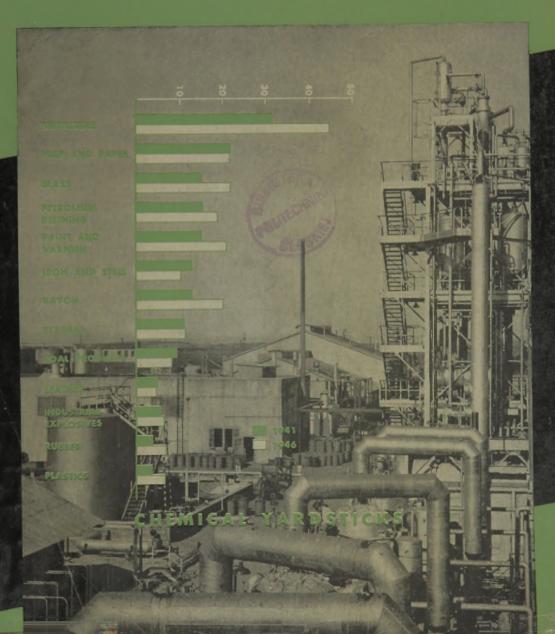
NATIONAL EDITION

FEBRUARY 1947 P. 352/47

CHERNEL & METALLURGICAL ENGINEERING



Featuring this issue is Chem. & Met.'s 24th annual review and outlook which includes discussions of what's ahead for American business and industry, and how the international situation likely to affect the chemical industry. Also articles on catalysts for chemical reactions, enzyme production, synthetic rubber and resins, design data on graphite heat exchangers.





"Sure we've got Wrought Iron Welding Fittings!"

WHEN you need wrought iron welding fittings you really need 'em! A good way of getting them is to get the Tube Turns distributor on the phone.

He handles the most complete line of welding fittings on the market, represents the one source of supply on which you can depend for all welding fitting requirements.

Tube-Turn wrought iron welding fittings are a standard part of the line as well as stainless steel, copper, aluminum, monel metal, inconel, nickel, carbon moly, chrome moly, brass. Tube-Turn welding fittings in these metals are available in all necessary weights, in a wide range of analyses, types, and sizes. The complete line of Tube-Turn welding fittings and flanges covers more than 4,000 items. Many of these are in stock with foresighted Tube Turns distributors, in every strategic industrial

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TUBE TURNS (Inc.) LOUISVILLE 1, KENTUCKY. District Offices at New York, Washington, D.C., Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, Houston, San Francisco, Los Angeles.

ONE SOURCE OF SUPPLY FOR ALL WELDING FITTING REQUIREMENTS

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STRINGS ARE TREMENDOUS TRIFLES

FILTRAT

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The string discharge feature of the FEinc Rotary Vacuum Filter—because it eliminates compressed-air blow-back, wire windings, and doctor blades—and because it discharges tough-to-handle filter cakes as thin as 1/16 in. with no limitation on thickness, in one continuous sheet ready for processing—is a tremendous trifle that may save you thousands of dollars yearly. The string discharge gets rid of scraping wear on filter cloths—you can use lighter filter cloths that are more efficient and make them last longer.

Other FEinc features that can save for you are the compression mechanisms; washing mechanisms; drum dryer combinations; etc.—all standard features that can be added to create a FEinc filter that is "special" for your filtration problems. Don't wait for a case that can't be handled on any other filter find out now how Filtration Engineers can cut costs on your regular filtering problems.



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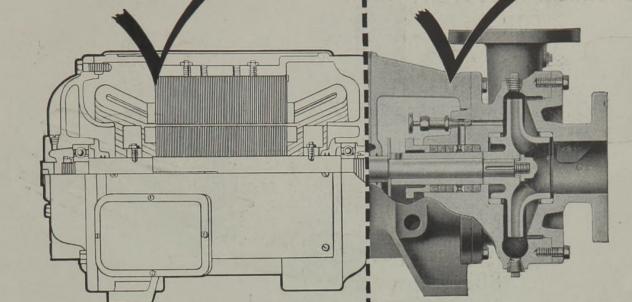
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New Bulletin 101 shows many methods for improving your continuous filtration with FEinc. filters. Send for your copy today.

Motorand Pump



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TO GIVE UNDIVIDED RESPONSIBILITY FOR CAPACITY...EFFICIENCY...HEAD

NOT ONE maker's pump hooked up to another maker's motor —but pump AND motor, designed and built as a unit by Allis-Chalmers.

There's no buck-passing. Allis-Chalmers backs every "Electrifugal" pump all the way — tests and checks the performance of each unit, at the factory.

FOR EVERY PUMPING NEED ... CALL ON A-C

This versatile, popular "Electrifugal" pump is only part of the complete Allis-Chalmers line of centrifugal, axial and mixed-flow pumps — single or double suction, single or multi-stage, capacities up to 170,000 gpm. Call your A-C office or dealer — or write for bulletin B6018. ALLIS-CHALMERS, MILWAUKEE. A2073

SPLASH-PROOF, LO-MAINTENANCE MOTOR — specially built for pump service. Sturdy, long-life rotor, interchangeable stator coils.

PUMP AND MOTOR IN ONE RUGGED FRAME, and on the same shaft. Result: perfect alignment; smooth, vibrationless operation; longer bearing life.

EASY INSTALLATION AND MAINTENANCE.

Just hook up and pump ... operates in almost any position ... all parts easily accessible for checking and service.

SIZES FROM 3/4 TO 25 HP

meeting a wide range of requirements as to capacity, head, and fluids to be pumped.

5



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Propylene Dichloride

EXCELLENT SOLVENT FOR

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TANK CAR QUANTITIES

A LOW COST SOLVENT WEIGHS 9.64

WAXES

POUNDS PER GALLON

Propylene Dichloride — which can be supplied in drum and tank-car quantities—is an ideal solvent for many industries. Propylene Dichloride resembles ethylene dichloride in its solvent properties and in general its applications are similar. Propylene Dichloride is a clear, colorless liquid that boils at 96.3°C. As this compound is resistant to oxidation by air, and hydrolysis by water, it can be handled in common construction metals.

Propylene Dichloride should also be considered as an intermediate in the synthesis of rubber anti-oxidants, plastics, elastomers, and pharmaceuticals. Call or write our nearest office for samples and prices.

A Few Industrial Applications of Propylene Dichloride

Plastics and Resins

 \ldots low-cost, stable solvent for resinous materials.

Pharmaceuticals

... for the residue-free extraction and purification of drugs, vitamins, hormones, and alkaloids.

Metal Cleaning

... for the economical cleaning of metal articles.

Textiles

... grease solvent and penetrating assistant in spot removers, dry-cleaning soaps, and scouring compounds.

Industrial Oils

... low-cost, efficient extractant for petroleum, vegetable, animal and fish oils.

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

30 East 42nd Street, New York 17, N. Y. Offices in Principal Cities Distributed in Canada by Carbide and Carbon Chemicals, Limited, Toronto



Bulk-Ho Handles Coal Economically from Car to Storage Bin at Starch Plant

• The problem of the Union Starch & Refining Company, Granite City, Illinois, was to handle coal without manual labor from hopper bottom cars — horizontally 30', then vertically 50', then to an overhead bin feeding an automatic stoker on a dryer for reducing moisture content of gluten feed.

The answer was a Link-Belt BULK-FLO unit, discharging to a screw conveyor with multiple discharge points. In addition to cutting handling cost and saving manual labor, this setup is self-feeding from bottom of track hopper... is compact and fully enclosed ... has underground horizontal run... eliminates auxiliary construction... is equipped with automatic limit switches. Link-Belt is prepared to help you solve similar problems.

10.415

This is but one of the many variations of setup possible with BULK-FLO, which combines the functions of conveyor, elevator and feeder in a single unit of high capacity. The material conveyed occupies practically the full area of the carrying duct. Loads automatically at one or several points; and automatically discharges at the head end of the vertical runs, or at one or more points on horizontal runs.

General view of Link-Belt L-path Bulk-Flo conveyor-elevator-feeder for handling coal from track dump hopper, through a shallow tunnel under ground, up side of building to L-B screw conveyor on roof. Screw, in turn, discharges into overhead bunker within building.

7

LINK-BELT COMPANY

Bulk-Flo

ELEVATOR-CONVEYOR-FEEDER

Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

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EERING

The simplest, surest mechanism ever devised for holding wheels to shafts. Complete unit. Slip it on, line it up and tighten while sighting.

TAPER LOCK A New Cost-Saving Taper Bore Sheave Holds fast to the shaft with firmness equivalent to a shrunk-on fit.

Disengages with less effort than any other sheave. Easy on. Easy off.

Complete range of sizes in Dual Duty (A and B); B, C and D grooves.



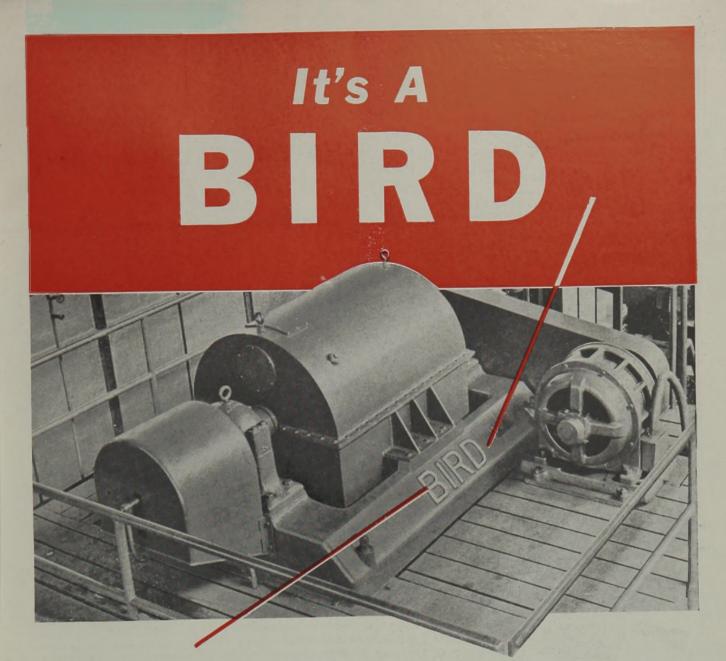
For details about cost-saving developments in power transmission equipment, call the Transmissioneer your local Dodge distributor. He's factory-trained, qualified to suggest ways to improve machine performance and increase production. Look for his name under "Power Transmission Equipment" in your classified telephone directory.

DODGE MANUFACTURING CORP., MISHAWAKA, INDIANA

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FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

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For Better Filtering

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LINOIS

RING

The Bird Continuous Centrifugal Filter can be expected to give you a drier cake and clearer filtrate. The solids can be thoroughly washed with a minimum of wash liquor.

Tests will readily prove how much better the Bird will do *your* job, before you risk a single penny.

For Faster Filtering

Solids and liquids are retained in the Bird Filter only a few seconds. No storage of material is necessary. Capacity, depending on the settling rate of the solids, stimulated by centrifugal force up to 1800 x gravity, ranges up to better than a ton a minute.

For Lower Cost Filtering

Operating and maintenance cost is extraordinarily small because there are no filter cloths to block, blind or renew, no filter media of any sort, no vacuum pumps or auxiliaries, no operating labor.

Get the facts and figures as they apply to your filtration operations by getting in touch with

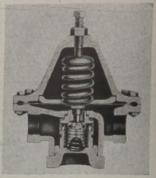
SOUTH WALPOLE - MASSACHUSETTS

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GET THESE COST MAKERS off your Hands!

Streamle

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES Send for them



Bulletin 950—features the CASH STANDARD Type D Single Seat Pressure Reducing and Regulating Valves for use with most fluids. Shows simple inner working parts that save in maintenance. Diagram explains how valve works. Blueprint shows simplicity of installation.



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 Freen Gas Capacity Chart based on ABSOLUTE pressures.



Bulletin 966—features the CASH STANDARD Self-Contained, Pilot Operated Type 10 Pressure Reducing and Regulating Valve for use with water or air; with any gas or oil that is non-corrosive; and with refrigerating fluids such as Ammonia and Freon. Many interesting particulars explained such as: how valve works, tight seating, large capacity, no waste, no water hammer or chatter.

What actually happens when you install the CASH STANDARD Type 1000 is a quick and permanent riddance of the cost makers pictured above. If these troubles are yours, concerning valve performance, why not take this simple and proved way of shaking them off your hands.

If you will send for Bulletin 962 you will get the

big, important picture of how the CASH STANDARD Streamlined type 1000 Pressure Reducing Valve works to your advantage continuously, giving you the benefits listed below.

POOR REGULATION

TYPE 1000

Maximum Capacity When Needed Most • Accurate Pressure Control Under Toughest Working Conditions • Trouble-Free Service • Smooth Operation • Tight Closure • Accurate Regulation • Speedier Production Results • Elimination of Failures • Constant Delivery Pressure • Cost Saving Operation • No Spoilage • Practically Zero in Maintenance Costs.

A. W. CASH COMPANY DECATUR, ILLINOIS

DO IT

WITH THE

CASH STANDARD

VALVES

CONTROLS

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chatter



Your Plans Include MARLEY **COOLING TOWERS** COOLING EQUIPMENT

WATER COOLING

and of course

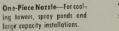
The Marley Company builds such a complete line of cooling towers and equipment that a Marley unit will accurately, economically fit every proposed air-conditioning, refrigeration or processing project now in planning stage. Your surest guarantee of excellent performance upon completion, is the quarter century record of Marley towers in service the world over.

Every Marley tower is the product of constant pioneering and development in thermal engineering; each the dominant design in its field.

MARLEY TOWERS and EQUIPMENT in your plans assure perfection in your project.



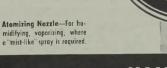




Two-Piece Nozzle-for all spraying and cooling equip-ment, Readily cleaned.



midifying, vaporizing, where a 'mist-like' spray is required.



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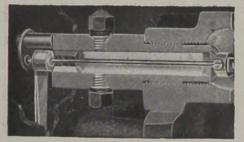
CHEMICAL ENGINEERING • FEBRUARY 1947 •

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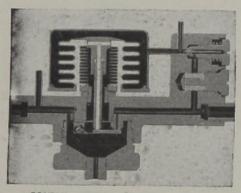
Look Twice... You Can't Have POSITIVE CONTROL Without PRECISION MEASUREMENT



11

CONTRIBUTING TO PRECISION MEASUREMENT PRESSURE-TIGHT BEARING

The connection between float and lever assembly. Chrome-Vanadium steel shaft is lapped to clearance of .00005" at bearing surfaces. No stuffing box or packing required. Bearing is filled with suitable grease for the particular service and pressure.



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Precision manufactured to minimum tolerances throughout. Non-bleed construction permits use of large intake and exhaust ports for rapid control valve operation. Uses air only when increasing valve pressure, thus reducing air consumption to a minimum. LOOK first at the meter body—the measuring element—of a flow controller. Does it have simplicity of design, rugged construction and permanence of calibration? Does the pen respond instantly to the slightest change in differential? In short, will it give continuous precision measurement of flow?

Look next at the control unit. Has it been designed and constructed so that it can easily be "tuned-in" to specific requirements, without guesswork, and will then "line out" control exactly at the set point without cycling, drifting or shifting?

No controller can be better than its measuring system. That is why years of research and engineering have been devoted to the development of an instrument that delivers precision measurement of flow—at all times. This continuous accuracy of flow measurement in combination with the automatic control afforded by the *Air-o-Line* unit makes the Brown Flow Controller outstanding for any process requiring continuous, positive flow control.

Look twice . . . for the features of Brown Flow Controllers contributing to precision measurement and control . . . and remember . . . you can't have positive control without precision measurement. Write for the Brown Flow Control Catalog 2221.

THE BROWN INSTRUMENT COMPANY, a division of Minneapolis-Honeywell Regulator Company, 4478 Wayne Avenue, Philadelphia 44, Pa. Offices in principal U.S. cities and in Toronto, Canada; London, England; Stockholm, Sweden; Amsterdam, Holland.

LOW CONTROLLERS

Air-o-Line-THE COMMON DENOMINATOR OF PROCESS CONTROL

PREVENT RUST!

The hydraulic system of a broaching machine operating 22 hours a day had to be dismantled every two weeks to clean rust and deposits from pistons and valves in order to get the machine to run smoothly and with the proper speed. After changing to Texaco Regal Oil (R & O) the same machine ran for 90 days between drain periods with no indication of trouble.

A machine tool manufacturer found, when operating one of his machines continuously day in and day out with a turbine grade mineral oil, that sludging of the hydraulic system resulted after 500-700 hours of operation. By switching to Texaco Regal Oil (R & O) he was able to increase the period between drains to 2400 hours, f gum, sludge or varnish.

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EVENT SLUDGE! HYDRAULIC MECHANISMS

TEXACO Regal Oils (R & O) are designed to lick the biggest bugaboo of hydraulic mechanisms - the costly stoppages caused by rust and sludge. They are specially in-

hibited against rust and oxidation. The rust inhibitor in Texaco Regal Oils $(R \ \mathcal{E} \ O)$ "plates" all parts of the hydraulic system so that moisture cannot reach and rust the metal. The oxidation inhibitor aids the oil in freeing itself rapidly of air and water and thus prevents sludge formation. In addition, Regal Oils (R & O) will not foam - extra assurance of smooth, dependable operation.

Leading makers of hydraulic equipment either ship their units filled with Texaco Regal Oils (R & O) or recommend their use. There is a complete viscosity range to assure trouble-free, economical performance from every hydraulic mechanism, large or small.

For full information, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 E. 42nd St., N. Y. 17, N. Y.

13



Tune in TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

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Why American Flexible Seamless

IN COUNTLESS APPLICATIONS, handling oil, steam, water, and other liquids, gases and semi-solids, American Seamless successfully withstands heat, vibration, pressure, abrasion, corrosion and repeated flexing. The way it is made (see below), accounts for the superior performance and widespread utility of this quality product. Write for Publication SS-50, which gives detailed information on types and uses of American Flexible Metal Hose and Tubing.

> Heavy-walled tubes are reduced in our own plant to the proper thickness for forming into flexible tubing. Exact dimensions assure maximum service life.

> After annealing, the thin-walled tubes are corrugated to provide flexibility. Special machines form these corrugations in either an annular or helical pattern.

> After corrugating, one or more wire braids are applied, depending on the service. Braids provide added strength and prevent elongation under pressure.

Although American Seamless is sold with or without fittings attached, it is usually supplied in the form of complete assemblies ready for installation. Either soldered-on or heatproof couplings are available.



ALOYCO Stainless Steel Valve Success Is Due to 2 Primary Factors

ANGLE No. 331

SWING CHECK No. 571

Y-FLANGED No. 361

Wide Selection of Corrosion-Resisting Alloys 2. Excellence of Design and Construction

ALOYCO Valves and Fittings are made in a wide variety of stainless steels and other corrosion-resisting alloys. Each of these differs from all others in relative resistance to various corrosive fluids, under different conditions of temperature and concentration. It has taken us many years of specialization in the manufacture of corrosionresisting valves, exclusively, to gain the experience which enables us to recommend the one best alloy for any specific application.

Of equal importance with the selection of the correct

ALOYCO GATE VALVE NO. 111

This popular valve has doubledisc, ball-and-socket type wedges that are free to rotate and are non-fouling in any position. The design insures tightness on both seats and permits easy repairs. alloy, is the quality of design and construction of the valve. In pattern shop, foundry and machine shop, particularly, corrosion. resisting alloys require very different handling from all other metals. Here again, our concentration on corrosion problems makes Aloyco Valves distinctive for mechanical excellence. You get more out of Aloyco Valves, because we put more into them. Consult us on your requirements.

FLUSH BOTTOM TANK No. 751 CHEMICAL ENGINEERING • FEBRUARY 1947 •

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GATE VALVE

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GLOBE CHECK No. 45-A

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VALVES AND FILLINGS

SCREWED, FLANGED AND WELDING FITTINGS

1301 WEST ELIZABETH AVE.

Alloy Steel Products Company, Inc.

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R 24" SER WATER HOSE CONN. FOR WASHING 24"

24"

VAPOR 18150 /HR VEL.120 FR/SEC.

** EFFECT 20 HG. VAC VAPOR

SWENSON DARES TO BE

Swenson dares to be first in working out difficult processes because of its tremendous background of research, experience, and engi-

neering skill. The development of equipment and techniques for producing ammonium thiocyanate is another "first" that illustrates how industries secure important benefits by using Swenson Process Engineering to work out unusual problems.

Swenson is not just another builder of chemical equipment... it is an organization capable of analyzing new, unusual, and difficult processes, and developing the evaporators, filters, and crystallizers required to achieve the desired results. Call in Swenson engineers while your plans are still in the formative stage.

SPRAY DRYERS

TO SEWER

TO BE SHOVELED



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• FEBRUARY 1947 • CHEMICAL ENGINEERING

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ammonium thiocyanate—urgently needed for the production of insecticides, anti-corrosives, matches, adhesives, and photographic chemicals; for textile printing and dyeing processes; and for use in synthesis and laboratory tests. The government assigned high priorities for plants to manufacture ammonium thiocyanate . . . but more than priorities were needed to secure quick production. There were special problems in evaporating the original solution of sodium thiocyanate due to its high boiling

America's entrance into World War II found this country with no consequential source of

> Swenson-Walker Crystallizer

25"STEAM

22 57 -2

EFFECT

VAPOR

point rise, its tendency to foam, and its highly corrosive properties. There was no time to experiment or set up pilot plants.

24

M.L. VAC FIT

SWENSON

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Process Empineer

THE PRODUCTION

AMMONIUM THIOCYANATE—WAR-SHORT CHEMICAL

SALT WASH VAC. FILTER

APPLIED

In the emergency, Swenson engineers were entrusted with the design and fabrication of full scale production equipment. They employed Long Tube Vertical Evaporators built with nickel and stainless steel; and solids were crystallized out of the concentrate with Swenson-Walker Crystallizers.

Thus under stress of wartime conditions, working in a new field without the benefit of an experimental installation, Swenson was able to develop urgently needed equipment that worked successfully. It is still in use and performing satisfactorily.

SWENSONEVAPORATORCOMPANY15669Lathrop Ave.Division of Whiting CorporationHarvey, Illinois

00 â 6 Analysis of Manufacture of Equipment Periodic Check-Ups Tes Design and Operation I avour SWENSON PROVIDES THIS FIVE-WAY SERVICE SWENSON EVAPORATOR HARVEY, ILL., U.S.A. SURGE GILY CONDENSATE SURGE TANK TANK Req 8 Title · FLOW SHEET MATERIAL BALANCE Ch'd FM Capacity Scale 1/2" = ONE FT. Appr. 1-9965 Appr

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3 WAYS to CONTROL TEMPERATURE

WITH



BAILEY PYROTRON ELECTRONIC RESISTANCE THERMOMETERS

1. FOR AIR-OPERATED SYSTEMS

A free floating air pilot valve actuated by the Pyrotron slidewire unit establishes an air loading pressure for the control of valves and drives. Adjustments and relays provide flexibility of range, sensitivity, and speed of response, as well as reset action, easy coordination with other factors, and remote manual control.

2. FOR ON-OFF ELECTRICAL SYSTEMS



By Electronic Relay—Two slidewires, one set manually to the desired temperature standard by a convenient knob and scale, and the other automatically positioned by the Pyrotron slidewire unit, form a control bridge which operates an electronic relay.

By Electric Contacts — Adjustable cam on Pyrotron slidewire unit operates a totally enclosed snap switch.

3. FOR MODULATED ELECTRONIC SYSTEMS



A control bridge formed by two slidewires establishes a small signal voltage which changes in phase and intensity to operate a standard electronic control unit. The d-c output of this unit is accurately regulated according to the signal and applied to a saturable core reactor to vary voltage on the a-c heating circuit.

UNUSUAL FEATURES OF THE BAILEY PYROTRON ELECTRONIC RESISTANCE THERMOMETER

- 1. Resists vibration and shock.
- 2. Needs no careful leveling.
- 3. Motor drive provides abundant power for operation of recording pen, controller, alarms and signals.
- 4. Simple a-c measuring bridge needs no battery.
- Sturdy electronic units keep the bridge in continuous balance and replace the usual galvanometer and its attendant mechanism for step by step balancing.
- 6. Interchangeability of packaged units simplifies replacement.

For details on this unusual Electronic Resistance Thermometer, which indicates, records and controls temperatures between -100°F. and 1200°F. ask for Bulletin 230-A. P-10





Sulfanilamide Activated By Urea and Urethan

Sulfanilamide in quantities insufficient to inhibit growth of bacteria becomes bacteriostatic when mixed with urethan or urea, according to a paper published recently. In addition, the author states, urethan increases the solubility of sulfanilamide at least two times and of sulfathiazole at least three times. The report also indicates that urethan improves the action of penicillin, particularly in the treatment of mixed infection of wounds.

Increases Soap Lather

To improve the lathering of soap, a method has been devised which consists of treating the soap with nitric oxide prior to the salting out process. The soap afterward was said to give a thicker and finer lather than without this treatment.

THE MONTH IN TEXTILES

A flameproof, mothproof, and non-shrinking wool is said to have been developed . Limited commercial production of nylon staple fiber — a material claimed to have outstanding properties of strength, abrasion resistance, and dimensional sta-bility — is announced . . . A method for lubricating fibers at a stage prior to spinning is patented . . . Congress will be asked to enact a law forbidding interstate transport of highly flammable textiles, according to a reputable source . . . A waterproof and stainless fabric is marketed which is said to need no special stitching . . . A report on synthetic fiber developments in Germany is made available . . . The British announce a new organization to undertake research into the growing and breeding of cotton . . device is produced which accurately determines the amount of moisture in wool . . . A new finishing agent for cotton and rayon fabric, described as a water-soluble gum finish of low viscosity and good stability, is manufactured . . . A new dry-cleaning fluid is placed on the market.

New NF VIII Available

The new, completely revised and enlarged National Formulary has just been issued. It is said to represent the culmination of four years of planning and work by the Committee on National Formulary, the staff of the American Pharmaceutical Association Laboratory and hundreds of collaborators.

Ups Starch Solubility

The solubility of starch in aqueous solutions is said to be increased by a process patented recently. The process consists primarily in treating the starch with a soluble inorganic chlorite under prescribed conditions of heat and pressure.

New Shampoo Stabilizer

The turbidity tendency of shampoo compositions can be decreased notably by the use of a stabilizing agent, described as an anionactive salt of a monoalkyl sulfate, according to a recent patent. Lathering power is said to be unimpaired by the stabilizer.

1946 Advances in Drug Field Used Many U.S.I. Chemicals

Intermediates, Solvents, and Other Chemicals Supplied for Amino Acid Therapy, and Treatment of Leukemia. Malaria and Ophthalmia

The cascade of "wonder-drugs," fed by seven years of intensive war-time research, swelled last year as new pharmaceuticals hit the market and as "top-secret" labels were removed from many war-time developments. During

New Scale Simplifies Solution Preparations

To simplify the preparation of solutions in which the weight of water must be figured, a new scale has been developed which is claimed to save considerable time for pharmacists and chemists because unit weights replace tedious mathematical calculations. The new scale is graduated into units, called "yagles." Each "yagle" is equal to one per cent of the weight of a fluid dram of water (454.6 grams).

Hormone Combats Ulcers

A group of American scientists have announced the isolation of a new hormone which is claimed to have brought relief to 40 of 58 patients suffering from peptic ulcers. The hormone, known as enterogastrone, is said to be derived from the mucous lining of the upper intestinal tract of pigs.

Mildew Resistance Tests

A summary of the tests used to determine the mildew and rot resistance of textiles and the effectiveness of textile fungicides have recently been published. Complete laboratory details of the more important tests are given.

many war-time developments. During the year, U.S.I. continued to supply the pharmaceutical industry with many chemicals, intermediates, and solvents. Among its major contributions was a new low-cost method for synthesizing the up-to-then rare and expensively-priced methionine, a vital amino acid for which wide use is foreseen in human foods, animal feeds, and the treatment of various diseases.

Also introduced last year were new therapies for periodic ophthalmia and leukemia, the dreaded "cancer of the blood," in which riboflavin and urethan respectively played prominent parts. Government scientists disclosed the development of a new synthetic drug, "SN 7618," which is said to be superior to both atebrin and quinine in the treatment of malaria. Familiar pharmaceutical stand-bys, such as ethyl acetate, ethanol, acetone, and butanol, gained new stature by their applications in the manufacture and processing of vitamins, hormones, barbiturates, "sulfa" and other drugs.

Low-Cost Methionine

Practically unobtainable before 1946, methionine is now available to pharmaceutical manufacturers for much-needed applications, thanks to the new U.S.I. manufacturing process which slashes costs about 97 per cent. Anticipated uses for this compound, which is one of the ten amino acids necessary for the growth and repair of animal tissue, include the treatment of shock, burns, exposure, as well as poisoning from a wide range of compounds. It is reported that protein hydro-(Continued on next page)



In 1846, William Morton made the first public demonstration of the use of ether as an anesthetic. Since then, the pharmaceutical industry has continued to triumph over pain. Last year saw the introduction of new therapies for leukemia, malaria, and ophthalmia.

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February *

S.I. CHEMICAL NEWS

Pharmaceutical Advances in 1946

(Continued from page one)

lysates fortified with methionine have been | than atebrin or quinine, and with fewer ill employed with outstanding success in the treatment of peptic ulcers and starvation cases.

Hope for Leukemia Victims

To the many victims of leukemia, for which no cure has yet been found, new hope came last year as British scientists announced a definite palliative effect in many cases when urethan treatments were used. The results were reported to be similar to those obtained from X-ray therapy which has been employed for some time to give temporary relief and to prolong life in chronic forms of the disease. Urethan therapy, it was noted, dropped the total white blood count to normal limits and raised the hemoglobin level.

New Antimalarial

After four years of extensive research the U. S. Government's Board for the Coordination of Malarial Studies finally came up with a new antimalarial, "SN 7618," which, it is claimed, relieves malaria three times faster

effects. An important intermediate in the manufacture of this drug, is noval ketone (5diethylamino-2-pentanone), a product of U.S.I.

Wider Use for Old Stand-bys

Familiar chemicals continued to play important roles in the pharmaceutical industry in 1946. A stir was created when it was announced that ethanol was found effective in the treatment of rats' cancer, but the greatest pharmaceutical manufacturing use for this compound was still found in the processing of vitamins, hormones, and plant extracts. Other solvents, such as amyl alcohol, amyl acetate, butanol, and acetone entered into the same type of processing. Riboflavin extracts were suggested as a cure for periodic ophthal-mia, "moon blindness," a disease common to horses. Diethyl carbonate and diethyl oxalate were used in the preparation of barbiturates; ethyl acetoacetate in the manufacture of antimalarials, leucine, antipyrine, and Vitamin B_1 ; and ethyl acetate in the processing of "sulfa" drugs, such as sulfadiazine.

25,000 ATTEND FIRST AUTOMOTIVE INDUSTRIES SHOW SINCE PEARL HARBOR



More than 450 exhibitors displayed products ranging from seat covers to hydraulic springs at the Automotive Service Industries show held recently at Atlantic City under the joint sponsorship of the MEMA and the MEWA. The show attracted about 25,000 visitors. Shown here at the U.S.I. booth, left to right are: J. F. Creamer, Horton, Gallo, Creamer Co., W. J. Fried, U.S.I., J. T. Fleming, Horton, Gallo, Creamer Co., W. W. Newell, U.S.I., A. E. Tongue, U.S.I., H. L. Snyder, Jr., U.S.I., T. M. Bennett, U.S.I., J. Blessing, Harrisburg Auto Parts Co., and E. B. Mower, George W. Myers Co.

