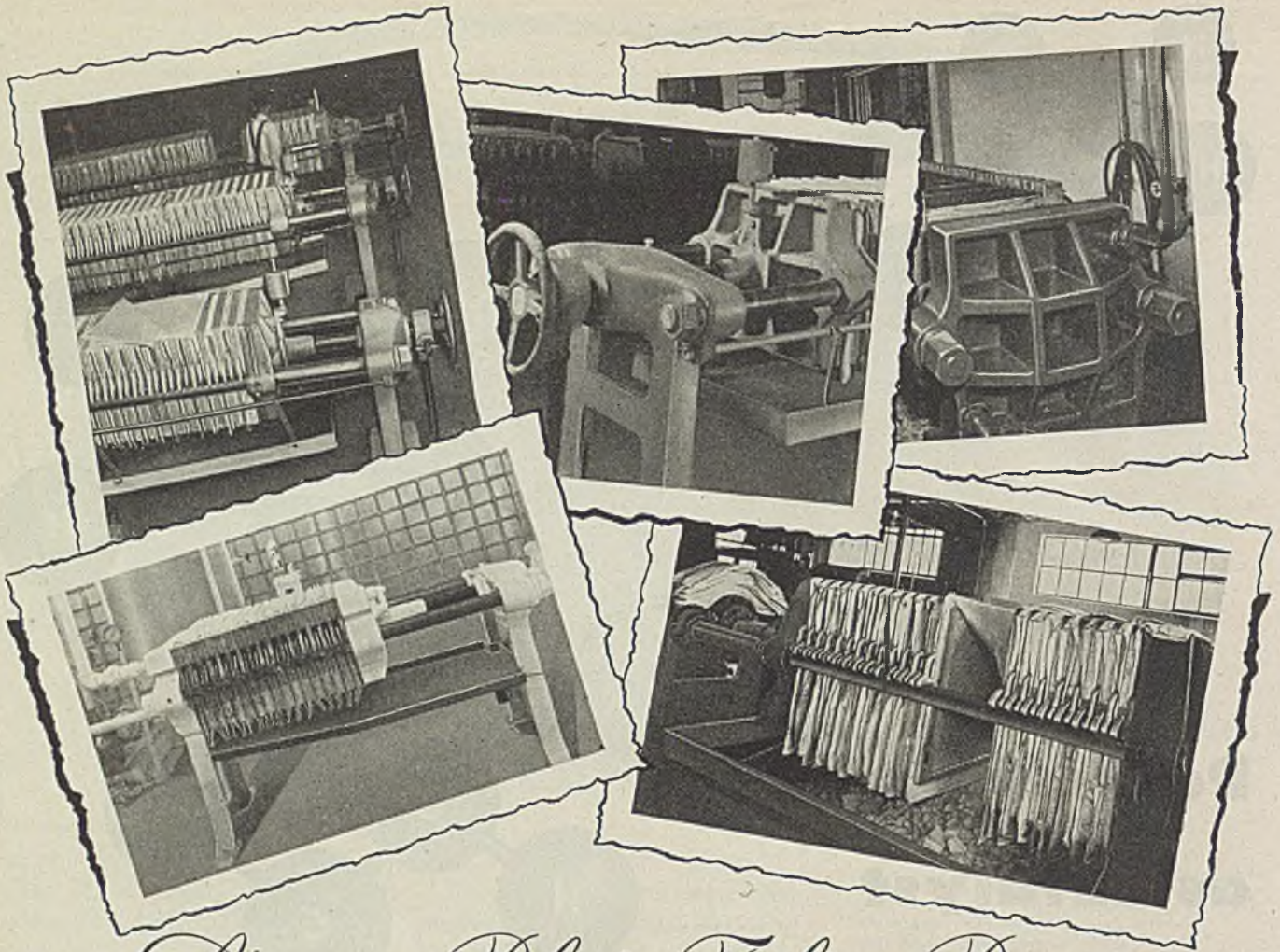
Dehydration with Porocel is a continuous process, giving the producer all the cost-saving advantages

of this method. Further savings are made possible by the low initial cost of Porocel and the ruggedness of the granules, which do not deteriorate under severe conditions of temperature, flow, regeneration and handling.

Our research staff and engineers are studying the catalytic action of Porocel in many dehydration reactions. The facts they have assembled may help you improve your own process or reduce costs. We shall be glad to place them at your disposal without obligation. Just write Attapulugus Clay Company (Exclusive Sales Agent), 260 South Broad Street, Philadelphia 1, Pennsylvania.

POROCEL CORPORATION • BAUXITE ADSORBENTS AND CATALYSTS

CHEMICAL & METALLURGICAL ENGINEERING • JUNE 1946 •



Sperry Plate Filter Press

To meet the diversified needs of industrial filtration, Sperry Plate Filter Presses have been made of an almost endless variety of materials.

Nickel, wood, bakelite, lead, cast iron, monel, stainless steel, vitreous enameled iron, copper, rubber, ni-resist, galvanized iron, nickel plated, bronze, cast steel, tinned iron, aluminum, tinned bronze... this is only a partial list of the materials that are used to manufacture the plates and frames—in fact all the parts coming into contact with the liquid filtered—of Sperry Plate Filter Presses.

For example, the Sperry Lead Plate Filter Press is manufactured for use in filtering acid substances. Plates, frames and piping are made of solid lead. The drip pan is lead covered.

Certain substances can be filtered with a Sperry Plate

Filter Press made of cast iron. But others—such as red oil—may be injured by contact with iron. A Sperry Plate Filter Press made of aluminum is the answer to this particular filtration problem.

But many other advantages besides the diversity of uses to which it can be put contribute to the widespread and constantly mounting popularity of the Sperry Plate Filter Press. Its simplicity of construction make it economical, both in first cost, maintenance and operation. And its fine performance assures, always, precision results.

If you have a filtration problem, why not take advantage of Sperry's more than 50 years experience in industrial filtration? Consult Sperry engineers... get their unbiased recommendations. There is no obligation.



Send for your **FREE** copy of Sperry's book containing valuable data and charts on industrial filtration.

D. R. SPERRY & COMPANY BATAVIA, ILLINOIS

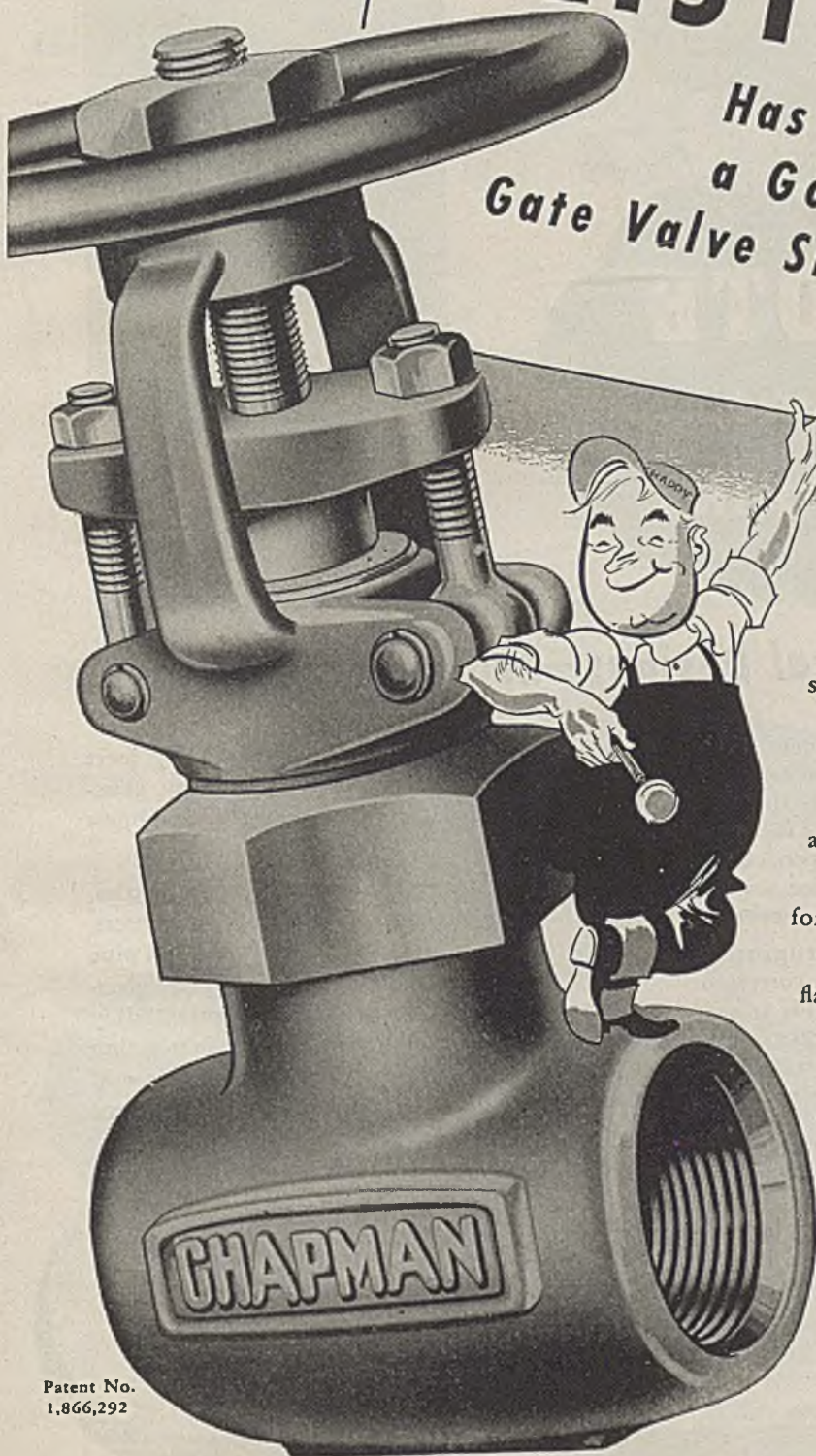
Filtration Engineers for Over 50 Years

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Has Everything
a Good Small
Gate Valve Should Have



It has a bonnet fitted with a substantial forged steel yoke; a flanged forged steel packing gland (eliminating exposed threading on valve yoke, and affording protection against corrosion when placed in exposed locations); and swivel bolts for holding the packing gland. It has *no* gaskets to blow, as in valves with flanged bonnet connections.

Stems, plugs and seat rings on all Chapman List 960 Gate Valves are of heat treated stainless steel to insure more efficient working qualities.

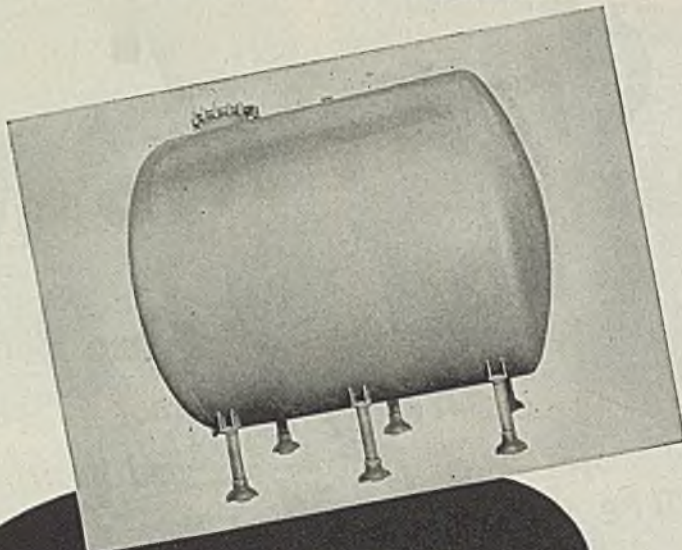
**The Chapman Valve
Mfg. Company
Indian Orchard, Mass.**

Patent No.
1,866,292

THE INERTNESS OF GLASS

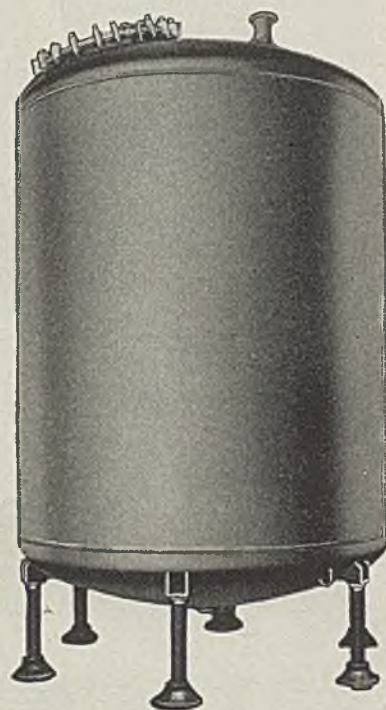


THE STRENGTH OF STEEL



GLASCOTE

Corrosion Resistant
Storage Tanks



Horizontal or Vertical Designs—Wide Range of Sizes

● Equipped with inlet and outlet nipples, man-holes, agitators, and other accessories to meet the individual requirement, including legs that are adjustable to overcome any unevenness of the floor, Glascote glass-on-steel horizontal and open, closed and vertical tanks are ideally suited for a wide variety of blending, storage and holding services.

The glass, developed by Glascote engineers specially for services requiring highest corrosion resistant qualities, is resistant to all acids at any concentration, at low or elevated temperatures, excepting hydrofluoric and hot concentrated phosphoric. Glascote glass is a true glass. It is

not decomposed by heat. It is chemically inert and has all the properties of laboratory glass-ware combined with greater strength, toughness and elasticity.

Ask us about our glass-on-steel reaction kettles, crystallizers, evaporators, chlorinators, condensers, and distillation units; glass-on-steel pipe and pipe fittings that permit the making of complete glass-on-steel assemblies,—also our stainless steel and alloy vessels. Let Glascote engineers help you in selecting a standard or suggest special equipment that will meet your particular and individual requirements.

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Tri-Sure Closures have the endorsement of more experienced shippers than any other device ever developed for protecting liquids in metal drums and pails. The reason is that Tri-Sure Closures have demonstrated all over the world, under every condition, that they are the most completely *reliable* safeguard against leakage, seepage, pilferage and substitution. Tri-Sure *leadership* is your *protection*—your assurance that you are using the closure that is rated No. 1 in soundness of engineering and efficiency of performance. Get this protection in every shipment, by specifying “Tri-Sure Closures” in every drum order.



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TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

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NEW BROCHURE ON INDUSTRIAL OPPORTUNITIES IN *Los Angeles*



"F.O.B. LOS ANGELES" is the title of an eye opening, fact-packed brochure that has been written and edited for corporation presidents, directors, general managers, vice-presidents, controllers, sales managers, chief engineers and other executives whose opinions are asked for in connection with decisions regarding new plant locations.

Here, in brief, right-to-the-point form, with interesting illustrations, are the key facts you should know about Los Angeles markets, labor conditions, industrial stability, growth, water and power supply and rates, raw materials, basic industries, agriculture, living and working conditions, transportation, harbor facilities, industrial sites.

For *your* copy of this valuable reference on the West's busiest and richest industrial city, just attach coupon to your company letterhead.

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DEPARTMENT OF WATER AND POWER

207 South Broadway, Los Angeles 12, California

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"Serving the water and power needs of 1,700,000 citizens"

*Special U. S. Census
as of Jan. 28, 1946

Los Angeles

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6. Room for plant expansion and decentralization
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10. Accessibility to the store-house of raw materials in the West and the Far East

Los Angeles



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1st IN YOUR INDUSTRIAL FUTURE

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Title

2. ATTACH TO COMPANY LETTERHEAD

3. MAIL TO:

DEPARTMENT OF WATER AND POWER
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LOS ANGELES 12, CALIFORNIA

SEND
THIS
COUPON
TODAY

CME

DO YOU NEED A BETTER REFRACTORY?

● Corhart Electrocast Refractories are high-duty products which have proved considerably more effective than conventional refractories in certain severe services. If your processes contain spots where a better refractory is needed to provide a balanced unit and to reduce frequent repairs, Corhart Electrocast Refractories may possibly be the answer. The brief outline below gives some of the basic facts about our products. Further information will be gladly sent you on request.

Corhart Refractories Company, *Incorporated*, Sixteenth and Lee Streets, Louisville 10, Kentucky.

"Corhart" is a trade-mark, registered U. S. Patent Office.

PRODUCTS

The Corhart Refractories Company manufactures Electrocast refractory products exclusively. Corhart Electrocast Refractories are made by melting selected and controlled refractory batches in electric furnaces and casting the molten material into molds of any desired reasonable shape and size. After careful annealing, the castings are ready for shipment and use.

Three Electrocast refractory compositions are commercially available:

CORHART STANDARD ELECTROCAST—a high-duty corundum-mullite refractory, with density of approximately 183 lbs. per cu. ft.

CORHART ZED ELECTROCAST—a high-duty zirconia-bearing aluminous refractory, with density of approximately 205 lbs. per cu. ft.

CORHART ZAC ELECTROCAST—a high-duty zirconia-bearing refractory, with density of approximately 220 lbs. per cu. ft.

Other Corhart products are:

CORHART STANDARD MORTAR—a high-temperature, high-quality, hot-setting cement for laying up Electrocast, or any aluminous refractory.

CORHART ACID-PROOF MORTARS—rapid cold-setting, vitrifiable mortars of minimum porosities.

CORHART ELECTROPLAST—a high-temperature, hot-setting plastic refractory, designed for ramming and made from crushed Standard Electrocast.

CORHART ELECTROCAST GRAINS—Standard Electrocast crushed to desired screen size for use in many commercial applications.

PROPERTIES

Due to the unique method of manufacture, the Electrocast refractory line possesses a combination of characteristics found in no other type of refractory. Data on properties will be sent on request.

POROSITY: Apparent porosity of Corhart Electrocast refractories is practically nil—therefore virtually no absorption.

HARDNESS: 8-9 on Mineralogist's scale.

THERMAL EXPANSION: Less than that of conventional fire clay bodies.

THERMAL CONDUCTIVITY: Approximately one and one-half times that of conventional fire clay bodies.

REFRACTORINESS: Many industrial furnaces continuously operated up to approximately 3000° F. are built of Corhart Electrocast.

CORROSION: Because of exceedingly low porosity and inherent chemical compositions, Corhart Electrocast refractories are resistant to corrosive action of slag, ashes, glasses, and most non-ferrous metals as well as to disintegrating effects of molten electrolyte salt mixtures.

APPLICATIONS

Most heat and metallurgical processes present spots where better refractory materials are

needed, in order to provide a balanced unit and reduce the expense of repeated repairs. It is for such places of severe service that we invite inquiries regarding Corhart Products as the fortifying agents to provide the balance desired. A partial list of applications in which Corhart Electrocast products have proved economical follows:

GLASS TANKS—entire installation of sidewalls and bottoms, breastwalls, ports, ruckstones, throats, forehearths, bushings, bowls, recuperators, etc., for lime, lead, opal and borosilicate glasses.

ELECTROLYTIC CELLS—for production of magnesium and other light metals.

SODIUM SILICATE FURNACES—sidewalls, bottoms, and breastwalls.

PIGMENT FRIT FURNACES—complete tank furnaces for melting metallic oxides and salts for pigment manufacture.

ALKALI AND BORAX MELTING FURNACES—fast-eroding portions.

BOILERS—clinker line.

RECUPERATORS—tile, headers, separators, etc.

ENAMEL FRIT FURNACES—flux walls and bottoms.

BRASS FURNACES—metal contact linings.

ELECTRIC FURNACES—linings for rocking type and rammed linings of Electroplast for this and other types.

NON-FERROUS SMELTERS—complete hearths, sidewalls, and tapping hole portions.



CORHART ELECTROCAST REFRACTORIES

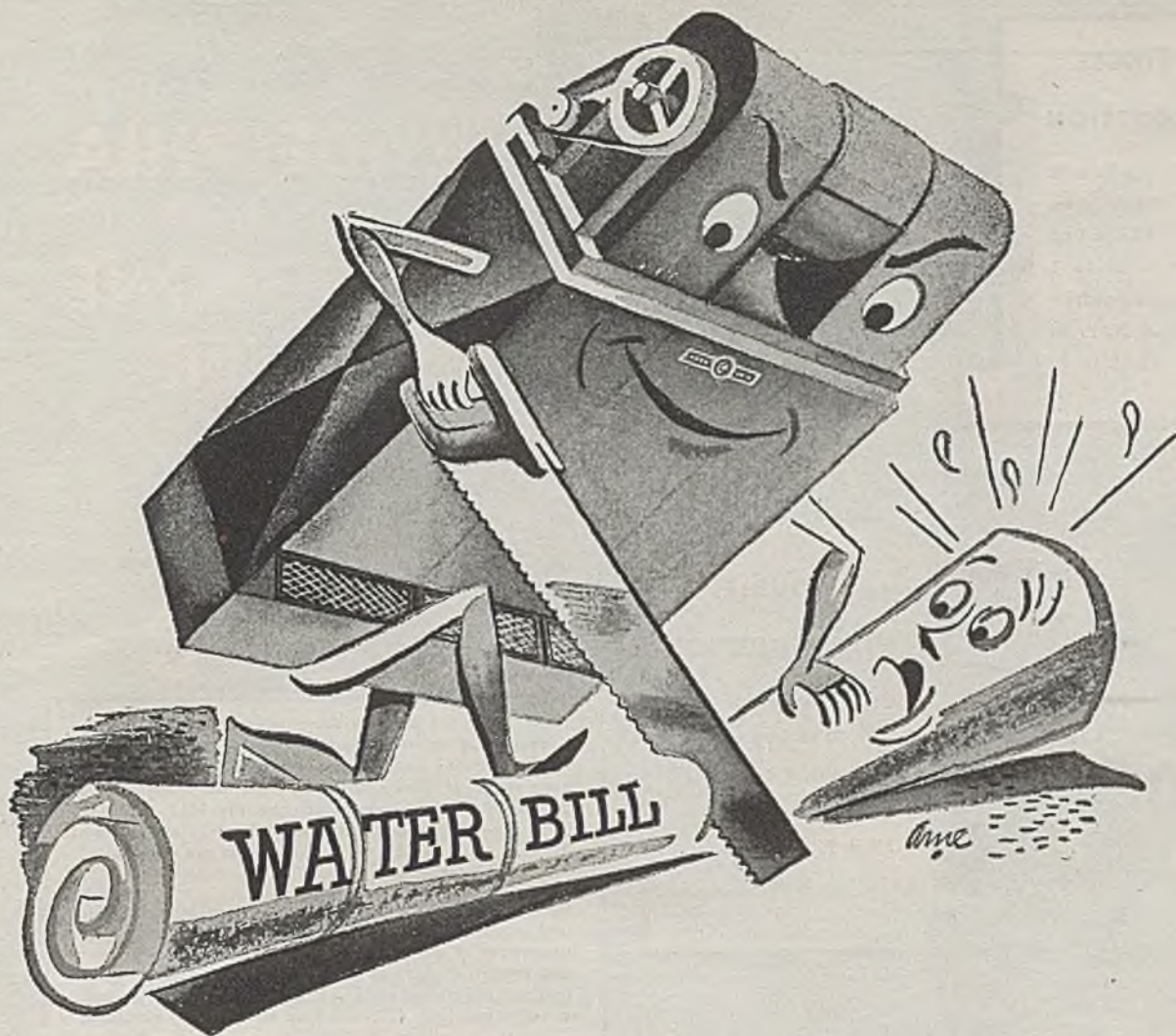


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plate work . . . for nearly half a century

HAMMOND designs, fabricates and erects tanks of all types
for liquid and dry storage . . . high or low pressure . . .
cone roof . . . breather . . . floating roof . . . vapor-lift . . .
sphere . . . spheroid . . . underground . . . gas holder . . . also vessels
of all types and designs for the Petro-Chemical industries.

HAMMOND IRON WORKS • WARREN, PA.
NEW YORK • BOSTON • PITTSBURGH • AKRON • CLEVELAND • DETROIT



Cut Water Bills up to 97% with a G-E Evaporative Cooler

THROUGH recirculating cooling water in a closed system, a G-E Evaporative Cooler can often cut water bills up to 97%.

To dissipate up to 240,000 BTU per hour a conventional shell and tube cooler might require an average of forty-seven gallons per minute. *A G-E Evaporative Cooler consumes only ONE gallon per minute to do the same job.*

Plus these other advantages

Since its closed system permits economical use of treated water, a G-E

Evaporative Cooler can reduce maintenance costs due to impurities. The danger of immediate shut-down through water failure is minimized, too, since so little make-up water is required.

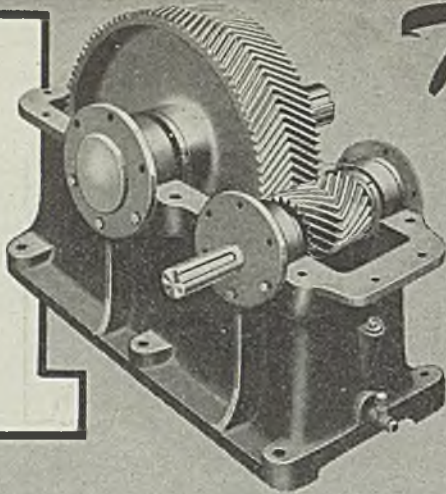
For G-E Evaporative Coolers available for your specific needs, consult your G-E distributor. He's listed under "Refrigeration Equipment" in your Classified Telephone Directory. *General Electric Co., Air Conditioning Dept., Section 6693, Bloomfield, New Jersey.*

GENERAL ELECTRIC

Industrial Refrigeration

**SINGLE
REDUCTION**

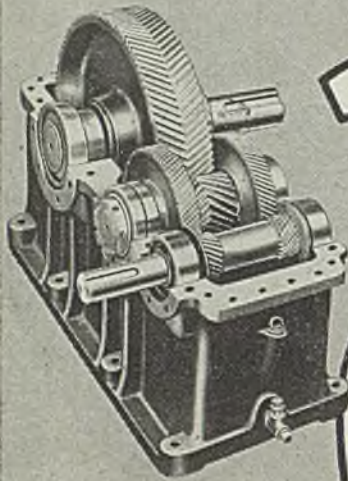
Standard Ratios from 1.75 to 1 up to 10 to 1
Ratings from .8 H. P. to 2820 H. P.



There's a...
PHILADELPHIA
continuous tooth
**HERRINGBONE
REDUCER**

for
**every possible
requirement—**

1-2-3



**DOUBLE
REDUCTION**

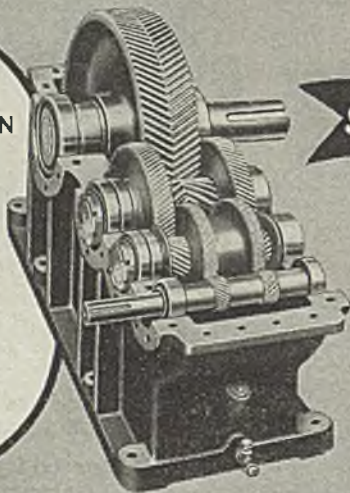
Standard Ratios
10 to 1 up to
69 to 1. Rat-
ings from
.52 H. P. to
1200 H. P.

These Units are built in three general classes, single, double and triple reduction types, determined by the number of gear trains used. Each type covers a wide range of sizes and ratios. From this complete line practically any equipment can be provided with the right operating speed, as standard ratios range from 1.75 to 1 up to 320 to 1. These units are also suited for speed increasing.

Helical and herringbone type gears give high capacity and efficiency with smooth tooth action. Symmetrical arrangement of gears reduce shaft stresses and eliminates end thrusts. Pinions are heat treated alloy steel, gears heat treated carbon steel. All shafts are mounted on ball or roller bearings. Efficiencies up to 98% are obtained.

**TRIPLE
REDUCTION**

Standard Ratios 60 to 1 up to 320 to 1. Ratings from .19 H.P. to 555 H.P.



send for catalog H-39

Other outstanding features of these units are explained in our catalog H-39. Write for a copy on your business letterhead.



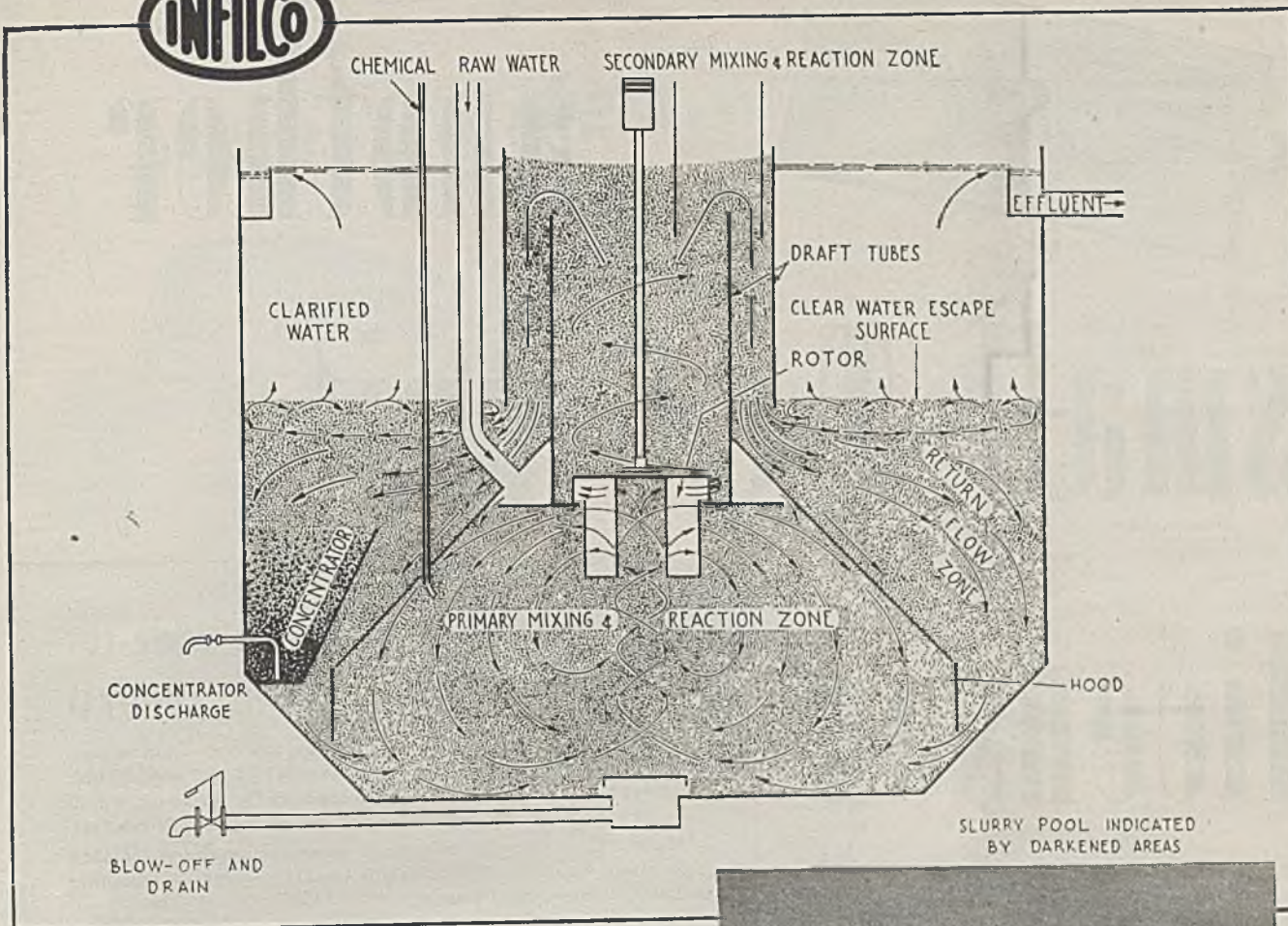
Philadelphia
GEAR WORKS INCORPORATED

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO . . . IN CANADA: WILLIAM AND J. G. GREY LIMITED, TORONTO



**Industrial Gears and Speed Reducers
LimiTorque Valve Controls**



SLURRY POOL INDICATED BY DARKENED AREAS

One compact unit combines all steps in water pre-treatment

A product of Infilco research.

Here's a departure in water treating methods that will amaze you. It's rapidly becoming the standard method. It's the Infilco ACCELATOR. As to performance . . . the ACCELATOR pictured above pre-treats 1500 gallons of water per minute—in one-fifth the space needed by a conventional plant of equal capacity. Performance is equally as spectacular for ACCELATORS of all capacities.

This tested method, the ACCELATOR method, was developed by Infilco research to combine the functions of rapidmix, coagulation and sedimentation. But the ACCELATOR does this and more.

Based on the principle of continuous re-circulation of chemicals and water, ACCELATOR treatment is always uniform. Chemicals are used sparingly and



Typical ACCELATOR installation. This unit softens 2.2 million gallons of water daily.

effectively. Water reaches equilibrium in a matter of minutes—often eliminating the need for recarbonation. And there's no need for auxiliary sludge thickeners—with the ACCELATOR sludge removal is continuous and automatic.

Used for softening . . . clarifying . . . stabilizing, ACCELATORS are regularly reported to produce results superior to those obtained with conventional type plants. Write for your copy of the *What, How and Why of the Accelerator*. INFILCO INC., 325 West 25th Place, Chicago 16, Illinois.

CONSULT **INFILCO** — FIRST IN WATER AND TRADE WASTE TREATMENT



... another

small TCC unit

licensed

by

Houdry!

New Lion unit will process wide-cut sour stocks over synthetic catalyst

Lion Oil Company, of El Dorado, Arkansas, has contracted to construct the 70th Houdry-licensed cat-cracker, a TCC unit of 4500 bbl. fresh-feed capacity, with additional capacity for recycling. It will process sour stocks of wide boiling range, over synthetic catalyst.

Naturally, in planning this major post-war improvement, Lion considered the merits of all catalytic cracking processes. Weighing heavily in favor of TCC were:

- its demonstrated ability to handle heaviest charging stocks;
- the extremely small additional capital required for corrosion protection, assuring maximum profit from the processing of low-cost, high-sulfur crudes;
- built-in recycling, permitting variation at will of product distribution according to seasonal demands—optimum yields of motor gasoline for the warmer months, proportioned production of distillate heating oil for winter.

The small TCC unit is not an engineering "guinea pig," but a well-proved design which has been engineered from the ground up, with the same basic design features of the larger commercial TCC plants. Economics, not expediency, have guided its basic planning—have made TCC the catalytic cracking process most favored by operators of small refineries. In cost per ton of steel used in construction, in cost per barrel of high-octane gasoline produced and by other equally decisive standards, the small TCC unit will compare favorably with the catalytic cracking operations of major companies. Details will be furnished gladly to interested refiners.

HOUDRY PROCESS CORPORATION WILMINGTON, DEL.

New York Office: 115 Broadway, New York 6
Houdry Catalytic Processes and the TCC Process are available through the following authorized firms:

E. B. BADGER & SONS CO.
Boston, Massachusetts

THE LUMMUS COMPANY
New York City, New York

BECHTEL-McCONE CORP.
Los Angeles, Calif.



users like them..

**for their
extra strength
and ease of cleaning**



Where shipping requirements demand durability, strength and ease of cleaning . . . you'll find the Hackney Removable Head Seamless Steel Barrel. This sturdy container is made from a single sheet of open-hearth steel, pressed and cold-drawn into a seamless shell with integral bottom. It is bilged to shape by the Hackney Method, increasing its rigidity and making it more resistant to blows and abuse.

This bilged shape makes the Hackney Barrel easy to handle, too—while the Toggle-tite or Bolt closure permits easy, quick opening and closing of the removable head. With such outstanding features, it is only natural that Hackney Removable Head Barrels should be first choice with shippers for the transportation and storage of paints, varnishes, inks, chemicals, greases, soaps, etc. Be sure to write for full details—and see how your handling and shipping can be improved, too.

The Hackney Barrel above is equipped with bolt-type closure. This single bolt of alloy steel results in a strong, rigid closure—easily and quickly operated with speeder wrench. Cadmium plating prevents rusting.

Barrel Cover at right illustrates the Hackney Toggle-tite closure. The handle permits quick opening and closing. When handle is in closed position, barrel is locked positively air-tight. Closing mechanism is cadmium plated to prevent rusting. Rolling or stacking is not interfered with by locking mechanism.



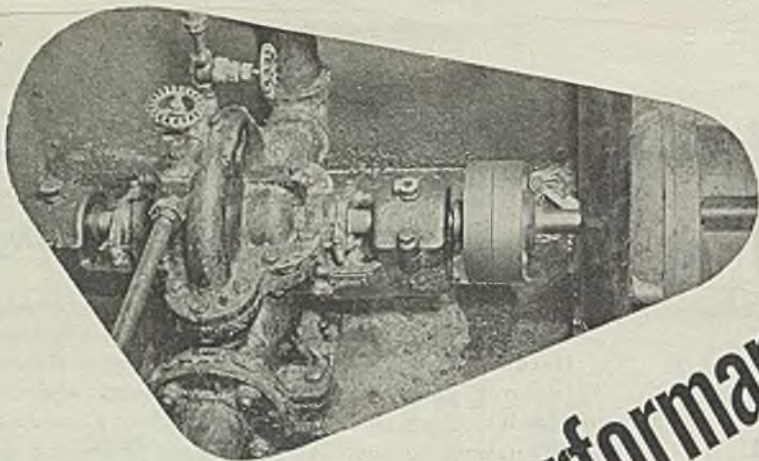
Pressed Steel Tank Company

Manufacturers of Hackney Products

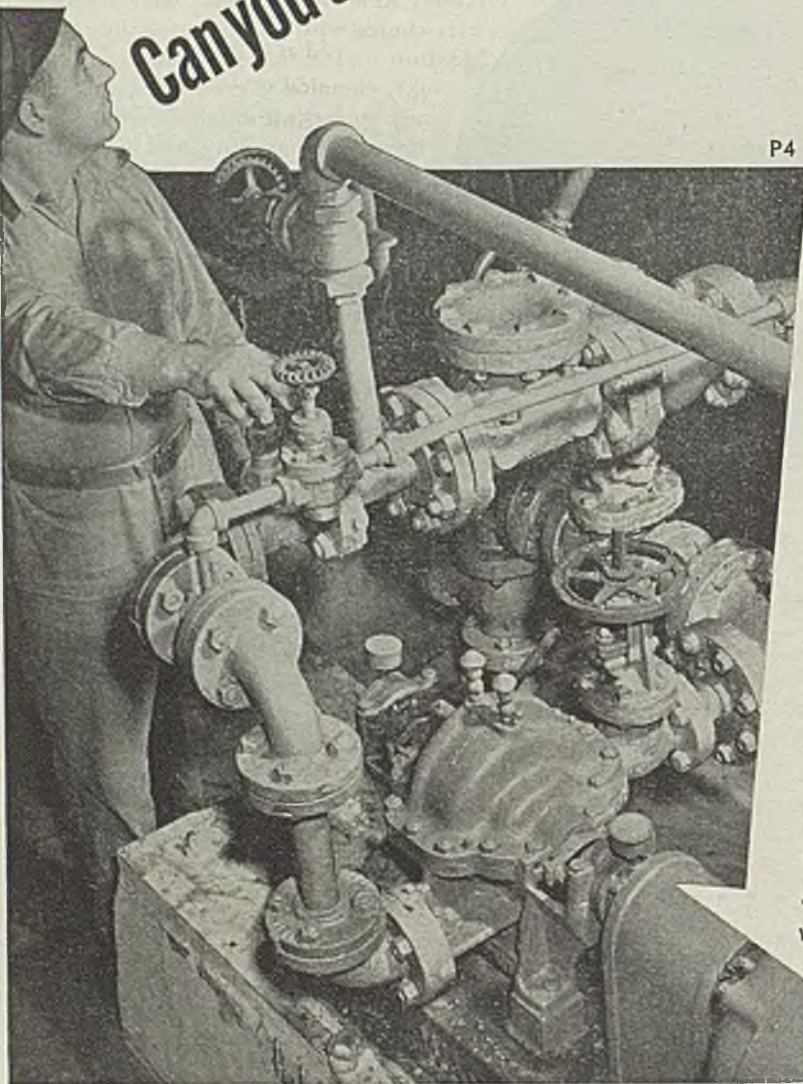
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1325 Vanderbilt Concourse Building, New York 17 208 South LaSalle St., Room 2070, Chicago 4
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CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

CHEMICAL & METALLURGICAL ENGINEERING • JUNE 1946 •



Can you top this Performance?



P4

THE PHENOLITE COMPANY
 Successors of the National Phenolite Pipe Co.
 WILMINGTON • DELAWARE

PHENOLITE
 Kennett Square, Pa.
 February 7, 1946

Warren Single Stage Pump Company, Inc.
 Warren, Massachusetts

Gentlemen:

In reply to your letter of February 7, 1946, it will be O.K. for you to use the photograph of the Warren pumps in service at the Phenolite plant in your advertising material.

The Well Water pump has been in continuous service since 1933, and has given us excellent, uninterrupted service. This pump is operated 24 hours a day, 7 days a week and our only maintenance has been an occasional packing. This excellent record proves that a Warren pump is the pump for a tough job.

We manufacture laminated plastic in sheets, rods, tubes and special shapes under the trade name of Phenolite. Our product is used in all industries where good electrical, mechanical or chemical qualities are needed.

If we can be of any further assistance, do not hesitate to call on us.

Yours very truly,
 THE PHENOLITE COMPANY
John Bishop
 John Bishop
 Eng'g.

28 (10)

175,200 trouble-free pumping hours

This is the record set up by a Warren Single Stage, Double Suction, Centrifugal Pump at the plant of The Phenolite Company, Kennett Square, Pa. This is based upon twenty years of continuous 24-hours-a-day, 7-days-a-week service. The pump, of necessity, is located in a pit 10 feet in depth, with six inches of water in the bottom and plenty of moisture on the side-walls. A tough job, requiring a tough pump . . . and yet over this long period the user says the only maintenance has been an occasional packing! Other Warren Pumps at Phenolite, and elsewhere, are performing equally well.

If your pumping problem involves General Water Service, Boiler Feed, Paper Mill Services, Process, Dewatering, Condensate Return, Oil Handling, Hydraulic Pressures . . . or other services, your inquiry will receive prompt attention.

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASS.

Atlanta Boston Chicago Cleveland Houston Hartford
 Indianapolis Los Angeles Minneapolis New Orleans New York
 Philadelphia Pittsburgh Richmond San Francisco Seattle

For greater dependability, longer life, lower maintenance

WARREN PUMPS

FEATURED CHEMICALS in the PFIZER FAMILY

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 Iron Gluconate
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 Itaconic Acid
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 —and many other chemicals

no. 1 in a series:

CITRIC ACID



Whether it's to be used as a food, a beverage, a pharmaceutical or an industrial chemical, Pfizer citric acid is a "known quantity." It offers known *quality*, reflecting the many major advances contributed by its makers to its development.

Research at Chas. Pfizer & Co., Inc. has changed the commercial history of this versatile organic acid.



It has widened citric acid's industrial usefulness by reducing the cost of preparation and by developing domestic sugar as a raw material instead of foreign lemon and lime juice concentrates.

The same thoroughness which made possible these citric acid advances is now applied to the accurate control of the product in manufacture.

The technical skill of a well-trained staff is combined with care consistently exercised in every operation. The result is a high degree of uniformity

and purity that can be relied upon safely by citric acid buyers everywhere — and by users of each one of the more than a hundred Pfizer products. Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 West Grand Ave., Chicago 10, Ill.; 605 Third Street, San Francisco 7, Cal.



PFIZER

Manufacturing Chemists Since 1849



HOW VARIABLE-SPEED INDIVIDUAL ROLL DRIVE MULTIPLIES TESTABILITY IN THIS LABORATORY MILL

Powered by individual 5 HP variable-speed motors (1), each roll (2) of this Farrel-Birmingham 6" x 13" laboratory mill can be run at speeds varying from 25 to 60 RPM. This multiplies the test-making ability of the mill by making possible a wide range of roll friction ratios . . . from even speed to 2.4 to 1.

Whatever combination of roll speeds is desired can be obtained simply by manipulating the separate motor speed controls (3) mounted on the front of the mill. Roll RPM is shown on easily visible tachogenerator indicators (4). Each motor also has push button control (5) for start, stop and reverse. Either stop button will stop both motors.

Other details of design include precision ground, hard chilled iron rolls, accurately bored for uniform heating or cooling . . . front roll adjustment by worm, worm wheel and hand ratchet (6) . . . and safety throwout which may be operated by both knee action (7) and overhead bars (8) from either side of the mill.