TECHNICAL DEVELOPMENTS

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

A medified carnauba wax, having an alleged melting point of 178-180 degrees F, is recom-mended by the manufacturer for use in seli-polishing floor waxes, and in the production of carbon paper and carbon inks. (No. 159) TIST

An easy method for testing tension in a strand of thread, yarn, or cord is said to be supplied by a new tensometer which measures tension di-rectly in pounds. Clipped on a moving continuous cord, the instrument is reported to record fluctua-tions with a minimum of error. (No. 160) USI

Quantitative test papers for determining concenrations of quaternary ammonium compounds are now on the market. Strength in parts per million is rapidly measured merely by dipping the papers in the solution, according to the manu-facturer. (No. 161) USI

A "tool-proof" liquid adhesive, stated to require no catalyst or special preparation for use, is described as a tough, flexible cement having a six-months' minimum package stability. The manufacturer states that the adhesive can be applied without thinning by brushing, roller coating, or dipping. (No. 162) USI

An odorless lanolin, said to be applicable to the manufacture of cosmetics, is reported to have a new non-darkening pale color. (No. 163) USI

A lighter-than-cork insulating material is de-scribed as a cellular rubber that will not absorb moisture and is fire-resistant, rot-resistant, and unaffected by acids, oil, vermin, and termites. Said to be a more efficient insulator than cork, it is specially recommended for refrigerator trucks. (No. 164)

USI

Four types of phenolic cements, designed prim-arily for acid-proof brick or tile in the construc-tion of acid tanks, pulp digesters, acid towers, and floors, have been developed. Supplied as powders, the cements are reported to set in 4 to 6 hours at room temperature and to retain their physical properties over a wide temperature range. (No. 165) USI

A new rubber accelerator, which is alleged to make tires more resistant to thread cracking and ply separation, has been announced. It is sold to be especially beneficial in the process-ing of synthetic rubber. (No. 166) (No. 166) USI

FEED CONCENTRATES

Chemically Pure RESINS

Collodions Ethylene Glycol

Riboflavin Concentrates Vacatone 40

Curbay B-G Curbay Special Liquid

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

A new fungicide and spray adjuvant that will not wash off in rain or dew, according to the manufacturer, is described as an air-drying ad-hesive which can be used as a carrier for insec-ticides and other fungicides. The compound is mixed with water and can be used in all stand-ard equipment, it is stated. (No. 167)

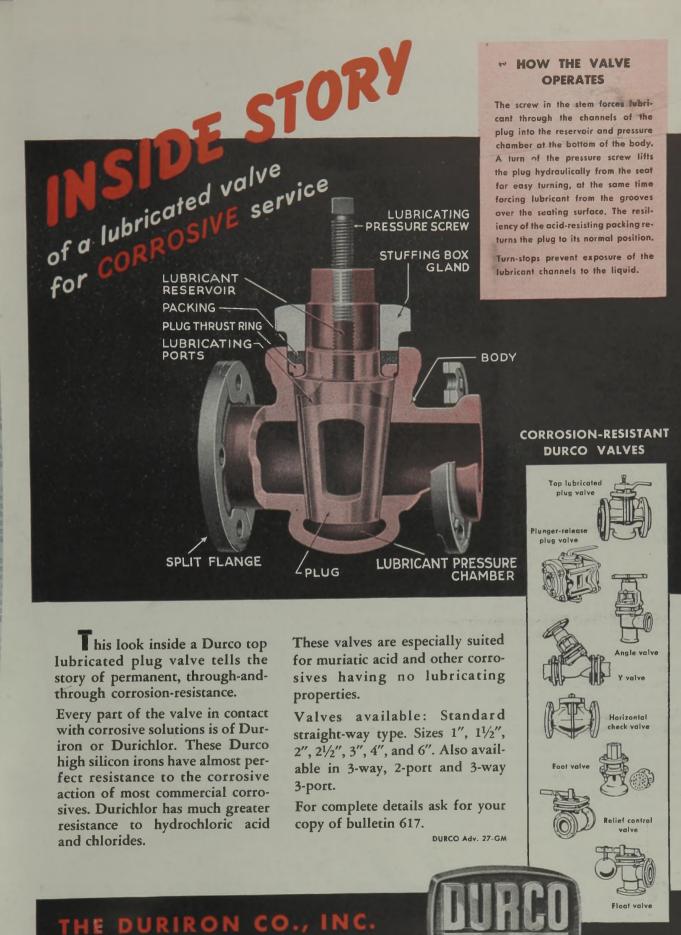
U.S. NOUSTRIAL CHEMICALS, INC. 60 EAST 42ND ST., NEW YORK 17, N. Y. (U.S.)

- ALCOHOLS Butanol (Normal Butyl Alcohol) Fusel Oil-Refined
- Ethanal (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

- ACETIC ESTERS Amyl Acetate Butyl Acetate OXALIC ESTERS
- Dibutyl Oxalate Diethyl Oxalate PHTHALIC ESTERS
- Diamyl Phthalate Dibutyl Phthalate Diethyl Phthalate
- OTHER ESTERS *Diatol Diethyl Carbonate Ethyl Chloroformate

INTERMEDIATES Acetoacet-ortho-anisidide Acetoacet-ortho-chloranilide Acetoacet-para-chloranilide 5-Chloro-2-pentanone 5-Diethylamino-2-pentanone Ethyl Acetoacetate Ethyl Benzoylacetate Ethyl Alpha-Oxalpropionate Ethyl Sodium Oxalacetate

1947

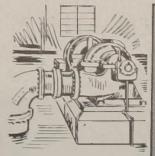


DAYTON 1, OHIO

CHEMICAL ENGINEERING • FEBRUARY 1947 •

21

CORROSION RESISTING ALLOYS & EQUIPMENT



Goulds **DOUBLE-SUCTION CENTRIFUGALS**

for dependable industrial pumping

GOUL

Only a careful check would reveal the actual number of varied services for which Goulds dependable Double-Suction Centrifugal Pumps are being used in industries of all types. They have been shipped in large numbers since early 1900, have been constantly improved in design and operation. Today, standard units are economically pumping liquids ranging from water to crude oils!

Made in a wide range of sizes, they pump from 100 to 14,500 G.P.M. with heads up to 475 ft. depending on capacity. They are driven directly by electric motors, steam turbines, gasoline or Diesel engines, and through "V" or flat belt drives from any power source. Note some of the specific applications and features of these pumps shown at the right. This is the kind of pump performance you want! For further details, write Pump Headquarters or your nearest Goulds office.

the PUMP FOR the JOB

TYPICAL APPLICATIONS

- Condenser service
- Irrigation
- Air conditioning and refrigeration Municipal water supply

- Gasoline, oils and distillates
- White water in paper mills • Process pumping • General water service

- SPECIAL FEATURES
- Preformed micarta shaft rings prevent leakage—tested to 1000 P.S.I. • Water quenched glands for high tempera-
- Replaceable longue and greave wearing rings keep pump up to peak efficiency
- over the years
- Permanent bearing alignment—bearing housings cast integral with casing

C PUMPS, INC.

SENECA FALLS, N.Y.

60

TO HELP YOU CHOOSE THE **RIGHT** STAINLESS STEEL FOR EACH TASK and to fabricate it successfully

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EERING

Fabrication

You'LL spend less money and get better results with Stainless Steel equipment – whether you build it yourself or have it built outside—if you know what to expect from the various grades of Stainless available for application in chemical engineering equipment.

For it is well to remember that the name "Stainless Steel" covers a number of alloys that vary widely in their resistance to corrosion, whose strength under high temperatures is not the same, that have different hot and cold working properties, and are unlike in their machining characteristics. These steels also vary considerably in cost.

Here is where our engineers and stainless steel specialists fit into the picture. With years of experience in developing, testing and applying U·S·S Stainless Steels of all grades they are usually able to tell you exactly what particular type of Stainless will do the best, most economical job for you and what is the best fabricating practice to ensure success.

For ordinary applications, where no unusual conditions are involved, our new textbook, "The Fabrication of $U \cdot S \cdot S$ Stainless and Heat Resisting Steels" can be used as a general guide to steel selection and fabricating procedure. This book contains the latest, most comprehensive information on this important subject. Both users and makers of Stainless Steel equipment will find it practical and helpful.

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STATES STEEL

U·S·S STAINLESS STEEL

U-S-S Stainless

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nd Heat Resideing

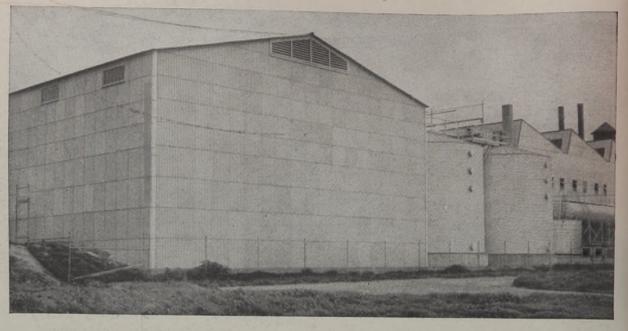
SHEETS . STRIP . PLATES . BARS . BILLETS . PIPE . TUBES . WIRE . SPECIAL SECTIONS

AMERICAN STEEL & WIRE COMPANY, Cleveland, Chicago and New York CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago COLUMBIA STEEL COMPANY, San Francisco NATIONAL TUBE COMPANY, Pittsburgh TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham United States Steel Supply Company, Chicago, Warehouse Distributors United States Steel Export Company, New York

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CORRUGATED TRANSITE*... for the complete exterior

*Transite is a registered Johns-Manville trade mark



For buildings large and small, industry uses Johns-Manville Corrugated Transite for the entire exterior—roofs as well as side walls. Transite needs no upkeep



Whether it's used for a one-story utility building or a multiple-story factory, J-M Corrugated Transite meets all the modern requirements for attractive design and streamlined construction. It builds fast! And it's built to last! Corrugated Transite is a rigid asbestos sheet that provides durable, weatherproof walls and roofs for buildings of every size and design.

Whatever your industry, whatever type of building, you can use Transite for both new and remodeled structures, and cut construction costs.

The large convenient sheets, with their unusual strength further increased by corrugations, permit a minimum of framing. They're quickly and easily applied, and when alterations are necessary can be completely salvaged.

. . . can't rot . . . can't burn . . . can't rust

You save on maintenance, too. Made of asbestos and cement, practically indestructible materials, Transite requires no preservatives ... remains virtually maintenance-free.

For more details, write Johns-Manville, Dept. CE-2, Box 290, New York 16, N. Y.

Because of the unprecedented demand for J-M Building Materials, there may be times when we cannot make immediate delivery. We urge you to anticipate your needs.





From Savannah to Seattle — from Albany to Albuquerque — millions of people take time-out for "the pause that refreshes with ice-cold Coca-Cola." And in doing so they enjoy one of the world's purest beverages — a beverage that is guarded every minute of its long journey to bottling plants all over the country. For Coca-Cola has one of the most valuable reputations in industry. Every possible safeguard is taken to protect it.

Special 55-gallon Stainless Steel Drums — costing ten times as much as ordinary drums — carry the syrup from the factory. To ensure a perfectly sanitary container, the drums are cleansed with steam before they are filled. And to prevent any possibility of contamination in transit, every Tri-Sure Stainless Steel Flange is capped with Tri-Sure Seals. Coca-Cola started to use Tri-Sure sealed drums ten years ago — with a stock of 1000 drums. Today tens of thousands of these drums are in use. Many of them, in congested areas, make eight or ten trips a month. Yet — despite the length of service, the vast number of drums in use, and the frequent trips taken by many of the drums — not a single gallon of Coca-Cola syrup has ever been spoiled or lost by seepage, evaporation, or contamination.

The experience of Coca-Cola is eloquent proof that any product — and the reputation behind it — is safe in drums equipped with Tri-Sure Closures. It is further evidence that the finer the product, and the greater the investment in it, the more it pays to give every drum the protection of Tri-Sure Closures.



CLOSURES

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y. TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

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Backed by 35 years' experience

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One man and a Mercury Fork Truck speed the flow of materials from receiving, through process, to shipping – load, unload and tier to ceiling height with ease. Powerful, versatile – this handling team does the work of four or more men – faster, easier and at lower cost.

Mercury, with over 35 years in the design, manufacture and installation of material handling equipment, is well qualified to recommend the handling system that meets your particular requirements. For on the spot consultation, ask a Mercury Sales Engineer to call. There is no cost or obligation.

FREE: BULLETIN 201-6

48 pages illustrating and describing all Mercury equipment—including the latest additions to Mercury's expanded material handling line. Write today.



Compact, powerful Mercury "Jeep" fork truck, capacity 2000 lbs., picks up pallet load of package materials.



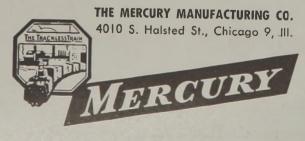
• FEBRUARY 1947 • CHEMICAL ENGINEERING

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MERCURY

YANK

Most powerful fork truck in the Mercury line, the "Yank" tiers two pallet loads quickly and accurately. Capacity, 6,000 pounds.



TRACTORS · TRAILERS · LIFT TRUCKS

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receiving - load, up t with ease dling team nen - faster,

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PROTECT

against ACID F

Fume removal is VITAL here! That is why Inland Steel Company installed "Buffalo" Rubber-Lined Exhausters (B. F. Goodrich Vulcalock Process) to handle the corrosive fumes from tanks in their large-scale pickling process. Many types of gases can quickly destroy metal, but not rubber . . . thus these exhausters provide far longer service, at lower cost.

Do your operations call for exhausting of gases or materials? The complete "Buffalo" line offers you types and capacities of fans for trouble-free, economical delivery in every air application. For full information, simply write:

BUFFALO FORGE COMPANY

501 Broadway

Buffalo, N. Y.

RUBBER-LINED

EXHAUSTERS

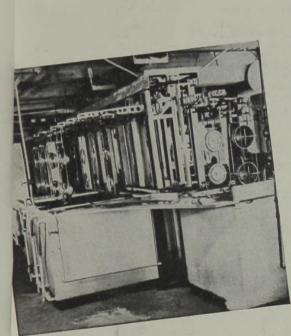
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GETTING THE MOST out of a vacuum The process operator who is trying to boost production, cut costs, or improve The process operator who is trying to boost production, cut costs, or improve product quality knows that his vacuum-producing equipment must be exactly product quality knows that his vacuum-producing equipment must be exactly suited to his specific application, and that it must be capable of sustained, This is the kind of performance you will get from Ingersoll-Rand Steam-Jet Ejectors, Condensing Equipment, and Reciprocating Dry Vacuum Pumps. fectors, Condensing Equipment, and Reciprocaung Dry vacuum rumps. If you have a problem or process that requires a vacuum, why not consult If you have a problem or process that requires a vacuum, why not consult Ingersoll-Rand? Perhaps our specialists can suggest a new application for trouble-free operation. Ingersoil-Rand? Perhaps our specialists can suggest a new application for vacuum producing equipment that will enable you to get the most from your vacuum producing equipment that will enable you to get the most from your manufacturing process—the most in processing efficiencies—the most in reduc-A two-stage, single-element ejector mounted tion of product cost—the most in product improvement. on a direct-contact type intercondenser, Reciprocating dry vacuum pump. 26 4-858 11 Broadway, New York 4, N.Y. A.large vacuum booster fining

Special multi-stage ejector for service

A single-stage, twin-element ejector mounted on a surface-type combination precooler and aftercooler.





RING

Shown here are two 15,000-gallon rubber-lined barge tanks. 10 ft. in diameter x 27 ft. long. Weight 27,000 lbs. each. Rubber-lined by Manhattan with acidproof rubber for conveying sulphuric acid solution.

Tanks like these are easily handled in Manhattan's giant tank-lining vulcanizer, which is 15 ft. in diameter and takes anything that can be shipped on a rail-road flat car.

Below is an installation consisting of a number of rubber-lined plating, acid dip and rinse tanks lined by Manhattan for use with a Hanson-Van Winkle-Munning elevator-type, full-automatic conveyor.

Manhattan has developed a special rubber-to-metal bond that cannot be mechanically separated. Regardless of contraction and expansion of metal under radical temperature changes, Manhattan's rubber lining compound clings securely, does not crack or oxidize.

Manhattan rubber linings resist abrasion and shock and eliminate stray currents. They pay for themselves many times over in savings on maintenance. A textile finishing plant reports over 25 years constant service in a battery of 10 onethousand gallon chemical storage tanks which are still giving satisfactory service.

LOWER YOUR OPERATING COSTS

Avail yourself of the services of Manhattan's 40 years' experience in rubber lining problems in the metal finishing, plating, chemical processing and allied industries.

MANHATTAN RUBBER DIVISION

EXECUTIVE OFFICES'AND FACTORIES

PASSAIC, NEW JERSEY

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How wet is it?

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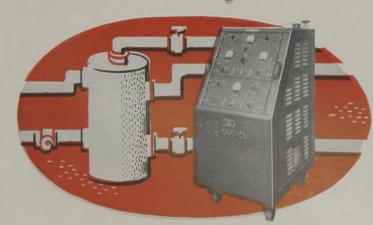
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GENERAL

A G-E DEWPOINT RECORDER will give you a continuous, accurate record of the dewpoint temperature of a gas. This is easily converted to a moisture content reading. It operates in a range of ambient to -90degrees F. When the moisture exceeds a preset critical level, an alarm warns the operator. This instrument has been successfully used in controlling the moisture content of compressed gases, in checking mechanical dryer and furnace atmospheres, in testing and research work. For a complete description of the G-E dewpoint recorder, send for Bulletin GEA-4613.

What is the exact composition? A G-E MASS SPECTROMETER is a sensitive analytical device for determining the constituents of gas mixtures. Particularly effective with isotopes, it surpasses other methods in ease and accuracy i. e. in hydrocarbon analysis the macr concentration with hydrocarbon analy-

methods in ease and accuracy i. e. in hydrocarbon analysis, the mass spectrometer usually provides a 10 to 1 time saving. Measurements in the mass range of 2 to 400 are available. A mass spectrum for the mixture of gases in the sample is produced; from this the percentages of various gases in the mixture can be determined. Write your local General Electric office for more information.



Where is the system leaking?

A G-E LEAK DETECTOR possesses uncanny ability to ferret out small leaks. In fact, it surpasses any known method for locating points of escape in radio tubes, refrigerator parts, piping systems, boiler tanks, or any other closed system. Moreover, it can locate one source of leaking gas in the presence of many others whether in a single component or an entire system. Helium is employed as an extremely sensitive leak-detecting medium. This instrument is an excellent means for finding small leaks either in production equipment or in the laboratory. Write for Bulletin GEA-4640.

• FEBRUARY 1947 • CHEMICAL ENGINEERING

ELECTR

662-23-132

get them quickly, accurately

and automatically

MANY chemical processes which involve a gaseous material have been hampered by bottlenecks at control points. Gas analyses have been difficult to make at production-flow speeds, even by highly trained technicians. Measurements lacked the high sensitivity necessary for precise quality control.

Now G.E. makes it possible for you-by the use of these new electronic instruments-to get a wide variety of "gas facts" almost instantaneously. These instruments produce extremely accurate data, and do it automatically so that very little operator training is necessary.

G-E instrument specialists can offer you many valuable suggestions on how to adapt these and other G-E measuring devices to your present or future processing plans. For their assistance, get in touch with your nearest G-E field office. For more technical data on the instruments described here, write Special Products Division, Apparatus Dept., General Electric Company, Schenectady 5, N.Y.

sensitive and nts of gas min it surpasses of hydrocarbon m provides a 1011 s range of 2m the percentage determined. more informa

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G - E LECTRO ISTRUMENTS

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Has the mixture changed? These two instruments perform the same function of analyzing gas mixtures. However, each has its own sphere of application. A G-E specialist can advise you on their usefulness in your particular gas analysis problem.

A G-E THERMAL GAS ANALYZER indicates and records continuously the concentration of one com-ponent in a mixture of gases. It operates on the thermal-conductivity principle. It may also be used for signal-ing the presence of gas impurities in hydrogen, carbon dioxide, sulphur dioxide and in many organic vapors. It reacts to gas changes speedily. Accurate data is assured by the stability of its calibration. Full informa-tion is contained in bulletin GEA-4561.

A G-E X-RAY PHOTOMETER indicates the concentration of one chemical element in a mixture of gases in the presence of others by measuring the difference in absorption of x-rays between a sample and a reference. Typical applications include the de-termination of tetraethyl lead content of gasoline, chlorine or fluorine content of plastic, and the bromine content of certain brominated compounds. No special skill is required to operate the equipment. Write your local General Electric office for complete information.



CHEMICAL ENGINEERING . FEBRUARY 1947 .

SOME OF THE PRODUCTS REQUIRING SULPHUR

110

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ACIDS	LUBRICANTS
CHEMICALS	MATCHES
CLEANING FLUIDS	MEDICINE
DRUGS	PAINTS
DYESTUFFS	PAPER
EXPLOSIVES	PETROLEUM
FABRICS	PRODUCTS
FERTILIZERS	PLASTICS
FILM	PROCESSED FOODS
FOOD PRESERVA-	REFINED METALS
TIVES	REFRIGERANTS
FUMIGANTS	RESINS
FUNGICIDES	RUBBER
GASOLINE	SYNTHETIC RUBBE
SLASS	SOAP
LUE	SODA
LYCERIN	SOLVENTS
NSECTICIDES	STEEL
EROSENE	SUGAR
EATHER	TEXTILES

SULPHUR

Day in and day out, people the world over must depend upon the farmer for food supplies. The farmer in turn depends upon fertilizer, insecticides and fungicides to help him produce a plentiful supply of healthy crops.

HINKING

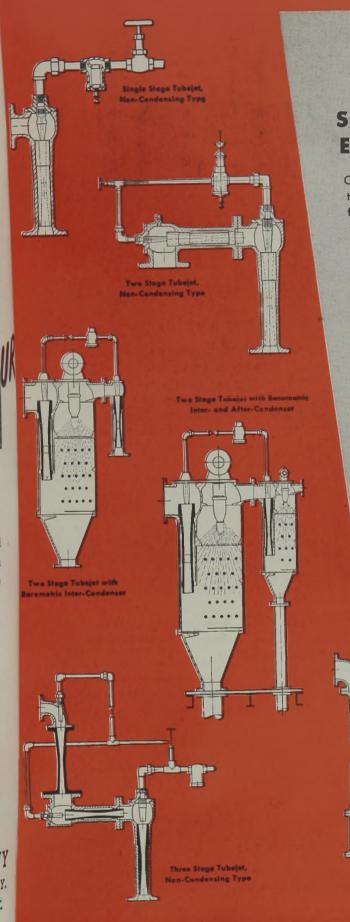
Sulphur plays an important part in the production of these farming essentials. Sulphuric acid treatment of phosphate rock produces the principal ingredients of commercial fertilizers. The Sulphur in fertilizer also protects plants against Sulphur Hunger and in its elemental form as dusts and sprays, Sulphur guards crops against insects and disease.

Freeport Sulphur Company's abundant stocks and ample reserves coupled with modern mining methods promises a continuing supply of Sulphur for these important farming aids.

FREEPORT SULPHUR COMPANY OFFICES: 122 E. 42nd ST. • NEW YORK 17, N. Y. MINES: PORT SULPHUR, LA. • FREEPORT, TEX.

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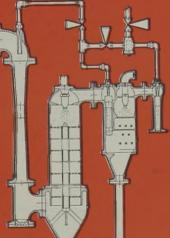
H. Wheeler

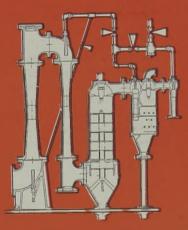
STEAM JET AIR EJECTORS Engineered to Your Needs

Our complete line of Tubejet Steam Jet Air Ejectors is illustrated to demonstrate that the selection of the correct unit for an individual job requires more than some people may think. It requires years of experience in successful installations to correctly solve the "never before encountered" problems of today's new methods and industries. Radojet now Tubejet are the oldest names in steam jet air ejectors, known to the most people in the world today; we have the most experience because we believe we have made the most installations. If there is any vacuum problem within the scope of ejectors which we have not already met and solved, we don't know of it. You can safely rely on our advice, whether your problems are new to you or to the world. Bulletin on request, catalog in preparation; write to us now.

> C. H. WHEELER MFG. COMPANY 1808 SEDGLEY AVENUE, PHILA. 32, PA. REPRESENTATIVES IN MOST PRINCIPAL CITIES

Three Stoge Tubejet with Two Barometric Condensers





Four Stage Tubejet with Two Barometric Condensers

STEAM CONDENSERS - AIR EJECTORS COOLING TOWERS - HEAT EXCHANGERS OF PHILADELPHIA

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PANY 17. N. Y. 7. TEX.



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(as told by a personnel director)

"See those men going out of the gate? Somewhere in the back of the mind of every one is the thought that HE might not be headed for home tonight—IF!

"You see, some of our operations are extremely dangerous. Our accident rate used to make me sick.

"It made the men down in the plant sick, too, every time we had a serious accident. They were scared all the time. And those accidents cost us plenty.

"Three years ago we placed our workmen's compensation with Employers Mutuals. They sent in their Safety Engineers —and those fellows do know their stuff. We thought we knew something about safety—but those engineers were way ahead of us.

"Today we've got a real Safety Program. Accidents just quit happening. It seemed almost like a miracle!

"If it hadn't been for that Safety Pro gram, one hundred and sixty-three a those men going home to supper now would have been killed this year, or laid up in the hospital, or maybe crippled to life. Right here in this plant!

"They're pretty good guys, too."

For the benefit of policyholders ...

Employers Mutuals have a long experience as one of the largest carriers of workmen's compensation (they wrote one of the first policies ever issued). Their constant effort to provide for the welfare of policyholders has given them unusual insight into the needs of employers and of their employees.

To serve those needs, they have developed Safety Engineering and other services, in order to reduce the number of accidents to employees, and to provide care for injured employees.

You can reduce your insurance costs

All these services are available to you, to reduce your accident frequency and

accident severity, thereby reducing the cost of your insurance.

In addition, all savings made through sound, conservative management, over and above provision for ample reserves and surplus, are returned to policyholders in the form of dividends —a further reduction of your insurance costs.

Employers Mutuals 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. Consult your telephone directory.

men will be OR SUPPER TONIGHT

This leader in Safety Engineering can reduce YOUR accident rates . . . and 'save you money, too

US,

director)

ve've got a real Soli cidents just quit hoppe Imost like a mirodel

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verity, thereby m our insurance.

ll savings made th ervative manage ve provision for surplus, are retu

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in the form of div duction of your

Employers Mutuals nationally known achievements in Safety Engineering get we have been the basic principle guiding but those engineen w these progressive companies-to operate for the benefit of the policyholders and their employees.

E-M Safety Engineers were first put to work because high accident rates made workmen's compensation insurance costs a burden to employers. And insurance costs are only the beginning of the price you pay for accidents.

Other costs include lost production, spoiled material and broken machinery, replacement of trained workers, lowered efficiency of others who see an accident-talk about it-are fearful of their own safety.

Get safety-on-the-job

E-M Safety Engineers have developed an efficiently planned and coordinated program that can build safety-on-thejob for you-from the ground up. Engineers survey your plant to analyze the hazards surrounding your employees. Engineering specialists on various machines and in-

dustries, chemists, industrial nurses all play their part in such a survey. They make recommendations for eliminating these hazards.

Engineers help you set up a safety program. They provide practical suggestions, posters, literature, films, and other help. Safety education helps your men understand the fundamental principle of safety-on-the-jobthat taking time to be safe saves time -and lives.



The Industrial Hygiene department and a staff of industrial nurses help eliminate the causes of occupational diseases.

The Employers Mutual nurse will help you set up an efficient first aid department.

E-M Safety Engineering has reduced accident rates as much as 60% to 75%. Even in exceptionally hazardous industries, accidents can be brought under control.

Another service to policyholders and their employees is the effective use of modern physiotherapy laboratories when serious accidents do occur. Physiotherapy frequently reduces the time lost following a severe injury, and over and over again has prevented permanent disability.

Ask an Employers Mutuals man for an engineering survey of your plant and recommendations for the safety program you need to reduce your accident rates.

FREE: Write for complete information on Safety Engineering, and for a copy of "A Dictionary of Insurance Terms-How to Understand Insurance and Buy It In-telligently." Write on your business letterhead

to: Insurance Information Bureau, Employers Mu-tuals of Wausau, Wausau, Wisconsin.



GET THIS E-M RISK ANALYSIS ON YOUR PUBLIC LIABILITY HAZARDS

Employers Mutuals engineers can show you, through a Survey and Risk Analysis, how to eliminate most of the hazards that might result in injury to members of the public on your premises or through the operations of your business.

Employers Mutuals combine in one comprehensive policy the several forms of public liability protection needed by manufacturing, mercantile, and contracting firms-protection against claims arising from all the usual and all the unusual chances of loss through bodily injury and damage to property of others.

Only after a survey of the hazards can the proper form of this comprehensive policy be recommended. Then, Employers Mutuals tailor the policy to provide the coverage needed.

Ask the Employers Mutuals man to make a Survey and Risk Analysis of your public liability requirements. This analysis involves no obligation.



EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN ESTABLISHED 1911

EMPLOYERS MUTUAL FIRE INSURANCE COMPANY ESTABLISHED 1935

Home Office: WAUSAU, WISCONSIN

"For This Job. Give Me Two Things in a Motor"

... said the Power Plant Engineer



"To Drive Boiler Feed Pumps, motors must first be *simple*. For example, take these three Allis-Chalmers 800 hp, 3600 rpm motors. They're 2-pole, squirrelcage, single winding machines . . . with practically fool-proof rotors and sleeve bearings. But second, and even more important . . .



They've Got to be Dependable! Here's what I mean. These same motors have given us 17 years of uninterrupted service. We've had to order replacement parts for them only twice . . . at a total cost of less than \$12 a year. We call that good performance ... the kind we've come to expect of all your motors!"

NAINTENANCE

Frankly, Mr. Reader, we are mighty proud of our 2-pole motors. We've been developing them for high-speed requirements like this from the very earliest. Licked a lot of problems too. Like cutting down noise through better design ... reducing windage noise with proper baffling, and curbing magnetic noise. ...

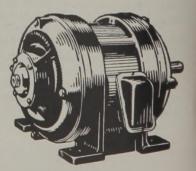


We're Getting Better Efficiencies and power factor ... and lower starting kva, through improved squirrel-cage design. We've designed bearing brackets generously for greater structural rigid-ity. In fact, all the way around you can expect to find long life and low maintenance built-into our motors!

Yes, "A-C" Means Long Life in Motors!

R^{EGARDLESS} of size or type you'll be money ahead with Allis-Chalmers motors. For at A-C you can expect and get the same careful engineering, generous design and long-life operation that thousands of motor buyers have come to rely upon through the years.

And remember . . . while many jobs call for special or modified motors, there are many more that can be solved with standard motors . . . at less cost . . . and often with saving in time! Allis-CHALMERS, MILWAUKEE. A 2082





Biggest of All in Range of Industrial Products

It's as easy as ...



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to use coded lubrication

How it works. All lubricants used in the plant are assigned numbers. A number is

applied to each storage container or dispensing unit indicating the lubricant it

contains. Each spot to be lubricated is also marked by an easily applied decal

What it does! The results you get with Coded Lubrication make it well worth while. It reduces breakdowns resulting from the application of wrong lubricants. It prevents application of costly lubricants where ordinary lubricants can be used. It simplifies training of oilers. A Standard Oil Lubrication Engineer will fully explain Coded Lubrication and its application to your plant. Write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.

Why you need it. Standard's Coded Lubrication provides one of the simplest known

your plant. It helps them avoid errors in filling oil cans, grease guns and other dispensing

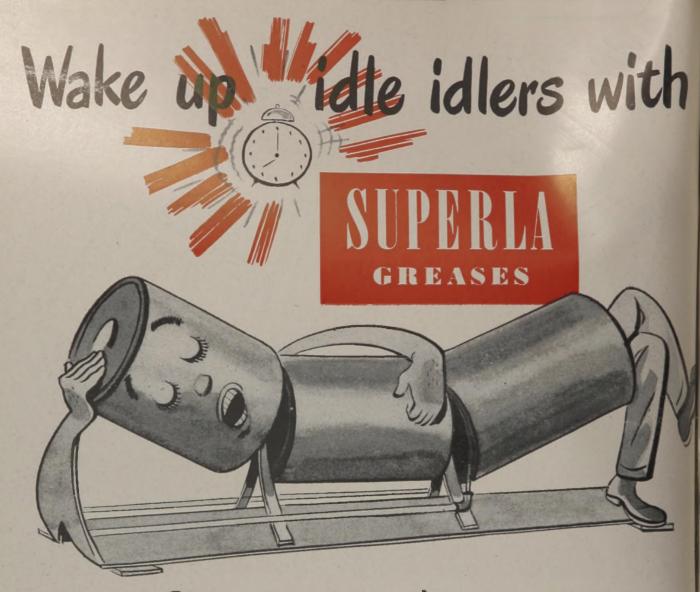
numbered to indicate the lubricant required.

equipment. It eliminates the need for their learning a great number of detailed

instructions and grade numbers of lubricants.

methods for helping oilers determine what lubricant is needed at every lubricating point in

STANDARD



Save power... belts... and material-handling time on conveyors

ARE CONVEYOR IDLERS slow to start up in cold weather? Do they heat up, throw off grease, and run dry when the weather's hot?

A change to a better lubricant may make these lazy idlers carry their share of the load and incidentally save on power, belt wear, and material-handling time.

Superla Greases are ideal for idlers. Grades are available that permit idlers to turn readily at low temperatures, yet these lubricants do not thin out or separate when normal operating temperatures are reached. Where temperatures are above normal (over 175°E), Superla X Greases resist separation and oxidation, and have good sealing quality.

A Standard Oil Lubrication Engineer will gladly help you make a test. Standard Oil Co., (Ind.), 910 S. Michigan Ave., Chicago 80, Ill.

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It's Simple to avoid a Big Bill for valve upkeep!

A. Choose the right type value for the service.B. Place values correctly in the line.

C. Choose Jenkins Valves for lifetime economy.

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THESE three, simple, basic rules, plus intelligent treatment and care of valves, are paying extra dividends in valve economy to more and more valve users in every industry.

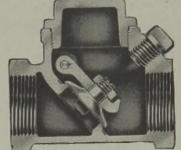
By choosing Jenkins Valves, you get not only valves made with extra endurance that means extra economy, but also expert advice of top-rated valve specialists, Jenkins engineers, on any question of valve selection or placement for any service.

Base your valve buying on this ABC formula for *lowest cost in* the long run.