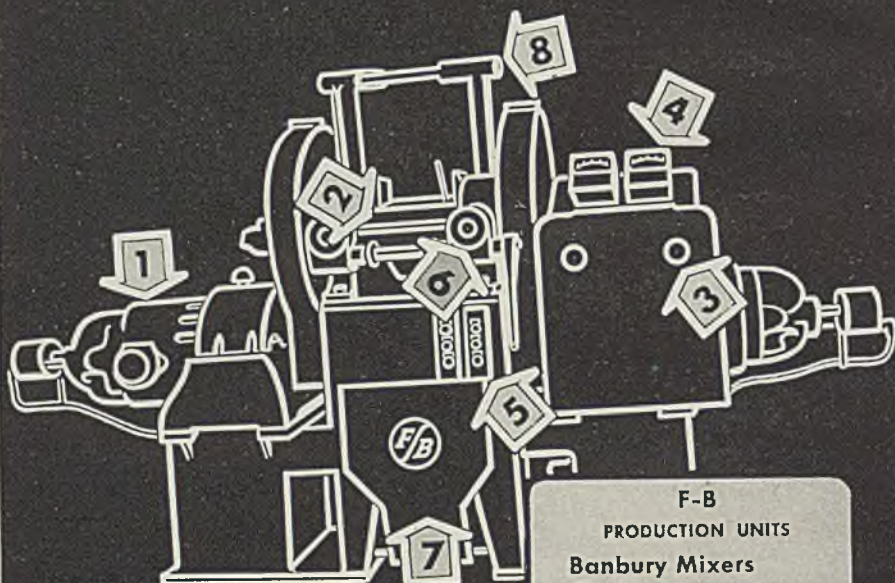
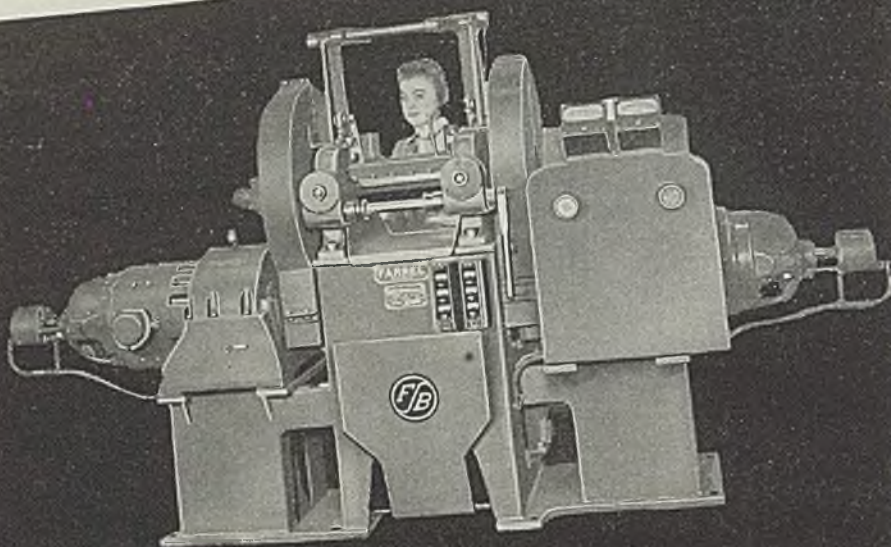
FB-302

**FARREL-BIRMINGHAM
COMPANY, INC.**

ANSONIA, CONNECTICUT

Plants: Ansonia, Derby and Stonington, Conn.,
Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York,
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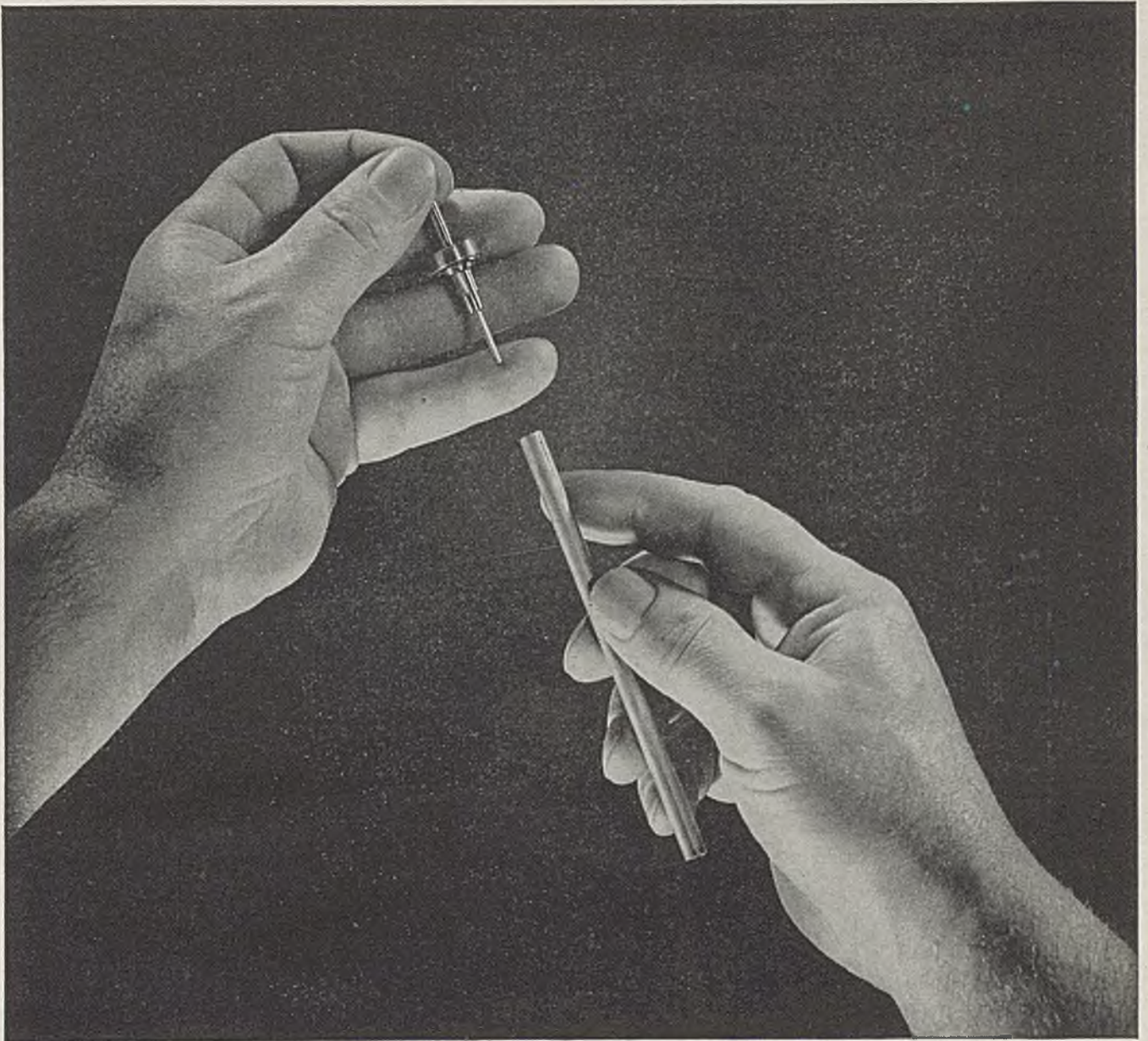
F-B

PRODUCTION UNITS

Banbury Mixers
Plasticators
Pelletizers
Mixing, Grinding,
Warming and
Sheeting Mills
Bale Cutters
Tubing Machines
Refiners
Crackers
Washers
Calenders
Hose Machines
Hydraulic Presses
and other equip-
ment for processing
rubber and
plastic materials.

Other sizes and types of laboratory mills are designed and built to suit individual needs. Farrel-Birmingham engineers will be glad to help you select the correct mill for your purpose. Feel free to call on them at any time, without obligation.

Farrel-Birmingham



What . . . roller expand heat exchanger tubes this small?

A watchmaker's job? You might call it that. Roller expanding $\frac{1}{4}$ and $\frac{3}{8}$ inch tubes into tube sheets is a delicate operation . . . *does* require careful control and extraordinary skill.

But Ross is known for such leadership . . . not only in roller expanding tubes, but in the design and manufacture of the expanding tool itself. That's the very reason you have the same permanently tight tube joints in all Ross heat exchangers, large or small, regardless of the size and number of tubes.

Over 50,000 heat exchangers, with $\frac{1}{4}$ inch roller expanded tubes, have been built by Ross . . . and over 30,000 more with $\frac{3}{8}$ inch tubes for the U. S. Navy (to U. S. N. Spec. 66-C1).

Ross Heater & Mfg. Co., Inc., 1411 West Ave., Buffalo 13, N. Y. Division of American Radiator & Standard Sanitary Corp. In Canada, Ross equipment is manufactured and sold by Horton Steel Works Ltd. Fort Erie, Ontario.



PATTERSON-KELLEY
Heat Exchangers
AND
Process Equipment

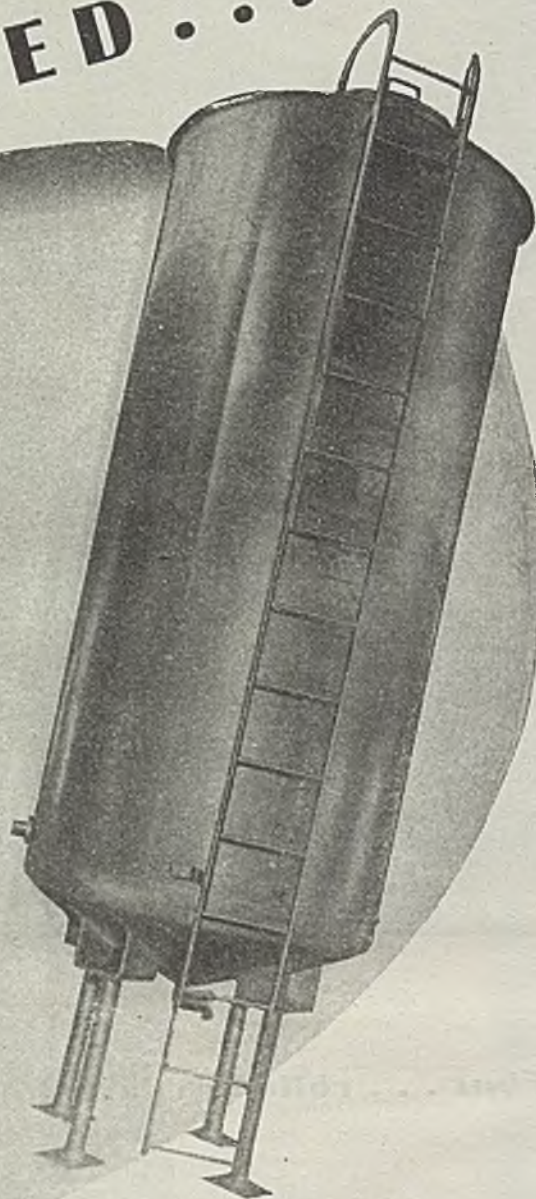
IF IT'S AN *Aluminum* UNIT YOU NEED...

We have two qualifications to offer in connection with aluminum equipment in the pressure vessel and heat-transfer group:

- 1...Years of pre-war as well as war experience with this useful metal.
- 2...Years of experience in the design as well as construction of many types of process units.

This combination is not too prevalent in the equipment manufacturing field. It is assurance to you that your equipment will be soundly constructed and that it will be properly designed, should you want the help of our engineers.

Considering that we are well-experienced with aluminum and know heat transfer equipment and pressure vessels, why not call on Patterson-Kelley to help in connection with aluminum equipment you require for processing?



THE PATTERSON-KELLEY
Company, Inc.

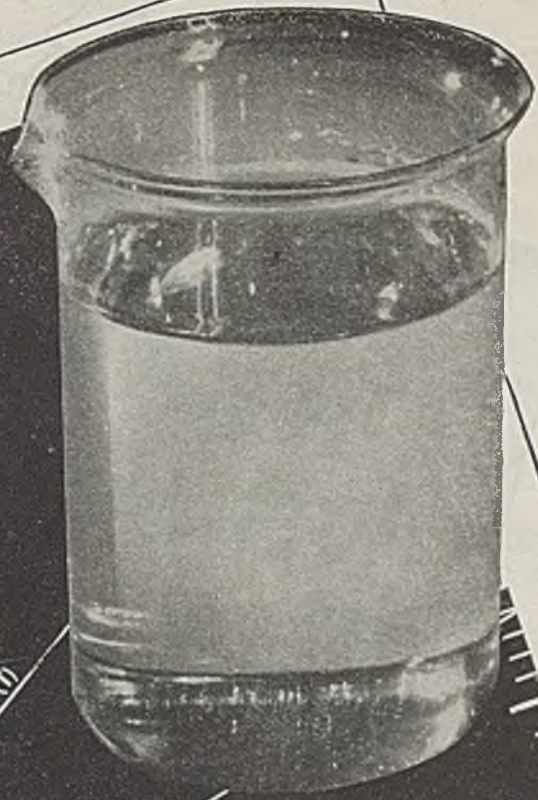
109 WARREN STREET, EAST STROUDSBURG, PA.

BOSTON 16, 96-A Huntington Avenue
PHILADELPHIA 3, 1700 Walnut Street

NEW YORK 17, 101 Park Avenue
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Representatives in All Principal Cities

Chemical Engineers Report



PERMUTIT DEMINERALIZING PROCESS

TO FIGURE DEMINERALIZING COST:

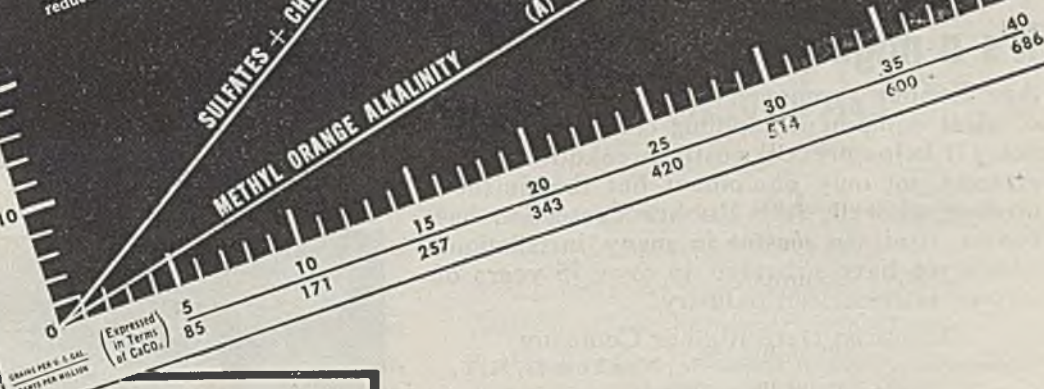
1. Read across to number of gpg (or ppm) alkalinity as CaCO₃ in raw water, up to A curve and read off cost at side.
2. Read across to number of gpg (or ppm) sulfates plus chlorides as CaCO₃ in raw water, up to T curve and read off cost at side.
3. Cost of Demineralizing = sum of results found in 1 and 2.

NOTE—The above curves are based on \$40 per ton each for sulfuric acid and soda ash. When bought in carload lots reduce accordingly to lowered costs.

Demineralizing Costs in Cents per 100 U. S. Gallons

SULFATES + CHLORIDES (T)

METHYL ORANGE ALKALINITY (A)



Big savings with this new kind of water

Do you use distilled water *sparingly*, because of high cost? Then you'll be interested in a new kind of water that's meant sharply *lowered* costs to former users of distilled.

Permutit[®] Demineralized Water is suitable for most applications for which distilled water is satisfactory. Yet the cost is a *fraction* of the cost of distillation!

In the Demineralizing process, Zeo-Karb[®] H, Permutit's acid-regenerated organic cation exchanger, removes metallic cations from the water, converting salts

present into corresponding acids. Then *these* acids are removed from the water by De-Acidite[®], a resin-type anion exchanger.

ION EXCHANGE—NEW UNIT PROCESS

Improved ion exchangers are, in fact, extending the range of usefulness of this Permutit process far beyond the field of water treatment. Chemists and chemical engineers now apply the principles to a variety of industrial processes, from purifying sugar to reducing the calcium content of milk.

Write for free bulletin, "Ion Exchangers for Industrial Processes." It may suggest applications of this new unit process in *your* field. Address The Permutit Company, Dpt. CM6, 330 West 42nd Street, New York 18, N. Y. or Permutit Co. of Canada, Ltd., Montreal.

*Trademarks Reg. U. S. Pat. Off.

PERMUTIT

WATER CONDITIONING HEADQUARTERS



With Ace Rubber Protection it's a mighty sound investment

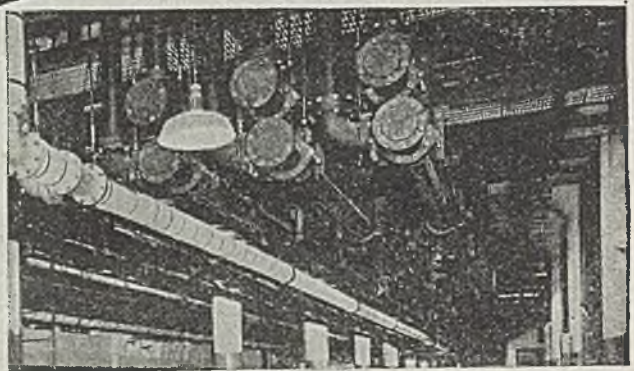
Ace Rubber Protection adds years to the life of plant equipment handling corrosives. In so doing it helps prevent costly breakdowns as it protects not only equipment but the finished product as well. Ace Rubber Protection has proven itself *on the job* in many installations which we have provided in over 75 years of service to American industry!

American Hard Rubber Company
 General Sales Office: 11 Mercer St., New York 13, N. Y.
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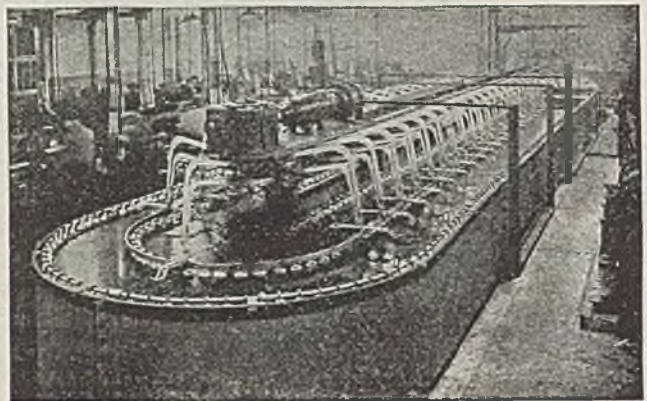


PLANT EXECUTIVES:

Write for free copy of 64 page handbook containing invaluable information about anti-corrosion equipment.



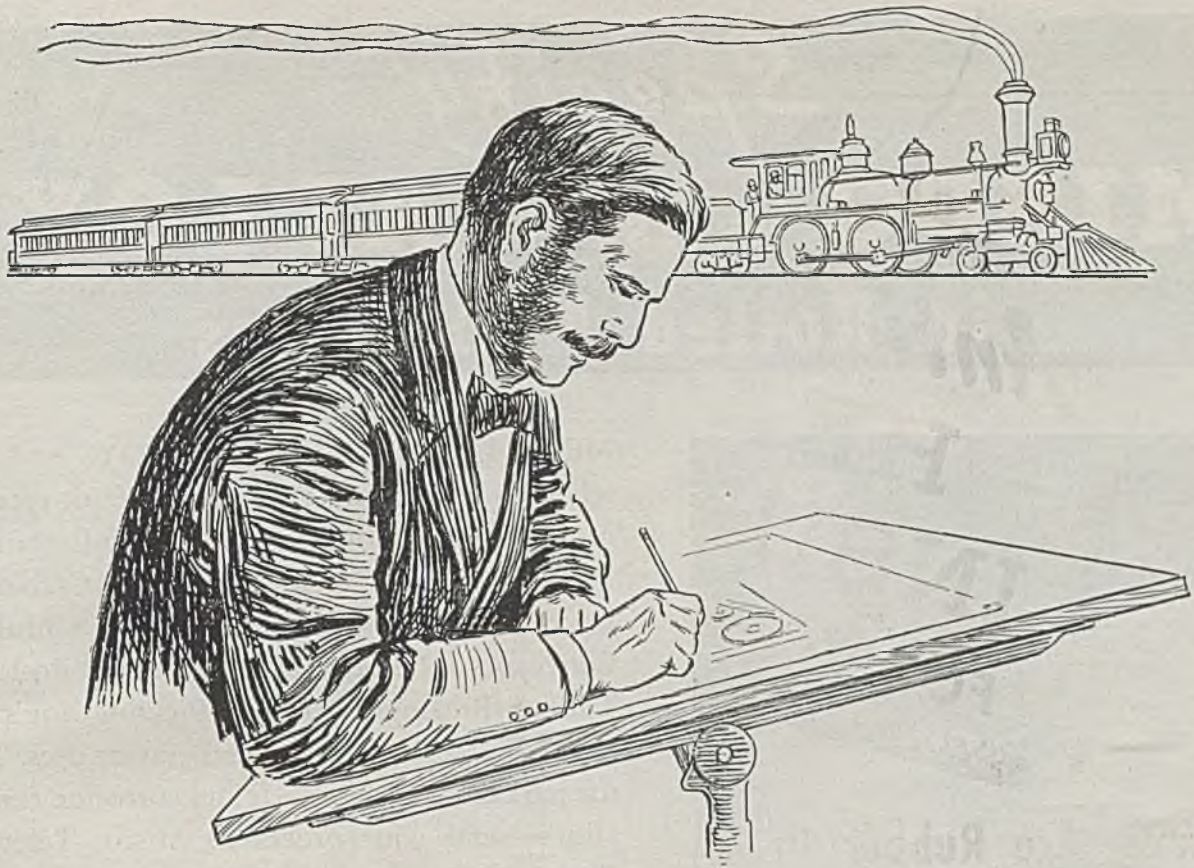
A partial view of an installation of over 12 miles of Ace Hard Rubber Pipe and Fittings, in sizes from 1½" to 8".



Ace Rubber lined return type plating tank

Ace Hard Rubber

*Hard and Soft Rubber Lined Tanks, Pipe and Fittings
 All-Hard Rubber Pipe, Fittings and Utensils
 Hard Rubber Pumps in a Wide Range of Sizes and Capacities
 Made-to-Specification Equipment—Hard Rubber and
 Hard Rubber Lined*



... Proved His Idea Workable

HIGH SPEEDS menaced life and limb when trains depended solely on slow-working hand brakes. Then to young George Westinghouse came the idea of translating the steam pressure that drove trains... into fast-acting air pressure that stopped them.

He *proved his idea workable* by building the first of the now-famous air brakes bearing his name... heralding a new era of safety and speed for America's railroads.

Conceiving new ideas... then proving them workable... is the very foundation of engineering advance, and the essence of activities at Kellogg's application-development laboratories.

*Engineered by the Kellogg Subsidiary—The Kellogg Corp.

By following this sound principle, Kellogg pre-tested and proved major phases of the government's wartime aviation gasoline program... and Kellogg pilot-plant data established with inflexible certainty the flexibility and efficiency of the Fluid catalytic-cracking process. And when time was of greatest importance, a similar technique aided the design and building of the atomic bomb plant, K-25*.

New processes—new ideas—of promising usefulness to the process industries are now under day-and-night test in Kellogg laboratories. When they are *proved* beyond a doubt, the facts will be presented to you.

THE M. W. KELLOGG COMPANY

Engineers and Economists to International Industry



225 Broadway, New York 7, N. Y. • Jersey City, N. J. • 609 South Grand Ave., Los Angeles, Calif. • Philtower Building, Tulsa, Okla. • 402 Esperson Building, Houston 2, Texas • Stone House, Bishopsgate, London EC2, Eng.

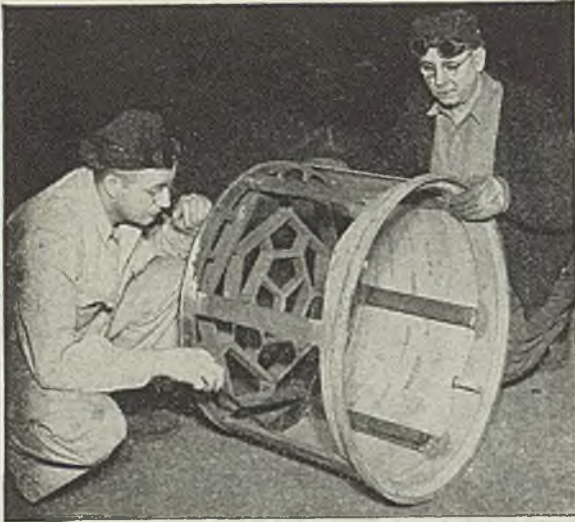
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389

Specify

MISCO HEAT RESISTING **ALLOYS**

in Rolled Mill Forms



MISCO HEAT RESISTING ALLOYS lend themselves to economical fabrication of pit type furnace baskets, as shown here, or for Gas Carburizing Fixtures • Trays • Annealing and Carburizing Boxes • Baskets • Enameling Racks • Muffles • Conveyors • Retorts • Thermocouple Protection Tubes • Brazing Furnaces • Pickling Equipment and Miscellaneous High Temperature uses. When the job calls for rolled heat and corrosion resistant alloys—send your orders to Misco. Telephone Fitzroy 1545—Detroit, Michigan.

Use our Warehouse Stocks of:

MISCO METAL

35 Nickel—15 Chromium—Type 330

MISCO K

25 Chromium—20 Nickel—Type 310

MISCO B

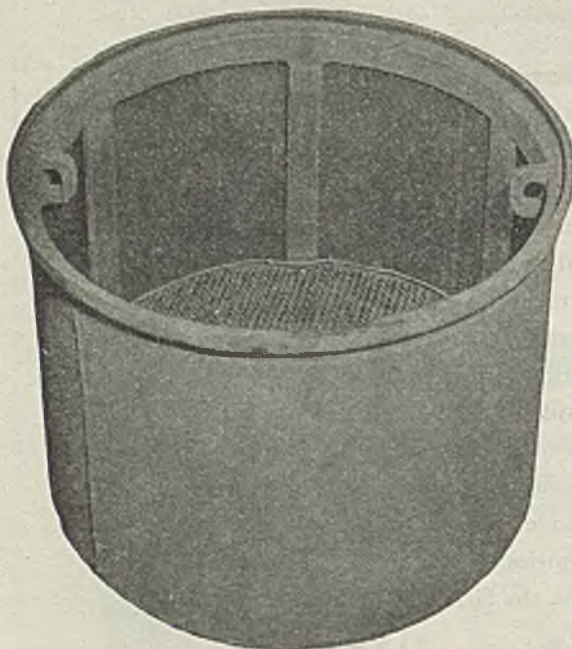
25 Chromium—12 Nickel—Type 309

Sheet ——— Plate —————

Rounds ● Squares ■

Hexagons ◆ Flats ———

Angles L Pipe ○ Channels U



Gas and Arc Welding Rods, plain and coated, in Types 330-309-310-312-316-308-430-446.

Monthly inventory lists available on request.

ROLLED PRODUCTS DIVISION

Michigan Steel Casting Company



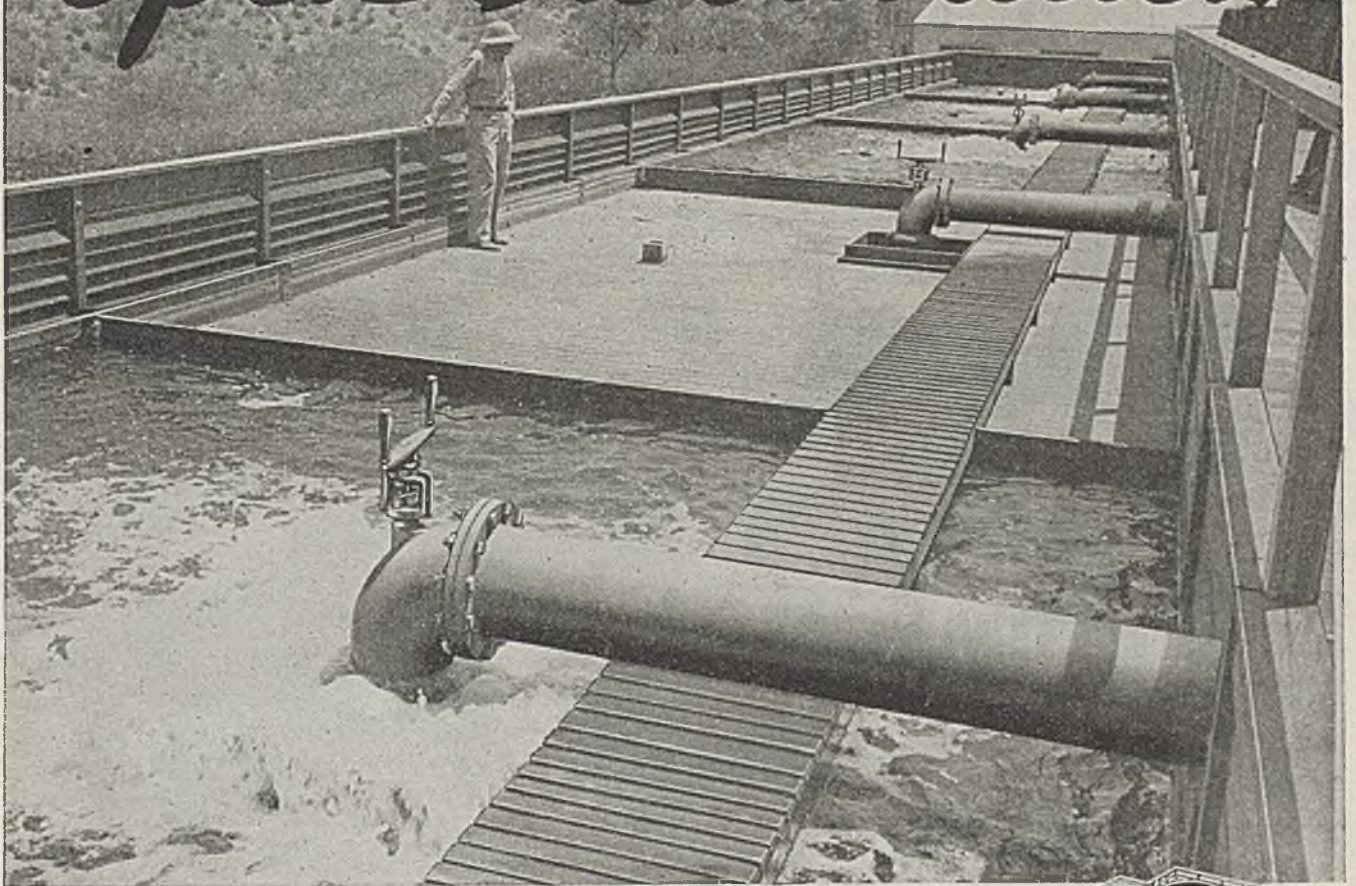
One of the World's Pioneer Producers of Heat and Corrosion Resistant Alloy Castings

1999 GUOIN STREET • DETROIT 7, MICHIGAN

MARLEY

SECTIONAL CONTROL

Open Distribution



Only Marley DOUBLE-FLOW TOWERS provide exposed, gravity flow distribution with all these advantages:

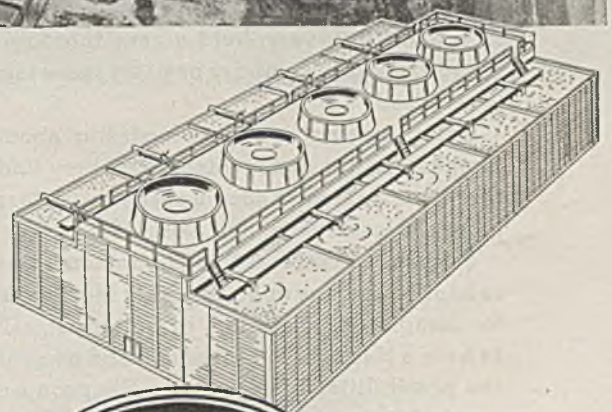
Full Accessibility for inspection or cleaning of any cell or part of any cell—no shut-down.

Eliminates inaccessible small distribution arms or troughs that clog and require replacement.

Operating Flexibility—Water flow readily controlled from full capacity to any desired minimum over each cell.

Adaptability to side or end inlet piping connections at no extra cost.

Lowers Pumping Head by reducing height of water lift and eliminating forced distribution.



MARLEY COOLING TOWERS

THE MARLEY COMPANY, INC. • KANSAS CITY 15, KANSAS

no other
method...

will mix and blend
dry, semi-dry or
pasty materials...

as uniformly
and quickly...

as *Mulling*
in a **SIMPSON**

The kneading, smearing action of the heavy Simpson mullers, traveling with a forward, sideways motion, produces a more uniform mixture, faster than by any other known method. This Simpson principle of mixing by "mulling" has been used to advantage in practically every field where thorough blending of dry, semi-dry or pasty materials is required.

Users are not only enthusiastic about Simpson better, faster mixing but they find that their mixing is accomplished with less labor, in less space, and with less power.

Simpson mixers are made in ten sizes to handle batches up to 50 cubic feet. Write for complete information, or better yet, ask to have a National Engineer call and go over the possibilities of applying a Simpson on your mixing applications.



SIMPSON-MIXED PRODUCTS INCLUDE

Asbestos Cements—Boiler Compounds—Catalysts—
Ceramic Tile—Chemicals—Clays—Crucibles—Feeds
—Fertilizers—Food Products—Glass Batching—
Graphite Products—Mercury Reclamation—Paint
Pastes—Plastics—Pharmaceuticals—Porcelain
Enamel Frit—Powdered Metals—Refractory
Cements—Soaps—Steatite—Storage Battery Pastes

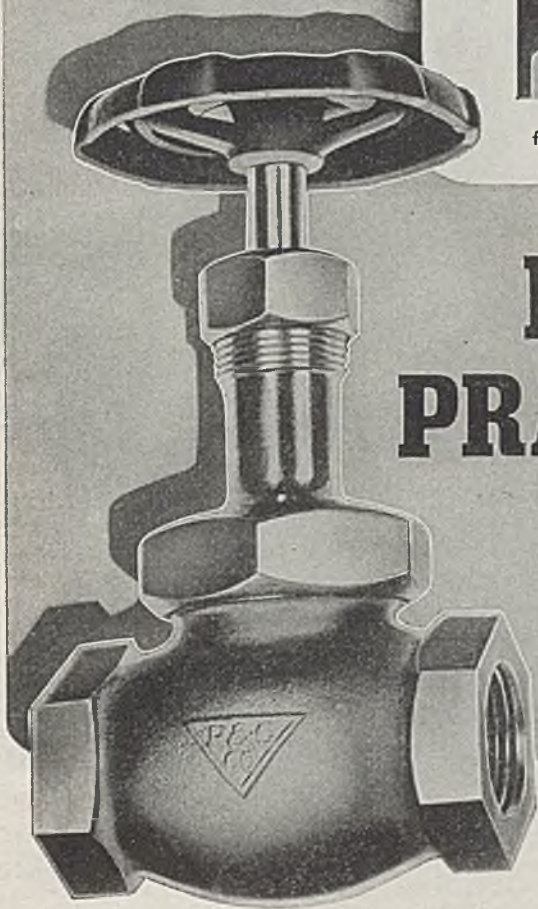
WRITE FOR THE NATIONAL CHEMICAL
AND PROCESS CATALOG




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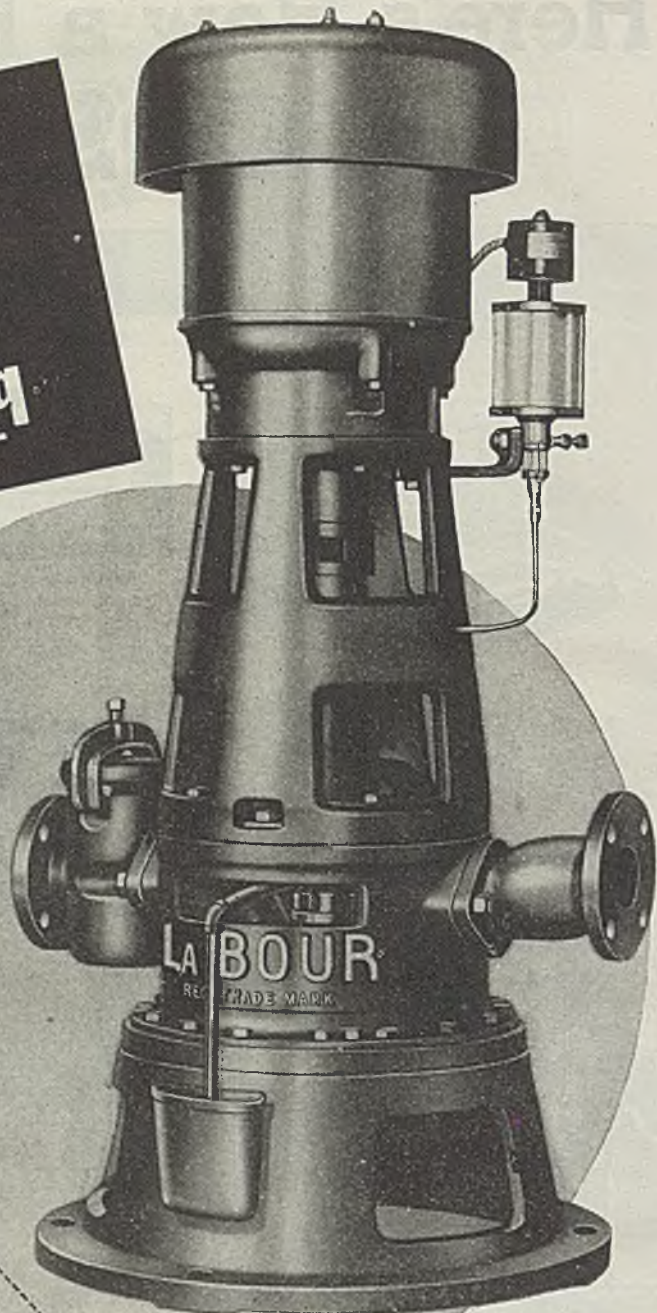
It's more efficient—pumps more liquid per unit of power input than any previous LaBour self-priming pump, and they were recognized everywhere as tops in the industry.

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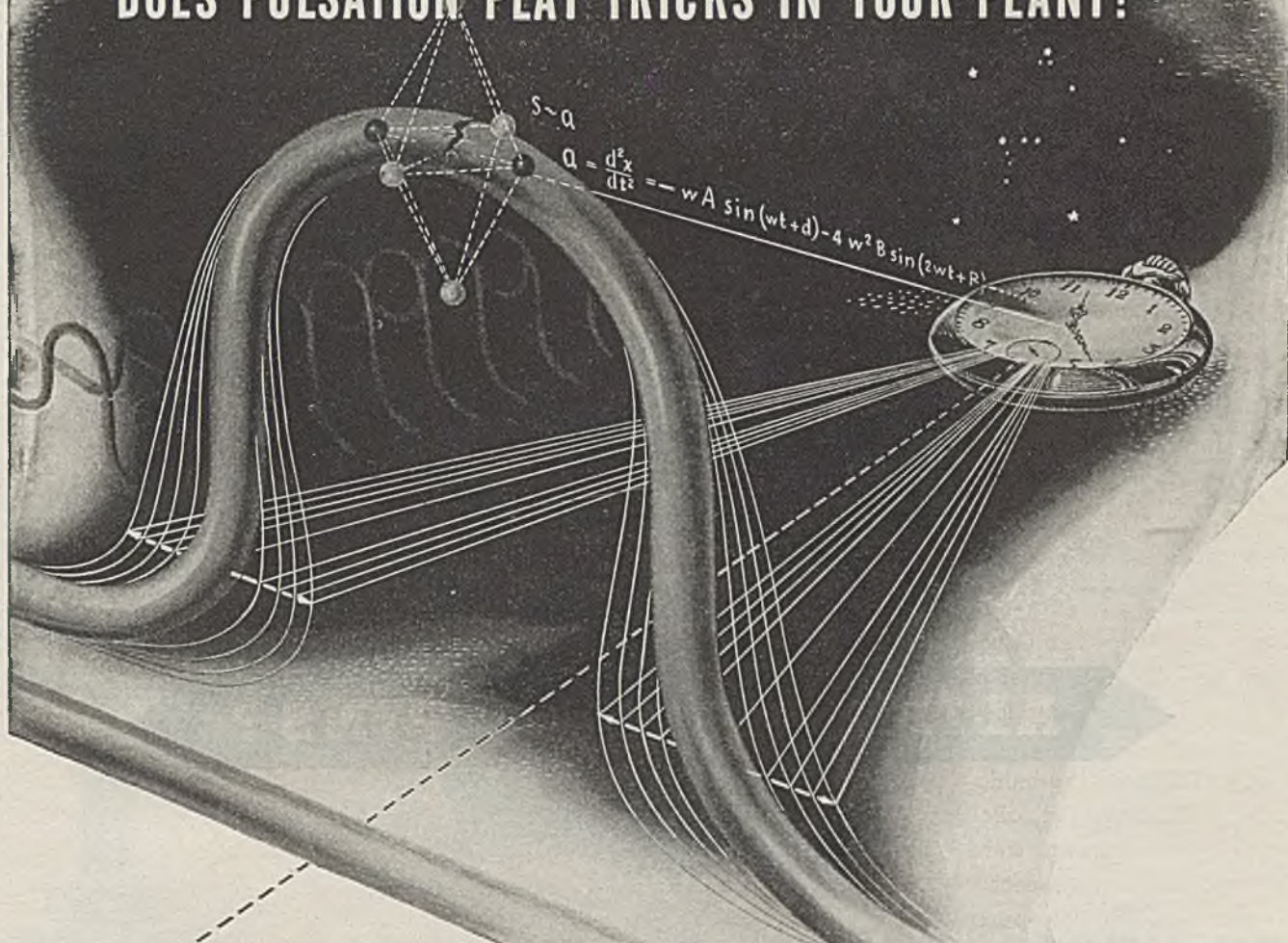
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Western Electric, manufacturing branch of the Bell System, applied the new science to its large-scale production. In war, it was used by industrial and government agencies of the United Nations in establishing and maintaining standards for military matériel. A Quality Assurance Department, a novelty back in the nineteen-twenties, has come to be indispensable to almost every important manufacturer.

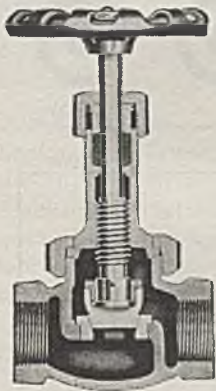
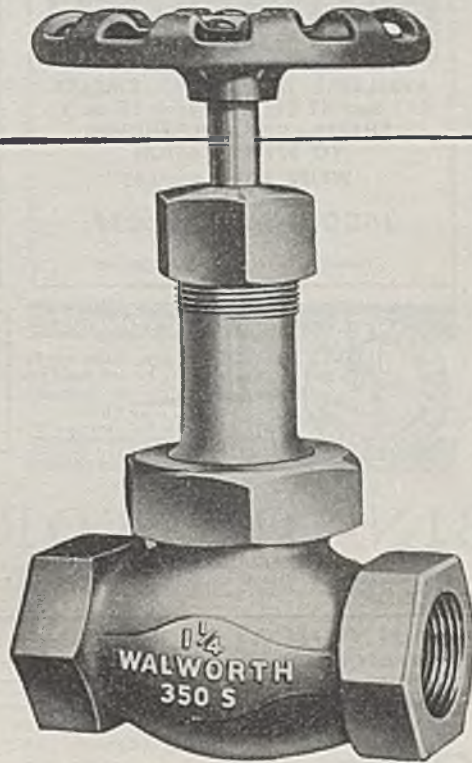
Scientific quality control is one of many Bell Laboratories' ideas that have born fruit in the Bell System. The application of mathematics to production helps good management all over the industrial world — and furthers the cause of good telephone service.