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



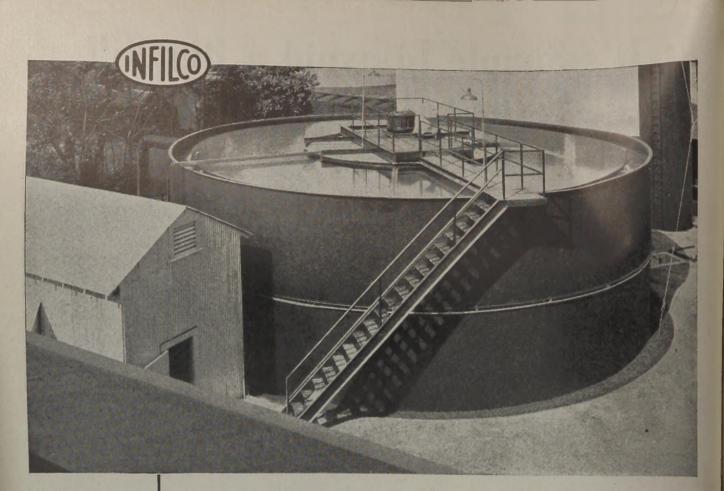
JENKINS Fig. 92 Regrinding BRONZE SWING CHECK VALVE



125 lbs. Steam 250 lbs. O.W.G.

Designed for service on non-return control systems; especially with Gate Valves, where a comparable full, free flow of steam, oil, water, or gas is required. It is also widely used for condensate and return lines. The high tensile bronze disc is carefully machined to a smooth. tightfitting finish, can be reground easily without removing valve from line.

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



OVER 600 ACCELATORS NOW IN SUCCESSFUL OPERATION

A Proven Principle of Water Treatment

WATER

AND

The soundness of the exclusive Accelator principle of water treatment is being demonstrated daily in over 600 installations. There is nothing new or untried about it.

The principle involves the maintenance of a slurry pool at a constant level for varying flow rates and slurry concentrations so that clear, treated water will separate at a high rate at the surface of the slurry pool. This is accomplished by mixing one volume of raw water and chemical with approximately 15 volumes of previously formed slurry in the primary chamber, and the gentle discharge of 3 to 5 volumes of this mixture at the surface of the slurry pool. One volume separates and rises from the surface of the slurry pool, while the larger volume passes downward and back into the primary chamber. Excess solids are continuously concentrated and automatically discharged. Thus, the separate steps of quick mixing, coagulatmg, settling and sludge removal of older methods are combined in one compact unit

This modern, streamlined water treating process applies the "Know-How" gained by Infilco engineers from many years of intensive research and development. Ask for Accelator Bulletin No. 1824. INFILCO Inc., 325 West 25th Place, Chicago 16, Illinois.

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ADVANTAGES

Space Saving Lower Construction Costs Longer Filter Runs Automatic Sludge Removal

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Know-How" research and CO Inc., 325

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MCKAY

STAINLESS STEEL ELECTRODES

FOR WELDING ALL TYPES OF CHROME AND CHROME-NICKEL STEELS

Whatever your requirements for welding low-chrome, highchrome and chrome nickel steels—McKay research, development, and production assure you the proper shielded-arc electrodes for each particular group of these metals.

McKay Stainless Electrodes meeting chanical requirements for welding over 100 analyses of stainless steels produced by the various steel manufacturers. McKay Electrodes possess superior chemical properties and smooth, uniform performance which give optimum penetration and better fusion of the weld metal with the parent metal.

Before welding the particular stainless steels you are using, call on McKay Engineers for recommendations. They will be glad to advise you on electrode selection and welding procedure for obtaining highly satisfactory results. Inquiries are invited on standard or special electrodes for welding stainless, alloy and mild steels.

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E6010 10E6013
E6012 711E7011
16
18
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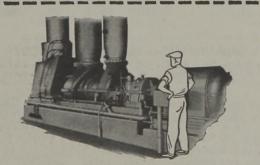
Handling Air or Gas?

ALLIS-CHALMERS BUILDS 5 TYPES OF EQUIPMENT FOR YOU!

THAT MEANS we can engineer ... to your exact job requirement ... a blower, compressor or dry vacuum pump. Further, we are able to build it standard or special — whichever you need.

Allis-Chalmers experience in this field goes back half a century. Its engineers have fingertip acquaintance with many process problems and applications. The fact that A-C builds many varieties of high-speed rotating machinery is your assurance of air and gas handling equipment that will be *coordinated* with your drive and power requirements.

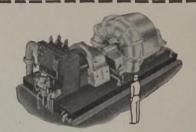
A qualified engineer in our nearby Sales Office is ready to discuss your future needs. ALLIS-CHALMERS, MILWAUKEE 1, WIS.



AXIAL COMPRESSORS Good base load machines. Handle large fixed volumes of air with pressure variations over a comparatively long range. Used in connection with gas turbines and for high velocity wind tunnel operations. Able to compress to 60 lbs. gauge with high efficiencies. Cannot build up dangerous pressures.



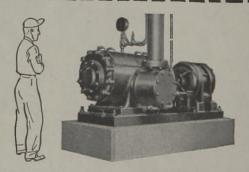
SINGLE STAGE BLOWERS Discharge nozzle can be arranged in any of 24 positions. Cast casing provides rigidity, longer life, smoother operation . . . deadens machine noises, eliminates vibration. Available in pressure ranges from one to 6.50 lbs.



MULTI-STAGE BLOWERS Centrifugal type, for boosting, exhausting, circulating. Cannot build up dangerous pressures. Have enclosed backward-bladed impeller wheels. Pressure volume curve favorable to parallel operation. Inlet volumes to 130,000 cfm, air pressure to 35 lbs. gauge uncooled. Other ratings for special application.



ROTARY COMPRESSORS, sliding vane type. Air is compressed in cells formed by blades moving freely in and out of longitudinal slots in rotor eccentric to its casing. Quiet, smooth operation. Units start unloaded. Capacities for 5 to 35 psi-g.



DRY VACUUM PUMPS Same principle as rotary compressors with exception that inlet is hooked up to chamber to be evacuated and exhaust is open. No inside valves. Saves floor space. Range $2\frac{1}{2}$ to $2\frac{8}{2}$ inches hg. 52 to 5750 cfm, three to 250 hp.



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This 62-foot fractionating column, completely X-rayed and stress-relieved and built to API-ASME code, is another Edge Moor achievement in process equipment fabrication . . . a direct result of Edge Moor experience, facilities and proficiency.

Edge Moor is equipped to furnish any type of heavy-wall welded fabrication to your individual designs, specifications or requirements. Materials include:

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CHEMICAL ENGINEERING • FEBRUARY 1947 •

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IT TELLS YOU ABOUT **DRY**ing with **LECTRODRYERS**



Is moisture in materials being processed slowing down your production and cutting its quality? Lectrodryers can be placed "on stream" to keep processes on the straight and narrow path.

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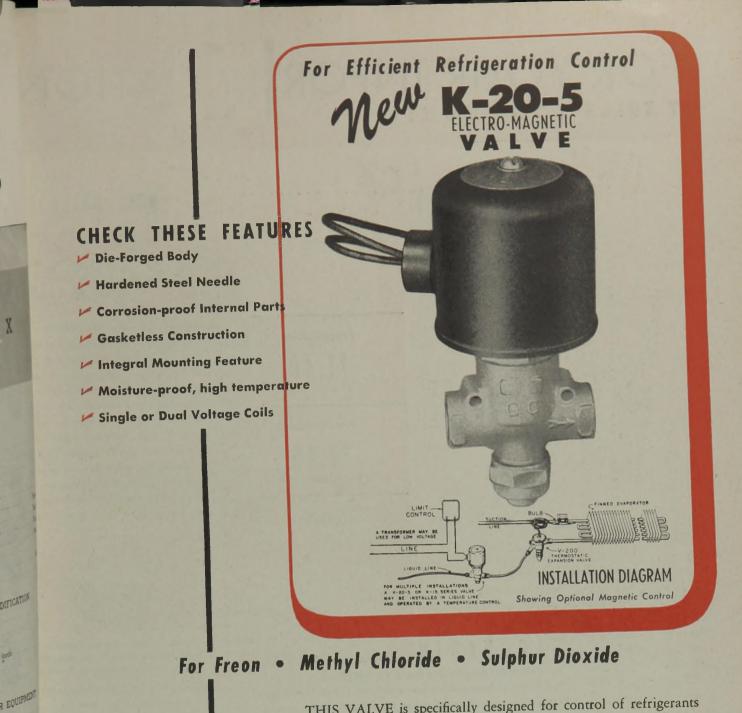
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Air Conditioning type Lectrodryer In Pharmaceutical Fields For the final drying, handling and packing of debydrated foods For Dry Blast. Schematic Flow Diagram SPECIAL LECTRODRYER EQUIPMENT

High Pressure Lectrodryers Oxygen Drying Liquid Air Dry Ice Manulacturing Wind Tunnels Liquid Hydrocarbon drying Lectrobreathers Dewpoint Apparatus





THIS VALVE is specifically designed for control of refrigerants and may also be used for controlling air, water, gas, light oil, etc. Controls suction lines or hi-pressure liquid lines. Assures tight shutoff for fractional tonnage installations. Bronze and stainless steel internal parts.

FOR COMPLETE SPECIFICATIONS on automatic temperature, pressure and flow controls, write for Catalog, or contact Factory Branch or Refrigeration Wholesaler near you.



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NO PRICE INCREASE

\$1.40 **Prewar Price**

Present Price

\$1.45 (in 100-pound lots)

SACCHARIN

Although production costs have advanced considerably during the war period, no increase in the price of Saccharin has been scheduled. In fact, Monsanto's present pound price, in 100-pound lots, is lower than its prewar price—\$1.40 compared to \$1.45. Price of single 5-pound cans remains \$1.65 a pound, unchanged since before the war.

While capacity was materially increased during the preceding 5 years, unsettled labor conditions curtailed production during the past 6 months. However, with production now resumed, it is expected that Monsanto will be able to meet all normal requirements on a current basis in the early part of 1947. Also, it is anticipated that appreciable gains will be made on the present backlog of demand.

MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

ROLL CALL!



Although the war is over, the shorts of drums isn't—due of course to a b shortage of steel. In many cases poses an acute packaging and sh ping problem at Monsanto which a be considerably relieved by the ret of empties as soon as they are an able. So, if you have any empties m we ask that you send them back Monsanto for credit. This will great expedite future deliveries—we m have the products you need, but the containers in which to ship the



New Literature on Wood Preservation with Santophen 20⁴ steppe (Monsanto's Pentachlorophenol, Technical)

Recently published, this 16-page book let forms a valuable text on war preservation with Santophen 20* oil solutions by pressure process. liberally illustrated and contains to **aciels** merous tables and reference data cerning the characteristics of this IN ognized wood preservative. Send to your copy.

Expanded Production of Synthetic Detergents

Monsanto recently announced \$3,000,000 plant expansion program for the manufacture of synthetic deter gents. Construction is already under way and it is anticipated that the new plant will be ready for operation in the latter part of 1947.

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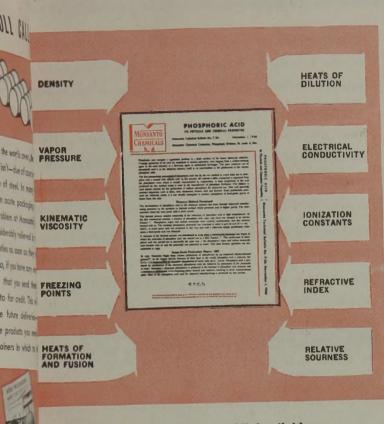
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of Monsanto Chemicals and Plastics Process Industries...February, 1947 the -



In 12 Handy Tables — All Available Physical Data on PHOSPHORIC ACID

Literature on Wough many years of research Monsanto's Phosphate Division has tion with Sontwempted to catalog and correlate all available physical and Pentedunyters emical data on phosphoric acid — and here the results have been blished, this logistilled into twelve handy reference tables and four pages of valuable text planatory notes.

with Santophe From the tabulations in this fact-packed bulletin, graphs of the by pressure pressure pressure prepared. Data are included on strated and and initials of a wide range of strength up to the strong phosphoric acids s and reference areitable.

preservative Write on your business letterhead for your copy of this helpful schnical Bulletin No. P-26 on Phosphoric Acid—a product recog-

zed as one of the most versatile and widely useful tools of the etic Detergenti remical industry.

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ant expansion Address MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri ture of synthetic

ion is allead) istrict Offices: New York, Chicago, Boston, Detroit, Cleveland, ^{ticipated ma} incinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle. n Canada, Monsanto Ltd., Montreal, Toronto, Vancouver. F 1947.



Does this mean anything to you?

No, this isn't another picture of the moon! The "rugged terrain" you see is simply a head-on view of oxygen corrosion—foe of the boiler room, thief of power- and steamgenerating efficiency. Fortunately this form of corrosion can be checked, simply by add-ing Santosite* (Monsanto Sodium Sulfite Anhydrous) to boiler feed water and maintaining a ratio of 30 parts to 1,000,000. All residual dissolved oxygen in feed water combines with Santosite to form sodium sulfate, the reaction product with oxygen. Result: no trace of oxygen remains—oxygen corrosion can't start!



Goodbye, Mr. Rat!

After hundreds of years as a world scourge, the rat is nearing the end of his trail of terror and filth. With the coming of Compound 1080, his doom is nearer at hand, as well as that of his army of 1,300 rodent relatives-house mice, field mice, squirrels, gophers and woodchucks, just to mention a few. Outside experiments are also being conducted to test the effectiveness of Compound 1080 in exterminating wolves, foxes, coyotes and other predatory animals. (Because of its high toxicity, Compound 1080 is sold only to licensed operators and to Government Experimental Stations.)



MONSANTO CHEMICAL COMPANY, 1700 South Second St., St. Louis 4, Missouri...District Offices: New York, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattile. In Canada, Monsanto Itd., Montreal, Toronto, Vancouver. *Reg. U.S. Pat, Off.

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Welding frame of jaw crusher.

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Turning ring gear for ball mill.



PRIMARY CRUSHING

Nordberg reduction machinery for processing basic ores and minerals includes a line of primary crushover offered where ers of the Jaw and Gyratory types. The Nordberg is and minerals in Jaw Crusher is of the well known Blake design in under engineeing which has been incorporated a number of imdexpetience and provements making it the most modern crusher of archerg equipment this type offered today. Jaw Crushers are built for divery field. The heavy duty service and are available in sizes from matering locates 30" x 42" up to 72" x 96" of welded steel frame or k and statisticate p sectional cast steel frame with tie rod construction.

The Nordberg Gyratory Crusher also incorporates advanced features of design and construction. submit you put stactory submit stactory submit the frame shells and spider rigidly held together with heavy through tie rods. Thorough lubrication to the oversize bearings is assured by a circulattactory submit ing, filtered pressure oiling system. The Nordberg

Gyratory is built in sizes from 30 to 72 inch and is especially adapted to large production operations.

SECONDARY CRUSHING

The thousands of Symons Cone Crushers in service throughout the world where materials are crushed to the finer sizes give evidence to the advantages of the Cone for secondary crushing. Built with crushing heads up to 7 feet in diameter and with capacities from 6 to 900 tons an hour, there is a Cone adapted to any fine crushing operation. Wherever materials are crushed to the finer sizes, a Symons Cone on the job pays big returns in lower costs and greater profits.



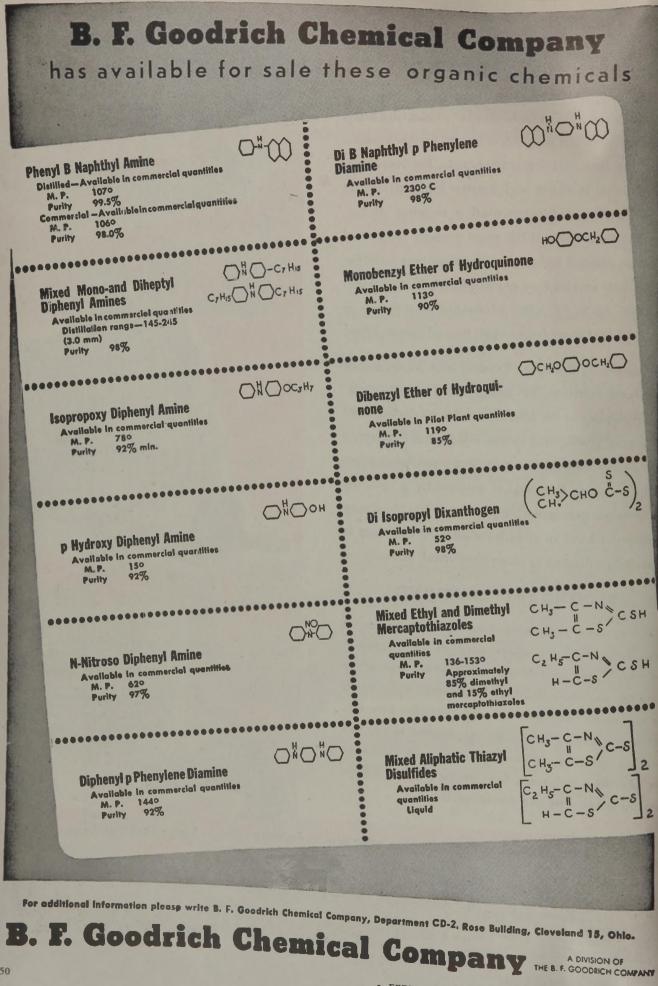
Facing head for ball mill.

geor for boll

Center bay in foundry.

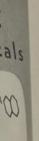
Large tool bay in machine shop.





• FEBRUARY 1947 • CHEMICAL ENGINEERING

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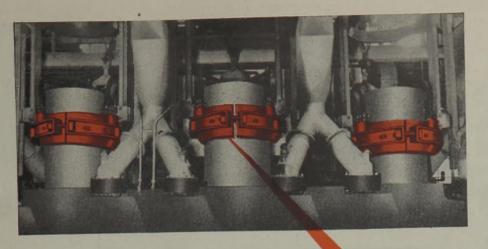
-C-NACS -C-5/

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IVISION OF DORICH COMPAN VEERING



3 N-B-M Electrode Holders applied to 40-inch carbon electrodes in a TVA 13,000 KW furnace unit producing phosphorus at Wilson Dam, Alabama.

HOLDERS ELECTRODE N.B.M CONDUCTIVITY INCREASE 500 TO SAVE ПD

 Special copper alloy combines tighter gripping strength with higher thermal and electrical conductivity.

To overcome the wasteful resistance between holder and electrode, N-B-M has perfected an extremely dense, non-porous copper alloy. It permits tightest contact with maximum conductivity. All water-cooled castings are carefully tested under high hydrostatic pressure.

N-B-M Electrode Holders fit all types and sizes of carbon or graphite electrodes, for the production of phosphorus or carbide, in furnaces of low or high KW rating

Tell us your requirements—we can help you save substantially on power and maintenance costs.

Brake Shoe

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NATIONAL BEARING DIVISION ST. LOUIS . NEW YORK

PLANTS IN: ST. LOUIS, MO. . PITTSBURGH, PA. . MEADVILLE, PA. . JERSEY CITY, N. J. . PORTSMOUTH, VA. . ST. PAUL, MINN. . CHICAGO, ILL. 51 CHEMICAL ENGINEERING • FEBRUARY 1947 •

Bemis MULTIWALLS

THE CHOICE FOR A BETTER PACKAGING JOB

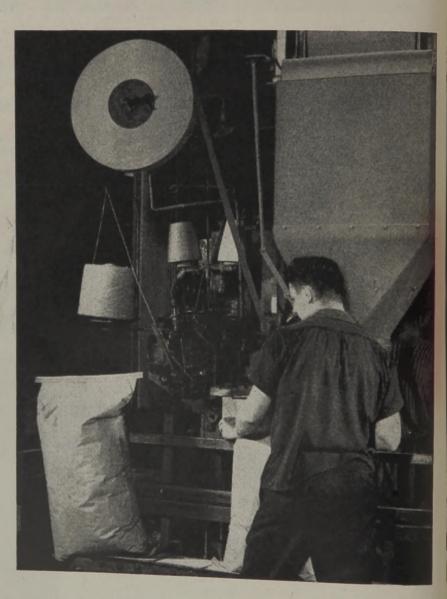


Chemical manufacturers have found there are two major reasons for choosing Bemis MultiwallPaperShippingSacks.

First, of course, they are good shipping sacks . . . top quality in every respect.

Then, equally important, the Bemis Multiwall Specialist will work with you on your entire packaging problem . . . package design, storage, plant layout, filling, handling, and car loading.

Bemis Multiwall Specialists have given important help in many plants. Chances are they can help you, too.



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ALTERNATE HEATING COOLING

SEAMLESS JACKETED KETTLES and MIXERS

GOD

IN BATCH PROCESSING OF: RESINS - SOAPS - GREASES - PHARMACEUTICALS - PLAS-TICS - ADHESIVES - FOOD PRODUCTS and many others





with e

THE NEW DOPP-BUFLOVAK KETTLE WITH ENCLOSED DOUBLE MOTION AGITATOR DRIVE UNIT

VITAMIN PLANT

WHEREVER mixing, heating, or cooling is an operation in batch processing this Dopp equipment unit shortens operating time and gives better heat transfer. In some actual case histories of Dopp Kettles operating time has been cut 75%. These savings result from the "scraping agitator" that cleans the heating surface as it mixes the product.

Because the Dopp Kettle can be furnished for alternate heating and cooling applications it saves material handling and eliminates extra pieces of equipment. This is a profitable advantage in many industries because cold water can be run through the jacket very quickly after the steam is shut off and pressure released. This method can also be employed to prevent over-heating the product or to check a reaction.

A TYPE FOR YOUR SPECIFIC NEEDS

EXPERIMENTAL KETTLE

Dopp-Buflovak Kettles are available in Seamless Jacketed or Single Shell construction with standard covers for pressure or vacuum operation. Holding capacities can be increased by the addition of jacketed or single shell belts depending on your needs. Various types of outlets can also be provided. Kettle sizes range from 15 to 1700 gallons capacity. Write us today about your specific needs.

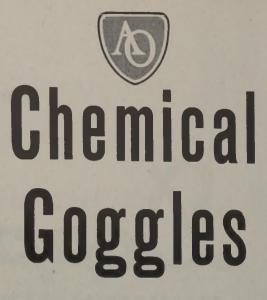
BUFLOVAK EQUIPMENT DIVISION

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ENGLNEER

N, CALIF.

Orleans oma City Salina



AO CUP Goggles.

an to Optic

A-O No. 361A Chemical Goggles provide protection against chemical splashes as well as flying particles. Splash-proof, and well ventilated to help keep lenses from fogging, these goggles offer a combination of features for protection and comfort. Newly designed side shields give maximum protection against chemical splashes, yet allow ample ventilation to reduce possibility of fogging.

Individually designed eyecups, molded separately for the right and left eye, permit a snug, comfortable fit. Rounded edges add to this comfort. The eyecups provide a wide angle of vision for greater working efficiency and are also non-conductors of heat or electricity. Available with 6 Curve Super Armorplate lenses, clear or Calobar.

PROTECT WORKERS AGAINST SPLASH AND IMPACT

A <u>Correct</u> Type of Goggles for Every Industrial Need

Send to American Optical Company, Box E Southbridge, Mass., for a copy of this booklet. It describes in detail the complete line of A-O Cup Goggles for use by chemical workers, chippers, welders, foundry men and workers exposed to general dust conditions.

Optical

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food for a lifetime, bright for an age-I Suth that's Allegheny Metal. What could its longbild lasting, lustrous beauty do for your producterhaps for only a little more cost? Or, if that's dead no point with you, what about the great strength d rolls and corrosion-resistance that make Allegheny Stainless stay heautiful-where can you use them to advantage? • You'll soon be able to get all the stainless you want-all the more reason for you to find out, now, where there's benefit for you in better reels. Let us help, plan, work with you.

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It's in . . .

mother's magazine

doctor's gloves

Calcium Carbonate. And quite possibly it's Wyandotte Precipitated Calcium Carbonate.

Wyandotte Precipitated Calcium Carbonate, as a pigment, makes possible high-grade *coated paper*.

This chemical is increasingly in demand by makers of *baking powder* for its calcium-enrichment properties.



Wyandotte Precipitated Calcium Carbonate is the best reinforcing agent known for many *rubber* products—lending tensile strength and tear resistance to rubber goods, including gloves, hospital sheeting and hot-water bottles...

This versatile product has many other uses in such diverse fields as plastics, dentifrices, polishes and pharmaceuticals . . .

Johnny's cookie

If you have a food-enriching, pigmenting, mild abrasive, reinforcing or extension problem, Wyandotte Chemicals Corporation invites you to consult them about the adaptability of Wyandotte Precipitated Calcium Carbonate to your purposes.

WYANDOTTE CHEMICALS CORPORATION

WYANDOTTE, MICHIGAN . OFFICES IN PRINCIPAL CITIES

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine Hydrogen • Sodium Zincates • Aromatic Intermediates • Dry Ice • Other Organic and Inorganic Chemicals What's Your Need?

COKE SIZER

SINGLE ROLL CRUSHER



TYPE B SHREDDER

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Johnny's cooli

dentifrices, pols centicals ... have a food-erric mild abrasive, ro

ision problem W ls Corporation im lt them about the Wyandotte Pres arbonate to yourpa

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Crushers, pulverizers, shredders, grinders . . . nearly every plant needs one. Practically every material requiring reduction is being broken down faster, more efficiently and at lower cost than formerly because of some Jeffrey improvement.

No matter what you want reduced . . . what size . . . what quantities . . . Jeffrey usually has the right unit to do that job exactly. We can furnish proof in dozens of industries.

> **Complete Line of** Material Handling, Processing and **Mining Equipment**

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MANUFACTURING

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DECADE OF UNUSUAL PERFORMANCE DECADE OF UNUSUAL PERFORMANCE BAKER PLATINUM LABORATORY WARE BAKER

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 tha will be very useful to you.

> BAKER & CO., INC. 113 Astor St., Newark 5, N. J. NEW YORK 7 SAN FRANCISCO 2

It's here at last-a new, better way to combine the tonnage output you get from maximum open area with the long-life economy of heavier wire diameters.

Vew!

WIRE SCREEN

than ordinary crimp types

—up to 90% more wear

In Roe-Flat, Roebling introduces a crimping method that provides an absolutely flat wearing surface. Without reducing open area, without sacrificing volume of production, Roe-Flat gives you up to 90% longer wire screen life!

Here's why:

1. Roe-Flat has over 75% more metallic wearing surface than ordinary crimps-because wear is spread evenly over practically all the surface of the wires, not concentrated on the raised intersections.

2. With parallel wires on the same plane, there's less blinding because of Roe-Flat's unique construction.

3. Accurate size of openings assures uniform product, helps increase screening production.

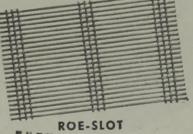
4. Improved quality steel is used, to increase Roe-Flat's resistance to abrasion, wear and fatigue.

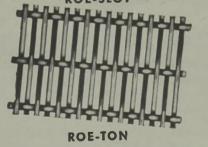
The advantages of Roe-Flat crimp can be incorporated in wire screening of practically every design. Get the full story. Write today for the facts.

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Manufacturers of Wire Rope and Strand • Fittings • Slings • Suspension Bridges and Cables • Aircord, Aircord Terminals and Air Controls • Aerial Wire Rope Systems • Electrical Wire and Cable • Ski Lifts Hard, Annealed or Tempered High and Low Carbon Fine and Specialty Wire, Flat Wire, Cold Rolled Strip and Cold Rolled Spring Steel • Screen, Hardware and Industrial Wire Cloth • Lawn Mowers

TWO OTHER WAYS TO CUT SCREEN COSTS





ROEBLING

A CENTURY OF CONFIDENCE

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O. INC.

ark 5. N. J

The Ajax Lo-Veyor is a vibrating type of conveyor consisting of an open or enclosed pan or tube, a Vshaped trough, a screen or other type carrier driven by a reciprocating drive. Pan or tube can be made airtight to prevent contamination or explosion in process operations.

Drive mechanism is the Ajax-Shaler Shaker, a selfcontained, enclosed motor driven drive unit consisting of 2 revolving weights in automatic balance.

Conveyor pan and drive float on rubber mounted springs. Conveyor is simple to install . . . requires little head room (averaging less than 18") . . . can be set on floor, in a pit, on wall brackets or suspended from ceiling.

10 years engineering and field experience in a wide range of industries will aid you in reducing material handling costs. Lo-Veyor Handles 50 Tons of Broken Glass Per Hour In Large Pennsylvania Plant

LO-VEYORS

SIDE ELEVATION

The installation detailed above covers an installation of an Ajax Lo-Veyor 40 ft. $4\frac{1}{2}''$ long for conveying broken glass from a crusher to an elevator. Capacity of the Lo-Veyor is 50 tons per hour, and it operates under difficult abrasive conditions encountered in handling cullet.

This installation is an integrated part of processing operations and is saving space, operating and maintenance costs for one of America's foremost glass manufacturers.

It is typical of how Ajax Lo-Veyors are being used with outstanding success by many of America's leading manufacturers.

Write giving an outline of your specific requirements.

Ajax Flexible Coupling Co. Inc. Conveyor and Screen Division Westfield, N. Y.

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THESE NEW USES FOR ION EXCHANGE!

REMOVAL

of undesirable impurities from solutions.

CONCENTRATION

of valuable substances to make their recovery commercially feasible.

SEPARATION

of desired substances from each other.

CATALYSIS

of chemical reactions.

SUBSTITUTION

of specific ions for other ions in solution.

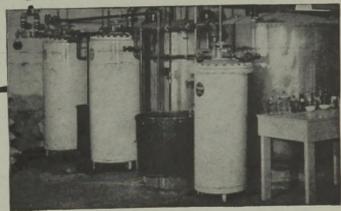
Industry finds many uses for this new unit process!

With Permutit's^{*} development, in recent years, of improved ion exchangers, chemical engineers have found numerous uses for this *new* unit process, beyond the field of water treatment.

Today, Permutit's Ion Exchangers are at work in such diversified fields as: sugar manufacturing, alkaloid recovery, the manufacture of vitamin extracts, the removal of harmful metallic ions from foodstuffs, the recovery of valuable pectin from grapefruit wastes.

The principles of ion exchange offer vast industrial application. Permutit's pioneering research in this field, coupled with its experience in the construction and installation of ion exchangers may help you put this new unit process to work in your own industry. Write for free, informative booklet,

Write for free, informative booklet, "Ion Exchangers For Industrial Processes," The Permutit Company, Dep't CM-2. 330 West 42nd Street, New York 18, N. Y., or Permutit Company of Canada, Ltd., Montreal. "Trademark Reg. U.S. Pat. Off.



A Typical Ion Exchange Installation

HOR STACHANGERS . MATERIALS & EQUIPMENT . CHEMICALS

Lo-Te ndles 50 K lass Per K ennsylva

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Division

Y. ICAL ENGINE FOR MORE THAN 30 YEARS



Enamel-coated tinplate emerging from drying oven

The productive flames of GAS perform essential functions in the manufacture of cans for the foods and beverages packaged by the giant canning industry.

American Can Company's trademark is a familiar sight on the grocery shelf because so many of the best foods are preserved in anco cans. As a leading producer, American Can Company has developed streamlined equipment in which heat is a production tool and the

heat source is GAS, the invariable choice of design engineers who require fuel flexibility.

For lithograph ovens where uniform temperatures are essential to maintain color tones, in



the joint-seal requires pre-heating and solder-melting, in the tunnel ovens for enamel-drying, the remarkably precise controllability of modern GAS equipment is amply evident.

Labor-saving automatic controls, clean and pleasant working conditions, availability and dependability of supply make GAS the preferred fuel for all process heating. Your local Gas Company will recommend methods for applying GAS to your industrial processes.

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

AMERICAN GAS ASSOCIAT

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BAKER PERKINS INC.

"TER MEER" CENTRIFUGAL

AUTOMATICALLY CHARGES, SEPARATES, AND UNLOADS AT CONSTANT RUNNING SPEED

> The ingenious design of the Baker Perkins "ter Meer" Centrifugal eliminates the stopping and starting delays commonly associated with separation of liquids and solids in centrifugals. Once the "ter Meer" Centrifugal is started and reaches desired operating speed, the loading, separating, and discharging cycle is performed continuously

as well as automatically. This constant running, automatic operation assures you of greater production with a minimum of power and labor. Illustrated is a Model HS-36 Baker Perkins "ter Meer" Centrifugal equipped with 4 cu. ft. capacity perforated filter type drum. Stainless steel and nickel operating parts. 10 HP main drive motor, 1 HP motor driven oil pump. Other Baker Perkins "ter Meer" Centrifugals are available with drums from 18" to 93" diameter, either perforated or solid type. Send us a description of your liquid-solid separation requirements, and we will be glad to recommend the Baker Perkins "ter Meer" Centrifugal specifically suited to speed and simplify processing of materials to precise specifications in your plant.



CHEMICAL MACHINERY DIVISION, SAG

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American Call Plant, Brain

taking machine rt-seal requires pol l solder-melting, i vens for enamela arkably precise of of modern GASe amply evident. saving automatic an and pleasants tions, availability ility of supply 1 preferred fuel fi ating. Your local will recomm or applying GA rial processes.

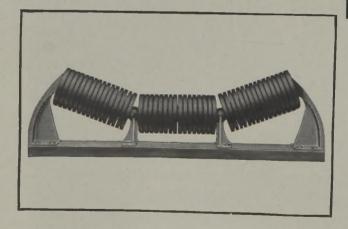
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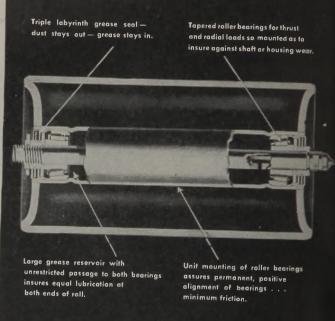
These idlers add LIFE to your conveyors



(2) DESIGNED AND BUILT by idler specialists, Rex Idlers have the same fundamental design that revolutionized idler construction more than 25 years ago. Improvements have been made, but basically these are the same idlers that have been and still are years ahead of the field. A glance at the cross-section will show you why. Note the exclusive triple labyrinth grease seal that keeps dust out—grease in. So effective is this seal that Rex Idlers can operate for extremely long periods between greasings.



(1) WANT LONGER LIFE from your belt conveyors? Install Rex Belt Idlers and forget your conveyor troubles. These hard-working idlers with their combination of built-in efficiency and rugged dependability add life to any conveyor wherever loads are heavy and the going tough! They're a big help in keeping up the pace of production... eliminate frequent costly breakdowns.



(3) AND FOR LONGER BELT LIFE, here's a new development that really clicks... the new Rex Impact Cushioning Idler. Its proved grooved rubber covering effectively cushions the hammering of heavy and sharp lumps dropping on the belt, protecting it against rupture of the belt carcass and laceration of its cover. Four of these idlers under the loading point will give you real protection.

For all the facts on Rex Belt Idlers, send for your free copy of Bulletin No. 463. Chain Belt Company, 1648 West Bruce Street, Milwaukee 4, Wisconsin.



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here's a new derin new Rex Impact (an over rubber correin evering of heavy an e belt, protecting 1 ass and laceration 1 der the loading pair

dlers, send for you hain Belt Company ukee 4, Wisconsin



CAL ENGINEER

THE DOCTOR SAYS IT'S "Industrial Arteriosclerosis"

What the Doctor means, of course, is "thickening of the walls of the arteries"—the rust-clogging of those all-important industrial pipelines that convey water, compressed air, gases, fuel oil, refrigerants, lubricants, and an almost endless variety of process materials in fluid form.

Symptoms may be evident in reduced volume of flow, inadequate pressure, increased pumping costs, or rust-stained solutions.

Surface coatings of any kind offer but temporary protection and, eventually, rust-roughened pipe interiors will accelerate "sliming-up," particularly in lines with threaded fittings. The result may be a product contaminated by flaked-off scale, nonseating valves, clogged indicating or recording instruments, untimely dismantling for cleaning, or premature pipe replacement.

Copper tubes are not a panacea for all industrial piping ills—but they go a long, long way toward a permanent cure. Just how and why are explained on the following page.

THE AMERICAN BRASS COMPANY General Offices: Waterbury 88, Connecticut

Anaconda COPPER TUBES AND FITTINGS



Copper Tube Pipelines?



COMPARE THEM—point for point with any material...at any price

- Copper tubes combine the advantages of corrosion resistance, light weight, flexibility and low installation costs.
- Pipelines of copper tubes connected with solder fittings can be taken down, moved, or have new connections cut in faster and with less expense than with threaded pipe.
- Bends and offsets to clear beams, girders or other obstructions can be made readily in copper tubes.
- Assembled with solder fittings, such lines have a low coefficient of friction and reduced resistance to flow...no need for oversize lines to provide for clogging.
- Anaconda Solder Type Fittings can be installed in restricted space where the use of a wrench would be impossible.
- Anaconda Copper Tubes in standard sizes are furnished to A.S.T.M. and Federal Specifications: Soft in 60-ft. coils; also hard and soft in 20-ft. straight lengths from ³/₈" to 12" in diameter. Larger sizes, up to 26" I.D., can be made to order.

Publication C-24 tells a lot more about Anaconda Copper Tubes and Fittings. A copy will be mailed on request.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut Subsidiary of Anaconda Copper Mining Company In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Anaconda COPPER TUBES and FITTINGS



ANACONDA from mane te consumer



BONDERIZING protects fine appearance .. guards against corrosion

The automobile's fine finish has a stout ally in the fight against snow, slush, rain and sun-BONDERIZING*!

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FITTIN

This tough, effective nonmetallic coating is integral with the metal of fenders, body and sheet metal parts. It anchors the organic finish, resists corrosion and greatly retards the spread of finish failure from scratches and bumps.

Over 90% of all automobiles are BOND-ERIZED.

Bonderizing can add to the lasting finish beauty of your product, too. Write today for full information.

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Holds Paint to Metal	Inhibits Rust	Retards Wear on Friction Surfaces
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67

Since 1934 = Pioneering

the Effective

Typical Applications of POLYBUTENES

Adhesives—Caulking Compounds Laminated Paper Products Wax and Resin Plasticizer Electrical Cable Insulation Compounding Rubber Latex Tackifier Moisture Proof Agent Protective Coating Plasticizer Plasticizer to Produce Low Modulus GR-S Rubber Stocks Plasticizer for Superior Aging of Electrical and Surgical Tapes

ビステクマート

68

Over since 1934 the Technical Development Laboratories of Advance Solvents & Chemical Corporation have solved hundreds of customer problems in the effective use of Polybutenes.

If you have a problem involving these industrially important products, the technicians of Advance Solvents & Chemical Corporation will be glad to assist you and furnish all required data and information.

Sales Agents for: VISTANEX POLYBUTENES ranging from 10,000 to 140,000 M.W. Produced by:

> Stanco Distributors, Inc. Distributors for:

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ORONITE POLYBUTENES, Low molecular weight polymers VISTAC #1, VISTAC #2, VISTAC #4

Produced by: Oronite Chemical Company A complete range of molecular weights is now available for immediate delivery from stocks.

ADVANCE SOLVENTS & CHEMICAL CORPORATION

Main Office: 245 Fifth Avenue New York 16, New York Technical Service Laboratories: 315 Coles Street Jersey City 2, New Jersey

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e 1914 the Techn ent Laboratories of vents & Chemical have solved husmer problems in the I Polybutenes.

problem involving lly important prodnicians of Advance emical Corporation assist you and fured data and infor-

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DLYBUTENES, veight polymers VISTAC #2, C #4

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Day and night...year after yearFalk achievement goes on!

Constant progress in the science of metals, in the art of mechanical design, in the field of efficient mechanical production, has been a consistent Falk policy for over fifty years.

In spite of extraordinary demands made upon facilities from time to time, the Falk policy has always been one of meeting all demands, yet ever keeping prepared for the future.

THE FALK CORPORATION . MILWAUKEE 8 WIS.

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. When all present demands have been met, Falk will again be ready with still further developments that are in the laboratories now.

This constant achievement, day after day, night after night, year after year, is the fundamental reason for the quality and performance of Falk products, and the standards of Falk service which have kept the name



... a good name in industry

No Ad is large you All the details of

ULLETIN

4100

It shows and tells you how the movement of grid in the lubricated grooves comes into play play when parallel misalignment is involve The misalignment is accommodated while permitting full functioning of the grid-groo action of the coupling in absorbing shock or damping vibration. Also graphically shown this page is the manner in which this Falk and groove design acts to accommodate angue misalignment and free end float.

See Page 9

See Page 7

On this page you will note how the grooves provide a slot for a grid member made of chronalloy steel with an elastic limit of 180,000 pounds per square inch... an ultimate streng of 220,000 pounds per square inch, in addition to other features of the grid-groove design.

TORSIONAL RESILIENCE See Page 8 ALL STEEL CONSTRUCTION See Page 7

Send for This Book and <u>Get All the Facts</u>!

Falk Steelflex Couplings are designed to meet the needs for couplings for any size and any service. This book contains complete load classification tables, rating specifications and formulas for easy selection of Falk Steelflex Couplings for motor and turbine drives or engine drives. It also contains information on Falk flexible coupling for special service or dualpurpose applications. Send for it today THE M South States

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larnough to give ails RLK Steelflex Couplings

Falk Steelflex Couplings are the evelopment of a company whose perience in gear design and ower transmission dates back to 192.

is experience has enabled Falk produce a coupling that transmits ower smoothly, dampens vibraon, reduces shock, and cushions eak loads between the driving and

and tells you how the me te lubricated groups on riven member.

n poralel ministered he Falk Grid-Groove design is the fill functioning of the success of Falk Steelthe coupling in abushing ex. Couplings. It provides flexibil-intration. Also graphing by and torsional resilience to a is the moment is which filly and torsional resilience to a rign acts to accommutal egree not found in other couplings at and free and fact. of this type. It provides the utmost

:ompensation for both angular and

See Page 7

ar a grid member moter with an elastic limit of quare inch . . . an allinch ures of the grid-groove i



CONSTRUC See Page

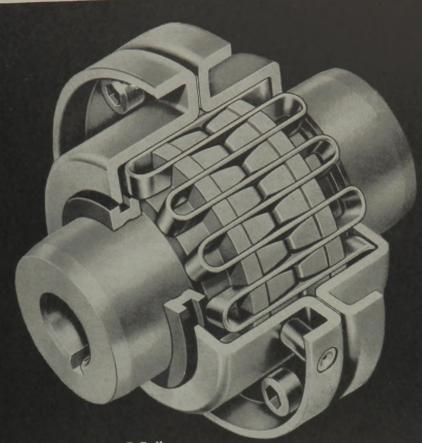
parallel misalignment, also for free end float. This unusual combination of features has solved many otherwise tough coupling problems.

Falk Steelflex Couplings may be used in either a vertical or horizontal position. A new wide shoulder seal ring keeps the cover in position and protects against dust, dirt and you will note how the still loss of lubricant.

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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.

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New Type F Falk **Steelflex** Coupling

It's the Grid-Groove design of Falk Steelflex Couplings that protects connected machinery from damaging shock and vibration, compensates for angular and parallel misalignment and provides torsional resilience.

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Here is Why It Pays to Consult **FALK on Speed Reducer Problems**

Important Features

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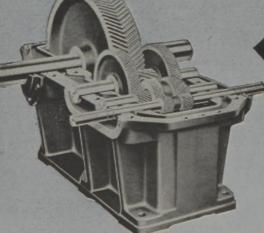
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Fifty-four years of experience in metallurgy, gear design and the manufacture of power transmission equipment enable Falk to provide a superior speed reducer, one that will meet your specific requirements.

Special techniques and machinery enable Falk to provide speed reducers which operate at efficiencies of 96 to 981/2% of full load.

Symmetrical arrangement assures balanced performance . double-ended shafts double gear life . . . precision herringbone and single helical gears give smooth-running operation . . . patented lubrication system increases efficiency. These and many other Falk features guarantee trouble-free performance.

Falk Speed Reducers are simple and compact . . . provide the safety and economy of space demanded for modern individual machine drives. They offer you the same maximum efficiency, dependability and long life that have made them the choice of every type of industry and have constantly kept he name Falk . . . a good name in industry.



FALK parallel shaft, herringbone gear speed reducer. Ratios: single reduction, 2.2.1 to 10:1; double reduction, 11.5:1 to 70.2:1; triple reduction, 80:1 to 300:1.

FALK right angle speed re-ducer with vertical low speed shaft. Ratios: single reduction, 1.5:1 to 5.28:1; double reduction, 5.7:1 to 43.5:1; triple reduction, 52.1:1 to 430.1.

THE FALK CORPORATION MILWAUKEE 8 WISCONSIN

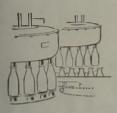
For over fifty years precision manufacturers of Speed Reducers ... Motoreducers ... Flexible Couplings . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches ... Steel Castings ... Contract Welding and Machine Work. District Offices,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

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- Rigidity
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Of course you won't take chances on the purity of your product -that's the most important reason for using stainless steel tubing in your processing machinery and equipment.

At the same time don't overlook the costs involved in the operation and maintenance of processing equipment. No other tubing equals stainless steel in long service life and resistance to corrosion in most food and chemical processing applications - no other tubing is so easily kept clean and sanitary without impairment of the tubes themselves.

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The Celanese chemical plant at Bishop, Texas, is now offering n-propyl alcohol in drum or tank car lots for early delivery. If you are looking for processing advantages in your manufacturing; for improvements in your products; or for shortcuts in your production, the advantages of this straight chain hydrocarbon are worth investigation.

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Here is a Celanese chemical with great industrial possibilities. Propionaldehydehitherto obtainable only in laboratory amounts—is now being produced by Ceianese, and can be supplied in quantities large enough for pilot plant operation.

Furthermore, you can depend on Celanese for a steady supply of this aldehyde, when you are ready for full-scale production. Write for further information.

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INDUSTRY-WIDE BARGAINING... Death Trap for Business, Suicide for Free Labor

F CONGRESS is to succeed in its present efforts to prevent strikes in key industries from devas-L tating the nation, it will have to put a crimp in industry-wide collective bargaining. This kind of bargaining is designed to apply agreements between employers and organized workers on wages and working conditions to an entire industry.

ALDEHY e Chemical

chemical with g es. Propionaldel being produced be supplied in qu r pilot plant operation re ready for follo or further informa

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Further, if extension of this type of bargaining is not curbed, there is reason to believe that it will undermine the freedom of both American business enterprise and American wage earners. For, while increasing the destructive power of labor disputes, the general spread of industry-wide bargaining would so concentrate the fixing of wages-by far the largest element in the cost of production-that government regulation would be a next short step. With that step lities for a taken, freedom for business enterprise and freedom for labor would be well on the way out.

Unfortunately, industry-wide bargaining is comonly in later monly regarded as presenting a general conflict between organized labor and employers, with unions favoring it and employers opposed to it. This mistaken notion raises the heat of much of the discussion withdy supply of fish out increasing the light. The fact is there is no such general conflict. Employers and organized workers are on both sides of the argument about industrywide collective bargaining. For example, while some union leaders are characterizing as labor baiters all those who raise the slightest question as to the desirability of industry-wide bargaining, organized workers in the air transport industry are strenuously opposing that type of bargaining; and the employers are advocating it.

Some Employers Like It

The reason there is in fact no clear cut issue between employers and unions over industry-wide bargaining is readily understandable. It presents certain advantages to both sides in the bargaining process. For example, union advocates of such bargaining generally stress the fact that industry-wide agree-

ment on wages protects wage standards from being undercut by lower wage areas and lower wage employers. By much the same token, however, employers who like it often emphasize the fact that industrywide bargaining may save certain well-managed and prosperous companies from being singled out for particularly heavy wage exactions. This general point has been underlined in both the full-fashioned hosiery industry and the West Coast paper and pulp industry. There, local unions, affiliated with international unions, have protested that industry-wide collective bargaining prevents them from getting from especially prosperous employers wages as high as they could get if allowed to go it alone in collective bargaining.

So long as employers remain subject to the federal antitrust laws while unions are exempted, the balance of power in industry-wide bargaining would seem to be heavily weighted on the side of the unions. If, for example, employers were to announce an intention to match an industry-wide wage increase by an industry-wide price increase, there is no doubt that they would promptly be indicted for violation of the federal antitrust laws. Even so, the fact remains that some employers favor industry-wide bargaining while some segments of organized labor are against it.

A Clear Cut Public Issue

The industry-wide bargaining issue as it affects the public, however, is clear cut. It is concentration of economic power (in the hands of both unions and management) which can make industrial conflict devastating to the public welfare. At least five times within about a year—in steel, on the railroads, in the maritime industry and twice in the soft coal industry -strikes prompted by union efforts to impose industry-wide agreement about wages and working conditions have paralyzed large parts of the nation's economic life.

In soft coal about 90% of the production workers are members of the United Mine Workers. In steel about 80% of the production workers are members of the United Steelworkers, C. I. O. In some other key industries there is a comparable degree of concentration of union control. In the face of such concentration many employers see no alternative but to get together on their side for industry-wide bargaining. But when they do so in key industries, the odds are lengthened that failure to agree on wages and related matters, will result in generally ruinous conflict. If agreement is reached, the chances are increased that it will take too little account of the welfare of the consuming public.

It is possible to have industry-wide bargaining on many subjects other than wages. But the main interest is wages; and the main drive is toward industrywide and ultimately nation-wide uniformity. Such uniformity is the deadly enemy of industrial decentralization and the pioneering expansion of industry in new areas. Why pioneer, with inexperienced workers, if the wage rate must be uniform for the whole industry? Moreover, it would also be hard to conceive of a more effective way to put a blight on local efforts to improve industrial relations than to make wage rates and other working conditions uniform throughout the industry and then the nation. However, among many other dangers, the overshadowing danger in industry-wide bargaining lies in its concentration of economic power.

Wages Monopolized

On the average, the cost of labor accounts for about two-thirds of the total cost of all industrial products. The universal spread of industry-wide bargaining would thus concentrate in relatively few hands control of the greater part of the cost of industrial production. There is no reason to believe that even without disastrous strikes, such concentration would long continue free from government regulation. That would turn more earth for the graves of American business enterprise and American working men's freedom.

Those who believe that industry-wide bargaining serves the public well—and many sincere people do -stress the fact that, on the whole, it has worked in the industries where it has been tried over a considerable period. Most of the industries of which this is true, however, are not key industries. The pottery industry, the glassware industry, and the silk and rayon dyeing industry—to cite a few in which industry-wide bargaining has been practiced with considerable success—are important industries. But they are not industries in which strikes would have a ruinous impact on the nation. In contrast, a strike in the soft coal industry as the result of a breakdown of industry-wide negotiations quickly becomes a national disaster. The dangers inherent in industry-wide bargaining are multiplied accordingly.

England No Guide

Those who think extension of industry-wide bargaining would be good for the public often emphasize the fact that it has worked smoothly in England, where it has been extensively practiced. Not the least of the things it has smoothed in England, however, is the transfer from private enterprise to state socialism of industries in which industry-wide bargaining by monopolistic unions and employer groups had so badly undercut competition that private enterprise had lost much of its justification. A general extension of industry-wide bargaining could be expected to have the same consequences in this country.

The best way to curb industry-wide bargaining is a question which lies beyond this discussion. Much would be accomplished if the federal government would discontinue its active promotion of industrywide adjustments, in the fields of both labor and management, at which it has been busy ever since N. R. A. days. Still more would be accomplished if the federal antitrust laws were applied with evenhanded justice both to unions and employers—a course urged in the 53rd editorial in this series. Perhaps a definite limitation of the scope of labor agreements would also be necessary.

The effects of industry-wide bargaining in increasing the extent of public regulation of industry will vary. They will, of course, be less pronounced in railroads and other public utilities, which are already extensively regulated, than they will be elsewhere. For unregulated industries, however, industry-wide bargaining carries the threat of extensive regulation and, along the way, of industrial conflict devastating to the public. In these excited times, to say what I have said here is to invite characterization by overheated partizans as a foe of legitimate union progress. That is perhaps not so bad, however, as to qualify as a pall bearer for both American business enterprise and some of the basic freedoms of American working men. That may well be the fate of those who blindly accept the expansion of industry-wide collective bargaining as being "in tune with the times."

Mues H. W. haw. N.

President McGraw-Hill Publishing Company, Inc.

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Fig. 1708—200-pound Bronze Globe Vaive with screwed ends, union bonnet, renewable, specially heat treated stainless steel seat and regrindable, renewable, wearresisting "Powellium" nickel-bronze disc.

There are at least two notable reasons why Powell Valves minimize flow control troubles. One is that every valve in the Powell Line has been scientifically designed to operate under certain specific flow control conditions—pressure, temperature and/or media. The other is that there's a Powell Valve for *every* operating condition, or set of conditions, known today.

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That's why so many plants, representing every phase of modern industry, are now standardizing on Powell Valves.

Fig. 2429-150-pound Stainless Steel O. S. & Y. Globe Valve. Has flanged ends and outside screw stem.



200-point Brone Cont d ends, union boost on ly heat treated stations agrindable, renevate, a owellium"

nd Stainless Steel Valve. Has Hanged rew stem. Fig. 3003—Class 300-pound Cast Steel Gate Valve with bolted flanged yoke, outside screw rising stem and taper wedge solid disc.

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Fig. 1944—Large size 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yokebonnet and outside screw rising stem.

PUVYELL 150 WP Fig. 1793—125-pound Iron Body Bronze Mounted Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke, bronze seat rings and taper wedge solid disc. Also available in All Iron.

> Fig. 1969—150-pound Stainless Steel Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and taper wedge solid disc.

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CHEMICAL ENGINEERING • FEBRUARY 1947 •

MICAL ENGINE



Fig. 375 — 200-pound Bronze Gate Valve with screwed ends, inside screw rising stem, union bonnet and renewable, wearresisting "Powellium" gickel bronze disc.

POWELL

WATCHING WASHINGTON

R. S. McBride, EDITORIAL CONSULTANT J. V. Highlower, WASHINGTON CORRESPONDENT

Scope of synthetic liquid fuels program of Interior Department may be curtailed by cut in amount of funds allocated . . . Priority assistance for obtaining equipment and materials has been greatly reduced . . . Chlorine supply this year will be expanded by the sale or lease of government-owned plants for private operation . . . Styrene plants also are passing to private control . . . Chemical industry opposes lowering in tariff rates . . . Proposal for establishment of research agency to study physical phenomena . . . OTS closes contracts for government-financed research

SYNTHETIC FUELS FACE TEST

IF AN economy-minded Congress should slash the Interior Department's request for funds to continue its synthetic liquid fuels program, it is believed that the phase of the work relating to fundamental research is less likely of curtailment than the "plant demonstration" program. In the budget presented to Con-

In the budget presented to Congress last month, the funds requested for continuation of the synthetic liquid fuels program envisaged the continuation of all phases of that work, authorized by Congress in 1944. However, Interior Department officials were looking for attacks on the program on the grounds that present large scale work by private corporations nullifies any work by the government on a comparable scale.

It is understood in Washington that private industries in this field strongly support continued government studies in research. These spokesmen, Interior Department men say, discourage large-scale work, on grounds that failures in the grand manner make it hard to secure from boards of directors appropriations for further work.

WHY OIT REPLIES ARE SLOW

FORESHADOWING further relaxations on exports is the statement of authorities in the Office of International Trade that applicants for export licenses should not be discouraged by failure of OIT to act promptly. Applications which normally would be returned without action because of current quota limitations will not be returned to the applicant where it is possible that favorable action may be taken at a later date. These applications will be held by OIT for further consideration. In such cases the applicant will be notified that his application is being held temporarily without action.

Applicants are asked to wait two weeks before further inquiry. Exporters are reminded that requests for information on the status of delayed cases, or other inquiries, should be submitted in accordance with provisions of Comprehensive Export Schedule 22, Pa. 40.

PRIORITIES SHARPLY CURBED

RECEIVING little attention when issued a few weeks past, a sweeping amendment to CPA's Priorities Regulation 28 has cut deeply into priority assistance formerly given to manufacturers needing equipment and materials. CPA will no longer give CC ratings for production materials, maintenance, repair and operating supplies, capital equipment, construction equipment or facilities for starting or maintaining any individual plant to alleviate individual hardship. However, CC ratings already issued will continue valid.

Henceforth, a CC rating will be issued only in limited cases to meet needs of the military, public health, and public utilities, as well as veterans' housing requirements.

The axe has completely eliminated Schedule 1 to PR-28, which listed certain "critical" materials, producers of which were entitled to ask priority aid. Schedule 1 included normal butanol, industrial ethanol and methanol from non-food materials, lead, penicillin, rosin, rubber, streptomycin, titanium dioxide and wood pulp.

Two weeks ago, Direction 18 to PR-28, (CC ratings for consumers of iron castings and steel) was still in effect. Also, ratings for exports required to support "public policy" still remained.

CAUSTIC SUPPLY STILL SLIM

SCARCITY of caustic soda, soda ash and chlorine, which is of worldwide proportions, will contine well into the summer of 1947, according to Department of Commerce estimates. Production of these three basic commodities, although much above 1939 levels, is insufficient to meet heavy requirements. Last year's strikes, causing setbacks in production of steel for containers as well as production losses in caustic manufacture, have aggravated the effect of abnormally high demands.

Contributing to limited caustic deliveries, according to Commerce and CPA officials, has been the shortage of pressure tank cars for moving chlorine The shortage has been so severe on numerous occasions as to curtail output in electrolytic caustic-chlorine plants. Little relief from this lack of cars is expected before the middle of the year. One producer informed CPA recently that he was suffering a probable daily cut back of 50 tons of chlorine because of the car shortage. Another manufacturer asserted that for the same reason he has delayed a contemplated expansion in production. CPA Chemical Division officials say

CPA Chemical Division officials say they will not issue a direction aimed at assuring users of caustic soda a delivery in 1947 of at least 65 percent of the quantities they obtained last year. Voluntary allocation by producers will be followed.

GOVERNMENT PLANTS AIDING

THE scarcity of caustic and chlorine would be appreciably worse than it is, were it not for the fact that the government-owned electrolytic plants, aside from the Chemical Corps

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Tygon white* for lower costs and better light

Industry has learned that light reflecting paints mean lower costs, better workmanship, improved worker morale.

But until the development of Tygon, paints that could last any length of time against corrosive gases and fumes were mostly black or gray.

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Tygon white consists of a chemically inert synthetic resin compounded with titanium oxide, in

* In addition to white, Tygon Plastic Paints are available in red, green, aluminum, buff, gray and black. Other Tygon formulations include: Tygon sheet stocks, Tygon flexible plastic Tubing, and Tygon molded plastics. a solvent vehicle. It is applied in the conventional manner, over properly prepared surfaces, by spray gun or brush. On evaporation of the solvents, a tough, sturdy, flexible white plastic film is formed. A coat of clear Tygon is then applied to prevent chemical attack and discoloration of the white pigment.

This tough Tygon film bonds tightly to steel, concrete or wood. Stands up longer against most acids, alkalies, oils, waters or alcohols. Its smooth, hard, semi-glossy surface is easy to keep clean. For better light—use Tygon white!

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arsenals, have been bought or leased and are in production totaling about 460 tons per day of chlorine. This group of plants consists of those at Memphis, Tenn., purchased by Heyden Chemical Co.; Velasco, Tex., bought by Dow Chemical Co.; Las Vegas, Nev., leased by Stauffer Chemical Co.; and Natrium, W. Va., bought by Columbia Alkali Co.

Around July an additional daily output of 240 tons of chlorine is expected to come from revamped facilities at Lake Charles, La., leased during the war by Mathieson Alkali Works. Southern Alkali has leased and is converting that plant to manufacture of caustic and chlorine.

As to the caustic-chlorine equipment in the Chemical Corps arsenals, leases of the Pine Bluff, Ark., facilities to Diamond Alkali Co., and those at Denver, Colo., to Colorado Fuel and Iron Co., were expected to be announced early in February. Only the plant at Huntsville, Ala., was in production on February 1. Diamond Alkali, lessee of the equipment at Edgewood, Md., may get into production early in March. Total chlorine capacity of the four arsenals is around 300 tons per day,

ALKYLATE UNITS MOVING

WAR Assets Administration engineers believe that a goodly number of government-owned plants for producing alkylate, an iso-octane component of 100 octane aviation gasoline, will yet be sold to chemical manufacturers. Several have been so marketed. Latest was the sale, a few weeks ago, of the plant operated during the war by the Pennzoil Co. at Oil City, Pa., to the Koppers Co. Koppers bought the unit to convert it to the manufacture of alkylated aromatic chemicals.

Previously, the Oronite Chemical Co., member of the Standard Oil Co. of California, took a long-term lease on the unit formerly operated by Mohawk Oil Refining Co., for "manufacture of other chemicals." Also, Utah Refining Co., affiliate of the Standard Oil Co. (Indiana), purchased from WAA its previously leased alkylation unit in order to operate it "for other purposes."

Negotiations for the disposal of several other units are under way. There are prospects that a few may be dismantled and moved to China and Sweden.

STYRENE UNITS ALSO SELL

LIKE the alkylation units in the government's petroleum refining holdings, the five styrene units in the government-owned synthetic rubber system have proved to be of considerable interest to manufacturers of chemicals. Sale, last month, of the styrene plant at Velasco, Tex., to Dow Chemical Co., the wartime operator, was the third such installation to be sold. Dow continues to furnish some of the product for synthetic rubber manufacture, but is understood to be channeling the major part into chemical lines. Previously, the styrene units at Texas

City, Tex., and Kobuta, Pa., had been sold, respectively, to Monsanto Chemical Co. and Koppers Co., the former lessees of the plants. Those companies likewise are furnishing a portion of their production to rubber and are diverting the remainder to chemicals. Koppers is installing new facilities at Kobuta to produce polystyrene.

Remaining are the styrene plants at Los Angeles, Calif., and Institute, W. Va. Dow Chemical Co. is still running the Los Angeles unit as part of the rubber program. The Institute plant, leased during the war by Carbide and Carbon Chemicals Corp., is idle.

SOME WAY OUT

ONE of the most difficult problems with which Congress has been struggling, portal-to-portal pay, will not be solved even when the first bills have passed and been approved by the President limiting for the future the extent of back pay suits in this category. No one thinks that a single legislative measure is going to be enough. But it seems absolutely certain that some way will be found to escape from the multibillion dollar flood of demands.

Seriously feared, though much wanted, is some form of retroactive legislative interpretation of what Congress meant when it sought to prevent chiseling employers from making time demands on workers without payment and without contract right. The fear is that any form of interpretation which purports to be retroactive may set a dangerous precedent. Yet the need for some such effect is clear to all parties, especially including those who have at heart the long-term good of organized labor.

TO PROTECT CUSTOMERS

MOLASSES control would normally have prevented Allied Molasses Co. from doing current business because of alleged violation of distribution rules. But the Department of Agriculture found that strict application of a suspension order was "working an unreasonable hardship on persons who are necessarily solely dependent upon that company for blackstrap molasses or for products derived therefrom." Hence this company has been given permission to renew activity, limited to such business as is essential to protect the innocent customers.

"AGREEMENTS" VERSUS ITO

PARTISAN politics probably will enter international affairs most violently through discussion of trade agreements and of the proposed International Trade Organization. The establishment of ITO will touch off a new and perhaps even more bitter controversy be cause that State Department creature means that Congress must vote still further surrender of American sovereignty in trade control for the cause of increased international goods movement.

The present schedule of Reciprocity Committee hearings, an 18-nation gathering for negotiation, and the formulation of 18 new trade agreements, has not yet been disturbed. It is too much for the proponents of that program to expect that some of the more radical protectionist members of Congress will not propose and perhaps advance some drastic legislation that will cut down on the authority of the State department to dicker and the President to order more extensive tariff reductions. Foreign representatives in Washington know that the way is not smooth. It is reported that they will enter the forthcoming negotiations with less than complete confidence in getting U. S. adoption of the agreements reached. This greatly weakens the State Department in its trading.

TRADE ORGANIZATION DELAYED

THE Department of State has very discreetly decided to present to Congress the proposed charter of ITO under United Nations sponsorship only after the 18 trade agreements have been signed, sealed, and delivered. Critical Congressmen know this. And in the decision they find a megaphone through which to shout their comments that Congress is being ignored and that the State Department is trying to override legislative authority by withholding proposed international agreements until after they have gone beyond the range of Congressional review and change.

Not the least of General Marshall's problems in dealing with Congress will be a decision both as to policy and procedure in these trade matters. The effect of these on process industry probably will not be felt to any great

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extent for several years, until exportable surpluses are developed in other nations to be shipped into the United States in competition with our production. But this delayed effect of present tariff changes is not persuading to silence the critics of the trade agreement program. In fact it seems to stir them to even more violent attack. All of this, of course, does not obscure the fact that a vast majority of Congressmen of both parties now want the United States Government to take all steps reasonably possible toward elimination of the major barriers to international trade for both United States imports and exports.

TARIFF HEARINGS FRIENDLY

CONCLUDING oral hearings in Washington, last month, on domestic tariffs on imports of chemicals and allied products were held in an atmosphere of good-will on the part of both the representatives of the chemical industries and government committee holding the hearings. Respect for views of parties on both sides of the table characterized the hearings.

In general, requests by chemical manufacturers that existing tariffs not be lowered were based on two main points: (1) American industries must be protected in order to maintain production of critical and strategic materials if and when another "national emergency" occurs, (2) at this time there is no information as to probable manufacturing costs of foreign competitors in the next few years. Several companies urged that no action be taken on tariff changes before a survey of foreign manufacturing costs can be made.

Observers at the hearings commented on the evident efforts of the committee to secure facts from domestic manufacturers as to production costs at home and abroad. Committeemen indicated that these differentials are likely to be a decisive factor in our sparring with foreigners next April,

PAPER CHEMICALS LIMITED

PAPER authorities in the Department of Commerce say that the major chemicals required for the manufacture of pulp and paper will be limited in supply during most of 1947. Although salt cake and sodium silicates probably will not be of concern, caustic and chlorine will remain below needs. In general, pigments should ease, but availability of titanium dioxide is not expected to meet demand this year. Synthetic resins, in great demand for paints and plastics, will likely remain scarce during 1947.