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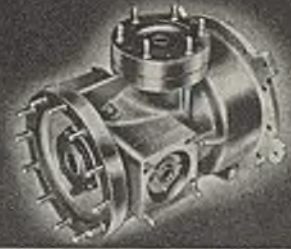
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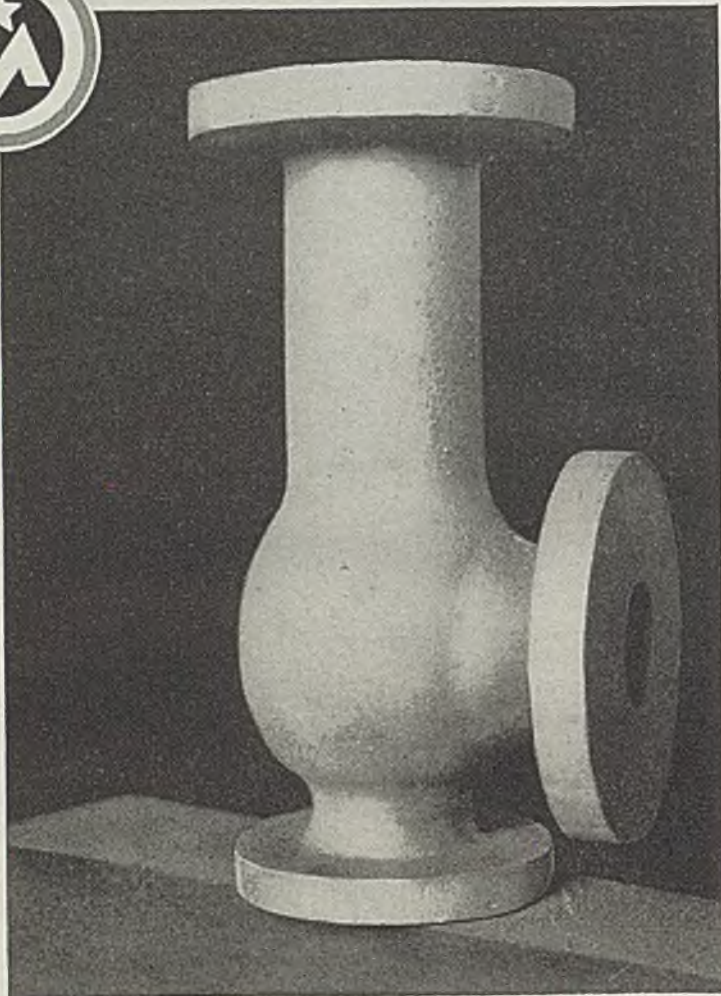
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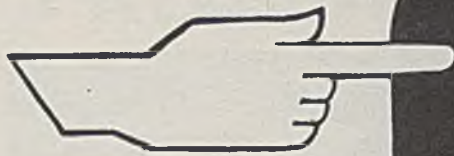
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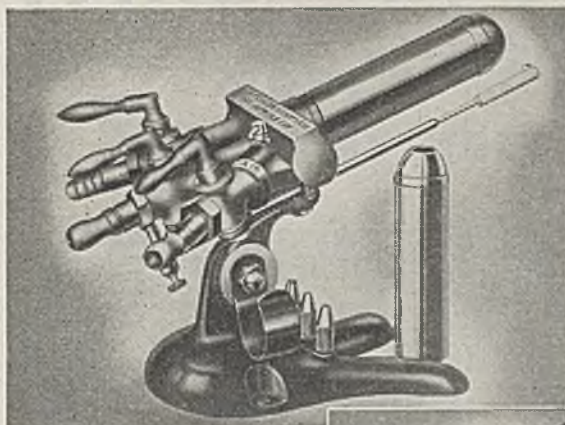
If fabricating difficulties in the past deterred your engineers from using stainless steel to solve your corrosion and heat problems, pass the word along that new techniques and skills are now yours at Solar... and stainless *can* be used to solve almost any of these problems. Consult Solar about *longer lasting* stainless parts (or equipment) that will save you money.

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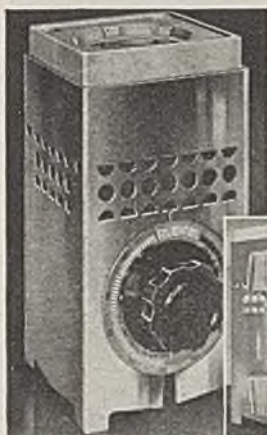
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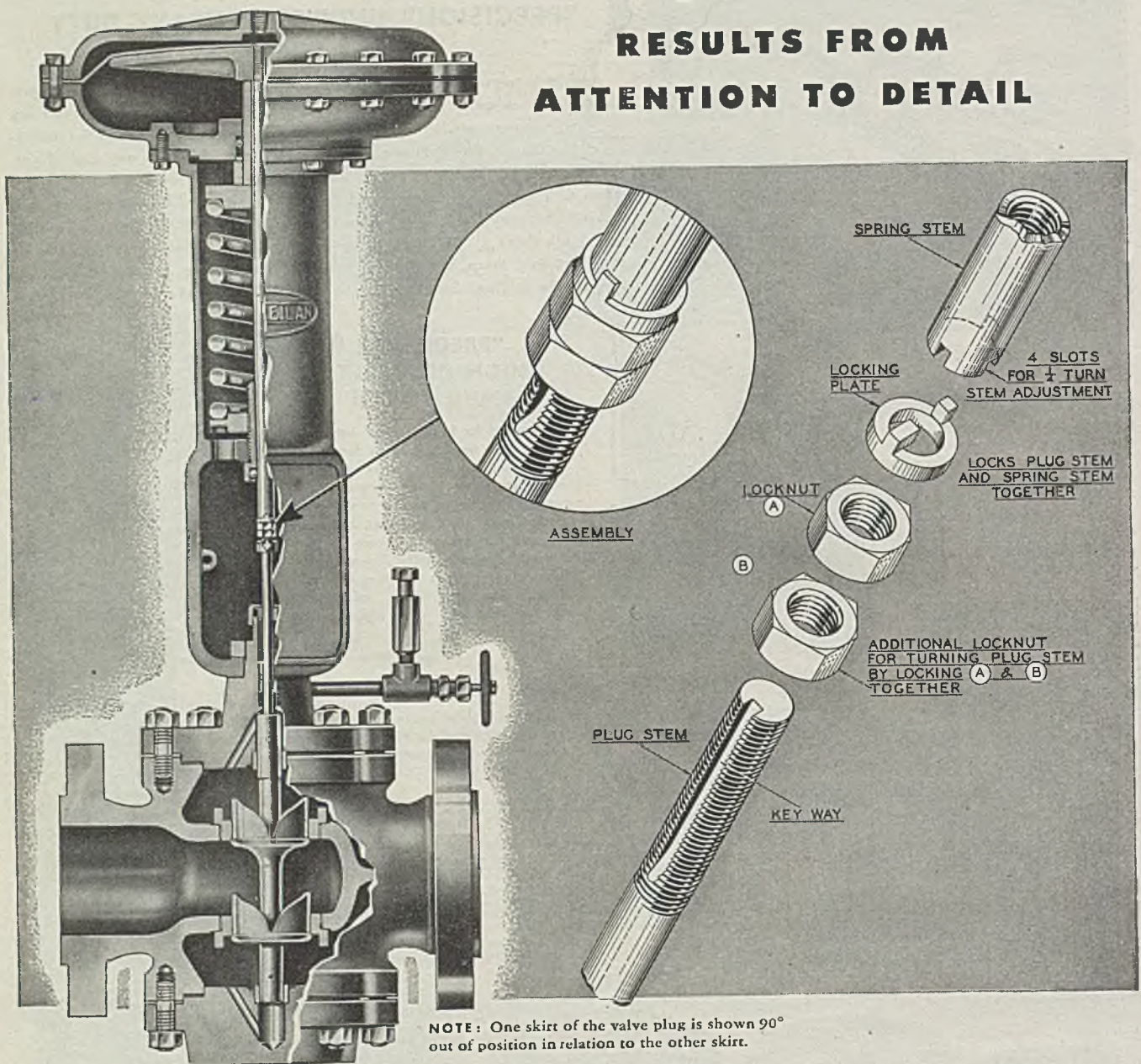
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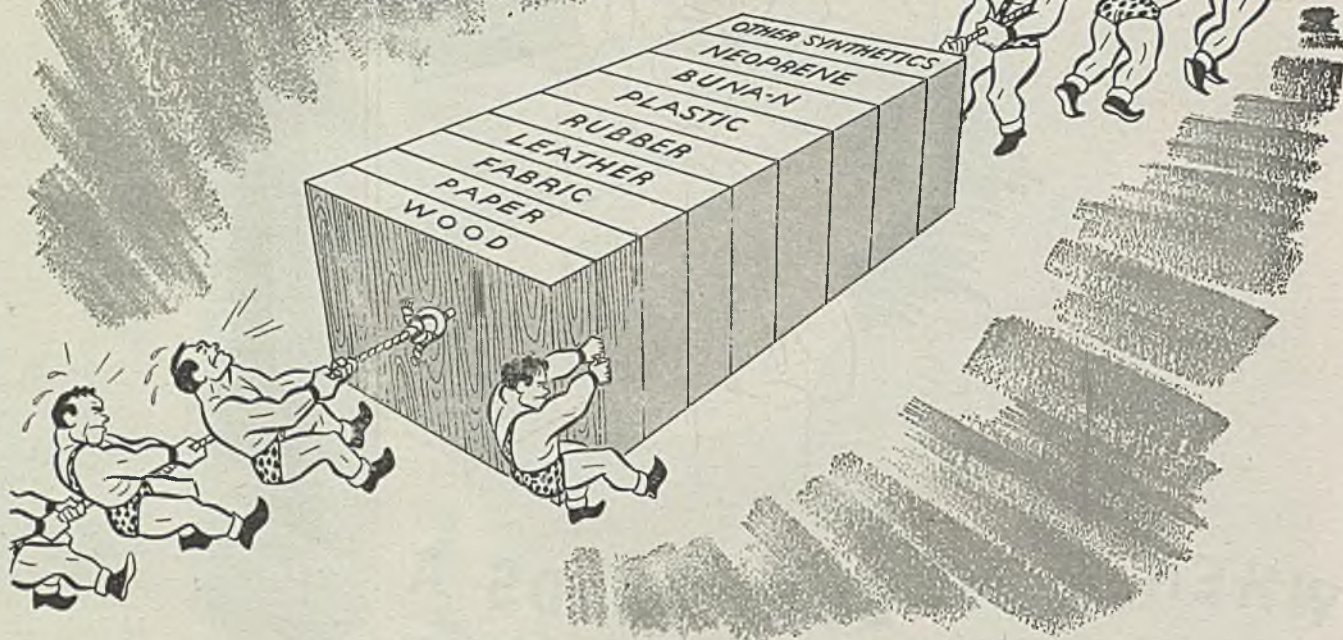
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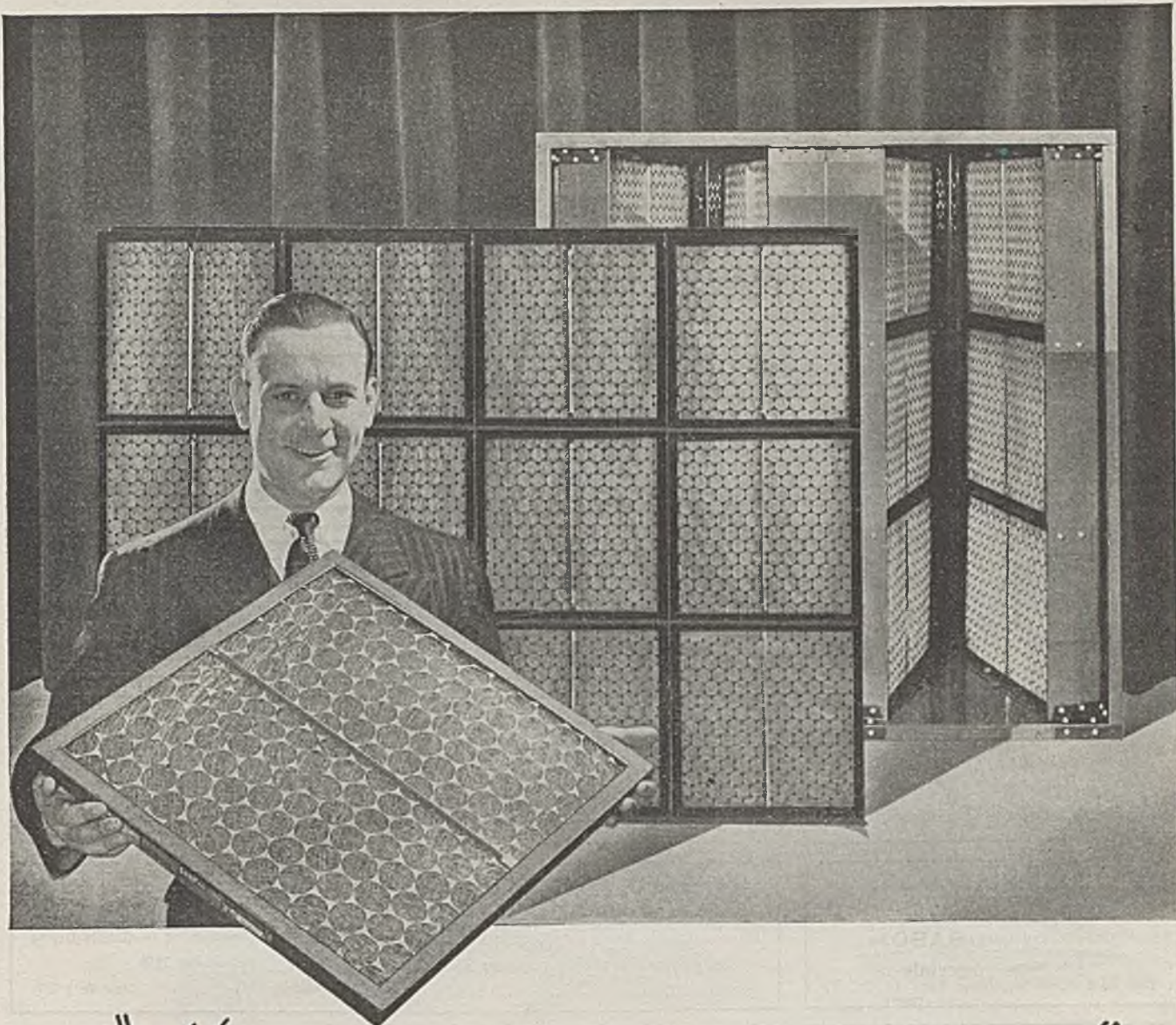
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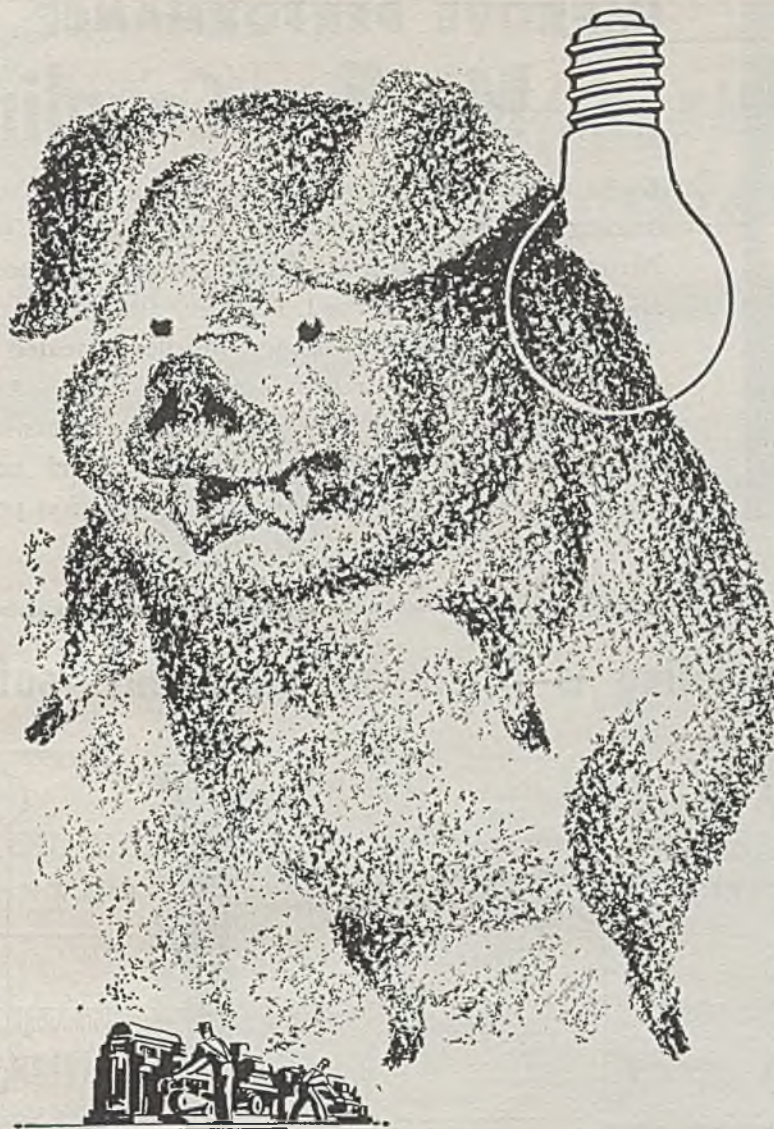
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DUST

WHY DUST CONTROL?

In many plants, dust is regarded as no worse than a nuisance and unless the danger of explosion is present or dust is worth reclaiming, nothing is done about controlling it.

Yet the unsuspected costs of dust — reflected in excessive plant maintenance, machinery breakdown, inefficient workmanship, spoilage and reduced morale — are present wherever dust is allowed to disperse into the air.

W.O. Vedder, author of "Industrial Dust Control Through Exhaust Systems", says: "Wherever organic or inorganic materials, such as ores, minerals, metals, pigments, chemicals, wood, coal, grain, etc., are handled, transported, crushed, ground, separated, abraded, shattered, packed, etc., dust particles of varying sizes are produced."

If such conditions exist in your plant, there is the chance that dust may be increasing your costs unnecessarily. A Pangborn booklet, "Control of Industrial Dust", reporting a 41-year experience with dust problems, will give you a helpful viewpoint on dust control. Address Pangborn Corporation, 283 Pangborn Blvd., Hagerstown, Maryland.



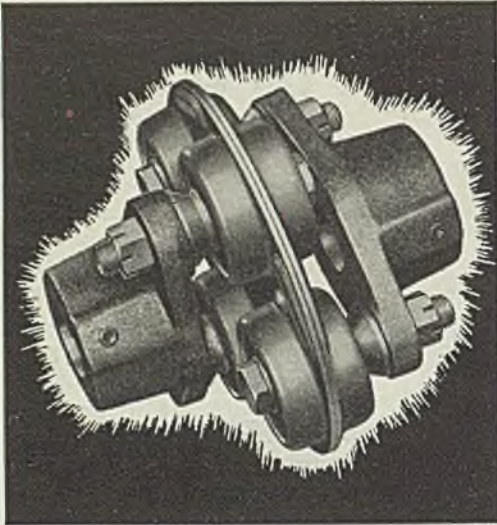
METAL FIRM SAVES \$8,000

Illustrative of the savings obtainable from a Pangborn system is the case of a metal specialties manufacturer who reports an annual saving of \$8,000, based on expenses before the system was installed to control metallic dust. A beneficial effect on quality of work has also been observed. The system's operating cost is only \$260.00 per year.

IMPROVE PERFORMANCE

WITH Morflex Couplings

● An exclusively Morse-designed feature, the Neoprene biscuit assembly *packs the load* in the Morflex Coupling. No metal-to-metal contact; bearing wear reduced. Shock and vibration are absorbed. Positive, direct drive permits no power loss. No maintenance; Morflex is sealed against dirt and weather . . . requires no lubrication! ● *Single* Morflex is designed for up to 5° misalignments. *Double* Morflex handles extreme misalignments and universal drive connections. ● Address your application problems to Morse Chain Company, Detroit 8, Mich.



Now available in 12 sizes in capacities of 8 to 725 foot-pounds torque

Why the Morflex Coupling is Torsionally Resilient (soft)

Fig. 1—Section of trunion block in free state before insertion into housing. Note that due to the special shape of the block, the internal stress is constant throughout its volume under all conditions. (A) Compressed on diameter when inserted into housing.

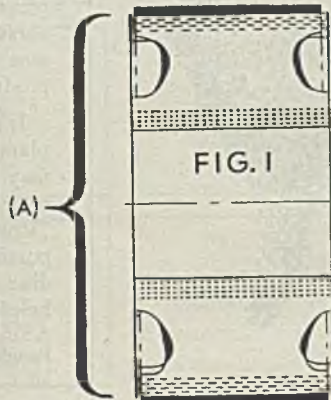


Fig. 2—Axial displacement resulting from thrust loads.

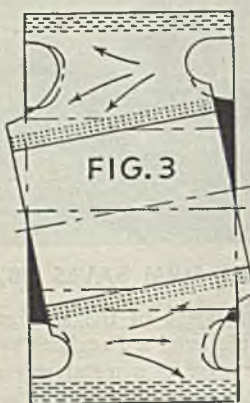
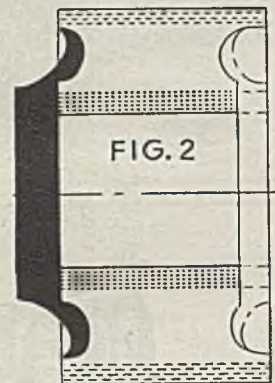


Fig. 3—Angular deflection. Displacement of Neoprene, as indicated by arrows, resulting from angular misalignment of connected shaft.