On the brighter side of the picture, corn starch should be ample. Movements of tapioca from the Netherlands Indies will probably increase. Casein supplies, short at present, are expected to improve materially through higher domestic production and expanded imports from Argentina. After the 1947 first quarter, rosin is believed to be in appreciably better supply because of the outlook for a good crop and increased output of wood rosin. Supplies of aluminum sulphate are believed ample.

Demand for chemicals for pulp and paper production should be somewhat higher than in 1946, on the basis of Department of Commerce estimates. It is expected that the output of paper and paperboard will reach 20 million tons this year, an increase of 5 percent over the 1946 record production.

ATOMIC INSTITUTE PROPOSED

ESTABLISHMENT of a \$20,000,000 research agency to study fundamental physical and biological phenomena has been proposed jointly by the National Bureau of Standards and U. S. Public Health Service to the Atomic Energy Commission. Such laboratory probably would be placed at Bethesda, Md. in order to facilitate cooperation with the nearby principal laboratories of Public Health Service and convenient participation in operation by the Bureau.

The Commission apparently has received this proposal with favor, but not undertaken to act on it, nor on other new projects, prior to confirmation of the Commission membership by the Senate. It is also rather expected that final decision regarding this laboratory may be somewhat affected by the size of the research budget which Congress decides to give the Commission for its next fiscal year beginning in July.

If set up as proposed, the new laboratory would include a uranium pile for the preparation of various fission prod-

ucts and for the study of energy and reaction controls. Many of the products would be used by Public Health in its own investigations, and presumably also with many cooperating medical and biologic institutions. At least \$3,000,000 would be required for the uranium pile and at least as much more for initial laboratory buildings. The total laboratory investment would, of course, not be made during the first year; but as new installations decreased in cost, the operating expenses and payroll would increase over a period of several years,

FEDERAL GOVERNMENT RESEARCH

BOTH the scope and the budgetary support for future government research hinges on decisions not yet reached by the staff of the President's Scientific Research Board. That agency is make ing a reappraisal of the spending of about \$1.5 billion per year currently being disbursed on one form or another of so-called "research and development effort." If one adds Manhattan Project the figure is even higher. And at the moment the President's advisors appear quite confused as to the relative urgency as well as to the relative importance of many of the major parts of the programs which they seek to review.

The first step to be made by the staff of the Board is a review of the authorizations, the organization, and the size of the spending in different agencies. Functional classification 15 also being undertaken in order to bring together, for example, all research bearing on public health and in another group all bearing on preparedness and national defense. Then also the Board is trying to decide what is a reasonable division between the civilian and the military purposes, after it determines what the total budget should be. And finally it is confronted with the problem of deciding how much of the work it to be done in the government establishments themselves and how much should be undertaken by contract outside.

A frank and extremely open-minded approach is being made by the govemment staff serving the Board. One of its spokesmen has pointed out very frankly both the pros and cons affecting several of the major theories of research disbursement. It is evident that the hoped for policy-making report from the Board will not be ready in the early spring as first planned.

RESEARCH FOUNDATION BILL

ALL of the confusion as to what to do regarding budget for research already under way seems seriously to jeopardize the plan of establishing the proposed National Research Foundation. The White House still insists, apparently quite sincerely, that the establishment of such a Foundation is much desired and even confidently expected during 1947. A modification of tactics may occur. If so, the present confusion may be used as an argument for a permanent coordinating agency like the proposed Foundation.

agency like the proposed Foundation. Perhaps only Mr. Truman personally knows whether the prestige of Presidential influence may be back of that argument. And many Washing-

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As the white outline indicates, a standard unit of much greater frame size would be required to do the work of Speedaire. Photo by courtesy of General Die Casting Corp., Oakland, Calif.

EEDATRE permits compact design THE increased capacity of Speedaire and the minimum space required for its installation enabled the builder of this THE increased capacity of Speedaire and the minimum space required for its installation enabled the builder of this lowinum Die Casting Machine to design a more compact and required for its installation enabled the builder of this Aluminum Die Casting Machine to design a more compact and efficient machine. In addition, Speedaire cost 16% less than a conventional worm-gear unit, saving \$39 on each drive. encient machine. In addition, Speedaire cost 16% less th conventional worm-Bear unit, saving \$39 on each drive. Speedaire is Cleveland's new for cooled nventional worm-gear unit, saving \$59 on each unive. Speedaire is Cleveland's new fan-cooled worm-gear speed educer Because it is fan-cooled. Speedaire will do more work Speedaire is Cleveland's new fan-cooled worm-gear speed reducer. Because it is fan-cooled, Speedaire will do more work will deliver up to double the borsehower of standard worn unit ducer, because it is tan-cooled, speedaire will do more work will deliver up to double the borsepower of standard worm units of equal frame size at usual motor speeds. It can be installed of equal frame size, at usual motor speeds. It can be installed economically on many applications where other types have been of equal frame size, at usual motor speeds. If Can be installed economically on many applications where other types have been used heretofore—giving you the advantages of a compact right economically on many applications where other types have been used heretofore—giving you the advantages of a compact right-angle drive. Speedaire gives the same long, trouble-free service characteristic of all Clevelands. characteristic of all Clevelands. Catalog 300. The Cleveland For full description, send for Catalog 300. The Cleveland Worm & Gear Company, 3273East 80th St., Cleveland 4, Obio. Affiliate: The Farval Corporation, Centralized Systems of Lubrica-tion. In Canada: Peacock Brothers Limited. angle drive, specuane gives me t characteristic of all Clevelands. Affiliate: The Farval Corporation, Centralized, tion. In Canada: Peacock Brothers Limited, CLEVELAND Worm Gear

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ton observers doubt whether the President has yet had time to go very deeply into these matters of tactics, perhaps not even into the more simple questions of basic policy. Certainly one would be quite foolhardy to place any bets on the early establishment of the Foundation.

JUSTICE AFFECTS WAA SALES

WAR ASSETS continues to wrestle with a dilemma in its efforts to sell the more costly surplus plants. That dilemma consists of the fact that on the one hand, only the big companies are in a position to buy the large plants, and on the other hand these companies, precisely because of their size, are deterred from trying to buy because of fear of rejections by the Justice Department. Last year, the "majors" bought or leased only 24 percent, on the dollar basis, of the disposals.

Justice Department officials admit that companies that might otherwise spend time and money involved in negotiating for surplus plants hesitate to do so because such companies want to give Justice no impression that they contemplate expanding their positions in their fields of manufacture. Such firms feel that where their own bids probably would be opposed by bids from new or small companies, they might as well refrain from the competition. War Assets had hoped last year to dispose of large plants to "multiple tennant" groups, but has found few of the smaller producers interested in becoming bedfellows.

OTS INDEX ISSUED

ORIGINALLY scheduled for release in December, the first index of material in the weekly Bibliography of Scientific and Industrial Reports was off government presses last month. Covering all reports and microfilms relating to domestic and foreign developments, the index extends from the first issue of the Bibliography to June 28, 1946. The price is 50c, either to subscribers or non-subscribers of the Bibliography. Next issue of the index, covering July, August and September, 1946, has gone to the presses.

This index is a subject reference to abstracts contained in Vol. 1 of the Bibiliography, and cites the page numbers and report numbers referred to in the weekly issues of that publication. The reports indexed have been received from civil and military agencies of the government and from cooperating foreign governments.

Office of Technical Service officials

point out that the index refers to every chemical and all chemical manufacturing processes and equipment which receive more than a passing mention in the original reports. In those instances where a report deals with a large number of chemicals, it is listed under the generic term "chemicals," but references to the individual chemicals in the report are contained elsewhere in the alphabetical list under the name of the specific chemical.

IRDD CONTRACTS MADE

OFFICE of Technical Services through its Industrial Research and Development Division closed before the beginning of February, about a half dozen contracts for research to be financed by Uncle Sam. This group will utilize \$200,000 out of the total million-dollar fund which was made available by Congress for this fiscal year.

The closed contracts deal with powder metallurgy, ramie fiber, dimensional standardizations in construction, and the technologic development of several building materials. None thus far closed are strictly chemical or chemical engineering in nature, though some approach closely to process industry projects. A number of pending projects which seem likely to result in contracts are much closer to chemical enterprise.

IRDD officials believe that they have now set a pattern for contracts and established a departmental policy. Thus the next job is to negotiate more contracts from the large number of pending applications that have probable merit within their field. Far more applications are pending than could be financed with the remainder of the million-dollar fund. Hence, some projects probably to be approved will have to wait for funds until July 1 when next fiscal year's money becomes available.

FODDER FROM WOOD WASTES

FOREST SERVICE officials in the Department of Agriculture were preparing to go before Congress this month to ask funds for construction of a semi-commercial plant intended to carry forward on a larger scale an investigation of the conversion of wood wastes to fodder yeast. In 1943 the Forest Service began a laboratory study of the subject at Madison, Wis.

Officials claim no basic new discovery in the process. Conversion of wood into sugars by hydrolysis, followed by growing of yeast on the sugars, has been practiced commercially in Europe, principally in Germany, for a number of years. The Forest Service argument is that there have been recent improvements in technical details sufficient to warrant further development work on a scale large enough to establish the economics of using the process in this country, as a source of supplementary high-protein, high-vitamin B stock feed.

MINOR NEWS GLIMPSES

Palm oil needed by domestic tinplate manufacture this year may be more plentiful than International Emergency Food Council allocations would provide this country from the Portuguese colonies. The Department of Agriculture has announced negotiations with Belgium for palm oil from her colonies in exchange for a like amount of domestic oils from this country.

Government salary scales may be revised in the upper grades as Civil Service Commission executives are urging that Congress remove the old \$10,000 ceiling on salaries for such civil servants. Now that Congressmen themselves get \$15,000 there is some chance that top-grade scientists, engineers, and other professional men may be granted a more attractive top salary.

Rocket research programs on a vast scale frequently come to the attention of chemical producers asked to supply huge quantities of chemicals to serve either as combustant or oxidant. Actual willingness to buy is far less than the inquiries for chemicals might indicate. Top military officials do their estimating only in most general language.

Rubber compounders again have a freedom of choice regarding the quantities of natural rubber and various synthetics which may be used in most products. Authority to accept delivery of natural rubber must still be obtained from CPA, however. Thus the choice as to which end product will get the limited supply is an industry decision. But the total still is officially limited.

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Aerosol bombs for control of the common cold have been so highly publicized in the popular press that a strong warning statement was issued by Public Health Service. The proposals are not criticized directly. But warn ing is issued that this new use of chemicals is still in the experimental stage and far from proved successful. The authorities are, however, encouraging further development. ope, principally number of re e argument recent improve etails sufficient to establish & source of same ein, high-vitzen

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CHEMICAL ENGINEERING • FEBRUARY 1947 •

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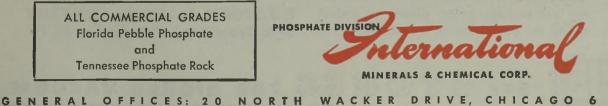
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CHEMICAL ENGINEERING

ESTABLISHED 1902

FEBRUARY 1947

SIDNEY D. KIRKPATRICK, Editor

THE CHEMICAL ENGINEERING OUTLOOK



CHEMICAL engineers have more reason than most people to be optimistic about the future. They are part of a continuing advance that will not be stopped short of a more paralyzing recession than even the most pessimistic economist has dared to predict. Their services are sorely needed in the process industries to carry forward the large scale exploitation of the new products and proc-

esses that have had only laboratory or pilot-plant development during the past six years. From the standpoint of the national economy, their technology can contribute most to improve productivity—to produce more goods at lower costs—and thus to put a stop to the suicidal spiral of wages and prices.

To look realistically at the facts and factors that will largely determine the chemical engineering outlook is the purpose of this twenty-fourth annual review number. In the following pages the broad outlook for American business as a whole is first appraised by qualified economists who are constantly concerned with the study of such trends. Next the international situation is summarized and reports presented from trained observers in the principal industrial capitals of the world. Finally, the outlook for commodities, for both the raw materials and finished products of chemical industry, is reviewed by Chemical Engineering editors in the light of current trends in production and consumption. All this is to the end of helping to meet the problems that lie ahead for the process industries.

We know there will be a continuing shortage of technical manpower—particularly in the junior brackets that would normally have been filled by recent graduates. Most chemical engineering equipment and many materials are still scarce and it will take most of 1947 to catch up with deferred demands and current needs. Meanwhile the better balancing of inventories with production and sales must soon be attained if we are to regain and improve the overall efficiency of our operations. This is no time to be lulled to sleep by today's big backlog of unfilled orders. Competition is coming; in fact, it is already beginning to make itself felt in several closely related fields.

There is cause for concern, too, with the factors that lie outside the chemical engineering province and influence. Labor is one of these for chemicals are so closely integrated into so many different industries that work stoppages and unreasonable wage demands can drastically affect production and distribution. Further rises in most prices will penalize our progress by increasing costs and slowing up new construction and modernization projects. And it is the heavy and durable goods industries that must take up the slack in consumer goods as our economy shifts back to a better peacetime balance.

Such is the chemical engineering outlook—a combination of opposing forces here and abroad that cannot readily be resolved into a balanced equation or working formula. But it is to the chemical engineer's lasting credit that resourcefulness based on research and sound engineering, backed by aggressive and progressive management, has always kept the process industries at the head of the procession. The growth of the chemical engineering field will continue at a more rapid rate than the over-all industrial growth of this country as long as we are willing to accept the challenge of such leadership.

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What's Ahead for American

Are we in for a bump or a slump, a rise or recession? Here are the views of trained observers who hold that a lot depends on the smoothness with which the economy shifts in emphasis from non-durable to durable goods. Chemicals stand both to gain or lose in this process.

C ELDOM has American business entered a new year with such a mixture of favorable and unfavorable factors confronting it. The war created a heritage of needs that in themselves must require a number of years of high employment and heavy output to fill. Yet the first year of adjustment to peacetime conditions has left the economy twisted and distorted in numerous respects. The more serious of these kinks must be ironed out during the coming year, and it is not unlikely that business in general will take a dip downward in the process. But to foretell at this time the degree and duration of such a dip is almost impossible. For here events of the next several months-including those on the labor side-must be of critical importance.

It is helpful in assessing the future of business to see where current production is flowing. This is best done by examining the gross national product, which is the total value of all goods and services produced. The gross product reached a peak of about \$208 billion during the war. Strikes and reconversion pains dragged it to a low rate of \$182 billion in early 1946. But by the final quarter of this year, output had sufficiently recovered to lift the gross product above \$200 billion (part of this increase, of course, merely reflects higher prices). Moreover, the distribution of the national product



JOHN D. WILSON

Before jaining McGraw-Hill in 1946, Mr. Wilson taught economics at Harvard, was chief of the business analysis unit at the U. S. Dept. of Commerce, and editor of its Survey of Current Business, 1941-2. From April 1942 to December 1945, he was assigned as Lt. (jg.) USNR to OSS to serve as assistant executive officer.



DEXTER M. KEEZER

Director of McGraw-Hill Economics Staff, Dr. Keezer taught economics at Cornell, Calarado, North Carolina and Dartmouth befare serving as president, Reed College, Portland, Ore., 1934-42. During the war he was deputy administrator of OPA, London representative of FEA, and public member, National War Labor Board.

among various broad consumer groups had changed radically from the war period, as shown by Table I in which the figures represent an estimate of the annual rate in billions of dollars.

As is apparent from the table, both consumers and business have stepped into the breech created by the swift descent of government spending. It was the consumer, however, who first took the initiative, and the past 12 months are likely to go down in business annals as the year of the consumer powered boom. For the immediate upsurge in consumer expenditures after V-J Day strengthened and activated the decision of business to lay out large sums on expansion of facilities and the rebuilding of inventories. Unfortunately, however, this general advance has been accompanied by a series of developments that has left the economic structure in a position that can hardly yet be regarded as stable.

Three of these faults in the economic structure may prove of critical importance to business in 1947: A lopsided pattern of consumption emerged in 1946, largely as a result of limited supplies of durable goods; inventory accumulation has been encouraged to

Table I—Estimated Distribution of Gross National Product

(Annual Rate in Billions of Dollars per Year)

	2nd Quarter 1945	4th Quarter 1946	Net Change
Total Gross National Product	208	204	-4
Consumer expenditures Non-durables Durables Services	102 62 7 33	135 81 17 37	$^{+33}_{+19}_{+10}_{+4}$
Business expenditure for investment Equipment Construction Net change in in-	7 6 2	33 14 10	$^{+26}_{+8}_{+8}$
ventories	-1	9	+10
Excess of exports over imports	-1	3	+ 4
Government expendi- tures	100	33	-67
Source: 1945 Depart	mont of	Commo	1946

Source: 1945, Department of Commerce; 1946, McGraw-Hill Department of Economics, preliminary estimate.

Business



DEXTER M. REESSE of McGrow-Hill Economic bit progifit economics of Lond ; provident, Beed Colog hu 4-42. During the was law; instructor of OPA, Louis + of FEA, and public mem is labor Board.

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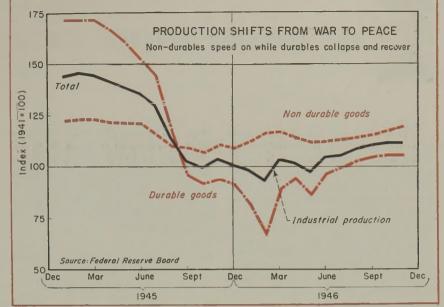
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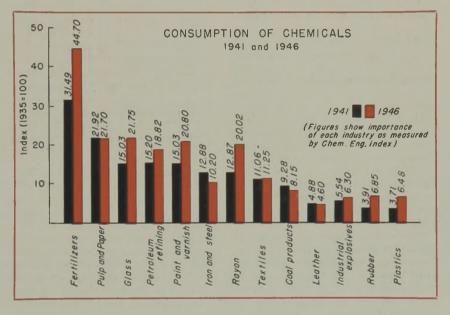
move ahead at a swift and unbalanced pace; and prices have climbed rapidly and unevenly to a level that in many instances is not likely to be maintained. Finally, the necessity to work out a new set of bargains with labor cannot help but cloud the outlook for a wide range of business.

Consider first the growth of production and consumption over the past year. The call of consumers for increased supplies after V-J Day could be met initially only by the non-durable industries. Apparel, textiles, foodstuffs, many luxury lines, and a number of the chemical processing industries were able not only to maintain production but in many cases to expand it. Altogether expenditures on non-durables rose in first half 1946 to more than a fifth above the level that might have been expected from an examination of the pattern of consumer spending in the past.

Meanwhile, reconversion problems, serious strikes, and (partly as a result of strikes) bad shortages in the supply of basic materials held back the output of durable goods. Not until after mid-1946 did production of durables as a whole move above the 1941 level, a fact shown in Fig. 1. And even then, output of some of the most important items (automobiles are the outstanding example) dragged along at a much slower pace than producers or consumers desired.

Many of the barriers to an expanded output of durables have now been overcome. Automobiles are rolling off assembly lines at a pace that approaches that of 1941, and except for refrigerators and sewing machines, production of most household appliances far excceds the prewar peak. Over coming months output of consumer durables should be further extended. But as consumers turn to these durable commodities they must inevitably cut their spending for high priced apparel, foodstuffs and other items.





Chemical Engineering Indexes For Industrial Consumption of Chemicals 1935 = 100

	1939	1941	1942	1943	1944	1945	1946	
Fertilizers	25.13	31.49	37.33	40.12	39.76	42.21	44.70	
Pulp & paper	16.52	21.92	20.51	19.05	18.87	19.44	21.70	
Glass	12.51	15.03	15.91	18.80	19.93	19.64	21.75	
Petroleum refining	13.45	15.20	14.43	15.56	18.10	18.71	18.82	
Paint, varnish and lacquer	10.66	15.03	14.35	15.40	16.71	17.37	20.80	
Iron, Steel	8.21	12.88	13.32	13.49	13.33	11.96	10.20	
Rayon	9.08	12.87	14.93	15.53	16.81	18.38	20.02	
Textiles	7.89	11.06	11.97	11.43	10.53	10.30	11.25	
Coal products	7.17	9.28	9.54	9.47	10.05	9,41	8.15	
Leather	4.16	4.88	4.88	4.56	4.25	4.54	4.60	
Industrial explosives	4.53	5.54	5.73	5.52	5.06	5.36	6.30	
Rubber	2.79	3.91	3.00	3.00	3.00	4.55	6.85	
Plastics	2.05	3.71	4.36	4.80	5.24	5.75	6.48	
TOTAL	124.15	162.80	170.26	176.73	181.64	187.62	201.62	

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THE ECONOMIC OUTLOOK

Still another factor that must tend to curb the ability of consumers to take goods from the market is the swift advance of prices. The price of necessities climbed more rapidly in 1946 than at any time since 1917, and at the year end consumers were paying out about 18 percent more on living costs than had been the case 12 months earlier. Food prices jumped more than a third, and the cost of clothing rose a sixth. Of the items that bulk large in household budgets, only rents have remained fairly stable.

Most of this price advance occurred after mid-1946, with the cost of living rising 15 percent since June. When these higher prices are lumped with a 7 to 10 percent increase in supplies available to consumers, it is apparent that consumer incomes will have had to be considerably expanded if some items are not to pile up on dealers' shelves. But wages and salaries (which constitute the bulk of mass purchasing power) increased only about 6 percent during the June-Dec. period. This gap between consumer incomes and the higher cost of an enlarged supply of consumer goods is one of the most serious distortions that developed in 1946.

The rise in prices has touched all business, as well as the consumer. Farm prices have led the parade upward (see Fig. 3), thereby pushing farm incomes to a new high. And Table II lays out the advance that has occurred since June in various groups at wholesale. There it may be seen that industrial prices have climbed more than 17 percent. The expectation of a general ad-

The expectation of a general advance in prices after mid-year encouraged business to speed up the process of restoring its stocks to a level consistent with its heavy peacetime activity. The result has been a substantial volume of output flowing not to final consumers but into inventory. Indeed, the table on the gross national product shows inventories in the last quarter to have been increasing at an annual rate of about \$9 billion.

How long this process of inventory accumulation will continue is uncertain. At least part of the unusually large "goods in process" inventory has been forced upon durable goods producers by shortages of materials and parts. Moreover, the ratio of inventories to sales still is considerably below the level of past periods of prosperity. Nevertheless, the building of stocks is almost certain to come to an end some time in 1947. When it does, a sizeable chunk of demand will have disappeared.

Table II—Advance in Wholesale Prices, June to Dec., 1946

(100 - Week of V-J Day in 1945)

			Percent
	June	Dec.	In-
	29 th	28th	crease
All Commodities	106.8	132.3	23.9
Foods	106.7	149.7	40.3
Hides and leather	104.5	144.6	38.4
Textiles	109.5	134.5	22.8
Metal and metal pro-			
ducts	106.5	127.8	20.0
Building materials	110.6	131.2	18.6
Chemicals and allied			
products	101.7	132.3	30.1
Housefurnishing			
goods	104.2	113.5	8.9
0			
All commodities other			
than farm products			
and foods.	105.3	123.8	17.6

Source: Based on data issued by Bureau of Labor Statistics.

All these facts suggest that as business enters 1947 it must contend with (1) a consumer expenditure on nondurables that may have to give way as supplies of durables expand; (2) a new price level that effectively cuts the purchasing power of the average consumer; and (3) the likelihood of a decline in business spending on inventories. The combined effect of these developments is likely to be felt principally (and initially) by such nondurable lines as textiles, apparel, foodstuffs, and most luxury items. These producers must either cut prices or reduce output, and under current conditions they probably will do both.

As a matter of fact, this process already is under way. Farm prices reached a peak in October, when the index touched 273 (1910-14 = 100). Today it rests around 260. Government supports promise to hold farm prices at 200 to 210 for the index, and a good crop in 1947 might drag them down to that level.

Still other straws in the wind are department store sales and purchases. These merchandisers are now selling less than they were a year ago, and many retailers have already begun to cut prices at the expense of profit margins. In the face of such trends, department stores have moved to curtail sharply their own buying for inventory.

The chemical industry of course must eventually feel the effect of any reduction in non-durable output, just as it benefitted from the extraordinarily high rate of activity in 1946. Textiles, leather, and rubber are industries that sometime in coming months, might be expected to move down from their record peaks of recent months. These accounted for about a tenth of the chemical consumption in 1946 Moreover, although the inevitable decline in farm incomes should still leave the farmer much better off than in prewar days, it may halt the advance in the use of fertilizer, which absorbs another fifth of the over-all chemical output.

But more than a fourth of the chemicals turned out in 1946 flowed into industries producing durable goods or into construction. These are markets for such important chemical processing lines as paints, glass, steel. and some of the plastics.

The extent to which a turn down in the non-durable may affect the demand for durable products is one of the most difficult questions facing the business analyst. Normally a business letdown tends to feed upon itself. But the current backlog of demand for most heavy goods is so great that many producers may be called upon to expand, rather than contract, output during 1947.

Firms turning out durable goods for consumers are the most likely to face this pleasant prospect. Buyers probably will continue to queue up for automobiles, electrical appliances, and many household furnishing. But these have been accounting for less than half the total outlay on durables. Construction of housing and plant, together with the output of new equipment for producers, have formed an even larger share of the national product.

Equipment—Construction

Here the outlook is less clear. Sky rocketing costs threaten to narrow the market for new housing and have caused some companies to postpone outlays for new plants. Moreover, any business downturn, even if it be mild, is likely to introduce a streak of caution with respect to equipment expenditures. But even with hitches such as these, it is difficult to see how demand in these important areas can fall substantially below the level of today, providing the labor problems of the next several months are surmounted successfully. ores have more heir own burg

nical industry : itted from the ma ate of activity a la netime ia coming 1 cord peaks of recent occounted for about as mical consumption a er, although the inter

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Indeed, it is within the durable goods field that labor developments over the next several months will exally ted the ercise their most decision strength is a nondurble organized in some of these basic industries. A lengthy work stoppage in steel or the other metals could seriand robust ously curtail output of many durables throughout 1947. And strikes in automobile or electrical equipment industries would reduce employment and output at just the time it is likely to be most needed to offset declining activity among the non-durables.

Much in the outlook for business in 1947 therefore hinges on management's success in working out a satisfactory set of new bargains with labor. th of the order Either strikes or a new wage level that requires a further advance in key industrial prices will deepen any dip in business. In the absence of such adverse developments, durable goods and construction should prove a source of considerable strength for business, at least until late in 1947. And as this is written, the chance of avoiding domestic labor conflicts appears better than at any time in recent months.

There are still other portions of the national product that can be expected to hold firm this next year. Government spending on goods and services should not fall much below the \$33 billion rate of the last quarter, with increased state and local budgets offsetting much of the proposed cut in federal outlays. Moreover, exports probably will expand beyond the \$10 billion shipped abroad in 1946. Only a small portion of our foreign loan commitments has as yet been expended, and the needs abroad remain enormous.

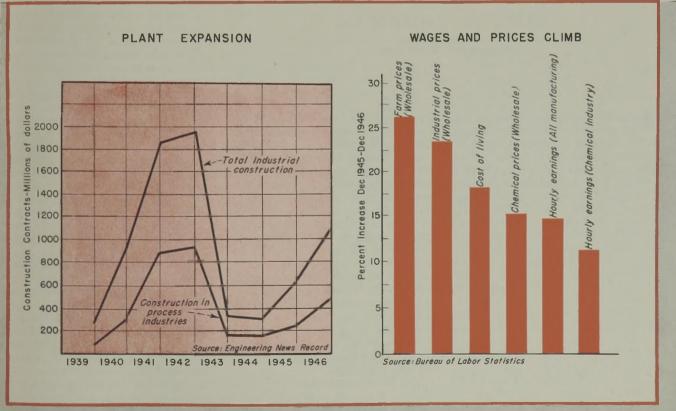
Decline and Readjustment

Thus the only links in the chain of demand that now show clear signs of weakness are consumer outlays on nondurables and business expenditures for inventory. A decline in these portions of the gross product (which might be expected to start in the second or third quarter) may in itself force a reduction in industrial production of 10 to 15 percent. This would push the Federal Reserve Board index of industrial output back to the level of first-quarter 1945. But in contrast to a year ago, the non-durables will have replaced the durables on the weak side of the list.

Perhaps the most important result of any such dip in business will be the healthy realignment of prices-particularly those prices that loom large in the cost of living. Barring the unforeseen in the way of poor farm crops, a decline in the average of food and clothing prices appears almost a certainty during 1947, and the pay envelope of the worker ought to carry more real goods in it a year from now than it does today.

While the statistical cards now at hand seem to spell out a let-down of this limited order, one cannot rule out the possibility of a much stronger bump-say a decline in industrial output of 20 to 30 percent from its current high level, with unemployment rising above five million. A downward move of this magnitude would string itself out over first-half 1948, and must inevitably involve a reduction in durable goods output. As suggested above, however labor holds one key to the gate that leads up this road. Events of the next few months should reveal whether that key is to be used.

But nowhere in the business picture is there to be found a sign that points to the beginning of a serious depression in 1947. On the contrary, recent years have seen the opening of great new frontiers in the U.S. economy. The development of these, coupled with the rebuilding of a rundown peacetime establishment, is a task that cannot help but remain a challenge to both business and labor for some time. And perhaps no group is faced with a more promising opportunity to push on into new territory than the chemical and the chemical processing industries.





What's Happening In World Markets?

When James H. McGraw, Jr., early in 1945, announced bis pioneering plans for a world-wide news bureau to concentrate on industrial, economic and technical developments, John Chapman was given the job of organizing and directing its far-flung activities. Today the bureau has full-time correspondents in 10 of the world's industrial capitals, supplemented by 28 part-time employees—all trained to seek out and interpret the business significance of foreign news. It is from this background and these sources that we report the International Outlook.

JOHN F. CHAPMAN Editorial Director McGraw-Hill World News

AD 1946 ended as it began, Russia would have wound up dangerously crowding the United States for position as the world's number one power. The end of the year, however, witnessed the United States emerging triumphant in its long diplomatic tugof-war with the U.S.S.R. Temporarily thrown off balance in the first six months of 1946 by the Soviet's rapidfire diplomatic and propaganda moves, which cleverly capitalized on our lack of consistent foreign policy, a toughened, smarter America regained its perspective and turned from a vacillating policy to one of firmness. Result: before the year was out, the U.S. had outmaneuvered the Russians and climbed solidly back into the saddle as the top world power.

as the top world power. The year 1947 will be a year of decision. The patterns that emerge will affect the world's trade and economy

for at least two decades to come. Behind, now, is all the cantankerous dickering that characterized 1946. The United Nations Assembly has weathered the storm, and its initial session wound up in a whirl of agreements on basic policies. All major issues in Eastern Europe have been ironed out by the Council of Foreign Ministers. The last big hurdle is the German peace treaty which will be tackled in Moscow in March. Just how quickly a settlement can be made is anybody's guess. But with the Russians becoming more and more cooperative in almost all international negotiations-a trend that began last November when the U. S. toughened her own role-it's a fair prediction that by June this tough nut will be cracked.

The first six months of 1947, however, are not going to be easy. Rivalry between the U.S.S.R. and the western



The well-traveled, industry-grounded foreign editor of Business Week was lowa-born and trained. After graduating from Grinnell in 1924, John Chapman spent 3 years as a teacher-journalist in the Far and Middle East as prolude to 20 years of world-wide service as an interpreter of the industrial and economic significance of foreign news.

> powers for spheres of influence has only momentarily been fought to a standstill. When the new Secretary of State, General George Marshall, goes to Moscow, sharp words will fly. Charges and counter-charges undoubt edly will be made. Sensational headlines will follow. But this is inevitable —because, to hold its number one spot, and the respect of other nations, the U. S. has to accept the Soviet challenge and move boldly.

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The American people in general, and businessmen in particular, however, will not be as upset by these diplomatic crises as they were in 1946. Hardened by a year of international blow-offs, which in each case came to naught, there will be more of an inclination to follow a "business as usual" attitude despite the storms that might roar at the high diplomatic level. All in all, more settlements are likely to turn up in 1947 than anyone dared hope for in 1946.

If the next 11 months shape up and follow the pattern that is now expected, how will the chemical industry be affected?

The answer to that lies with the industry itself. It can be safely said that during the coming year many of the barriers that have hampered world trade in 1946—namely, shortage of shipping space, difficult monetary exchanges, hampering government restrictions, and inoperative trade agreeWORLD NEWS SOURCES

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or spheres of maments,-will be lifted and alleviated. mentanly been healt will be up to the leaders of the When the new Muchemical industry to be alert and ready meral George Marifor the trade opportunities that are ow, sharp words icertain to develop in the last six and counter-change months of the year if the international be made. Sensituation follows its expected course.

follow. Bat this is To date, the postwar international to hold its matrade record of the chemical industry the respect of the leaves considerable to be desired. has to accept the switchile American industry in general has succeeded in tripling its exports move boldy. nerican people sover the 1936-38 average, the chemesmen in princical industry has yet to reach its prenot be as upset war level.

trises as they want The marked scarcity of basic chem-by a year d uter icals has been the biggest bugaboo which in each are contributing to the failure to fill the ere will be man export demand. But even considering to follow a to have follow to tour to have failed to keep pace. For example, the automobile industry, despite its material shortages, labor n all, more settlese trouble, and pent-up domestic de-mand, succeeded in boosting its rn up in 1947 that for in 1946. monthly average exports from \$6,300,ext 11 months shape 000 in 1936-38 to \$18,900,000 on the pattern that is a last reportable month. will the chemical a

As it now stands, experts in the chemical trade field estimate it will take all of 1947 to get caught up, and perhaps 18 to 24 months to reach the necessary production peak. The industry-in view of the market trend and the potential opportunities in all parts of the world-seemingly would be wise to make token deliveries in greater

volume than it has made in the past postwar months.

FULL-TIME CORRESPONDENTS "STRINGER" CORRESPONDENTS

This business of being the number one power in the world carries with it a challenge. True, the U. S. is top dog, and the chemical industry will always inevitably get a share of world trade. The point is, however, the industry will not get all it can unless it takes a long-range view, and takes advantage of the potential. Token shipments now would be one advisable step. Another would be more exporting of technical know-how,-the selling of American "brains" in aiding the chemical industries of other countries. Admittedly, it would seem that the latter was a little like fostering competition, but the fact remains that countries which are just beginning to industrialize, like India and some of the South American nations, and others which are rebuilding their warshattered industries, are going to get their materials, equipment, and technical assistance from somewhere else if they can't get it from the U.S. The American chemical industry would seem to have little choice but to keep ahead of the parade,-that is if this comparatively young industry wants to write as fine a record in the foreign field as it has domestically.

The years 1947-48 will bring golden opportunities for the industry. Reasons for this will be clearer as you read the country-by-country reports that follow this general introduction. Through all these dispatches, sent in by McGraw-Hill men in all parts of the globe, there runs the same story-that the demand is terrific, but that upset internal conditions, material shortages, lack of coal and dollars, and a variety of other causes have prevented foreign industries in staging a rapid comeback.

WESTERN NEMISPHERE

After the first six months, the world trade pattern will become clearer. The new Congress will have been in the saddle long enough to have indicated its planned program toward world trade. By midyear, the die will have been cast on the reciprocal trade program, and the chemical industry will know how it stands. Britain and other western powers have agreed to U.S. proposals for the creation of an international commercial policy pattern. Eighteen nations are scheduled to meet in Geneva, Switzerland, in April to see if they can agree on the details of a charter for the International Trade Organization. Although the mechanics of setting it up will prevent the ITO from being in operation before mid-1948, assuming an agreement is reached and ratification follows, at least the April meeting will be another signpost as to the direction world trade will be taking. The foregoing, plus the writing of the German and Austrian treaties in Moscow next month, will all tend to clarify the international business pattern for 1947.

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years.

THE INTERNATIONAL OUTLOOK

RUSSIA

ROBERT MAGIDOFF Moscow Bureau, McGraw-Hill World News

THE RUSSIAN chemical industry is now

back on its feet. Production, according

to Soviet government officials, is cur-

rently in excess of the prewar level.

The comeback is remarkable in view of

the fact that the chemical industry

sustained more war damage than per-

haps any other heavy industry in the

U.S.S.R. The new Five Year Plan, now

in operation, calls for still greater ex-

pansion in 1947 and the subsequent

sian chemical industry can not be given

-since, at no time, does the Soviet government release full production fig-

ures in the manner in which they are

made available in the U.S. However,

enough material has been released, from time to time during the past year

to draw a pretty comprehensive pic-

ture of the status of the industry today,

and to evaluate its potential for 1947.

strides made in rebuilding the battered

chemical industry in this country, must

fully realize the extent of the damage that was done. The bulk of chemical plants in the early war years was located in the Ukraine, the Donets

Basin, and the central areas-all within

An American, trying to realize the

A fully detailed picture of the Rus-



range of German bombers. At one time during the war, Russian production of nitrogen was down 50 percent, sulphuric acid 77 percent, soda ash 83 percent, dyestuffs 88 percent, and phosphoric fertilizers 65 percent.

The remarkable recovery in the last year, and in 1945, was attributable to the fact that many of the plants had been evacuated during the war further east, where new plants were being built and old plants enlarged. Figures for 1946 have not been released as yet. But the 1945 figures show that an average increase of 15 percent over 1944 was achieved in the output of chemical products for civilian needs.

Pet of Soviets

The chemical industry always has been one of the pet branches of Soviet industry, and 76 various chemical plants were built up and put in operation in the U.S.S.R. during the period 1928 and 1940, including the largest Soviet chemical works in Berezniki (in the Urals).

Most notable is the increase achieved in the production of fertilizers. The output of superphosphates, for example,

Sovfoto



has increased 66 times between 1913 and 1940.

Four new superphosphate plants are to be built under the new Five Year Plan in Central Asia to exploit the Kara Tau phosphorites, in addition to a special superphosphate department of the Aktyubinsk chemical plant in Kazakhstan. These plants will thus supply all Central Asia with mineral fertilizers of its own.

Before the end of 1947, the superphosphate plants in Odessa and Konstantinovka (in the Ukraine) will have been restored to their prewar capacities and the Vinnitsa and Neva (Leningrad) superphosphate plants are to be put partially in operation. A new plant is to be built in the Ukraine and a department for the production of superphosphates is being set up at the Alaverd chemical works in Armenia (South Caucasus).

Before the end of 1950, the total annual output of superphosphates is to be doubled, compared with 1940, and a total of 2,720,000 tons of new annual capacities are to be put into operation before then.

The major potash deposit at Stebniki in the foothills of the Carpathians, which before the war furnished over 100,000 tons of potash fertilizers, is now being worked to 70 percent of its prewar capacity. It is now proposed to expand the capacity of this plant several times and to build a new soda factory there. It is expected that Stebniki, whose deposits of workable mineral are estimated at some 19,-000,000 tons, will be in a position not only to supply all the potash fertilizers the Ukraine needs, but also to ship them to other areas as well.

In addition to the reconstruction of the Solikamsk, Stebniki and Kaluga potassium "combines," the fourth Five Year Plan provides for the construction of the first section of a new potassium "combine" in the Urals. Before the end of 1950, the total output of potassium fertilizers is to be increased by 30 percent, as compared with 1940.

The fourth Five Year Plan provides for an increase in the production of nitrogenous fertilizers by 80 percent as compared with 1940. For this purpose, it is proposed to restore the nitrogen plants in the Donets Basin and the central areas to their prewar capacities, to double the capacity of the Chirchik chemical plant and to start the con-

Restored soda works in Slavyansk, Stalino Region. It was seriously damaged by the German invaders

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superphosphate struction of a number of new major under the nitrogenous fertilizer plants, including ander the new one in Western Siberia.

atral Asia to The total output of mineral ferhosphorites, in tilizers (superphosphates, nitrogenous aperphosphate and potassium) is to reach 5,100,000 yubinsk dema and potassium is to react soviet gov-

These plats ernment estimates. Central Age of mineral fertilizers under the the end of the fourth Five Year Plan is evidenced by e plants in Great the fact that fully 50 percent of the la in the line capital investment in the Soviet chemical industry will be used during that Vinte ad in period for the restoration of old plants appropriate part and the construction of new ones for the production of nitrogenous, phosbut the User phoric and potassium fertilizers.

The next most important task unand is being set on dertaken by the Soviet chemical induswork in try during the five years will be a considerable expansion of the aniline dye

Unlike the case of the mineraloubled compared fertilizer industry, the output of dyes a of 2,72000 has not even quadrupled between 1913 apacities are to be and 1940.

The new Five Year Plan provides or potash departs for the complete restoration of the while of the aniline dye industry, as well as for the tons of production of two new plants for tons of production of synthetic dyes and semi-products for them. It is also proposed to organize production of dyes and semi-products at the plants set

up in the East during the war. By the end of 1950, the output of synthetic dyestuffs will increase by 30 percent, compared with the prewar mark, and in 1950 a total of 43,000 tons of these dvestuffs are to be manufactured.

In the first place, it is proposed to organize and considerably extend the production of indanthrenes and cryolite dyes. The output of indanthrenes is to be increased 2.4 times and that of cryolite dyes 5 times. The number of brands of dvestuffs produced is to be increased 2.9 times.

Plastics Doubled

Production of plastic materials has been doubled during the war, and a further expansion of this industry is contemplated for the next five years. In addition to the restoration and extension of the old plants, it is planned to build four new plants. Production is to be organized and considerably extended of new types of polymerised and stratified plastic materials, as well as those based on cellulose ethers and carbamide resins. A new Institute for the Polymerization of Plastic Materials has been set up in Leningrad to develop the process of production of vinyl plastic materials.

The new Five Year Plan provides

for the increase of soda ash production by 50 percent and of caustic soda by 110 percent, as compared to 1940. The total output of soda ash in 1950 is to be brought to 800,000 tons and that of caustic soda to 590,000 tons, for which purpose a total of 813,000 tons of new capacities are to be put in operation in soda ash industry, and 278,000 tons in the caustic industry.

The extent of capital construction work in the chemical industry during the period between 1946 and 1950 is evidenced by the fact that total capital investments in this industry during the five years will equal the investments made in this industry during the period between 1928 and 1940.

The construction of new plants and reconstruction of old plants are to be based on the maximum introduction of continuous processes, high pressures, oxygen blast, new catalyzers, automatic control of chemical processes and mechanization of various labor-absorbing processes. It is proposed to introduce automatic control of temperature, pressure, automatic safety methods, and communication.

The question of the mechanization of production and especially of laborsaving methods in the chemical industry in the coming years takes on special importance, since more than 50 percent of the workers of the establishments of the Ministry for Chemical Industry of the U.S.S.R. are women, and the number of young workers (not more than 25 years old) exceeds 40 percent of all workers.

The Ministry of the Chemical Industry of the U.S.S.R. is currently running a total of 17 scientific research and designing institutes, 5 higher chemical schools, and 17 technical schools. M. G. Pervukhin, Minister for the Chemical Industry recently said that it will be necessary to install modern laboratory equipment and considerably extend Soviet chemical scientific research. Equipment will undoubtedly be bought in the U.S.A.



MEXICO

ERNEST HEDIGER Mexico City Bureau, McGraw-Hill World News

IN SPITE of the still continuing difficulties of receiving sufficient raw materials and equipment from abroadnearly exclusively from the United States-1946 was an excellent year for the young and still growing Mexican chemical industry.

Although exact production figures for 1946 are not yet available, not even in the form of estimates, output for the year under consideration is known to be considerably higher than during any of the previous years. (For 1945 and previous statistics, see page 120-131 June 1946 issue of Chemical Engineering).

Development of the plants already in existence or under construction during the year was slower than expected. The Sosa de Texcoco plant, for instance, which was to produce large quantities of soda ash and caustic soda toward the end of 1946 from the deposits of the dried-out Texcoco lake in the outskirts of Mexico City, could not be completed during the year as



planned. Only part of the machinery has arrived in Mexico so far, and large scale production of these commodities will probably only start about August 1947.

Outlook for 1947 is good, though no very large scale development is to be expected during the coming year. Money is easily available, but Mexico is too poor yet in electrical power to allow for the building of large chemical plants, and equipment from abroad is still slow to come or hard to get at any price.

Greatest development planned for 1947 is the building in the vicinity of Mexico City of a \$10,000,000 plant for the manufacture of nitrogenous fertilizers from natural gas. The gas is to be piped from the Poza Rica helds, on the Gulf, by Petroleos Mexicanos (PEMEX), the government oil trust. Blueprints for the new plant, which will be set up by an autonomous, semigovernmental corporation, are at present being drawn by the Chemical Construction Corp. of New York. The Mexican Government will borrow the necessary funds at low interest rate from the International Development and Reconstruction Fund in Washington, D. C.

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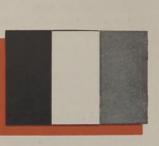


the war.

THE **INTERNATIONAL OUTLOOK**

FRANCE

MICHAEL MARSH Paris Bureau, McGraw-Hill World News



program for 1947, as shown in Table II. Other major items of French export will be pharmaceuticals, essential oils, glass, tires, and perfumes.

However, France will still in 1947 import a considerably greater value of chemicals and chemical materials than she exports. A brief breakdown of planned imports is provided in Table III

On the important question of what place French firms can take in markets formerly supplied by Germany, the French industry is reported generally undecided. One of the main reasons for lack of definite plans is uncertainty as to the future of the German industry. Actually, in the French zone of Germany, occupation authorities have so far been struggling chiefly to get back into production the great Ludwigshafen-Oppau complex and the other I. G. Farben plants in the zone.

I. G. Benefits France

The I. G. Farben factories, which were confiscated by the French military government and are operated under a French administrator, furnished France with a fifth of all her chemical imports (in the narrow sense of the term) during the first eight months of the year (\$5,500,000 out of a total imports of \$27,600,000), and by the end of the year they were scheduled to ship to France at the rate of \$1,200,000 a month.

On a composite view, therefore, the French chemical trades-instead of supplanting Germany in European or overseas markets-still import more than they export, and France is still in the position of relying on German supplies to satisfy part of the home market.

This does not mean of course that no French products will come into former German markets. The French



chemical export goals for 1947 are about 30 percent higher than actual en ports in 1938, and some 35 percent over the estimated 1946 figures. These are value figures, but adjusted for changes in price since 1938, and the therefore represent a considerable expected real expansion. French chemical imports, if they reach in 1947 the hoped-for total, will also be about 30 percent above 1938 and about 20 percent above 1946.

In the field of new investment, current construction in the French chemical industries is being held down by lack of steel, just as current production is often hampered by the coal shortage. One of the most significant efforts on foot is the plan-drawn up by officials from the major petroleum companies working with government technicians-to refine at home the great bulk of France's petroleum products consumption, in order to save foreign exchange.

Table I-French Chemical Output

(Thousands of Metric Tons)

			Plan for
Product	1938	1946	1947
Sulphuric acid	1,200	1,000	1,200
Superphosphates	1,350	1,100	1,350
Sod. carbonate	480	480	600
Nitr. fertilizer (N ₂)	200	150	200
Potash fertilizer (K2O)	580	580	660
Hydraulic lime	1,500	1,500	1.3 to 1.5 ^a
Plaster	700	1,000	1.3 to 1.5 [®]
Bricks and tiles	4,700	4.000	5.5 to 6.6*
Petrol. prods	6,000	2,800	4.9
(incl. synth.)			
Rayon filament	34	31	43
Rayon, staple fib		18	25
Hides and skins	80	56	60
Paper and pbd	1,280	660	770
Glass	505	606	650 to 680
Rubber (incl. synth.)	65	62	72 to 78
,			

* Millions of metric tons.

Table II-French Chemical Export Plans for 1947

(Millions of Dollars)
Organic chemicals	
Dyestuffs	15
Pharmaceuticals	17
Essential oils, etc	17
Mineral chemicals	
Glass	
Rubber	
Tires	13
Perfumes	
Rayon filament	
Hides and skins	
Other	
Total.	1

Table III-French Chemical Import Plans for 1947

(Millions of Dollars)

Paper and pulp	5(
Hides and skins	29
Chemical raw materials	19
Rubber and rubber arts., inc.	
synth 18.5	
Carbon black	
Tars. 13	
Nitr. fertilizers 13	
Total	27
Sources Com 1 1 1 1 1	

ource: Commissariat du Plan.

Most of the French chemical industries, with the important exception of petroleum refining, leather, soap, and paper, reached a level in 1946 not much below 1938 output. This represents a tremendous upswing from the almost complete stagnation at the time of the liberation in September 1944, when the index of chemical production stood at 5 percent of 1938. The recovery has been aided by the fact that most chemical plants, except petroleum refineries and rubber processing plants, were not tremendously damaged by

In 1947 the industry hopes generally to make a considerable further boost in output. The great bulk of this production will be needed for domestic industry and reconstruction, but it is hoped to export \$130 million worth of chemical products during the year, a considerable boost from 1938. Half of these exports would be organic chemicals.

Best picture of the chemical industries' 1946 performance and hopes for 1947 is in figures prepared by the French Plan Commissariat, representing joint estimates by industry, labor, and government services. Table I gives these estimates for a number of basic chemical products.

Among industries not mentioned in the table, the soap industry has lagged badly, owing chiefly to shortage of fats. By the fall of 1946 toilet soap output was back only to 55 percent of prewar, household soap to 17 percent of prewar, and industrial soap to 33 percent of prewar. Output of detergents, which are widely used as soap substitutes, had boomed on the other hand to 38 percent above the prewar level.

According to M. Hirsch, Technical Director of the Plan Commissariat and formerly an official of Establissements Kuhlmann, it is hoped in 1947, in addition to attaining the increased output noted in Table I, to push especially the output of plastics and dyestuffs. Dyestuffs will occupy a major place in the French chemical industries' export

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export goals for ercent higher the 1938, and some estimated 1946 for e figures, but in price since 199 e represent a une cal expansion. Free i, if they reach in for total, will also by at above 1938 and and above 1946.

construction in the Fe adustries is being bei of steel, just as care is often hampered b ge. One of the mota on foot is the planicials from the marrie inies working with p cians-to refine al bulk of France's petric consumption, in our exchange.

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CHINA

A. W. JESSUP Shanghai Bureau, McGraw-Hill World News

UNITED STATES domination of the the field in market, wild price fluctuations, and small Chinese production, highlighted the chemical business in China in 1946. In volume, imports of industrial chemicals and chemical products are well below those of prewar years. However, value of imports during the first ten months of 1946 was \$49.3 million compared with a 1936-37 an-nual average of 28.2 million. As never before the United States dominates the import list, accounting for roughly 75 percent of all chemical imports. In 1936-37 the U.S. was the source of only 11 percent of China's imports of the same products.

Prewar leaders in the Chinese markets were Germany, Japan and Great Britain, with Germany accounting for 40 percent. Both Germany and Japan are out of the picture, with little likelihood of coming into a competitive po-sition for several years. Whatever competition there is will come from Great Britain, which until recent months has shipped very small quatities to China.

U. S. Dominant

At least through 1947, the U.S. will continue in the same dominant position. This position could be retained indefinitely providing good marketing and service assistance is given to the Chinese purchasers. Complaints have been lodged by purchasers over poor packing, lack of or sloppily prepared invoices and shipping documents, cancellation of accepted orders and general disinterestedness of U. S. suppliers. Granted that some of this may be avoidable, the buyers tend to ignore even legitimate excuses if offers coupled with better service are available elsewhere.

Speculation and short supplies have turned prices upward to the sky. At the same time, certain chemicals in over-supply are down in price and are being sold at c.i.f. valuation or below. Some examples of the price situation (because of the currency value fluctuation, figures are in Chinese dollars) are

Sulphuric acid is selling at CN\$800,-000 to CN\$1,000,000 per 100 lb. whereas the landed cost is only CN-\$90,000. Local manufacturing cost per 200 lb. is CN\$700,000.

Bleaching powder costs CN\$100,-000 per. bbl. landed, but sells for CN-\$360,000 per 133 lb. Sulphur black is very short and costs

CN\$5 million per 133 lb. Landed cost of a similar quantity is less than CN-\$350,000.

Domestic production is exceedingly low and dropping daily as high costs force curtailment of manufacturing. Many private firms have stayed in operation not because manufacturing was profitable, but because the losses were less than payments which the Bureau of Social Affairs would force the employer to pay laid-off workers. Countless firms in this fix have been existing on borrowed cash, for which they pay interest of 15 to 20 percent per month.

What China will need next year are dyes and colors, bleaching powder, sulphuric and carbolic acids, chemical fertilizers, sulphur black and caustic soda. What China will be allowed to buy

Chinese Chemical Imports, Tons

	1936-37	Average	1946 (January-October)		
Article	All Sources	United States	All Sources	United States	
Acetic acid	893		985	939	
Hydrochloric acid	3,257		379	140	
Nitric acid	247		81	64	
Sulphuric acid	1,013		3.558	3,492	
Acids*	2,027	730	2,390	2,260	
Sulphate of ammonia	158,089	1,013	2,498	121	
Bleaching powder	7,636		9,771	7,021	
Carbide of calcium	3,618		1,375	1,163	
Explosives (industrial)	(\$246, 735)		139	3	
Glycerine	(\$116,600)	(\$1, 670)	449	10	
Fertilizers*	9,972	250	30	18	
Phosphorus	291		201	151	
Chlorate of potash	4,545		2,222	1,620	
Saltpeter	652		14		
Sulphur	6,152	2,727	2,233	2,094	
Soda ash	28,696	93	11,863	4,114	
Nitrate of soda	2,054	604	198	98	
Caustic soda	22,458	5,766	10,991	4,057	
Silicate of soda	631	239	3,759	3,104	
Sulphide of soda	2,774		3,085	2,524	
Soda, bicarbonate (soda crystal)	2,124	57	10,121	9,068	
Other chemicals	(\$4,533,415)	(\$504,950)	26,599	19,252	
Medicines, drugs*	(\$3,178,770)	(\$395,980)	6,297	5,439	
Aniline, other coal tar dyes	(\$4,188,400)	(\$475,437)	1,591	1,259	
Oxide of cobalt	(\$103,200)		46	22	
Dyes* Indigo	(\$76,500)		268	18	
Liquid, paste 20% or under	4.099	1.558	2,058	2,005	
Liquid, paste 50%	2,341	635	469	358	
Grain or dry 60%	670	115	272	116	
Printing ink.	1.406	593	1,581	1,445	
Sulphur black	5,921	570	1,917	1,754	
Zinc white	1,868		2,443	1,599	
Tans, tanning material			6,313	4,116	
Varnishes			191	142	
Paint*			1,559	1,287	
Pigments*			2,325	1,545	

*Not otherwise recorded. \$ valuations are in U. S. currency, used only where weight statistics were not available.

Nitric acid has jumped from CN-\$120,000 to CN\$800,000 per 144 lb. in two months.

Sulphuric acid in three weeks tripled in price from CN\$50,000 to CN\$150,-000 per 200 lb.

Glycerine dropped from CN\$340,-000 to CN\$180,000 per ton of 110 lb.

Magnesium carbonate and sodium silicate are selling below landed costs, as is calcium carbide which is sold at the c.i.f. value.

Until there is some stabilization of the currency, prices will not settle down to any fixed level or even a predictable curve. Largest effect on prices will come when strike-stranded shipments begin arriving in January.

under the tight import licensing control is still unsettled. The Import Quota Allocation Department, headed by Li Kan, is endeavoring to adjust essential needs for 1947 to the limited available foreign exchange. It is safe to say that products essential to the textile industry and chemical fertilizers will receive preferential treatment.

Chief goals of China's five year industrialization plan are:

	Capacity, Metric
Product	Tons
Sulphuric acid	450,000
Ammonia sulphate	100,000
Superphosphate	210,000
Caustic soda	125,000
Soda ash	250,000
Bleaching powder	40,000
Indigo dyes	5,000
Calcium carbide	45,000

CHEMICAL ENGINEERING • FEBRUARY 1947 •



THE INTERNATIONAL OUTLOOK

GREAT BRITAIN

FREDERICK R. BREWSTER London Bureau, McGraw-Hill World News



ALTHOUGH Britain's Labor Government has nationalized some of the country's key industries, and has taken steps to nationalize others, there is no indication whatever at the present of any intention to nationalize the chemical industry or to amalgamate its export selling efforts under government control. The 1947 policy of the British government is one of assisting or directing the chemical industry to supply first those other British manufacturers who are engaged in producing for export, and then, when these demands have been satisfied, to allow the remaining surplus chemicals to be ex-

ported through private trading. The demand for chemicals of all kinds from the British home market, however, appears to be insatiable--which is not surprising in view of the vacuum that has been built up by unfilled requirements that have been accumulating since 1939. With the coal supply promising to be worse this winter than last, the outlook for 1947 is for production to fall steadily farther behind the home demand, even though the industry's output has now risen well above the prewar figures. To American chemical exporters, this is significant-since it means that the British in 1947 will be lucky to hold their own as exporters of chemicals.

Export Problems

Solutions must be found to these problems before Britain can hope to regain its hold on exports:-

1. Rising Costs of Production— British chemical-producing plants have been inadequately maintained all during the past seven years. It is not now possible to shut down any parts of these plants to accomplish the necessarv renovation and modernization, because of the tremendous pressure for continued operation exerted by present demand for chemicals. Even if shutdowns could be arranged, the industry would be unable to make the needed improvements because of a shortage of plant-process equipment, repair parts, stainless steel, etc., as well as of build-ing materials, and because what sup-plies of steel and brick there are in Britain are being directed by priorities into housing. This situation means not only steadily rising costs of production but also a gradual yet steady decline in production volume.

2. Shortage of Coal-All British industries are short of coal for fuel and a general 5 percent reduction in coal consumption was ordered for most industries, including chemical manufacturing, as of Jan. 1, 1947. (The coal shortage does not create any critical situation as regards the use of coal as a raw material in chemical processing). ICI engineers have estimated that this coal cut will cause a reduction in chemical output of about 4 percent for the industry as a whole. (As a result of the coal shortage, ICI has already lost \$10,000,000 worth of export business)

3. Restricted Plant Capacity-The chemical industry is unable, because of the same factors which limit plant modernization) to make expansions of its plant that would be justified to cope with the increased demand.

4. A shortage of steel drums—Shipping containers will definitely become a critical factor further limiting the volume of chemical exports shipped in 1947. And since steel sheet for all industries is seriously short in supply, no soluton here is likely to be found.

5. Shortage of Skilled Help-Because the armed services in Britain are being maintained at a greater strength than prewar, the chemical industry finds it difficult to increase its force of young scientific workers.

The amount of chemical equipment removed from Germany to Britain now promises to be less than the quantity which had been expected a year or six months ago; the quality of such equipment is also getting poorer; in all, this field of endeavor does not hold out much hope of alleviating the equipment shortage.

Markets being regained: Despite the increase in chemical manufacturing within Canada that has been the result of the war's stimulus, and despite also the increased flow of American chemicals into Canada the United Kingdom confidently expects to rebuild its sales to Canada to a volume at least equal to the 21 percent share of Canada's chemical imports it supplied prewar. In fact U.K. exports to Canada already have exceeded in value those of 1938.

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ICI are readying for release early in 1947 "something very big" in the application of "Perspex" (acrylic plastic used in airplane glazing, etc.) They are concentrating on two fields-dye. stuffs and pharmaceuticals-in their activities to capture the world markets vacated by I. G. Farben. By the beginning of the war, British dyestuffs were more than holding their own with foreign competition (i.e. German mainly) in the world market, and in some substances the British had established a comfortable lead by reason of their extensive research activities (ICI's Caledon Jade Green, Monastral Blue, and Dispersol and Duranol colors for acetate rayon, are examples). To continue this trend, ICI is extending its dyestuff activities at home, and is branching out abroad with such projects as the joint company formed with Tata to manufacture dvestuffs in India. The second ICI objective, pharmaceuticals, reflects what has been the most significant recent development in British chemical manufacture: namely, the rapid rise of synthetic medicinals. which had previously been left almost entirely in German hands.

ICI Operates 23 Plants

ICI is still operating for the government-23 factories originally set up during the war to meet wartime needs. These plants are producing light metals, heavy chemicals, explosives, penicillin, alkalis, and other products. ICI is negotiating to take over and operate privately "quite a few of these," to add to the several it has already taken over into its own operations which include a large plastics plant (molding fibers) at Hillhouse. Lancashire, and huge light alloy plant at Gowerton, South Wales, whose production is now devoted almost exclusively to aluminum for prefabricated. housing. This Gowerton plant, actually a larger scale copy of the company's own light alloy factory at Holford, near Birmingham (which went into production in December 1940) brings ICI to a position where it supplies one-fifth of the total U. K. output of light alloys.



INDIA

J. K. VAN DENBURG, JR. New Delhi Bureau, McGraw-Hill World News

hat In fact UK cook The crowing Indian chemical indus-The crowing Indian chemister the war try, proud of its record during the war when it demonstrated that it could standing union turn out a high quality of both heavy smelling in the and fine products, appears to be markand fine products, appears the for the ing time just now—waiting for the in any are given ing time just now warring the clearincluding on the ing of the many stumbling blocks that ad parameter ing of the many stundered of the parameter ing of the many stundered its full development.

This marking time is true only in the production field, however. Reas of the war, Buts search is proceeding apace and once the more than holding road is clear the industry should take a orign competition of prominent place in the growth of a I in the world make strongly nationalist industrial boom.

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Perhaps in no other Indian indused a comfortable kan trial field are there such bitter feelings about the record of the British govern-Caledon Jade Green ment of India. The leaders see in the d Dispersol and Day barriers to import of plant equipment, ate rayon, are carry the prohibitive freight rates, the wele this trend. ICI coming of imported products and the tuf activities the refusal to enact protective tariffs, the og out abroad many deft touch of British mercantile policy.

Looks to America

They feel that all the progress they have made so far has been due to their own efforts. They have great plans for the future when, they feel, an independent Indian government will recognize the importance of a strong chemical industry in any program of national development.

Pending such recognition India represents a superb market for America; first insofar as she can meet India's current needs, second in assisting the development of India's future industry by the export of equipment and technical knowledge. The anti-British feeling will be a great aid.

That America is taking full advantage of this is shown in the U.S. Bureau of Foreign & Domestic Commerce breakdown of 1945 trade with India. Coal tar products, most in the form of dyestuffs, totalled \$6,900,000 and medicines and pharmaceuticals another \$5,600,000, reflecting the cutting off of prewar supplies of these materials in Germany. Industrial machincry of all types totalled \$7,400,000.

Alkali-chlorine electrolytic cells. They are of Siemens-Vohler type, 27 in number with an energy consumption of 15,000 Kw.

Doubtless the 1946 breakdown will show great increases when it is compiled. Impressive as these figures sound, however, they probably repre-sent only a small fraction of English trade in the same categories.

It has been announced, however, that during 1946-47 about 200,000 tons of chemical fertilizers will be available. Of this 180,000 tons will be imported. And Imperial Chemical In-dustries Ltd. will supply 140,000 at a price of about \$72 a ton (compared to the prewar \$24).

Prewar India's chemical industry was barely perceptible. A few acid plants, a small caustic soda and chlorine plant and a closed-down soda ash plant were the only major factories. Today the picture has changed greatly. Here is a review of a few important fields:

Sulphuric Acid-Prewar about 20 small chamber process plants were turning out a total of some 30,000 tons annually. They had a combined capacity of 85,000 tons but there was no market for their full production. Imports in the last prewar year were only 131 tons. Now, as a result of wartime demands, there are several more plants and the combined capacity is about 100,000 tons. Consumption has fallen off from the wartime 56,000 tons, but emergence of new fertilizer plants, and proposed synthetic fiber factories is expected to take up some of the slack. One snag to great expansion of the industry in the future is the

lack of adequate domestic deposits of high-grade sulphur. But gypsum is slated for interim duty until a cheap foreign source (Sicily before the war) or a method for utilizing pyrites is developed.

Caustic Soda—A virtual ICI monopoly before the war, imports totalled 25,000 tons in 1938-39, virtually the entire domestic consumption. At pres-ent productive capacity is about 12,000 tons, half by the electrolytic process and half from causticized soda, but actual output is estimated at about a third of this. Against this is an estimated demand for about 55,000 tons which ought to skyrocket to more than 120,000 tons as new rayon, soap, hydrogenated oil and paper industries develop.

Soda Ash-Another ICI field, in which imports were 65,000 tons in 1938-39 and 81,049 in 1939-40. Now there are three soda ash plants in operation in India with a combined capacity of about 50,000 tons compared to demands for around 60,000 tons and a further immediate need for another 40,000.

Chlorine-Hinging on the caustic soda industry, domestic production probably is around 5,000 tons compared with prewar imports of 10,000 tons. With development of new industries such as paper, chlorine solvents and chlorine-compound insecti-cides such as DDT, demand is ex-pected to be around 45,000 tons.

Further demonstration of the intensive imports of chemicals and chemical products into India from Great Britain came, interestingly enough, the very day the McGraw-Hill World News report on the industry was completed. On that day a British freighter docked at Bombay, India's premier port, and her report to Customs officials showed many chemicals.



CAL ENGINE

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THE INTERNATIONAL OUTLOOK

GERMANY

JOHN C. CHRISTIE Berlin Bureau, McGraw-Hill World News

THE GERMAN chemical industries generally have operated on a handto-mouth basis during 1946. Like the rest of German industry, they have suffered chiefly from lack of coal. It is estimated that during the past year the chemical industries as a group reached about 40 percent of 1936 production but had slumped to about 20 percent as the year drew to a close due to the winter fuel shortage. It appears that they will be handicapped by lack of fuel until toward the end of the first quarter of 1947. Mid-year should see the beginning of a fairly substantial improvement, particularly in the combined U. S. and British zones, as a result of more coal on one hand and the initial effects of new pump-priming measures on the other. The merger agreement provides for importing critical raw materials to stimulate production and also for a freer exchange of indigenous resources within the two zones.

Plant Dismantling

Dismantling of chemical plants in the western zones has been confined to those in the munitions category. Other plants have been listed for reparations in accordance with the 1949 level of industry plan but reduction of capacity in pursuance of this level has not been started pending final agree-ment to treat Germany as a single economic unit. Some chemical plants have been dismantled in the Soviet zone but the extent is not known.