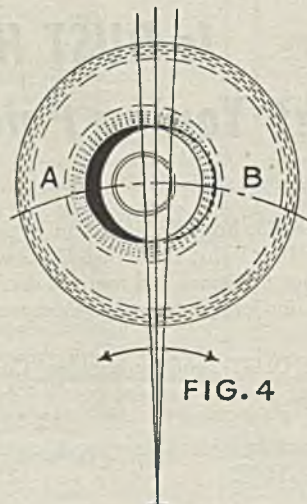


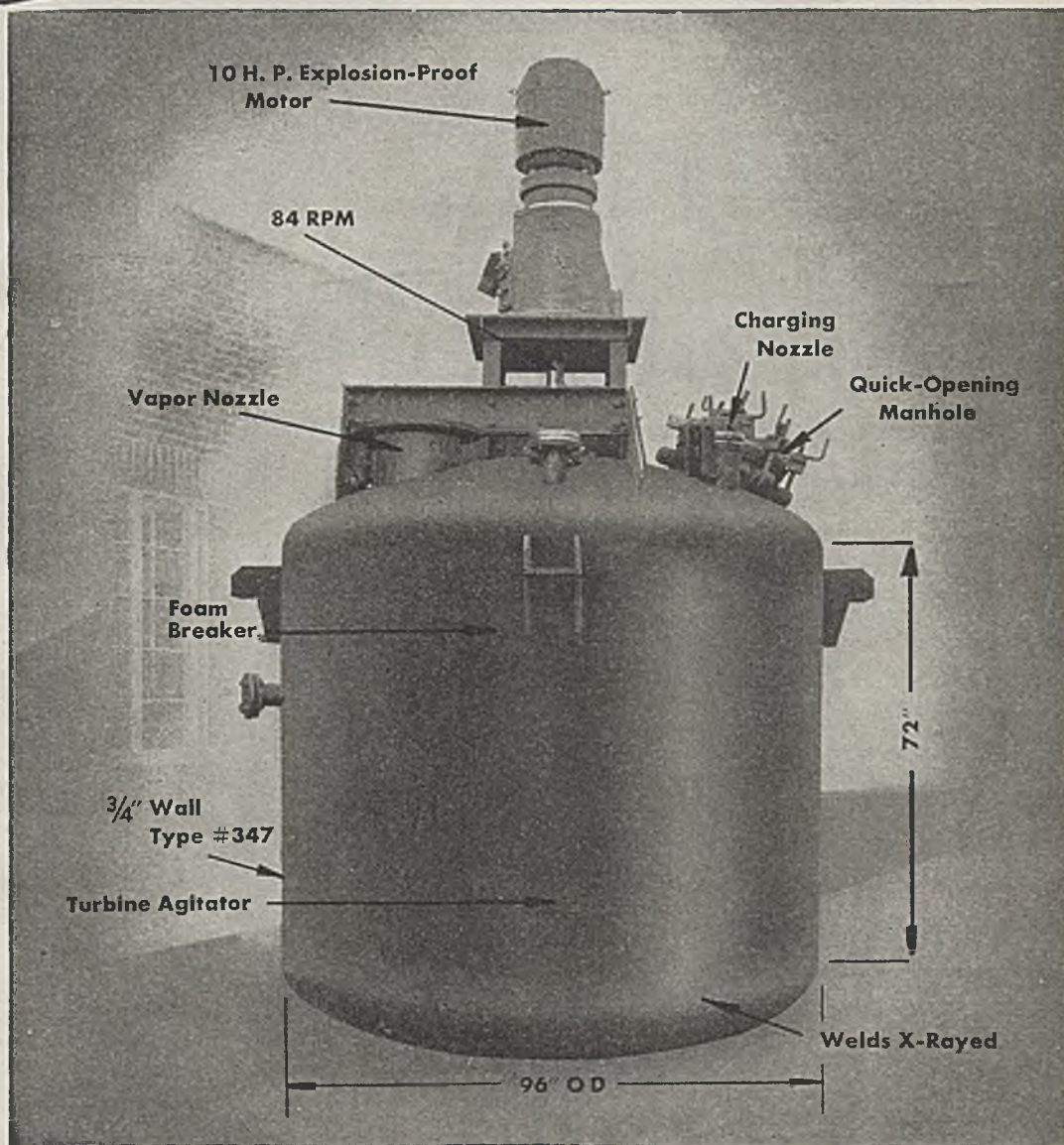
Fig. 4—Torsional deflection resulting from torque loads and torsional vibration. When the block is inserted into housing, the Neoprene is initially loaded. The torque load increases pressure at side A, and reduces pressure at side B, but under the maximum torque, the Neoprene at side B is still loaded.



MORSE

ROLLER and SILENT CHAINS
SPROCKETS • FLEXIBLE COUPLINGS • CLUTCHES

**FOR A PILOT PLANT OR
A PRODUCTION INSTALLATION**



RESIN KETTLE

ASME Constructed &
Stamped
Stress Relieved &
X-Rayed
2000 Gal. Capacity
Columbium Stabilized
Stainless Steel
Throughout

3/4" Wall
Type #347

Turbine Agitator

Welds X-Rayed

72"

96" OD

THIS resin and oil Processing Kettle which is to be used by one of the Country's largest producers of plastics, is typical of the work which is engineered and fabricated by Alloy Fabricators.

ALLOY FABRICATORS

DIVISION OF THE ROBINSON FOUNDATION, INC.

PERTH AMBOY • NEW JERSEY

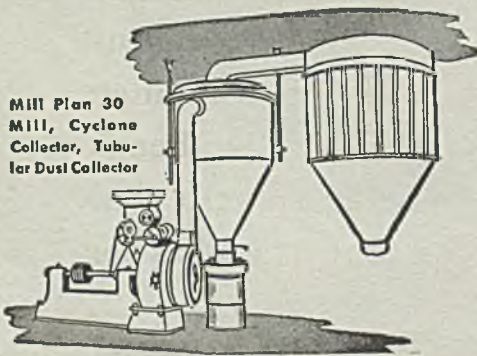


For Fast, Fine Grinding of DRY CHEMICALS and Allied Products

For general use in pulverizing a great variety of dry chemicals, drugs, colors, gums, glues, or any dry, non-gritty stock, the Schutz-O'Neill Pulverizers are unexcelled. The principle of centrifugal air force impact is fast, produces a uniform product, and will maintain relatively high outputs for superfine grinding up to 400 mesh. For products with high moisture or oil content, Schutz-O'Neill also has efficient and proven equipment.

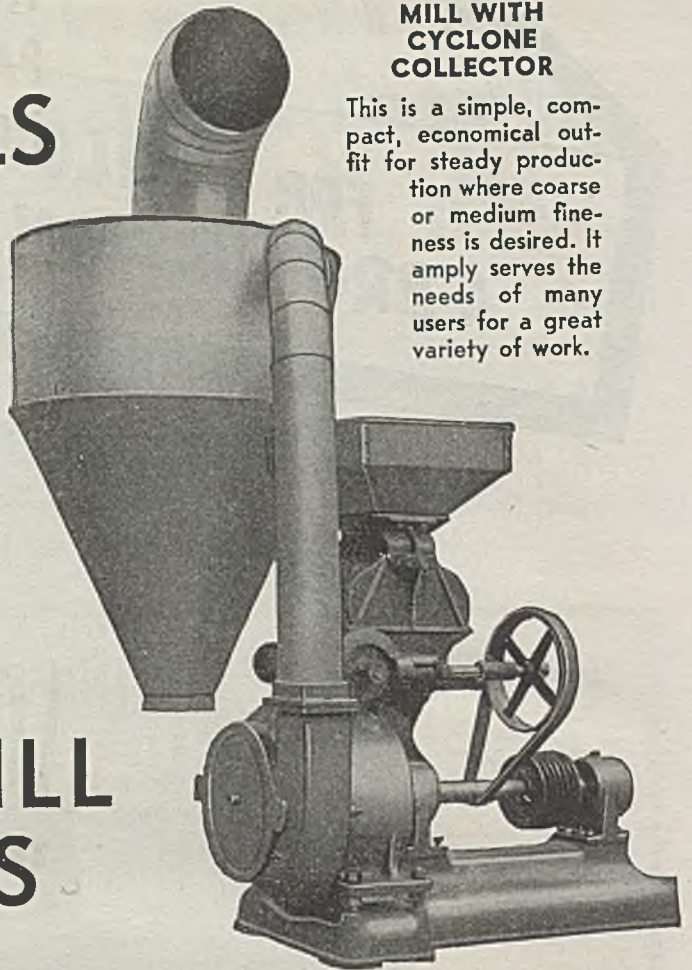
SCHUTZ-O'NEILL PULVERIZERS

are made in 12", 16", 20", 22", 24", and 28" sizes, with capacities ranging up to 2000 lbs. per hour, depending upon kind of material and fineness desired.



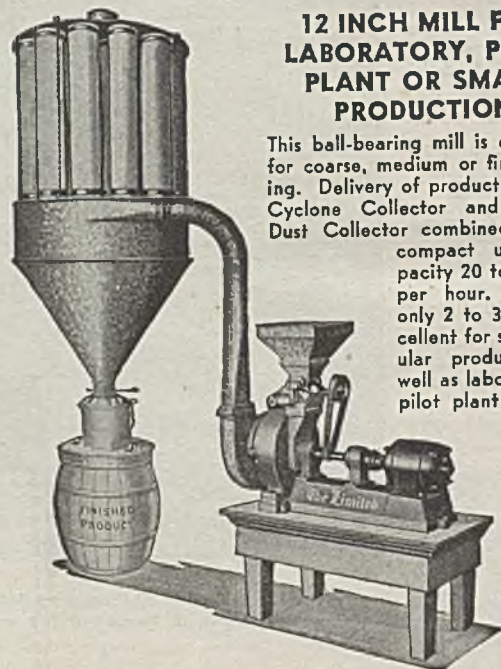
MILL PLANS FOR ANY SET-UP

Schutz-O'Neill has a great variety of Mill Plans for different purposes. If you will write us your requirements, products to be pulverized, output desired, and send a sample, Schutz-O'Neill engineers will recommend the correct size and type of mill and the most efficient Mill Plan for your use. This in no way obligates you. Literature on request.



MILL WITH CYCLONE COLLECTOR

This is a simple, compact, economical outfit for steady production where coarse or medium fineness is desired. It amply serves the needs of many users for a great variety of work.



12 INCH MILL FOR LABORATORY, PILOT PLANT OR SMALL PRODUCTION

This ball-bearing mill is easily set for coarse, medium or fine grinding. Delivery of product is into a Cyclone Collector and Tubular Dust Collector combined in one compact unit. Capacity 20 to 150 lbs. per hour. Requires only 2 to 3 H.P. Excellent for small regular production as well as laboratory or pilot plant use.



SCHUTZ-O'NEILL CO. DIVISION OF PARTEN MACHINERY CO.

PULVERIZERS • BREAKER MILLS • ROLLER MILLS • BURR MILLS • HAMMER MILLS

301 SIXTH AVENUE SOUTH • MINNEAPOLIS 15, MINNESOTA

• JUNE 1946 • CHEMICAL & METALLURGICAL ENGINEERING

**New!
Complete!
Concise!**

**THE BEMIS BOOK ON MULTIWALL
PAPER SHIPPING SACKS TELLS
HOW YOU CAN GET...**

- ① Better, low-cost packaging
- ② Safer, surer shipping protection
- ③ More efficient packing operations
- ④ Faster, more economical handling
- ⑤ Finer, more legible brand printing

Send for **"PACKAGING PICTURE"**



**The Story of BEMIS Multiwall
Paper Shipping Sacks**

This new 16-page book—largely pictorial—shows how Bemis Multiwalls are made . . . how you can use these versatile shipping containers most advantageously . . . how Bemis Packaging specialists can help you. You'll find it interesting as well as beneficial.

Your copy is ready for you Today

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Please forward my 'copy of "PACKAGING PICTURE."

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City _____ State _____

BEMIS BRO. BAG CO.

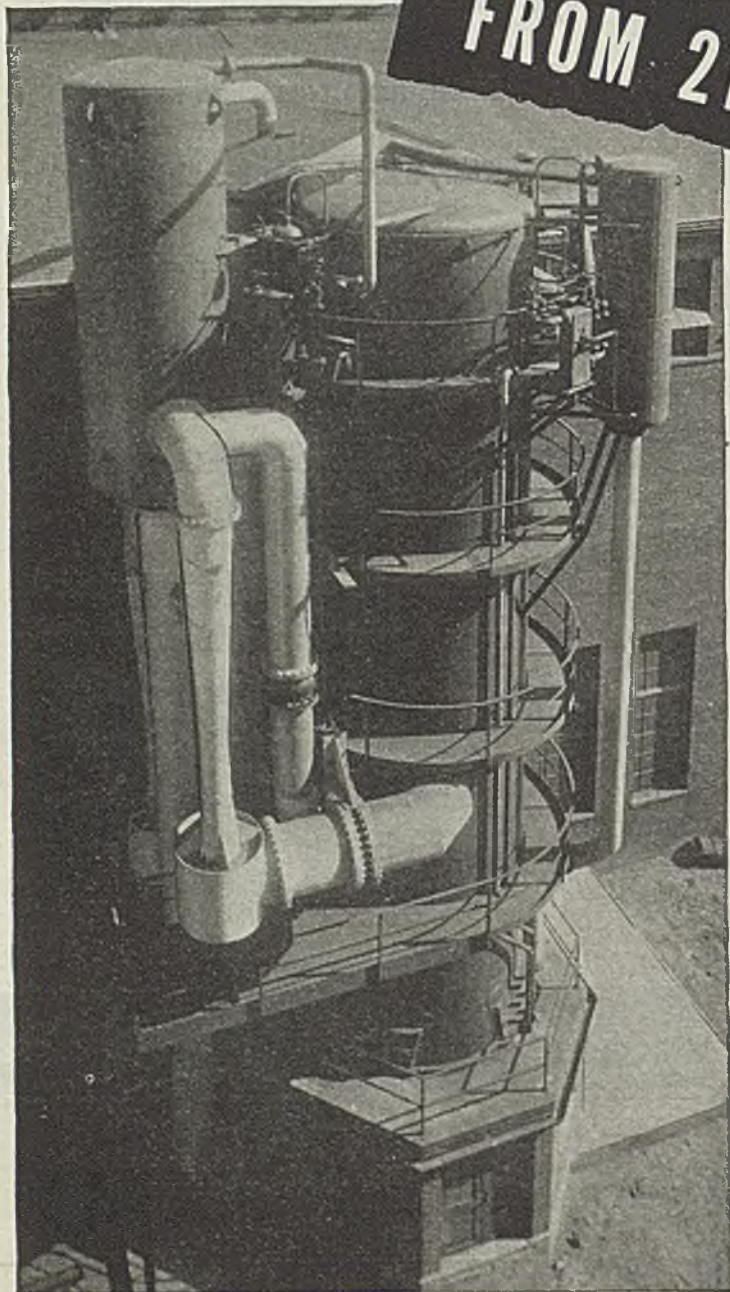
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GUARDITE

EVAPORATIVE COOLERS

for COOLING LIQUIDS
FROM 212°F TO 40°F



These coolers are designed for either continuous or batch operation. The cooler shown at left is designed to continuously cool 376,000# distillery mash and slops per hour from 190° to 75° F. The completely automatic controls system eliminates the necessity for an operator. There are no moving parts to wear. These units can be furnished in sizes to meet your requirements and fabricated of the proper materials to meet your conditions. When writing please state kind and quantity of material to be cooled, amount and temperature of cooling water available, steam available, and pressure.

We will be pleased to give complete information as to operation and costs.

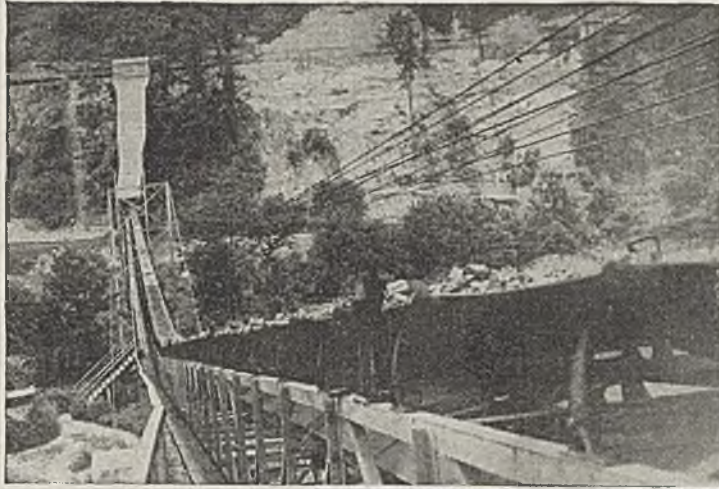
The GUARDITE CORPORATION

Vacuum Process Engineers

332 S. MICHIGAN AVENUE • CHICAGO, ILLINOIS



Kentucky to West Virginia on a Continental Conveyor

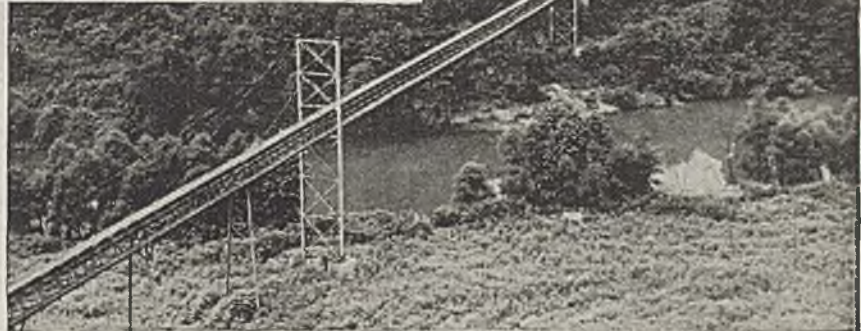


200 Tons
an Hour of
Run-of-mine Coal
Carried 680 Feet
at 200 Feet
a Minute

Continental Idlers

A complete line of Troughing, Flat Belt and Picking Table Idlers, Timken or SKF equipped, for belts 14 to 60 inches wide. Also a complete line of accessories, including Trippers, Pulleys, Take-ups, Drives, etc.

Write for Bulletin ID-105



When the Belfry Coal Company opened a new mine in Kentucky, they were faced with the problem of hauling the coal across the Tug River to the C & O Railroad in West Virginia. Many methods were considered, but it soon became apparent to company engineers that a belt conveyor carried on a suspension bridge was the most practical solution.

Continental engineers then designed the system pictured above on which run-of-mine coal is

uniformly fed by an apron feeder onto the 36" belt conveyor—sped across the river at 200-FPM to the tipple on the opposite embankment.

This is typical of the manner in which Continental engineering is assisting industry in solving their materials handling problems.

Many industries are taking advantage of our present day stocks to build complete conveyors. Send us your orders or inquiries.

100A

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA



ATLANTA • DALLAS • MEMPHIS



SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

(Not available for equipment advertising)
15 cents a word, minimum charge \$3.00.
(See ¶ on Box Numbers.)

POSITIONS WANTED (full or part-time individual salaried employment only), 1/2 above rates payable in advance.

PROPOSALS, 50 cents a line an insertion.

NEW ADVERTISEMENTS received by 10 A. M. July 5th will appear in the July issue subject to limitations of space available.

INFORMATION:

BOX NUMBERS care publication New York, Chicago or San Francisco offices count as 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is \$8.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches—to a page. C & M

MECHANICAL ENGINEER

to take charge of mechanical installation at plant located in small town in Central Georgia, for mining and processing kaolin. Position is permanent. Excellent opportunity for skilled man young enough to take charge of present installations and future improvements. Please state experience, family, last position, reasons for leaving, salary expected. This is splendid opportunity for man with proper qualifications.

P-702, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

Swiss Pharmaceutical Concern is looking for a

MECHANICAL ENGINEER

with extensive engineering experience in chemical factories and willing to take a job in Switzerland

P-738, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

POSITIONS VACANT

WANTED: SALES Engineers for large industrial instrument manufacturer. Men with instrument experience in process work between 25 and 30 years of age preferred. Must be graduate chemical, mechanical, or electrical engineers and willing to take aptitude test. P-675, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

UNUSUAL OPPORTUNITY for chemical engineer in pilot plant research in the field of natural gas conversion. Give qualifications. Answers held confidential. P-676, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

CHEMICAL ENGINEER: Laboratory supervision and production control for agricultural chemicals manufacturing plant located near Texas A & M College. State fully education, experience, age, salary expected, and enclose recent photo. Applications strictly confidential. Cotton Poisons, Inc. Division of Pennsylvania Salt Manufacturing Company, Bryan, Texas.

CHEMICAL ENGINEER: with detinning experience to supervise detinning plant. Reply by letter, giving full information about experience and qualifications to P-698, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

TIRE DESIGN Engineer with tractor tire experience. Salary will be commensurate with background and experience. Include complete details in reply. Please state age, experience, education and past salary. Established expanding company located in middle west. P-703, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

EXPANDING RESEARCH organization of large well-known industrial concern requires capable young colloid research chemists or engineers with graduate training and several years additional research experience in the field. Permanent employment with excellent opportunities. Location in Virginia and Tennessee area. Apply with full particulars to P-710, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

EXPANDING RESEARCH organization of large well-known industrial concern requires capable young high polymer research chemists or engineers with graduate training and several years additional research experience in this field. Permanent employment with excellent opportunities. Location in Virginia and Tennessee area. Apply with full particulars to P-711, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

EXPANDING RESEARCH organization of large well-known industrial concern requires capable young petroleum research chemists or engineers with graduate training and several years additional research experience in the field. Permanent employment with excellent opportunities. Location in Virginia and Tennessee area. Apply with full particulars to P-712, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

RESEARCH DIRECTOR: Long-established industrial company engaged in chemical process manufacturing offers unusual opportunity in administrative work for a chemist or chemical engineer, with graduate work or degree. Responsibilities of the position requires a forceful leader, with a record of industrial achievement and experience in directing a research group, preferably in the preparation of synthetic resins. Please give full details and enclose photograph if possible. Replies will be held in strict confidence. P-713, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

(Continued on page 417)

WANTED WAREHOUSEMAN

For warehouses of the mining company located in Bolivia at elevations of 16,000 feet down to 12,000 feet. Three-year contract. Single or, if married, single status for first six-months' period of contract. Transportation paid. Must have thorough knowledge (1) warehouse accounting; (2) mine, mill and general supplies and equipment; (3) must be capable of keeping accurate stock records and of ordering locally and abroad equipment and supplies; (4) must be thoroughly capable of supervising and operating several warehouses with local help. Spanish an asset but not necessarily required. Give full qualifications and experience. State salary expected.

P-700, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER WITH SUGAR EXPERIENCE

Chemical engineering graduate, about 30 years old, with laboratory and/or plant experience in beet or cane sugar factory to market special equipment and services for internationally known firm of sugar engineers. Only those experienced should apply, giving full particulars, references and salary expected.

P-706, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

Wanted . . . Mechanical Engineer

Young graduate for training in design, development, experiment with centrifugal pumps, fans, heat exchangers, etc. Excellent opportunity.

P-703, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

Brass Open Hearth Operator

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter.

P-672, Chemical & Metallurgical Eng.
520 North Michigan Ave., Chicago 11, Ill.

Aluminum Open Hearth Operator

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter.

P-673, Chemical & Metallurgical Eng.
520 North Michigan Ave., Chicago 11, Ill.

CHEMICAL MARKET RESEARCH

Long-established and nationally active chemical manufacturing company has an opening in its Market Research Department for a young man with training in chemical engineering or chemistry who likes outside contact work. The job consists of collecting information on the use, distribution and manufacture of chemicals and specialties needed by our management in planning expansion activities of the company.