Under the initial RFC self-liquidating import program, \$3,500,000 out of \$7,750,000 in inventory advances is allocated for chemical industries in the U. S. zone. Plans call for importing coal for production of soda ash, crude drugs for pharmaceuticals and toluene, benzene, and phthalic anhydride for dyestuffs. Orders had not yet been placed by New Year's Day and consequently the effects of this stimulus will not be apparent before mid-year. The export possibilities for all three



commodities are far beyond what is required to liquidate the RFC advances. It is hoped that sufficient coal and coal tar products will be available from the Ruhr later in the year to sustain these industries at higher levels.

Chemical industries in the combined U. S.-British zones will benefit by the provision in the zone merger agreement for a special class of imports, which are to be paid for out of the pooled proceeds of exports and which are to be used for industrial rehabilitation without regard for immedi-ate export prospects. This program plus possible furtherance of the self-liquidating import device should result in marked improvement in the chemical industries toward the latter part of the year providing fuel requirements can be met.

The prospects of soda ash being available for export again are of particular interest in view of the critical world shortage. Several European countries already have made known their willingness to pay exceptionally high prices and U. S. buyers can expect stiff competition in bidding for the limited quantities which will be made available from the combined zones. Small quantities should be available within the first half of the year and a fairly steady increase is expected thereafter.

It is estimated that Germany's potash mines are now producing at about 70 percent of capacity due to shortage of fuel, manpower and maintenance materials. The Soviet zone is the only area having a surplus over and above fertilizer requirements. Germany exported about 40 percent of its potash production in prewar years. Although production is only 70 percent, exports have been running somewhat over the 10 percent margin because of the shortage of other fertilizer components-nitrogen and phosphates.

The Potsdam Agreement provides that the production of synthetic nitrogen shall be prohibited but it is permitted to continue temporarily until Germany is in a position to meet her requirements out of imports. During the past year, German synthetic nitro gen production has met only about 45 percent of the requirements for fertilizer. Another 12 percent of the fer-tilizer requirement has been imported and some nitrogen in the form of calcium cyanamide has been used. It is hoped that in 1947 Germany will be able to meet at least 70 percent of her nitrogen requirement for fertilizer out of domestic production and imports.

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The serious shortage of coal tar products from the Ruhr has hit plastics and dyestuff production very hard. Dyestuff production has been running at only about 10 percent of the permitted rate under the 1949 level of industry. The British have been producing some synthetic phenol for plastics and resins but output has been such that the U.S. zone has had diffculty in getting even 60 tons per month for food-can lacquers.

Among the imports badly needed for German chemical industries are: iron pyrites, sulphur, natural rubber, high alpha cellulose pulp (for high tenacity rayon cord), arsenic (for insecticides), phosphate rock (both for metallurgical use and for manufacture of superphosphates), and fats and oils.

The Russians and British have been importing iron pyrites from Norway and may have the Norwegian production sewed up. If so, the U. S. zone will have to find another source of sup-

ply. The U. S. and British zones have about 80 percent of Germany's rubber tire production capacity, which is about equally divided between the two areas. In the past year, output has averaged only about 40 percent of prewar rate.

Plants in Good Condition

German chemical plants are generally rated as being in good condition. However, there is a shortage of repair items and the lack of paints, oils and other forms of protective coating is beginning to show ill effects on equipment.

Now that the procedure for research control has been established, increased activity can be expected in the coming year.

J. S. military government has given the Germans permission to carry out a program of salvaging useful chemical and metallurgical components of both toxic and non-toxic munitions, including explosives, gases, etc. Originally the material was slated for disposal at sea. An experimental recovery plant is being established in Bavaria.



AUSTRALIA

HERBERT LEOPOLD Melbourne Bureau, McGraw-Hill World News

The year may witness the laying of

the foundation stones of two new

chemical industries in Australia. A

government project calls for establish-ment of a 10,000-ton-a-year aluminum

reduction plant in Tasmania and sup-

meet at least meshorrage of fuel and process coal sa requirements throttled production in all major chemthrottled production in Australia throughout the shows and in 1946, and the situation is not likely to 1946, and the situation is can be meand dischiff many chanically expanded to meet greatly inreturn production in the product of the second seco ab the logic rest, which has so far not affected the and an more the stationally peaceful chemical indushar The Bridge try direct, is nevertheless one of the important factors governing the 1947 ad an http://chemical outlook, and the outlook that the US make from this particular angle is none too m sting on A good. th for food-can begun

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v ravon cord), zen	Salt	337,545	
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des), phosphate nd	Sulphur	17,192	
orgical use and for m	AIKan for soda crystals	8,155	
		5,264	
erphosphates), and its	Essential oils	339,826	
Russians and Building	Glycerine	2,192,687	
		18,611	
ing iron prites the	Stearine	666,850	
y have the Norman	Carbolic acid	74,699	
		14,189	
ved up. If so, the U.	Formaldehyde	110,959	
e to find unother some	Wool grease	229,546	lb.
e eo mas saturate even	TOTAL VALUE OF ADDVE	\$2,989,920	
	Total value of other mate-		
U. S. and British m	rials used (unrecorded) Articles Produced	\$20,208,515	
percent of Germani	Hydrochloric acid	7 500 011	
	Sulphuric acid	7,560,211	
duction capacity, 🖬	Sodium silicate	90,771,520	
qually divided betw	Sodium sulphate (salt	15,146,200	ID.
	cake)	17 519 100	11.
. In the past year, on	Sodium sulphate (Glau-	17,513,133	10.
only about 40 percer	ber's salt)	7,373,853	11-
OTHA TOOR IN bern	Sodium thiosulphate	1,394,588	
	Soap, toilet	647,900	
	soft	337,400	
ts in Good Conditi	liquid	1,298,600	
В Ш ОООД ОЛИН	Total value of above	\$2,845,981	10.
	Total value of other articles	W2,010,001	
chemical plants	produced (unrecorded)	\$55,145,520	
and a share		00012 10,020	

Figures do not include chemicals produced as byproducts by metallurgical, etc., plants, for instance, sulphuric acid.

Australian Imports and Exports of Chemicals, 1938-39 and 1945-46

Imports	193839	1945-46
Acids.	\$428,800	\$640.000
Pharmaceuticals	2,307,200	4.051.200
Sodium salts	2,297,600	1.238,400
Argol	70,400	268,800
Cyanides of potassium and		,
sodium	982,400	339,200
Dyes	1.459.200	2.019.200
Perfumery and toilet prepa-		_,,
tions	806.400	425,600
Essential oils (non-		
spirituous)	486,400	976,000
Exports		
Medicines	\$611.200	\$2.048.000
Perfumery and toilet prepa-		
rations	137.600	2.822.400
Total incl. all other chemi-		
cals and drugs	1,344,000	9.596.800

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porting bauxite refining plants on the mainland. And Courtauld's is at the point of materializing its long-standing plan to build Australia's first viscose rayon plant. Establishment of a plant for fine writing papers by another English concern is well under way, partly with American equipment.

These new industries are not as yet supported by sufficient chemical production capacity, and most of the chemicals required to treat bauxite and cellulose will have to be imported. Incidentally, Courtauld's woodpulp supply will also come from abroad, mainly or entirely from Canada.

Australian Chemical Industry Statistics

Year	Number of Factories	Persons Employed	Salaries and Wages Paid	Power, Fuel and Light Used	Value of Other Materials Used	Value of Production*	Value of Output†
1938–39	238	5,346	3,238,400	\$387,200	\$10,892,800	\$12,246,400	\$23,526,400
1943–44	326	9,662	8,739,200	1,484,800	27,443,200	25,728,000	54,656,000
1944–45	349	10,477	9,417,600	1,603,200	28,956,800	27,430,400	57,990,400

* The value of production is the value of output minus the cost of raw materials, containers, power, fuel light, lubricants, water, equipment replaced and repairs to plant, and therefore represents the value added in the process of manufacture. † The value of output is the wholesale selling value at the factory of goods made or processed during the year, including by products.



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Two World Wars and a policy of greater independence of foreign sources have been chiefly responsible for the development of the Spanish chemical industry in recent years. This development has been severely checked, however, by the extensive physical destruction of chemical plants and general economic disruption resulting from the 1936-9 Civil War, when Spanish chemical output was roughly halved. In the intervening years the degree of recovery and expansion has varied considerably in different branches. During World War II Spain's geographic and economic isolation as well as her political isolation have given added impetus to the trend toward chemical self-sufficiency, which has been reflected in the establishment of many new chemical plants and the expansion of older ones to produce a greater variety of products. Under the National Syndicate of

Chemical Industries (Sindicato Nacional de Industrias Químicas), the Spanish chemical industry is subject to considerable specific regulation, including numerous taxes, high duties, import quotas, import and export per-

SPAIN

KARL FALK Fresno State College, Fresno, Calif.

> mits, strict foreign exchange controls, price controls, government authorizations for building new plants and expanding capacity based on "essentiality," and to all the general restrictions of an authoritarian economv.

In terms of capital investment, the Spanish chemical industry, employing about 10,000 persons, was before the war the seventh largest industry of Spain, and accounted for an annual output of 500 million pesetas (roughly \$50 million). Its traditionally close association with the mining industry is due to the fact that Spain's chemical industry is based chiefly on available raw materials, pyrites, sulphur, potash, rock salt, phosphates, and mercury, plus naval stores and botanicals. Predominantly an agricultural economy, Spain requires chiefly fertilizers and agricultural chemicals, pharmaceuticals, dyes, and pigments.

During the war Germany and Switzerland were Spain's chief chemical suppliers, while in peacetime they shared this position with France, Italy, and the United Kingdom, who were also important customers.

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THE COMMODITY OUTLOOK

Sulphur and Sulphuric Acid Face Promising Futures

AST YEAR, production of sulphuric acid returned to normal with Ordnance plants closed for the full period and the output of acid coming from industrial plants. Closing of government works had a two-fold effect. In the first place it brought a reversal in the production curve which had been rising each year from 1939 through 1944, levelled off in 1945 and turned downward in 1946. In the second place, the drop in the supply of spent acid made available from government production, placed a greater burden on private plants. Several factors unfavorable to production and consumption of acid arose during the year but in spite of enforced cutbacks, increased activities in the final quarter of the year pulled production to a level estimated to be slightly in excess of that reported for private plants in the preceding year. This means that production of sulphuric acid in 1946 was the highest ever attained in a peacetime year.

The adjustment to changes in consuming markets included the elimination of high explosives and other products used solely in the war effort. The majority of other materials and finished products which require sulphuric acid in their manufacture and which have important military uses, are likewise essential in general industrial lines and the loss in military buying has been more than offset by an increase in civilian orders.

In the last six years requirements for sulphuric acid in industry have increased at a higher annual average rate than was the case in preceding years. This has been a natural consequence of the general rise in industry but there may be some question as to whether the present position of acidconsuming industries may be regarded as representing a new normal or whether they have been swollen by wartime influences and whether 1946 activities are an aftermath of the war with buying stimulated by a backlog of deferred needs and the added objective of building a more satisfactory inventory position.

Reference to the industries which offer the largest outlets for sulphuric acid, gives assurance that most of them will maintain or improve upon their present position in the year that lies ahead. Starting with production of chemicals, it is found that the growth in the last six years, while unusually large, appears to have a solid basis with the customary expansion accelerated by the opening of the market to the flood of new products developed in recent years but previously held back from commercial development. Rayon mills have taken on more acid in practically every year since the industry was established. Last year full capacity operations were not reached yet acid consumption moved up appreciably and a further rise is expected this year which could be as high as 15 percent if raw materials are fully available. In the pigment field, titanium dioxide is gaining a larger tonnage each year but never high enough to fill demands. Sulphate of ammonia was among the products most directly affected by work stoppages last year and the low 1946 output is sure to be topped in the current year. Every consuming field for steel is clamoring for deliveries of the metal. In other metallurgical lines demand is active, indicating a larger use of acid. ant s to the s to

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Turning to the largest single outlet -the manufacture of superphosphatethe outlook is more difficult to evaluate. There is no doubt that the fertilizer industry has grown to a point that makes it vulnerable. Acreage and outputs have been pointed toward satisfying domestic needs and providing a large part of food supplies for outside countries. In addition there has been the incentive offered by the prevalence of high prices for all agricul-tural products. While the high prices and the heavy export demand exists, the situation should not change to any extent but as prices decline and export buying tapers off, a gradual readjust-

Data and Estimates on U. S. Sulphur Activity and Sulphuric Acid Production, 1944-1946

Sulphur and pyrites in long tons; Acid in short tons, 100 percent

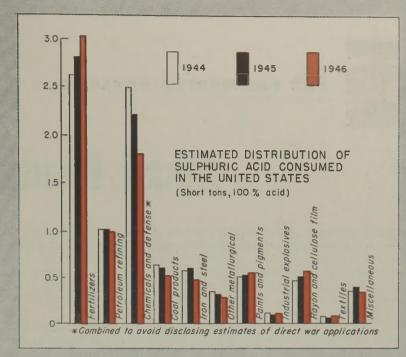
	1944	1945	1946'
	Revised	Revised	
Sulphur mined	3,218,158	3,753,188	3,890,000
Sulphur exports	653,686	918,691	1,150,000
Domestic shipments	2,925,000 ²	2,931,000 ²	3,030,000 ³
Approximate mine stocks, Dec. 31	3,500,000	3,500,000	3,400,000
Sulphur imports plus sulphur from fuel gases	5,000	12,000	35,000
Non-acid uses of sulphur	770,000	780,000	850,000
Sulphur available for acid	2,160,000	2,163,000	2,180,000
Non-mine stock changes ³		-25,000	50,000
Acid from sulphur	6,985,000	7,104,000	6,880,000
Pyrites imports	180,763	186,507	184,000
Domestic pyrites	788,530	722,596	720,000
Acid from pyrites	1,270,000	1,180,000	1,160,000
Acid from smelters	875,000	873,000	600,000
Acid from hydrogen sulphide	60,000	60,000	60,000
TOTAL sulphuric acid made	9,190,000	9,187,000	8,700,000

"Estimated from 11 months figures. ²Includes deliveries from distributing points to agree with Bureau of Mines reporting method employing "apparent sales." ³Changes in users' and consignment stacks, plus producers' stacks at distributing points, except in 1944 when only users' stacks are included. ment in fertilizer schedules seems inevitable.

Developments within the sulphuric acid industry last year were featured by a sharp drop in production of smelter acid resulting partly from strikes and partly because prices for zinc and copper were not favorable for full operations. There was very little change from the preceding year in the supply of domestic pyrites and imports in the two years were almost identical in volume. Hence greater reliance was placed on crude sulphur and of the total acid produced, that made from crude sulphur accounted for approximately 79 percent as compared with 77 percent in 1945 and 76 percent in 1945.

Sulphur wrote a new chapter into mined was close to 3,900,000 long tons which is a new yearly record. Shipments from mines were around 4,150,000 long tons, another new high, and exports approximated 1,150,-000 long tons-considerably above the total ever before shipped out of the country in a single year. The industry was particularly active in the closing months of the year.

> In the accompanying tabulations, revisions have been made for 1944 and 1945 with respect to amounts of acid made from pyrites in those years and also in the tonnage of sulphur allocated for non-acid use. Considerable expansion was reported in non-acid consumption last year with direct soil applications more extensive than hitherto. Larger amounts also went to pulp mills and to producers of carbon bisulphide-even though reported figutes for carbon bisulphide production indicate an opposite trend.



Estimated Distribution of Sulphuric Acid Consumed in the United States (Short tons, 100 percent acid)

CONSUMING INDUSTRIES	1944	1945	1946
	Revised	Revised	
Fertilizers	2,640,000	2,850,000	3,020,000
Petroleum refining	1,020,000	1,020,000	1,000,000
Chemicals and defense*	2,490,000	2,200,000	1,780,000
Coal products	625,000	600,000	510,000
tron and steel	560,000	570,000	475,000
Other metallurgical	350,000	330,000	280,000
Paint and pigments	510,000	520,000	550,000
Industrial explosives	120,000	100,000	105,000
Rayon and cellulose film	450,000	495,000	556,000
Textiles	75,000	70,000	75,000
Miscellaneous	350,000	400,000	345,000
TOTALS	9,190,000	9,175,000	8,696,000

*Combined to avoid disclosing estimates of direct war applications.

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tons, 100 percent

1945	8	
Revised		MARKET AREA
3,753,188	1K	Baltimore
910,011	1,12	New York City
2,931,000	10	Great Lakes
3,500,000	1.46 1.46	Gulf Coast
12,000	J.	
780,000		Chicago
2,163,000		South Atlantic
-15,000	3	Western
T 104.000 0,	th.	Pittsburgh
186,507	IR M	Southeast
722,596		Philadelphia
1,180,000	1	St. Louis
873,000	1	South West Centra
60,000 87	¥.	Cincinnati
187,000		New England
rints to agree with a	8	-
	6	Richmond-Norfol
ks are included.		and the second s
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DISTRIBUTION OF SULPHURIC ACID PLANTS

	1,000 tons of acid									
AREA	0	100	200	300	400	500	600	700	800	900
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City		_			_					
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land										

Market Area	Contact Plants	Chamber Plants	New Acid Production 1945 (tons)
		7	07/ 700
Baltimore		-	876,708
New York City	6	4	843,285
Great Lakes	9	11	734,332
Gulf Coast	9	3	732,263
Chicago	9	5	731,273
South Atlantic	3	36	697,200
Western	14	2	690,466
Pittsburgh	6	5	661,479
Southeast	3	12	657,883
Philadelphia	9	3	657,267
St. Louis	4	2	514,268
South West Central	6	1	281,611
Cincinnati	. 4	4	279,568
New England	. 4	2	182,748
Richmond-Norfolk	. 2	5	146,719
Totals	90	102	8,687,070

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THE COMMODITY OUTLOOK



Alkali Production Fails to

BASED on the experience of the first complete post war year, requirements for alkalis have grown to a point where they are far in excess of present facilities to produce. During the war productive capacities were expanded but for the most part existing equipment was forced to keep in constant operation in order to narrow the gap between supply and demand. Soda ash, most important of the alkalis from a tonnage standpoint, reached its peak production in 1944 but consuming demand grew at an even higher rate and a system of industry control over distribution was put into effect in order to insure deliveries for essential end uses.

It had been anticipated that the termination of the war would bring a temporary lull in buying pressure and give an opportunity for overhauling over-worked equipment, make necessary replacements, and bring about a higher level in general efficiency. In-

Production of Caustic Soda in the United States (Short Tons)

		ELEC-	
YEAR*	LIME-SODA	TROLYTIC	TOTAL
1921	. 163,044	75,547	238,591
1923	. 314,195	122,424	436,619
1925	. 355,783	141,478	497,261
1927	. 387,235	186,182	573,417
1929	. 524,985	236,807	761,792
1931	. 455,832	203,057	658,867
1933	. 439,363	247,620	686,983
1935	. 436,980	322,401	759,381
1937	. 488,807	479,919	968,726
1939	. 532,914	492,132	1,025,046
1940 (est)	505,000	595,000	1,100,000
1941	. 685,999	743,316	1,429,310
1942	. 634,291	939,878	1,514,169
1943	663,495	1,036,577	1,700,072
1944	689,565	1,205,039	1,894,604
1945	. 734,993	1,129,312	1,864,305
1946 (est)	737,000	1,118,000	1,855,000

*Figures for 1921-1945, except 1940 are from the U.S. Bureau of the Census. Prior to 1939 electrolytic caustic soda figures did not include that mode ond consumed at woodpulp mills, estimated at about 30,000 tons in 1927 ond 1929, ot about 24,000 tons in 1931, 21,000 tons in 1933, 20,000 tons in 1934, 17,000 tons in 1935, 19,000 tons in 1936 and 1937, ond 18,000 tons in 1938. stead of a lull there came a flood of industry demands which producers attempted to meet by keeping plants as close as possible to capacity rates and by effecting rehabilitation so it would least interfere with production schedules.

Under this handicap and with labor troubles and lack of coal at times curtailing plant operations, ammonia-soda plants turned out about 4,280,000 tons of soda ash last year. This compares with 4,375,017 tons in 1945 and with the 1944 record outturn of 4,538,498 tons. On the other hand production of natural and electrolytic soda ash is moving up with a total of approxi-mately 210,000 tons estimated for last year. In 1945 production from that source was 182,065 tons and in 1944, 179,940 tons. Hence total production of soda ash from all sources was 4,490,-000 tons in 1946, 4,557,082 tons in 1945, and 4,718,434 tons in 1944.

There was considerable change in monthly outputs at ammonia-soda plants last year. While capacity rates generally were maintained, outside factors at times interrupted production, hence total output for the year does not truly represent current capacites. In January, production was 387,012 tons and this was the peak month of the year although in the final quarter the output had climbed close to the January rate. Hence present equipment appears to be able to turn out something over 4,400,000 tons a year. Excess of demand over supply last year has been placed at about 500,000 tons which means that combined natural and ammonia-soda plants must be pointed for a 5,000,000 ton supply without consideration of what future expansions in requirements will be.

Plans for adding new ash capacity last year were delayed when restrictions on types of new building went into force. Later the shortage of ash became so prominent that government approval was given new ash projects and when building restrictions were removed the field was thrown open to all producers. Details regarding all new units, or expansions of existing units, have not been made public but it is reported that work already started or about to be started will mean the addition of nearly 800 tons a day to ash capacity and that this later will be increased by about another 550 tons a day. However it is not expected that much if any of the new plants will be in operation before the latter part of the year. New production of natural ash is expected to double the capacity with a large expansion at an existing works and three new projects said to be planning to enter the field. Meet

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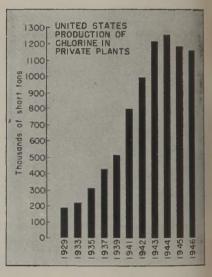
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Based on production data for the first 11 months, we have estimated the year's output of caustic soda at 1,855,-000 tons which, despite the fact that one plant was strike-bound, probably has not been given full justice to the rate of operations in December. In any case the difference between 1945 and 1946 outputs was very small. Reports of shortages, however, were more frequent last year and it is evident that rising requirements in several different industrial lines are overtaxing present manufacturing facilities. While the deficit in production is not so large as that reported for soda ash, it is large enough to have a retarding effect upon general industrial production. During the war distribution methods

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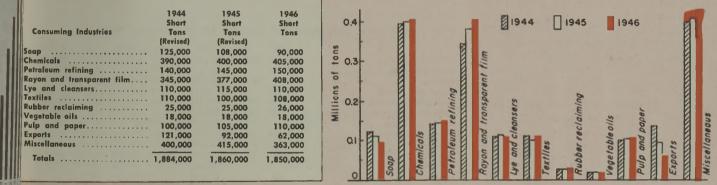
Fails Meet Requirements

have not been made a sported that work also out to be started vil a apacity and that this is apacity and that this is creased by about and day. However it is not about a sport and that is in apacity and that is no day. However it is no and if any of the in a sh is expected to no with a large expect works and three us a be planning to ease it

and the disk	1944 Short	1945 Short	1946 Short	la Ash Consum		1944	1945	1946	
Consuming Industries	1,025,000 100,000 170,000 110,000 22,000 61,000 320,000 79,000	Tons (Revised) 1,320,000 150,000 1,114,000 960,000 110,000 175,000 100,000 24,000 24,000 200,000 70,000 290,000	Tons 1,400,000 120,000 1,128,000 910,000 910,000 90,000 20,000 20,000 77,000 140,000 68,000 222,000 4,490,000	12 10 10 10 0.8 0.4 0.2 0 0.0 0.2 0 0 0 0 0 0 0 0 0 0 0 0 0	Soop Gaustic and bloarbonate All other chemicals	Cleansers and modified sodas	Water softeners	Petroleum refining Textiles Non-ferrous metals	Exports Exports Misie llaneous

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	-		CI Re Ly
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Estimated Distribution of Caustic Soda Consumed in the United States



n production data i niths, we have estimuit of caustic sola z which, despite the te was strike-bound, p eren given full judge rations in December ifference between 19 abs was very small h s, however, were na rear and it is evide ements in several di es are overlands for soda ash, it a a retarding effect of production.

were altered and deliveries were made without regard to the number of freight zones crossed. Producers have tried to restore the old order and limit their transactions to former customers and to eliminate long freight hauls. Scarcity of caustic and the fact that some wartime-created consumers had no regular suppliers complicated this adjustment and faced with the possibility of govcrnment controls, the industry continues to spread its business but contracts generally cover but 85 percent of the volume actually delivered last year. It is expected that caustic production this year will be increased through the transfer to private operation of the chlorine plants at government arsenals which have been closed since the end

of the war. In fact the transfer of those plants already has been partly accomplished and recent estimates hold out hopes for immediate improvement in the supply of caustic and it may be in balance by the end of this year.

Chlorine is expected to have one of the largest expansion potentials in the entire list of chemicals but the drying up of military outlets has not been made up by increased demand from industry. Production last year is estimated at 1,164,000 tons compared with 1,182,000 tons in 1945 and 1,-257,500 tons in 1944. These totals refer only to production at private plants. While the chlorine supply was short at times last year in general it proved about ample which was in sharp contrast to the position of soda ash. Production in 1946 reversed the pat-

Production in 1946 reversed the pattern of 1945 as monthly output for January through July was below that for the corresponding month of 1945 and from August through December was higher in each case than the 1945 monthly totals.

If the rate of monthly production in the final months of last year may be taken as a basis, the industry at the end of the year was set up to produce approximately 1,300,000 tons a year. However, the supply situation for the present year is improved by the probability that negotiations soon may be completed whereby government arsenal plants, now closed, will be reopened under private control and operation.

AL ENGINEER



Synthetic Organic Chemicals

PROSPECTS for synthetic organic chemicals remain undimmed by the decline of production since August 1945. Actual peacetime demand exceeds present production. While some adjustments have necessarily taken place due to curtailed production of certain military chemicals and aviation gasoline, the transition from war to peace has been largely a transition of markets rather than products and processes. Labor troubles, transportation difficulties, and unsettled military and political questions have contributed directly and indirectly to the raw material and equipment shortages that have retarded production and slowed down projected expansion. Specifically responsible for a substantial portion of the over-all drop in 1946, were the extensive steel and coal strikes early in the year. Direct loss of coal-tar crudes was reflected in lowered output of intermediates, and finished products to have a wide reaching effect on the whole synthetic industry. Output of synthetic resins and plastics were reduced by such shortages as formaldehyde, phenol, phthalic anhydride, butyl alcohol and many others. Adhesives, paint and coatings, synthetic fibers and other products based on synthetic resins suffered accordingly. Pentup demand for these products has not decreased.

While a number of new plants went into production during 1946, the year was marked by the projected expansion in diverse branches of the industry. Geographically, new plant construction is under way or being planned for most industrial sections of the country, but much of it is concentrated in the Texas gulf coast area. Significantly, this is further indication of the shifting emphasis to petroleum and natural gas as chemical raw materials. Accelerated by the war, the ready availability and



Table I - U. S. Production of Specified Synthetic Organic Chemicals'

	1939	1940	1941	1942	1943	1944	1945
Acetic acid (100%)	119,653	186,364	225,671	236,699	292,541	292,611	267,518
Acetic anhydride	181,156			430,634	460,426	495,522	524,748
Acetone		201,506	259,064	338,157	347,624	328,428	307,363
Acetyl salicylic acid	5,372	6,410	8,084	8,650	8,688	9,423	10,941
Butyl acetate, normal (90%)	77,734	86,721	93,227	67,025	64,319	69,987	67,461
Butyl alcohol, normal (100%)	72,737	100,413	129,472	126,190	128,999	150,320	129,364
Carbon bisulphide			240,635	266,765	272,568	291,807	335,056
Carbon tetrachloride	90,536	100,811	121,840	144,595	175,316	209,802	192,826
Chlorobenzene (Mono)			128,854	175,576	220,659	212,455	237,667
Ethyl acetate (85%)	69,897	7,5,369	94,690	85,542	103,600	108,196	105,814
Ethyl ether			22,646	55,018	65,847	76,192	76,598
Ethylene glycol			151,543		186,834	202,451	205,087
Formaldehyde (37%)	134,4792	180,8852	309,912	347,463	522,920	522,440	509,602
Hexamethylenetetramine				15,333	24,733	18,309	11,430
Isopropyl alcohol (100%)	179,062	219,926	260,180	351,959	376,065	480,772	490,997
Methanol (100%)		299,000	371,096	414,000	432,000	472,686	493,110
Oxalic acid	10,416	12,921	15,851	15,110	17,150	18,027	20,095
Phthalic anhydride		58,000	81,309	94,807	114,118	122,723	125,033
Phenol			92,922	127,632	181,347	173,141	181,640
Plasticizers, total ³	29,861	36,903	64,926	99,352	136,153	186,745	169,269
Sulfa drugs, total			2,091	5,435	10,000	4,514	5,888
Surface-active agents, total ³			27,960	32,025	114,360	152,636	161,540

¹Fram U. S. Tariff Cammission and Bureau of Census. All figures given in thousands of pounds. ²Reported as 40% by weight. ³Total of both cyclic and acyclic compounds.

Table II – U. S. Production of Cyclic Synthetic Organic Chemicals'

	1939	1940	1941	1942	1943	1944	1945
Intermediates	607,175	805,807	1,007,426	1,272,384	1,637,275	2,143,305	2,188,643
Dyes	120,191	127,834	168,657	151,878	144,013	151,653	144,296
Color lakes and toners	18,154	19,213	26,272	17,178	16,317	19,197	22,570
Medicinals	15,188	18,214	31,303	38,298	51,633	35,353	39,068
Flavors and perfumes	5,349	5,485	11,506	11,536	9,559	11,726	12,691
Rubber processing chemicals	29,966	37,139	42,928	36,536	61,710	73,774	80,080

¹From U. S. Tariff Commission and Bureau af Census. All figures given in thousands of pounds. Cyclic compounds shown in this table are mostly derived from coal-tar.

cts based on syntheticaccordingly. Pentaples products has not depa hile a number of new ja production during 194 raphically, new plant com er way or being planets nal sections of the own of it is concentrated in a ast area. Similized indication of the o petroleum and art raw materiak 1---the ready soll?

efic Organic Chemicali

1942 1943 196 236,699 292,541 2925 430,634 460,426 4955 338,157 347,624 321,01 8.650 8.688 9.6 67 025 64.319 49% 126,190 128,999 1503 266,765 272,568 21,15 1 44 595 175,316 20.8 175.576 220.659 22.65 #5,542 103,600 130M 35,018 65,847 74,18 186 834 22.01 347,463 522,920 521,48 5 15,333 24,733 11,18 151,959 376,065 40.771 41 4,000 432,000 02,48 5 15,710 17,150 11,10 94,307 114,118 12,70 127,632 181,30 173,10 99,352 136,153 146,76 5,435 10,000 (,51 32,025 114,380 152,68 in thousand of party in

Organic Chemicals

1942 1943 1944 72,384 1,637,575 2 143,261 1,878 144,013 157,457 178 16,317 19,10 298 51,633 25,351 \$7.6 9,559 11,758 36 61,710 73,714 thousands of point De

stable supply of petroleum and natural gas has attracted much of the projected capacity in this field. Basic limitations of the coal-tar supply and the inherent fluctuation of price and supply of agricultural raw materials have been a factor in this shift to petroleum. Advances in Fischer-Tropsch synthesis as well as the work on underground gasification of coal may well lead the way to new raw materials for organic syn-

Political considerations still have major influence on the synthetic rubber program. While production of GR-S will undoubtedly drop, some production will be maintained for security reasons, even with an abundant supply of natural rubber. Butadiene and other intermediates will come from petroleum. Alleviation of the methanol shortage depends somewhat on political considerations. Synthetic ammonia plants which can be readily converted to methanol production are tied up because of the world needs for fertilizer materials. Synthetic alcohol should continue to gain in importance. Part of the expansion under way in Louisiana by Standard Oil Co. (N. J.) includes a new unit for synthetic alcohol. Production facilities for ethylene glycol and related chemicals from petroleum by two new producers are under con-struction. Wyandotte Chemical Corp. entering the organic field will produce mixed ethylene and propylene glycol,

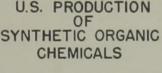
chloroether, polyglycols, etc. Jefferson Chemical Co. will use refiner gases to produce ethylene glycol and other intermediates at Port Neches, Tex., and one of its parent companies, American Cyanamid Co., will utilize these intermediates in an adjoining plant to produce a variety of industrial chemicals. Breaking away from coal-tar, phthalic anhydride is now being made from petroleum derived ortho xylene by the Oronite Chemical Co., in California. In view of the many pressing needs for naphthalene it is probable that any future expansion of production capacity will utilize petroleum.