Write giving age, education, experience, salary expected and photo to

P-705, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

WANTED

Assayer to take charge of large laboratory in the East. Must be familiar with all branches of assaying of the precious metals, including the separation of the six platinum metals. Write, stating age, education, experience, salary expected, and references.

P-628, Chemical & Metallurgical Eng.
330 West 42nd Street, New York 18, N. Y.



POSITIONS VACANT
(Continued from page 416)

PLANT MANAGER: In charge of production and sales of established mid-west industrial electroplating plant; thorough technical knowledge of chromium plating, selling and management experience preferred. Give complete information concerning education, experience, age and salary expected. P-714, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

ORGANIC CHEMIST: B.S. or M.S. wanted for Research Department of synthetic resin manufacturer in Northern New Jersey. Some industrial experience desired but not essential. Ambitious man around 25 interested in this field may apply stating age, education, experience and salary required. Include non-returnable photograph. P-715, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

TEACHERS WANTED: Instructor or Assistant Professor for each chemical and metallurgical engineering. Should have Masters or Doctors degrees. Experience in both teaching and industry desired but less essential than natural qualifications for class room work. Salaries open. Permanent, eleven months per year. Send details and small photo to Dean of Engineering, Fenn College, Cleveland 15, Ohio.

CHEMICAL ENGINEER: qualified to design, supervise construction and assist in initial operation of fertilizer plants. Applicants kindly state education, experience, age and starting salary required. P-716, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

WANTED—YOUNG male chemist to assist in research and development of chlorinated hydrocarbons. Salary \$50.00 week. Position permanent near Charleston, W. Va. Experience desirable but not necessary. Give complete details of education, experience and recent photograph. P-717, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED—YOUNG, graduate engineer, 30 to 35 years. Interested in procurement for prominent eastern chemical manufacturing corporation's centralized Purchasing Department. P-718, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

WANTED—CHEMIST: with some laboratory experience for opening in control laboratory of manufacturer located near Philadelphia. Experience with metals or plastics would be desirable. Write giving education, age, experience, and salary desired. P-719, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

SELLING OPPORTUNITY OFFERED

SALES ENGINEER Wanted: We are interested in securing the services of a good, reliable man for the sale of metals and alloys, principally to the major steel companies, but will only consider a man of experience and good record. Address Box 636, Niagara Falls, New York.

EMPLOYMENT SERVICE

SALARIED POSITIONS \$2,500-\$25,000. This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated, through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. Bixby, Inc., 260 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

B.S. IN Chemical Engineering desires position as plant engineer or pilot/development laboratory operation in pharmaceutical, cosmetic, or related industry. Broad experience for past twelve years in pharmaceutical, manufacturing, research and development. Familiar with layout and construction, with wide knowledge of materials and equipment. Know maintenance. Useful in design of special set-ups and laboratory gadgets. Write intelligent reports. Can handle men. Eastern location preferred but will consider any location within Continental U. S. PW-594, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

(Continued on page 418)

CHEM. ENGRS. - TECHNICAL

RECOGNIZED PERSONNEL SERVICE

Since 1914—Nation-wide Coverage

Confidential Intermediary

For Both Employer and Employee

SHAY EMPLOYMENT AGENCY

30 W. Washington

Chicago 2, Ill.

Junior Executive

FOR

PRODUCTION PLANNING

Progressive and growing chemical company on the Eastern Seaboard requires for its office force a young chemist or chemical engineer for work primarily in production planning and in coordinating sales and production. A background of actual plant production experience and some training in business administration is desirable. The position offers an excellent future with a well established, reputable firm. Applications will be acknowledged promptly and treated in confidence.

P-739, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

RESEARCH DIRECTOR

Long-established industrial company engaged in chemical process manufacturing offers unusual opportunity in administrative work for a chemist or chemical engineer, with graduate work or degree.

Responsibilities of the position require a forceful leader, with a record of industrial achievement and experience in directing a research group, preferably in the preparation of synthetic resins.

Please give full details and enclose photograph if possible. Replies will be held in strict confidence. Address:

P-740, Chemical & Metallurgical Engr.
330 West 42nd St., New York 18, N. Y.

DESIGN ENGINEER

Experienced in plant layout, chemical processing equipment and piping layout.

PERMANENT!

Large Bklyn. Chemical Mfrg.

State Full Particulars

P-741, Chemical & Metallurgical Eng.
330 West 42nd St., New York 18, N. Y.

Designer Draftsmen for Process Work

Good opportunity with prominent Engineering concern located in Midwest. Must have process design experience and ability to perform drafting work necessary. Good pay. Lengthy employment.

P-664, Chemical & Metallurgical Engineering
520 North Michigan Avenue, Chicago 11, Ill.

Opportunities for Technical Men and Refinery Engineers

now with

THE STANDARD OIL CO.

(Ohio)

- ★ Refinery Process Engineers
- ★ Refinery Mechanical Engineers
- ★ Refinery Metal Inspectors
- ★ Refinery Chemists
- ★ Industrial Engineers
- ★ Layout, Design and Estimating Engineers
- ★ Draftsmen

Now is your chance to advance with this company's fast expanding operations—to join a company that believes in taking good care of its people.

All positions listed are in Ohio—and are *open now!* Starting salaries from \$2500 to \$4800, depending on background. Ages 25 to 45. We will help you find a home. All applications kept confidential.

Good technical education with graduate degrees required for many of these openings. Three to five years refinery experience desirable for several of the positions. Several men wanted with ability to assume management responsibility.

Experienced draftsmen needed also.

State fully your educational qualifications and experience. Write at once to —

Mr. J. P. Jones
The Standard Oil Co. (Ohio)
No. 1782H Midland Bldg.
Cleveland 15, Ohio

POSITIONS WANTED

RESEARCH CHEMIST: with broad engineering and executive experience now available through policy change. Offers twelve years petroleum and coal tar research, pilot plant and production, plus fifteen years as executive in technical sales, advertising, publication and patent fields. Prefers responsibility of technical director or coordinator. Will consider part time consulting basis. PW-722, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

ELECTRICAL ENGINEER: 40, graduate, married, desires employment on expansion program of industrial concern with opportunity for permanent position as supervisor of power production or maintenance of plant electrical equipment. 17 years experience on power plant design, construction and placing plants in operation. PW-723, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CORROSION-METAL Finishing Engineer. 4 years experience all structural alloys, ferrous and non-ferrous. Supervisory experience. Graduate chemical engineer. Age 29. West coast preferred. Available July. PW-724, Chemical & Metallurgical Engineering, 68 Post St., San Francisco 4, Calif.

CHEMICAL ENGINEER: B.Ch.E. 2 years experience including pilot plant operations, supervision; plant operations; installation and testing of equipment; plant start-up; additional experience in piping layout drafting. Veteran, 23, single. Salary secondary to interesting job. PW-725, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMIST-METALLURIST: veteran, 29, married-varied background mining, cyanidation-floatation, smelting and refining, precious metals, assaying-chemical analysis, metallography-photo micrographs-physical testing, control work-research and dev. supervisory experience, ambitious, industrious, imaginative, desires position with future. Location immaterial. Present salary \$3600 per annum. PW-726, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER: BS 1943, Tau Beta Pi. 3 years process development work in synthesis of ammonia, methanol, and allied products. Desires position in Rockies or Northwest. Available in fall. PW-727, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

AVAILABLE PRODUCTION ENGINEER

With 10 years of well rounded and successful experience in the fine and synthetic organic chemical field. American, 35 years old, married. M. S. in chemical engineering. Desires position with real possibilities in progressive small concern. Missouri or southeast preferred. Available in 4 weeks. Salary \$6,000.

PW-699, Chemical & Metallurgical Eng. 330 West 42nd St., New York 18, N. Y.

PURCHASING AGENT

Offers 25 years' experience large corporations. Entirely familiar material control, machine shop and general industrial processing procedures. Intimate contacts with sources of supply raw materials, metals and all industrial equipment. Last connection chemical plastics industry. Engineering education, age 42, member of N.A.P.A.

PW-668, Chemical & Metallurgical Eng. 330 West 42nd St., New York 18, N. Y.

Chemical Engineer-Executive

Over twenty years diversified experience in the cellulose industry - rayon, cellophane and allied products. Sixteen years as plant and production executive. Age 45. Desires responsible position in plant operation, preferably in the south. Would also consider foreign assignment.

PW-708, Chemical & Metallurgical Eng. 520 North Michigan Ave., Chicago 11, Ill.

POSITIONS WANTED

MATERIALS ENGINEER: B.S. of Ch.E. "37". Research development and production experience. Past four years Chief Materials Engineer for company doing \$60,000,000 business. Capable of carrying ideas from research to production. Excellent contacts in the materials field. Available in one month. PW-720, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER: B.S. Four years experience involving compounding, processing, and polymerization of synthetic rubbers. Thorough knowledge of properties and applications of all rubber-like materials. Desires responsible position in branch of industry where knowledge and experience will be useful. PW-721, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

PRODUCT AND Sales Development; Chemist, twenty-five years experience with State, Federal, research institution and corporations; in charge of control, research, development and sales. Excellent record, publications, literature, patents. Wide knowledge of chemical and allied fields. Now available. PW-687, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

PLANT ENGINEER or assistant: 14 years experience chemical process and rayon maintenance, correlation of maintenance and production; establishment and control of work order system equipment records, materials of construction, budgets and direction of engineering group. PW-689, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

ENGINEER-EXECUTIVE: Age 45, graduate mechanical with 15 years heavy chemical plant experience; now employed heading large group of engineers; experienced design and layout of large and small plants; cost estimates and economic studies; organization and special reports. Location anywhere, travel acceptable. Salary five figures. PW-684, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

TECHNICAL DIRECTOR: 19 years experience in development and supervision of production of pigment dispersions, wax and resin finishes, and resin and lacquer emulsions. Proven executive ability. Age 40. Chicago area. PW-728, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

CHEMICAL ENGINEER: B.S. in Ch.E. 1941. Five years experience in design, construction and operation of pilot plants: organic chemicals, polymers, continuous processes. Desire development or production work, South or West preferred. Presently employed. Member A.I.Ch.E. Age 25, married, draft exempt. PW-729, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER: 1940, affable personality, desires development and/or production work. Three years development experience covering manufacture of rubber and plastic printing plates and explosives. One year government service mechanical engineering. 27, veteran, family. PW-730, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL SALES Executive: 15 years diversified experience in chemical and allied industry includes technical sales, new product development, engineering design, purchasing, management. Chemical Engineering education, age 38. Seeks responsible position with expanding chemical mfg. PW-731, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER: M.Ch.E. 5 years production, development, and research. By-product coke, fine chemical and electrochemical experience. Age 25, desire supervisory or technical position. Metropolitan New York preferred. PW-732, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

INORGANIC PHYSICAL Chemist M.S. 32 honors, publication. Five years industrial experience comprising analysis, research, plant and laboratory supervision; also ferrous metallography. Desires responsible technical position. PW-733, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

SELLING OPPORTUNITIES WANTED

ENGLAND GROUP of seven factories pulverizing, grading and refining raw materials would like co-operation with firm interested in entering European and British markets. Dohm Ltd., 167 Victoria Street, London, S.W. 1.

MANUFACTURER'S AGENT: experienced salesman would like to contact manufacturers of chemical equipment and industrial chemicals for representation in the Southwestern states. With a view of later foreign development. P. O. Box 1768, Oakland 4, Calif.

SELLING OPPORTUNITIES WANTED

CHEMICAL ENGINEER: Mexican Linguist, returning to Mexico, seeking sales representation for chemical and equipment suitable for export to Latin America and Mexico. RA-734, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

SALES ENGINEER 54 graduate, desires metropolitan New York representation of heavy industrial equipment; thorough engineering knowledge, broad contacts, twenty years sales to industrial plants. Salary or commission basis. SA-737, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

PART TIME WORK WANTED

PLANT LAYOUT Engineer: with 20 years experience and good record in process plant work desires part time employment. FTWW-735, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

SPECIAL SERVICE

TECHNICAL TRANSLATIONS: scientific and patents from German, French and Spanish by M.S. and Ph.D. in chemistry. SS-736, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITY

FOR SALE coal and minerals-2100 acres within Great Falls Coal Field. Sub or medium grade bituminous; 10 1/2 to 11M. BTU; five to six foot coal seam; drift truck mines, good mining conditions, one seam. Estimate 10 million tons coal. Gas, oil and all mineral rights included in property. Opportunity with many advantages for chemical and process industries. Address part-owner, L. J. Howard 913 Third Avenue, North, Great Falls, Montana.

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- 3—B. & C. 28" dia x 60" face Atmospheric DOUBLE DRUM DRYERS complete.
- 1—32"x72" BUFLOVAK ATMOSPHERIC DOUBLE DRUM DRYER, m.d.
- 9—Direct heat ROTARY DRYERS: 4'x30', 5'x30', 70"x30", 6'x60'.
- 1—ROTARY KILN, 6'x60'.
- 5—ROTARY VACUUM DRYERS: 1—Devine, 5'x30'; 3—Devine, 4'x25'; 1—Devine, 4'x30'; 1—Struthers Wells, 30"x12'.
- 1—6'x35' Louisville Direct Heat single shell Rotary Dryer.
- 2—Buffalo 6' Vacuum & Atmospheric CRYSTALLIZERS.

- 6—PEBBLE MILLS. 1—6' x 5' Burrstone Lines; 1—32" x 42" Rubber Lined; 4—30 gal. porcelain lined. Other Sizes.
- 2—18" x 18", 24" x 24", Jeffrey single ROLL CRUSHERS.
- 5—DRY POWDER MIXERS various sizes. To 3000 lbs.
- 6—RAYMOND PULVERIZERS: 4-roll Low Side; No. 3, No. 1, No. 0000.
- 12—OLIVER FILTERS, 4' x 6', 6' x 6', wood and iron; 8' x 8'; 8' x 12'.
- 8—HEAT EXCHANGERS, 50 to 1600 sq. ft. heating surfaces; 5 copper, 2 steel tubes.
- 8—RUBBER LINED Rectangular Tank; 7—500-gal.; 1—150 gal.
- 23—CENTRIFUGAL EXTRACTORS, 12" to 72" bronze and steel baskets, belt and motor drives.

JUST PURCHASED

Chemical Perfume Plant

- 2—200 gallon Copper steam jacketed Agitated Kettles.
- 4—100 gallon Copper steam jacketed Agitated Kettles.
- 1—275 gallon All Copper Vacuum Pan, complete with condenser.
- 1—250 gallon All Copper Vacuum Pan, complete with condenser.
- 1—60 gallon All Copper Vacuum Pan, complete with condenser.
- 1—50 gallon All Copper Vacuum Pan, complete with condenser.
- 2—25 gallon Copper Jacketed Evaporating Pan.
- 1—60 gallon Copper Jacketed Evaporating Pan.
- 1—Porcelain lined Pebble Mill.
- 1—J. H. Day Drug Mixer.
- 13—400 lb. All Copper Perculators.
- 8—200 lb. All Copper Perculators.
- 5—100 gallon Closed Copper Tanks.
- Miscellaneous small copper tanks, crocks, stone perculators, stone filters, etc.

SPECIAL

ALUMINUM VACUUM STILLS, KETTLES, TANKS

- 4—Closed jack, agitated Kettles with coils: 3—1,200 gal., 1—900 gal.
- 1—1,200 gal. closed jack. Kettle or Vacuum Still.
- 3—Closed jack, agitated Kettles or Vacuum Stills.
- 2—250 gal. Copper Jack, agit. closed Kettles or Vac. Stills, one with coils.
- 1—350 gal. closed jack, agit. Kettle.
- 1—80 gal. jacketed open Kettle.
- 1—100 gal. open Tank.
- 60—250 gal. NEW closed horizontal,
- 40—250 GAL. NEW CLOSED HORIZONTAL STORAGE TANKS, OVAL SHAPED, APPROX. 46" AND 28" BY 61" LONG, 18" ROUND MAN-HOLE IN TOP, 1/2" PLATE.

- 1—PNEUM. SCALE CARTON PACKAGING UNIT.
- 1—Pneumatic Scale Co. Auto tight WRAPPER.
- 1—36" dia. Cast Iron COLUMN, 23' high.
- 1—Hardinge BALL MILL 5'x22".
- 3—8' x 30" Hardinge Conical Silix Lined PEBBLE MILLS, also 6' x 36".
- 1—5' x 13' PEBBLE or TUBE MILL, with open trunnions.
- 1—300 gal. 5' x 6' BALL MILL.
- 9—Dapp C. I. Jacketed KETTLES, 25 gal. to 100 gal.: 30—steel, cast iron Jack., up to 2000 gals.
- 3—ROLLER MILLS, 12 x 30, 16 x 40 water cooled.
- 1—Shriver Iron FILTER PRESS, 42"x42", 30 chambers.
- 3—30 gal. copper steam jacketed VACUUM PANS. Complete; other sizes to 750 gal.
- 1—Size "B" Erie City COAL PULVERIZER with 40 P 3/60/220/440 V. Motor. Rated 2000 lbs. per hour.
- 9—COPPER & ALUMINUM steam Jack. KETTLES 50 to 500 gal., some with agitators.
- 2—200 gal. GLASS LINED Jack. KETTLES.
- 1—Rieble friction grease TESTING MACHINE, cap. 10,000 P. S. I.
- 1—World automatic rotary LABELER m.d.
- 1—1000 gal. lead-lined closed TANK, lead coils.
- 1—400 gal. horiz. rubber lined MIXER.
- 1—500 gal. Jack. agit. AUTOCLAVE, steel hammer welded construction 200 lb. Jack. press, 300 lb. Internal press.

SPECIAL PURCHASE

- 1—A. Colton No. 14 Fully Automatic Tube Filter Filler, Closer and Clipping Machine.
- 3—Cast Iron Plate and Frame FILTER PRESSES, side Feed, washing type; open delivery. Plate sizes 33x37"—40—1" frames. Gear Closing.
- 1—Pneumatic Scale, six head, fully automatic Capping Machine.
- 5—World and Ermold semi-automatic Labeling Machines, MD.
- 2—W & P MIXERS, 150 gallon capacity, 100 gallon working capacity, size 15, style VI, type BB, equipped with sigma blades, fully motorized.
- 2—Stokes Hand Tube Fillers.
- 2—Colton Hand Tube Fillers.
- 4—Hand Closers and Crimpers.
- 1—Morgan Nailing Machine, MD.

- 3—150 gal. aluminum TANKS cone bottom.
- 1—Stokes No. 21 GRANULATING MIXER 50 lb.
- 3—Bucket Elevators steel enclosed—28', 45', 35' o-c, including smaller elevators, screw conveyors, etc.
- 2—No. 0 Raymond Beater type Pulverizers, each equipped with air classifier, exhauster, cyclone collector, tubular dust collector and inter-connecting bling.
- 2—Jenat Automatic CARTONERS.
- 2—Anderson PACKAGING UNITS.
- 2—60 gal. and 1—80 gal. Aluminum steam jacketed Kettles.
- 5—Stokes R single punch 2 1/2"; 4—Colton 5 1/2" single punch.
- 1—U. S. Bottlers 22-spout Rotary Vac. Bottle Filter complete m.d.
- 3—Sharpless No. 6 Clarifiers and Separators, m.d.
- 4—DeLaval Clarifiers and Separators, m.d.
- 1—McClellan Dry Powder Tumbling Mixer, 1500 lbs.
- 1—J. H. Day Size 10 Jack, Imperial Mixer, 30 gal.

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Micro Pulverizers 24", Model 4TH with 50 HP motor, 3 phase, 60 cycle 220 V, including magnetic starter and motor driven feeder with motor. 4 year old.

Micro Pulverizers 8" size with special discharge chute. Two motors, one 1 1/4 HP motor, 3 phase, 60 cycle, 220 V, 1140 RPM and one 3 HP motor, 3 phase, 60 cycle, 220 V, 3400 RPM, complete with control. Standard iron welded base and stand, feed trough and side liners, special large hopper. Size 46" long, 36" wide, 84" high.

Enamel lined Vacuum Pan with Agitator 32" diameter.

Copper Vacuum Pans with Agitators 4 ft., 5 ft., 6 ft.

Steel Vacuum Pans with Agitators 4 ft. Centrifugal 40" with Copper Basket and 40 H.P., 220 Volt, 60 Cycle, 3 Phase Motor with drum control and brake. Longitudal Mixer 5,000 lb. cap. with Spiral Agitator.

National 9 ft. diameter Chaser, 2 Roll. Shriver Filter Press, Plate and Frame Open Delivery Type size 30" x 30", 35 plates 31 frames.

Smith Vail Filter Press, Recess Type, Closed Delivery, size 32" 41 plates.

Karl Keifer Rotary Visco Filler.

Elgin 24 spout Rotary Vacuum Filling Machine.

Gayco 8 ft. Air Separator.

Ermold and World Semi-Automatic Labeling Machines.

Copper and Aluminum Steam Jacketed Kettles, with and without Agitators. Brand New Pneumatic Scale Co. Filling Machine.

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- 1—4' dia. Callandria Copper Evaporator 350 sq.ft. heating surface.
- 1—DEVINE #11 Vac. Shelf Dryer 40"x43"
- 1—DEVINE Surface Condenser and Receiver 50 sq. ft.
- 1—DEVINE Vac. Pump 52 CFM with 3 H.P. AC motor.

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- 1—ABBE 30" x 36" Pebble Mill - M.D.
- 1—Three Roll Mill W.C. 16 x 40 M.D.
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- 3—Powder Mixers 400 to 2000# capacity
- 1—PFAUDLER Sectional Glass lined Tank 600 gal.
- 1—Stainless Steel Vacuum Pan 90 gal.
- 1—SHRIVER 12" Cast Iron Filter Press New S.S. Jacketed Kettles Portable Agitators 1/4 HP - S.S. Shaft and propellers.

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- #0 Devine Vac. Shelf Dryer, 3 sh. 17"x34".
- 300 gal. S.S. Tank, Jkt., Agit., 42" x 51".
- 300 and 400 gal. Copper Jkt. Kettles, agit.
- 150 gal. Pfaudler Tilting Tank, jkt., 44"x24".
- 300 gal. Pfaudler Tank, jkt., 42"x48".
- 300 gal. Jkt. Lead Lined Kettle, 48"x48", agit.
- Williams Lab. Pebble Mill, two 1 gal. jars.
- Hottman Mixer, 30"x60"x18", 15 H.P.
- 2" Ingersoll-Rand Pump, 5 H.P.
- 2—York Gear Pumps, 1/2 H.P.
- 50 to 450 gal. Homogenizers or Viscollizers.
- 3 ft. Copper Vacuum Pan with pump.
- 20 H.P. O. & S. Scotch & Marine Boiler with Oil Burner and Controls.
- New 1 gal. Laboratory Autoclaves.

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- 1—Oliver Filter: 5x4' open wood drum.
- 1—4x6 Atmospheric Drum Dryer.
- 1—3x15' direct heat Rotary Dryer.
- 1—5-roll Raymond high side Mill.
- 1—Packomatto 4-spout Net Weigher and Filler.
- 3—DeLaval #600 Clarifiers.
- 2—Viscollizers: 300 and 100 GPH.
- 3—Lead Lined Tanks 400-1000 gallons.
- 1—Link Belt Roto-Louvre Dryer 6 1/2 x 20".
- 1—Raymond 0000 Imp Mill.
- 1—Union 10x20x12" Dry Vacuum Pump.
- 1—#20 Prater Custom Hammer Mill.
- 1—(New) 24x48" Vibrating Screen.
- 1—#5 Sweetland Filter.
- 2—Packomatto carton Compression Units.
- 1—10 gal. Buffalo jacket agitated Autoclave.
- 1—24" Mikro Pulverizer, belt drive.
- 4—Water Still: 10 and 25 GPH.
- 3—Centrifugals: 28, 28, 40" copper baskets.

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- 2—Brand New 300 gal. Stainless Steel Jacketed Still with Condensers.
- 2—Nash 2" x 1 1/2" Pyrex Glass Centrifugal Pumps, motor driven.
- 2—Stainless Steel closed Storage Tanks, 268 Gals. each.
- 17—Bucket Elevators, from 12' to 50' high, steel housing, motor driven
- 1—Battery of 2 Tolhurst 40" Suspended Type Centrifugals, motor driven, bottom discharge
- 1—Tolhurst 40" Suspended Type Centrifugal, bottom discharge
- 1—Anderson No. 3 Moisture Expeller
- 1—Schaeffer Poidometer, 20" x 4'
- 2—Bufflovak 6' dia. Vacuum Crystallizers, complete
- 1—Stokes Jr. Rotary Vacuum Dryer, 18" x 3 1/2'
- 1—Devine 4' x 15' Rotary Vacuum Dryer, with condenser
- 1—Christie 6' x 40' Indirect Heat Rotary Dryer
- 2—Bufflovak Vacuum Shelf Dryers, with 20—40" x 42" shelves
- 2—Cast Iron Filter Presses, 32" x 32", with 32 and 26 chambers
- 1—Sperry 30" x 30" Cast Iron Filter Press, plate and frame, 28 chambers, 1" cake
- 1—50 gal. Jacketed, Agitated Kettle
- 1—275 gal. Nickel Lined Jacketed Kettle

FILTERS

- 6—Oliver 8' x 6' Acid Proof Rotary Fillers or Dewaterers, stainless steel fitted, rubber valves. BRAND NEW.
- 1—Shriver 36" x 36" Rubber Covered Filter Press, 15 plates
- 2—Sperry Type 32" x 32" Cast Iron Filter Presses, 26 and 32 chambers
- 8—Shriver, Sperry Filter Presses, 12" x 12" to 32" x 32", recessed and plate and frame
- 6—Wood Filter Presses, 18", 24", 30", 36"
- 1—Oliver 5' x 8' Steel Rotary Filter
- 1—American 6' Two Disc Rotary Continuous Filter, with Ingersoll Rand 8" x 8" Vacuum Pump
- 1—No. 49 Vallez Rotary Continuous Filter
- 1—Vallez Lab. Filter

KETTLES—CRYSTALLIZERS

- 1—Pfaudler 275 gal. Nickel Lined Kettle
- 1—Walters 5' dia. Copper Jacketed, Agitated Pressure Kettle, 700 gal.
- 4—Monel Metal Jacketed Kettles, 5 gal.
- 1—Autoclave, 50 gal., agitated
- 1—2' x 4' Horiz. Cast Iron Autoclave
- 1—Devine 5' x 4' Closed, Jacketed Kettle
- 2—Closed Jacketed Steel Kettles, 6' x 5'
- 4—Pfaudler Glass Lined Kettles, 50, 125, 200 gal.
- 5—Aluminum Jktd. Kettles, 5, 30, 60 gal.
- 22—Copper Kettles, Jacketed, some with Agitators, 10 to 200 gal.
- 1—Lead Lined Jacketed Kettle, 175 gal.
- 4—Bufflovak 375 gal. Jacketed Impregnating Kettles
- New Stainless Steel Kettles, up to 500 gal.

KILNS—DRYERS

- 1—Traylor 7 1/2' x 51' Rotary Cooler
- 10—Rotary Dryers, from 4' x 20' to 6' x 60'
- 1—Copper Shell Rotary Dryer 6' x 17'
- 4—Rotary Vacuum Dryers, 18" x 3 1/2', 4' x 10', 4' x 15', 5' x 33'
- 1—Albright Nell Chilling Roll or Atmospheric Drum Dryer, 4' x 9'
- 1—Buffalo 5' x 12' Atmospheric Drum Dryer
- 3—Buffalo Vacuum Drum Dryers, 24" x 20", 48" x 40", 5' x 6'
- 2—Rotary Steam Tube Dryers, 6' x 27'6", with 42—4 1/2" x 25' tubes
- 1—Steiner and Hudson Gas Fired Dryer
- 1—Gehrich Gas Fired Truck Dryer
- 2—Atmospheric Truck Dryers, 2 and 5 trucks

SPECIALS

- 3—Colton Class 9-18 18 Punch Rotary Preforming Presses, 2" dia. die
- 3—Stokes "R" Single Punch Preforming Presses, 2 1/2" dia. die
- 2—Stokes Rotary BB Tablet Machines
- 15—Colton & Stokes Single Punch Preforming Presses, up to 1 1/2" dia. die

GRINDERS — PULVERIZERS

- 1—Hardinge 4 1/2' x 24" Conical Ball Mill, magnesium lined, with 10 HP explosion proof gear head motor
- 1—Filzpatrick Model "D" Comminuter
- 1—Williams No. 1 Hammer Mill
- 2—Rubber Lined Pebble Mills, 3' x 3'
- 1—Robinson 30" Attrition Mill, with 2—40 HP motors
- 1—Krupp Cross Bar Beater MMH, with 40 HP motor
- 4—Raymond Mills Nos. 0000, 000, 00, 1
- 1—Abbe No. 2 Jaw Crusher, 3" x 4"
- 1—Sturtevant 30" x 16" Balanced Crushing Rolls
- 1—Allis Chalmers 9" x 18" Jaw Crusher

MIXERS

- 8—Stainless Steel 175 gal. Mixing Tanks, with stainless steel, double motion agitators
- 12—Agitator Drives, for tanks from 10" to 24" dia.
- New and Used Portable Agitators, from 1/4 to 2 HP, 440 and 1750 RPM
- 2—New Era Jacketed Double Arm Mixers, 100 and 200 gal.
- 1—Readco 100 gal. Double Arm Mixer, steam jacketed
- 1—Fowler & Rockwell 5 bbl. Mixer
- 5—Brand New 1000 lb. Dry Powder Mixers, motor driven
- 1—Howes 24" x 12' Dry Powder Mixer
- 5—Day, Ross Double Arm Mixers, 10 to 100 gal.
- 2—W. & P. Mixers, 9 and 20 gal.
- 6—Dry Powder Mixers, 100 to 1000 lb.
- 3—Powder Batch Mixers, 3000 lb.
- 4—Steel Mixing Tanks, with side entering agitators, 650 to 1500 gal.
- 2—Scott 1250 gal. Jacketed Horizontal Closed Mixers

CENTRIFUGALS

- 1—Tolhurst 40" Solid Basket Centrifugal, motor driven, 15 HP motor
- 7—Tolhurst 32", 40", 49" Self-Balancing Centrifugals, steel and copper baskets, top and bottom discharge
- 5—12" to 30" Belt Under Driven Centrifugals
- 1—A. T. & M. 40" Centrifugal, 30 HP motor, 1800 RPM, bottom discharge
- 2—Sharples No. 6 Presurite Centrifuges
- 2—Sharples No. 6 Super Centrifuges
- 4—De Laval Nos. 300, 600, 700 Clarifiers

EVAPORATORS—PANS

- 1—Scott Quadruple Effect Evaporator, each body 8'3" dia. calandria type, approx. 2500 sq. ft. each effect
- 1—Quadruple Effect Evaporator, designed to evaporate 60,000 lb. water per hour
- 1—Zaremba Double Effect Evaporator, all copper, 5' dia., 500 sq. ft. per effect
- 1—Lillie All Copper Double Effect Evaporator, 1000 sq. ft. per effect
- 1—Swenson Single Effect Aluminum Evaporator, 100 gal. per hour
- 1—Bufflovak Stainless Steel Single Effect Evaporator, forced circulation type, 900 sq. ft. 7' dia.
- 6—Copper Vacuum Pans, 30", 42", 5' and 6' dia., 50 to 750 gal.
- 1—Stokes Steel Vacuum Pan, 100 gal.
- 3—Cast Iron Vacuum Pans, 7', 8', 12' dia.
- 1—6' dia. Double Effect Evaporator, 2500 sq. ft.

MISCELLANEOUS

- 1—Orville Simpson No. 43 Triple Deck sifter, with 40" x 84" screens
- 4—Devine, Marsh Horizontal Piston Vacuum Pumps, from 50 to 200 cfm
- 4—Tubular Condensers, 25 to 260 sq. ft.
- 10—12" Belt Conveyors, built for any length, motor driven
- 1—16" Troughing Idler Belt Conveyor, 175' centers
- 10—Liquid, Paste and Powder Filling Machines
- 6—Can and Bottle Labelers
- 16—Copper, Glass Lined and Aluminum Tanks, 25 to 1000 gal.
- 25—Centrifugal, Piston and Rotary Pumps, 1" to 5" discharge
- 6—Tyler, Rolex, Leahy Screens

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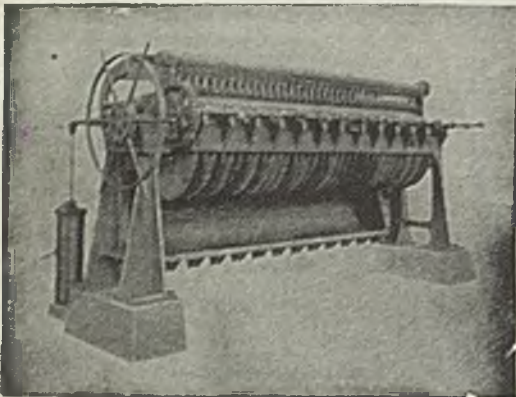
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- 1—Pfaudler Glass-Lined Tank, 2000-gals.
- 1—Pfaudler Glass-Lined Tank, 500-gals., with Stainless Steel Lightning Agitator.
- 1—Nick Chrome Iron Tank, 6666-gals.
- 1—Stainless Steel Holding Tank, 1200-gals.
- 1—Edze Minor Iron Works Jacketed Kettle, 3'8" x 11 1/2"
- 2—Copper Jacketed Bails, 50-gals., 200-gals., 500 gals.
- 4—Aluminum Electrically-Heated Kettles, 75-gals., Agitated.
- 1—Abbe Engr. Lined Ball Mill, 5' x 9'.
- 1—Abbe Engr. Lined Ball Mill, 4' x 4'.
- 1—Hardinge Mix-Lined Conical Ball Mill, 2' x 20".
- 1—Hardinge Conical Ball Mill, 4' x 16".
- 1—Abbe Untined Ball Mill, 2' x 4'.
- 1—Hendy Continuous Tube Mill, 2' x 12".
- 2—Abbe Continuous Tube Mills, 4 1/4' x 15".
- 2—Shalth Tube Mills, 6' x 12".
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- 1—Farrell 2-roll Rubber Mill, 14" x 34".
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- 1—Ball & Jewell #2 1/2 Rotary Cutter.
- 1—Louisville Rotary Steam Tube Dryer, 38" x 20".
- 1—Hubn Rotary Steam Tube Dryer, 38" x 9".
- 1—Ruggles-Coles Rotary Dryer, 7 1/2' x 60".
- 1—Bartlett & Snow Rotary Dryer, 8 1/2' x 50", Brick-Lined.
- 1—Buffalo Vacuum Drum Dryer, 3'2" x 4'6".
- 1—Buffalo Vacuum Drum Dryers, 5'10" x 10".
- 1—Buffalo Atmospheric Drum Dryer, 5' x 12".
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- 1—W & P Jacketed Mixer, jacketed blades, 50-gals.
- 1—W & P Jacketed Mixer, 30-gals.
- 1—W & P Lab. Mixer, 3 1/2 gals., 2 HP Motor.
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69	125	6x 6	Ingersoll Rand	315	100	11x10	Sullivan
93	100	7x 6	Penna.—Ing. Rand—C.P.	300	60	11x10	Worthington
153	40	9x 6	Ingersoll Rand	368	100	12x10	Ing. Rand—C.P.—Penna.
136	125	8x 8	Ing. Rand—American				—Amer.
173	100	9x 8	American—Ing. Rand CP.—Pa.	503	60	14x10	Ingersoll Rand
216	70	10x 8	Ingersoll Rand.—Penna.	577	50	15x10	C.P.
336	40	12x 8	Ing. Rand—C.P.—Penna. —Gardner	740	30	17x10	C.P.
424	25	14x 8	Ingersoll Rand	338	100	11x12	Worthington
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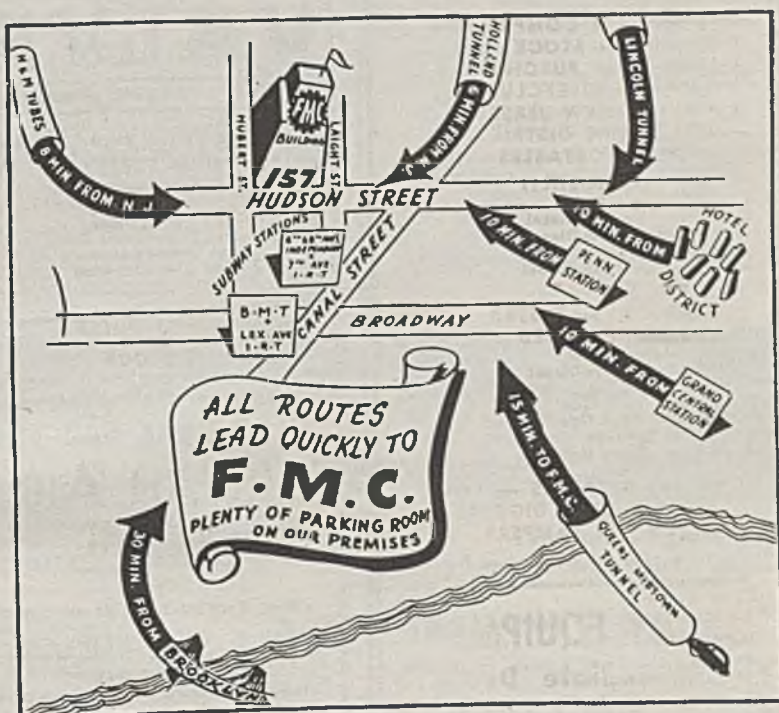


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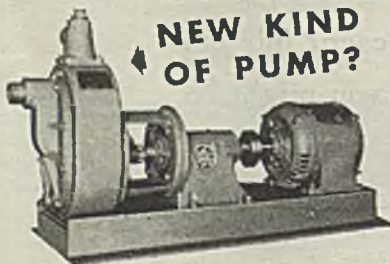
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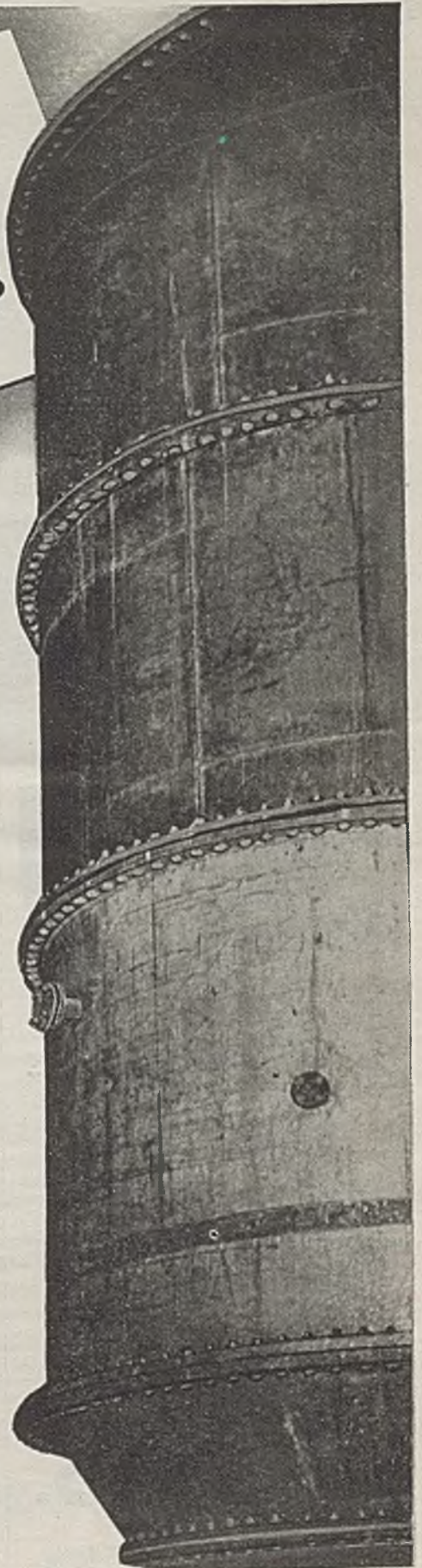
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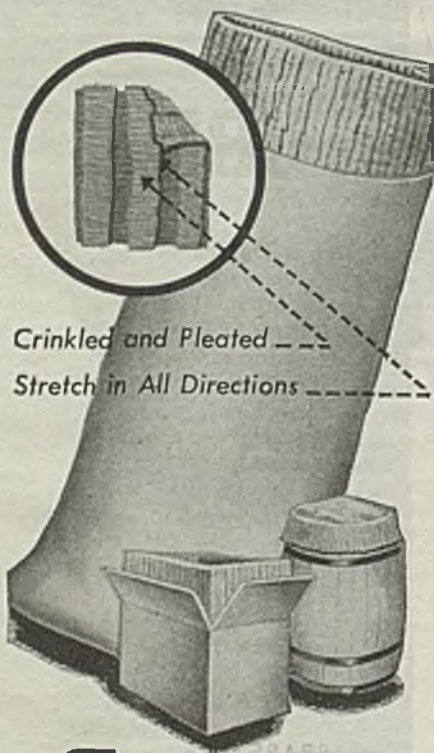
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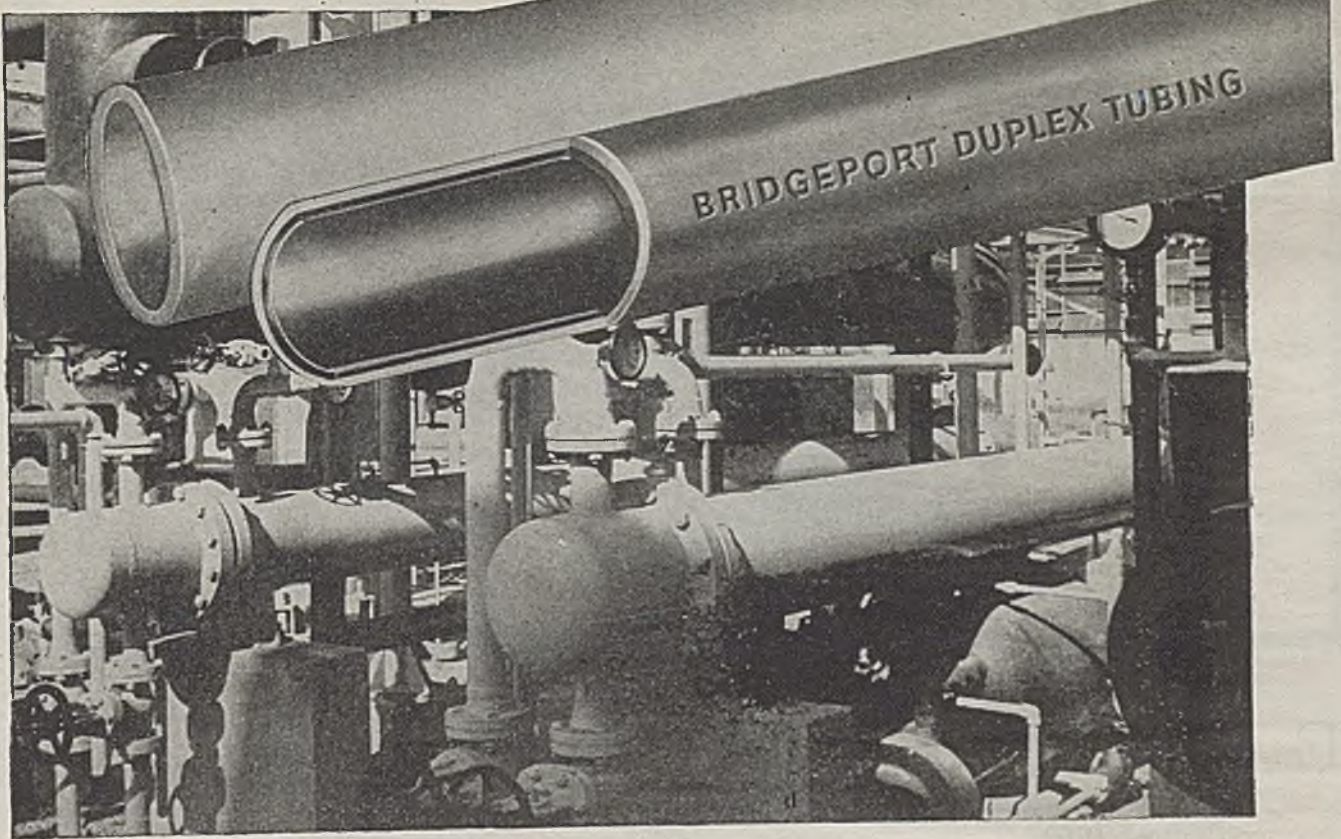
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