One of the fastest growing classes of compounds are the synthetic detergents. First manufactured for industrial use, synthetic detergents have become important as ingredients in

1929

household soaps and cleaners. From less than 15,000 tons in 1941, production capacity at the end of 1946 has grown to some 200,000 tons per year. A substantial tonnage is now based on petroleum and much of the future expansion (ultimate annual capacity has been estimated as high as 500,000 tons) will be petroleum derived. According to some predictions, up to 50 percent of total soap requirements may be met by products containing synthetic detergents. Bulk of this material will be furnished as intermediates to the soap industry. Inadequate production of soap, which has boosted the use of detergents, has also been responsible for the shortage of glycerine. This in turn has provided impetus for Shell Chemical Co.'s venture into synthetic glycerine. While much thought has been given to the economics of synthetic vs. natural glycerine it is felt that synthetic production will help stabilize this market.

Streptomycin reached large scale production in 1946 when Merck & Co. started its Elkton, Va. plant. Several other companies now turning out small quantities are constructing commercial size plants. Penicillin output has maintained a high level. Synthesis of penicillin G was achieved but commercial production is remote. DDT production has leveled off at a monthly rate of nearly 4,000,000 lb. and is readily available at the present time.



Acyclic compounds Cyclic intermediates Finished cyclic products - Coal-tar dyes



10.4 10.2 10.0

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8.2

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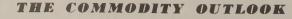
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Alcohol and Solvents

N THE EARLY part of last year fermentation alcohol producers were uncertain about raw material supplies because negotiations between Cuba and the Commodity Credit Corp. struck several snags before the contract actually was signed in Havana in July. It provided for a two-year purchase of sugar, blackstrap, and industrial molasses alcohol at fixed prices. Under the terms, during 1946 the United States was to purchase, in addition to sugar, 115 million gallons of molasses at 13.6c. per gal., f.o.b. Port Terminal, and 40 million gallons of 190 proof alcohol at 65c. per gallon. As 30 million gallons of molasses were earmarked for normal butyl alcohol, the original allocation did not provide more than 30 million gallons of alcohol by fermentation plus the 40 million gallons imported and the 80 million gallons held in the government stockpile. Hence the total available supply, not including grain and synthetic alcohol, was approximately 150 million gallons with an estimated demand of 170 million. The actual production from all sources was about 173 million gallons.

Producers of synthetic alcohol turned out about 65 million gallons but virtually none of this came on the open market so that alcohol was in short supply with the exception of that made from grain. Due to increased demands in the

rubber field, which had not been anticipated by the Rubber Reserve Corp. carlier in the year, the rise in production of butadiene cut sharply into the government stocks of alcohol. In an effort to protect the position of normal consumers, CPA took action resulting in an agreement whereby Rubber Reserve was able to buy 20 million gallons of alcohol and a supply of 60 million gallons was set aside for alcohol and solvent consumers. This stockpile was liquidated in the late fall and plants again were forced to use grain as a raw material. Since this represented a big increase in cost the price for alcohol was raised 28.5c.

per gal. in a single day bringing it to a basis of 85.1c. per gal. f.o.b. plants. Later some relief was found as a result of the shipping strike which prevented sending abroad the molasses allocated under UNRRA and this molasses was sold to fermenters.

Reports on production of ethyl alcohol as issued by the Bureau of Internal Revenue cover fiscal years ended June 30. For the 1945-46 year the Bureau places production at 348 million gallons with 408 million gallons withdrawn for denaturation. The excess of withdrawals over production is accounted for by a difference in terminology whereby the output at distilleries is referred to as spirits while withdrawals for denaturation are classified as alcohol whether originally produced as alcohol, spirits or unfinished spirits.

Production in the 1945-46 period is the lowest reported since the 1940-41 year and marks the first break in the upward curve in production since 1938-39. The peak fiscal-year output at industrial alcohol plants was in 1944-45 when production amounted to 683 million proof gallons with withdrawals for denaturation reaching 971 million proof gallons, thus indi-cating a supply of 288 million gallons obtained outside industrial alcohol plants. Production of denatured alcohol in 1945-46 was reported at 213 million wine gallons of which 26 million gallons was completely denatured and 187 million gallons specially denatured. While there was an increase in the amount of completely denatured during the war period, the rise was moderate with the maximum of 52 million wine gallons reported for 1943-44. Hence the greater part of the expanded alcohol supply went into specially denatured. Synthetic rubber was the most important factor in forcing the expansion as in 1944 almost 316 million wine gallons or about 64 percent all specially denatured produced went to the rubber industry. In 1943, 20 million wine gallons filled requirements for rubber.

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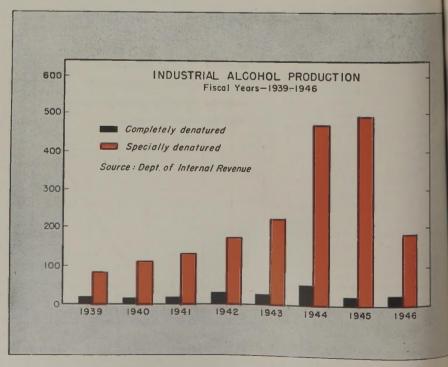
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Producers of synthetic methanol were relieved from the obligation of filling military orders but still had to turn out ammonia for the fertilizer market. Strikes caused the loss of a month's production in the spring and a two-weeks loss in the late fall. In spite of this handicap, production for the year was approximately 72 million gallons. War Assets Administration conducted negotiations to dispose of government plants but as the terms required plants to produce ammonia for at least two years, there has been no help in the methanol situation from these facilities.

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PRODUCTION

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1-1946

Wood distillers sought to keep plants going at capacities but were not able to match the 1945 production total of a little more than 2,800,000 gallons of natural methanol. The 1946 production is estimated at about 2,340,000 gallons. Because of the shortage of synthetic methanol for anti-freeze, more completely dena-tured ethyl alcohol was released to that trade in the final months. This accounts for the fact that virtually all natural methanol production was sold as denaturing grade rather than for anti-freeze.

Higher Alcohols

Under normal conditions, the largest part of normal butyl alcohol is produced by fermentation. Due to difficulty in getting raw materials, fermenters could not maintain capacity rates. It is estimated that production for the year was approximately 16 million gallons which fell considerably below consuming demands. It is reported that a large part of synthetic butyl alcohol was used in the manufacture of plasticizers and as anticipated new facilities did not materialize, normal butyl alcohol and acetate were difficult to obtain. Due to the shortage of these products as well as to a wide price differential, secondary butyl acetate was in active demand but again the supply was inadequate as the greater part of secondary butyl alcohol production was used in producing methyl ethyl ketone. Production of methyl ethyl ketone was about the same in volume as in the preceding year but the year closed with producers having a large number of unshipped orders.

Although all isopropyl alcohol plants operated at capacity last year they were not able to turn out enough to take care of the demand. It had been anticipated that additional capacity would get into operation, but the many problems connected with construction proved to be a real han-

Production* Withdrawn for denaturing† 176 Withdrawn tax-paid Stocks, June 30 101 Production Completely denatured . . 17 Specially denatured ... 84

*Production at industrial alcohol plants. †Represents products withdrawn as alcohol whether originally produced as alcohol, spirits, or unfinished spirits.

Denatured Alcohol

1,000,000 Wine Gallons

Production of Ethyl Alcohol

Fiscal Years Ended June 30

1,000,000 Proof Gallons

1941

299

274

28

10

154

18

136

1942

425

375

25

28

208

29

179

1943

448

408

210

223

24

223

6

1944

637

973

125

524

52

472

6

1945

683

971

28

141

527

33

494

1946

348

408

47

104

213

26

187

1940

244

223

24

22

127

15

111

1030

201

22

31

dicap and only one plant got into production and then only in the latter part of the year. The shortage of isopropyl also had an effect on the acetone market where demand for domestic use and for export was far ahead of the availability of supplies. Producers of synthetic acetone were able to keep plants going at capacities but fermenters were not able to obtain sufficient raw materials and their outputs fell below normal capacities.

The Outlook

Present indications are that 1947 will find supply and demand for solvents out of line to a greater degree than at any time since the middle of the 1920's. Last year production was at capacity rates with consuming demands tempered by strikes in consuming industries. If consumers are less restricted this year, requirements for solvents will be higher and producers are worried about the supply position as increased facilities are not expected to be ready for operation before the latter half of the year.

In the case of ethyl alcohol, contracts made with Cuba provide for the receipt of 165 million gallons of blackstrap molasses and 20 million gallons of alcohol in 1947. It is understood this alcohol will go into government stockpile. After molasses for fermentation butyl alcohol has been de-ducted, not more than 50 million gallons of ethyl alcohol will be produced and the deficit in requirements must be made up by using other raw materials such as potatoes, and grains.

While additional facilities for production of synthetic alcohol have been announced by a new producer, it is not anticipated they will be in production much before the latter part of the year and the output indicated is not substantial in terms of the alcohol shortage.

As a result of high-priced alcohol, producers who formerly used ethyl alcohol as a source of ethylene turned to ethyl ether so that while two years ago ethyl ether was considered a problem by the synthetic alcohol producers, today demand far exceeds supply.

A number of new facilities are being completed for methanol. It is understood these plants will produce in the latter part of the year but not in time to help in filling anti-freeze demands. Isopropyl alcohol may offer some help but at present the greater part of such production is going into acetone, anti-freeze, and chemicals. Shortage of molasses extends to European markets and this has served to increase attempts to buy acetone in this country.

While normal butyl alcohol undoubtedly will be as difficult to obtain in 1947 as it was in 1946, the real shortage is in high-boilers. At present, production of amyl acetate is confined to one company turning out a synthetic product and using a large part of it for specialized use other than for protective coatings.

During the past year, considerable publicity has been given to the Fischer-Tropsch process as a source of alcohols and solvents as well as other chemical raw materials. Informed opinion indicates that considerable work still is to be done on the process and in any event that it will not be a factor in the solvent business for at least two years.

Looking beyond this year it would appear that facilities now under construction are sufficient to create a balance between supply and demand for solvents in 1948.

CHEMICAL ENGINEERING • FEBRUARY 1947 •



Fertilizer Chemicals Lag World Demand

World Production and Consumption of Fertilizer Nitrogen (Thousands of Metric Tons of Nitrogen)

	1945	-1946	1938	-1939	1937-1	938
	Production	Consumption	Production	Consumption	Production	Consumption
Canada	179	21	49.5	10	51.5	9.5
U. S. A.*	520	611	188	332	185.5	327
Chile	254	5	225	5	224	5
America other and West Indies	1	28	1	38	1	23.5
Australasia	7	17	6	14	4.5	15
Japan	80	80	425	419.5	416.5	454.5
China	10	10	1	30	1	28.5
India-Ceylon	6	45	5	29.5	5	26.5
Other Asia		8		44		42.5
Egypt		65		77.5		76.5
Other Africa		11		18.5		19.5
United Kingdom	248	166	128	68.5	135	68
Norway	91	23	85	11	85.5	10
Belgium	87	90	84	53.5	82.5	54.5
Halland	25	80	105	95	104.5	86.5
France	70	220	150	184	148.5	175
Other Europet	300	400	1,090	1,026	937	975
Total†	1,878	1,880	2,542.5	2,456	2,382	2,397

Source: British Sulphate of Ammonia Federation, Ltd. *Including Puerto Rico and Hawaii.'† Exclusive of U.S.S.R.

MANUFACTURE of fertilizer chemicals reached a record rate in the U.S. at the end of 1946. Nitrogen, potash, and superphosphate all promise to make a still higher record in 1947. There seems almost no limit on the world's ability to absorb them.

The fertilizer business is now a world-wide activity. Since fertilizer means food in any language there remains for a while longer the need for some international, governmental control of fertilizer supply as a means for actual support of life in many areas. And, as in the war period, America remains the major source of supply. In fact if there were not American controls on export there would be much less than an adequate supply of fertilizer chemicals left in the U.S. currently.

Domestic demand also continues at a record high for actual purchases by farmers. Extremely high farm income,

agronomic education of farmers, and patriotism in food raising, have combined as a trio of super salesmen who remain very much on the job even now. And the Department of Agriculture for its soil conservation program continues to seek for this "give away" land-restoration service much greater quantities of fertilizers than can be spared for these purposes.

With the prospect of at least two more years of huge farm income there seems no doubt that there remain at least two more years of equally impressive fertilizer demand.

Nitrogen Chemicals

At the beginning of 1947 the nitrogen-products industry was operating at near capacity both in privately owned or leased and in government controlled nitrogen fixation plants. All ten of the wartime plants built for explosive pur-

poses with government funds are functioning for peacetime production of nitrogen fertilizers. Some years ago one of these arsenals was transferred to Tennessee Valley Authority, its builder and wartime operator. The arsenals at South Point, Ohio, and Sterlington, La., have been sold by Uncle Sam to Allied and to Commercial Solvents, the wartime builders and operators. Leased with option to buy by their wartime operators are Lake Charles, Ozark, and Jayhawk arsenals by Mathieson, Lion Chemical, and Spencer Chemical, respectively.

Remaining under Ordnance ownership and control are the other four arsenals at Morgantown, West Henderson, Texas Panhandle, and Missouri. These four are currently being operated for the Army account to make ammonia for ammonium nitrate export to occupation areas by Heyden Chemical, Allied, Spencer, and Hercules.

U.S. Phosphote Roy

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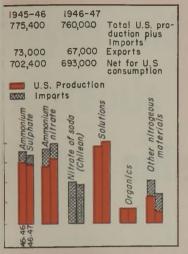
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The wartime necessity for a concentrated nitrogen fertilizer which could be made most effectively has firmly established ammonium nitrate as a usable fertilizer when suitably grained and coated. That chemical is now the product made in largest quantity from the ammonia produced at almost all of the ten wartime plants. It, therefore, constitutes at present by far the largest single chemical product of ammonia synthesis used directly as made. Most of the rest of the fertilizer ammonia synthesized is used for ammoniation of superphosphate.

The shipment of ammonium nitrate to our armies of occupation has caused one of the most serious fertilizer-supply problems of recent years. The army had shut down its arsenals and declared most of them surplus without any thought of the necessity of maintaining fertilizer flow into devastated areas to provide for reestablishing agri-

CURRENT NITROGEN SUPPLY



ogen fertilizers. Some of these arsenals was tra nessee Valley Authority vartime operator, The Point, Ohio, and St lave been sold by the and to Commercial Sil ne builders and opening option to buy by their tors are Lake Charles (se wk arsenals by Mattie ical, and Spenow Char vely.

naining under Ordna ls at Morgantown, Wa , Texas Panhandle, 1925 four are currently bags e Army account to = for ammonium nitaka wartime necessity frau nitrogen fertiliza di de most effectively hed ammonium ma fertilizer when ated. That chemical s et made in largest gom amonia produced at 22 n wartime plants. It, 6 tates at present by far the chemical product of an as used directly as mat rest of the ferbline a tized is used for ammon osphate. hipment of ammonium nies of occupation have

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COMPARISON OF U.S. POTASH CONSUMPTION AND SALES (SOURCE : U.S. BUREAU OF MINES) Apparentconsumption Sales of domestic producers 129 '33 137 '41 '45

Spencer, and Here U.S. Phosphate Rock Industry January-June, 1946 (Long Tons)

	Phosphate	P2O5
	rock	content
oduction (mined)	3,283,179	1,066,615
ld or used by		
producers: prida:		
Land pebble	2,246,595	754,783
Soft rock	49,025	10,229
Hard rock	55,432	20,182
Total, Florida	2,351,052	785,194
nnessee', 2,	726,149	210,552
aho	109,658	34,424
ontana	84,241	27,250
Irginia	(1)	(1)
Total, United States	3,271,100	1,057,420
ocks in producers		
hands, June 30:	500.000	169.000
orida	503,000	91,000
ennessee ¹ , ² , ³ ,	331,000	6,000
ther	19,000	
Total stacks ³	853,000	266,000
Source: U.S. Bureau of J	Minor	
Winginia included with		2 Includes

nies of management Virginia included with Tennessee. Includes most senous terms arown-rock matrix of sinter grade and sintered of recent term. Twasher-grade matrix.

culture and feeding of both enemy and allied peoples. Suddenly it found that it had lost control of the situation. It then proceeded to grab away from American agriculture large supplies of nitrogen chemicals which were needed in the United States. The combined efforts of farm organizations and the fertilizer industry were necessary to help the Department of Agriculture put the army in its place. But the deficit abroad was so serious that a majority of the arsenal output was taken with the promise that the product would be repaid in kind before the spring planting season of 1947. That promise is being kept only partially.

The future of these nitrogen plants is gradually becoming clear. Those which make ammonia with hydrogen produced from natural gas are likely to continue in operation. Those which use coke as the primary raw material are likely to be shut down in part by higher costs so imposed. The three plants under lease with option to buy are likely to be purchased outright by the present operators within a few years. Long term leases seem likely on some, but not all, of the four currently operated for the Army under emergency short-term leases. Negotiations are in progress for two of the four. The other two are high-cost producers and will probably be put in standby condition and later cannibalized.

Superphosphate Active

Superphosphate continues to be the major component of all mixed fertilizer. Demand for it continues to exceed supply partly because of the shortage of rock and partly because of the shortage of sulphuric acid with which to treat the rock. Scarcity of railroad cars was in some areas the bottleneck in the supply system even after the superphosphate and mixed fertilizer were made. All of these problems seem likely to continue as serious factors during the coming sea-

Production of superphosphate during the past year has been at the rate of 650,000 to 700,000 short tons per month (calculated as 18 percent P_2O_5). In few cases has there been any stockpiling by producers of the normal grades. Supplies have been moved promptly into the distributing system except where scarcity of nitrogen compounds for mixing has prevented such movement.

Production of double superphosphate (the 45 percent P_2O_5 grade) has continued also at fairly high levels during 1946. Typical production that year was approximately 30,000 short tons per month.

New capacity for production of phosphate rock is being developed by established producers of Florida. Some effort at western phosphate production has continued; but no important influence on national supply has yet resulted from these new efforts.

Kaiser activities at Permanente are yielding on a scale of 150 to 200 tons per day a fused product of phosphate rock and serpentine. A similar project using phosphate rock and olivine is at pilot-plant stage as a result of investi-gations at the Univ. of Washington done for the Oregon Manganese Development Co. Preliminary agronomic studies indicate that both of these new products give good performance in acid soil.

New Potash Record

Potash production at the beginning of this year is at the rate of approxi-mately 920,000 tons of K₂O annually. This is about 7 percent above the rate of production a year ago. Almost all of this output comes from the five major mining enterprises, three at Carlsbad, one at Trona, and one at Salduro, Utah. About 1 percent of the total comes from byproduct sources, which include cement production, distillery wastes, and a new potash recovery from certain brines being developed by Dow Chemical in Michigan.

Several of the companies have increased potash refinery capacity during the past year; and some increases of hoisting capacity have been made. Additional increases in facilities are under construction or planned, principally those of American Potash and Chemical Co. under its new management, Heyden Chemical.

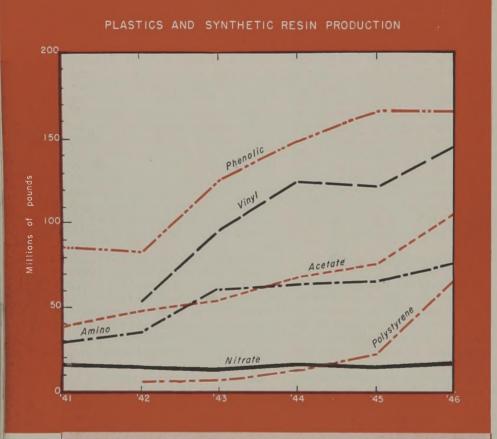
Deliveries of potash reported by American Potash Institute continue to be over 90 percent for agricultural usage, principally in the United States. Most of the balance is for chemical products. The exports go about half to Canada and the balance to American Territories, Cuba, and elsewhere in Latin America.

The international control of potash continues to make the two hemispheres more or less independent of each other. Most recent of such developments is the supply of Japan and Korea by potash from the Russian zone of Germany. This has relieved American producers of meeting that Oriental demand in the occupied areas which is the responsibility of the United States. The industry notes with interest that this supply of potash to the Orient from the Russian zone is at a price of approximately twice the prevailing rate for KO in the United States.

CHEMICAL ENGINEERING • FEBRUARY 1947 •



Plastics and Synthetic Resins



U. S. Production of Plastics and Synthetic Resins

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			Pounds				
	Acetate ¹	Nitrate ²	Phenolic ³	Amino4	Viny15	Polystyrene	
19466	103,000,000	18,000,000	166,000,000	77,000,000	144,000,000	64,000,000	
1945	76,637,000	15,235,000	165,156,000	65,797,000	122,507,000	22,794,000	
1944	65,023,000	15,951,000	148,650,000	62,484,000	126,892,000	10,571,000	
1943	54,386,000	14,042,000	126,173,000	59,859,000	95,564,000	6,737,000	
1942	48,246,000	15,129,000	82,466,000	34,830,000	52,156,000	6,965,000	
1941	37,101,000	16,497,000	84,432,000	28,216,000			

Data based on material compiled by United States Tariff Commission. ¹Includes cellulose acetate and mixed ester plastics, fillers, plasticizers, and extenders. ²Includes fillers, extenders and plasticizers. ³Excludes protective coatings, fillers, extenders, and plasticizers. ⁴Includes urea and melamine resins. Excludes protective coatings, extenders, plasticizers and fillers. ⁵Includes sheeting and film, textile and paper coating resins, molding, adhesives, and protective coatings. ⁶All 1946 production estimates are based on eleven-month production figures compiled by the Bureau of the Census

O VERCOMING many obstacles the plastics industry continued to grow at a healthy rate during the past year. A study of the larger gains of the year shows that polystyrene production rose from 27.8 million pounds in 1945 to 64 million pounds. Vinyl resin production surged up to a new high of 144 million pounds. Ethyl cellulose and related plastics reached an estimated annual output of 12 million pounds while other resins maintained a steady growth.

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It is anticipated that when the pres-ently planned expansion programs are completed this year basic production facilities will have an annual capacity of 1.6 billion pounds. Despite these increases in production, the large gap that still exists between fabricating and molding capacity and the available supply of plastic materials is likely to continue for a number of years because planned new additions to production capacities will be outstripped by increases in consumer demand. Expansion plans were retarded in 1946 by shortages of materials to manufacture resins and molding powders. Plasticizers, phenol and urea were in short supply with no relief in sight this year. Cellulose acetate plastics plants have not been operating at capacity due to difficulties in obtaining sufficient flake. However, they are operating above the wartime rates. The shortages were due to a number of factors such as difficulties in obtaining materials and equipment needed for producers expansion programs, and labor disputes in steel, coal and plastics industries.

Tariff Commission reports issued last year show that protective coatings have grown to a point where they consumed 303 million pounds of resin in 1945. In the case of alkyd resins 148 million pounds went into protective coatings from the 188 million pounds produced in that year.

An important new plastic called Teflon, tetrafluoroethylene, was formally announced last year.

Rayon and Synthetic sins **Fibers**

Plates industry en-plates industry en-ters its second postwar year the both expansion of caters its second postantial of cathe rear door that provide accent is on both expansion or ca-the rear door that production, and the latter makes that production better lacton me han 13 min dimensional stability. The industry is a 145 to 64 miles paralso interested in special effects with an production and puresin coatings, blending of fibers to th of 14 million proproduce increased strength, and imblock and related an proved water repellent properties of estimated annual approved fabrics. To show how far textile coatpounds while other ings have progressed, the Bureau of a steady growth the Census reports that in November t is anticipated that that 1.4 million pounds of urea and melaplanned expansion remine resins and 3.7 million pounds pleted this year barr of vinyl resins were used for textile ities will have an and and paper coatings.

Lo billion pounds. Dea American rayon producing capacity cases in production, but is expected to increase 26 percent by still exists between the end of 1948, with a capacity of 1 ing capacity and the billion pounds reached by the end of ly of plastic materials

Production	of Rayon	Filament	Yarns'
(1,000 lb.	Units)	

Year	U.S. Production	U.S. Export Balance ²	World Production
1923	34,960	-3,029	102,990
1925	51,050	-5,293	185,290
1927	75,555	-14,633	295,095
1929	121,400	-14,832	434,215
1931	150,880	-1,490	499,665
1933	213,500	176	663,395
1935	257,555	2,193	941,055
1937	321,680	525	1,203,105
1939	328,625	1,703	1,150,425
1940	390,070	1,440	1,183,760
1941	451,205	3	1,267,025
1942	479,330	5,600	1,213,170
1943	501,125	9,500	1,165,885
1944	555,215	16,300	1,039,630
1945	625,000	23,000	1,000,000
1946	677,000		

¹From Rayon Organon. Does not include staple which is estimated at 350,000 lb. in 1930; 880,000 lb. in 1932; 2,100,000 lb. in 1933; 2,200,000 lb. in 1934; 4,600,000 lb. in 1935; 2,300,000 lb. in 1936; 20,244,000 lb. in 1937; 29,861,000 lb. in 1936; 20,244,000 lb. in 1937; 29,861,000 lb. in 1936; 20,244,000 lb. in 1937; 153,285,000 lb. in 1940; 122,026,000 lb. in 1947; 153,285,000 lb. in 1940; 122,026,000 lb. in 1943; 153,285,000 lb. in 1942; 162,019,000 lb. in 1943; 153,285,000 lb. in 1942; 162,019,000 lb. in 1943; 153,285,000 lb. in 1942; 162,019,000 lb. in 1943; 153,285,000 lb. in 1942; 147,1000,000 lb. in 1935; 299,000,000 lb. in 1934; 139,900,000 lb. in 1934; 139,900,000 lb. in 1937; 958,000,000 lb. in 1938; 1,082,000,000 lb. in 1937; 958,000,000 lb. in 1938; 1,082,000,000 lb. in 1937; 958,000,000 lb. in 1942; 1,467,000,000 lb. in 1944; 1,537,000,000 lb. in 1944; 1,537,000,000 lb. in 1944; 1,537,000,000 lb. in 1944; 1,537,000,000 lb. in 1944; 1,457,000,000 lb. in 1944; 1,945, 20,614,000 lb. in 1937; 23,197,000 lb. in 1936; 20,614,000 lb. in 1937; 23,197,000 lb. in 1936; 20,614,000 lb. in 1937; 23,197,000 lb. in 1936; 10,914, 21,914,21,467,000,000 lb. in 1936; 20,614,000 lb. in 1937; 23,197,000 lb. in 1936; 20,614,000 lb. in 1937; 23,197,0000 lb. in 1936; 20,614,000 lb. in 1937; 23,197,000 lb. in

1947, against a present annual ca-pacity of 891 million pounds. In reporting this expansion program the Rayon Organon, official statistical reporter of the industry, said that the increase in rayon output will come from the extension and remodeling of existing plant equipment as well as from new rayon plants being built by American Enka Corp. at Lowland, Tenn., and by the Celanese Corp. of America at Rock Hill, S. C. Capacities of two other proposed rayon plants, one of American Viscose Corp. and the other of Industrial Rayon Corp., are not included in the survey since they will not be in operation by the fall of 1948.

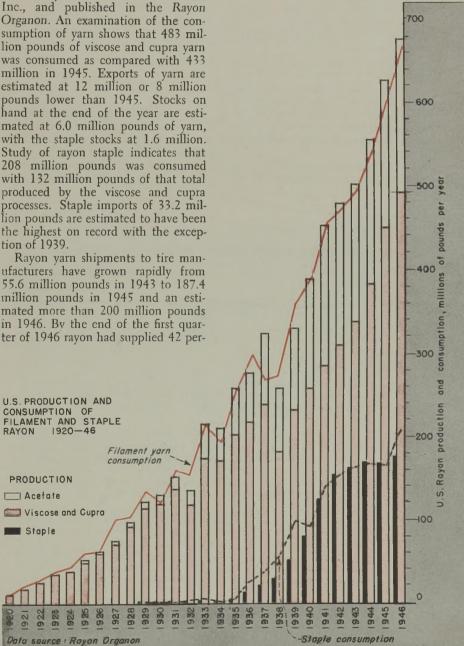
U. S. 1946 output of rayon was about 854 million pounds as compared with its previous high of 792 million in 1945, based on figures assembled by Textile Economics Bureau, Inc., and published in the Rayon Organon. An examination of the consumption of yarn shows that 483 million pounds of viscose and cupra yarn was consumed as compared with 433 million in 1945. Exports of yarn are estimated at 12 million or 8 million pounds lower than 1945. Stocks on hand at the end of the year are estimated at 6.0 million pounds of yarn, with the staple stocks at 1.6 million. Study of rayon staple indicates that 208 million pounds was consumed with 132 million pounds of that total produced by the viscose and cupra processes. Staple imports of 33.2 million pounds are estimated to have been the highest on record with the exception of 1939.

Rayon yarn shipments to tire manufacturers have grown rapidly from 55.6 million pounds in 1943 to 187.4 million pounds in 1945 and an estimated more than 200 million pounds in 1946. By the end of the first quarter of 1946 rayon had supplied 42 per-

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922 2020 cent of the total tire cord and fabric produced in that period.

Other synthetic fibers have been growing. Nylon capacity will be increased next year with the completion of another new plant at Chattanooga, Tenn. While no figures are available on 1946 production, Rayon Organon states that in 1944 64.4 million linear yards of nylon fabric was produced compared with 42.8 million linear yards in 1945. Vinylidene and vinyl fibers have proved successful in industrial fabrics and they will soon be used for household fabrics. Terylene is the name of a new synthetic fiber being developed by Imperial Chemical Industries. It is derived from ethylene glycol and terephthalic acid. However, this yarn is not expected to be available for some time.



MICAL ENGINE

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Vegetable Oils and Fats

O UTSTANDING economic event in fats and oils in 1946 was the new high record for prices set during the latter part of the year, when OPA controls were removed. Previous peak, reached in November 1919, was exceeded by about 20 percent, and the general level of domestic fats and oils prices at the year-end was about three times prewar levels.

World supply of fats and oils for the calendar year 1946 was about 18 million tons. This compares with 21.6 millions tons average in the period 1935-39. Net quantity available for world export trade was about 3 million tons, compared with 6.5 million in prewar years.

Production of fats and oils in U. S. from domestic raw materials in the cal-

endar year 1946 reached something less than 9 billion pounds, representing a drop of over 5 percent from the previous year. Stocks of fats and oils also dropped from the preceding year to a point only two-thirds the normal prewar level. On October 1, factory and warehouse stocks reached a low of 1.2 billion pounds, a point much lower than desirable for most comfortable working inventories.

Outlook for 1947

Between 10.5 and 11 billion pounds of fats and oils would be consumed in the United States in 1947, according to official estimates, if supplies were unlimited and there were no restrictions. Actually the 1947 supply is esti-

FATS	AND	OILS	PRODUCTION	FROM	DOMESTIC	MATERIALS	(MILLION	POUNDS)

						Estimates	Estimates Based on Goals
Crop Year	1941-42	1942-43	1943-44	1944-45	1945-46	1946-47	1947-48
Cottonseed oil	1,250	1,401	1,236	1,324	1,017	1.000	1,250
Soybean ail	. 707	1,206	1,219	1,333	1,410	1,350	1,590
Linseed oil	546	729	724	536	522	400	800
Peanut oil	77	131	135	107	99	125	125
Other veg. oils	252	255	222	234	191	235	235
Lard & rendered park fat							
Inspected	1,700	1,944	2,541	1,375	1,364	1,300	1,550
Other	740	890	880	831	811	800	850
Total	2,440	2,834	3,421	2,206	2,175	2,100	2,400
Butter:							
Creamery	1,779	1,725	1,510	1,420	1,109	1,200	1,530
Farm	370	347	331	330	331	350	370
Total	2,149	2,072	1,841	1,750	1,440	1,550	1,900
Tallow & grease	1,733	1,626	1,941	1,765	1,714	1,800	1,800
Other animal fats	297	290	232	220	155	170	170
Fish oils	216	165	172	200	170	125	125
Total	9,667	10,709	11,143	9,675	8,893	8,855	10,395

Following assumptions made in developing estimates: cotton crop, 8.5 million bales; soybean crap, 192 million bushels, 154 million bushels crushed, 9 pounds of oil per bushel; flaxseed, 24 million bushel crop; lard, 81 million combined spring and fall pig crap, 70 million hogs slaughtered, lard yield, 30 pounds per animal.

2⁷ Following assumptions made in developing estimates: cotton, 23 million acres harvested, yielding 11 million bales; soybeans, 220 million bushel crop, 177 million bushels crushed; flaxseed, acreage harvested increased to 5 million; lard, 75 million hogs slaughtered with 32 pounds of lard per animal. Iard yield may reach 34 pounds per hog because of heavy slaughter; inedible tallow and grease, more grease less tallow than in 1946-47. Butter estimated at 13 lbs. per capito.

Sources: 1940-41 --- 1945-46 -- Bureau of Census except lard and butter, U. S. Department of Agriculture 1946-47 and 1947-48 Estimates—Foodstuffs Division, U. S. Department of Commerce

Prepared by U. S. Dept. of Commerce

mated to be about 9 billion pounds, leaving a deficit of over 1.5 billion.

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Although shipments of fats and oils were large during the closing months of 1946, there was little apparent effort to hold back in the interest of uniform distribution throughout the coming year. When the winter crushing peaks have been passed, and supplies begin to dwindle, repetition of 1946 shortages may be anticipated during later 1947 until the new crop are harvested.

Prices will undoubtedly stay near their present levels unless there is a general business or price recession, at least until the 1947 oilseed crops begin to mature. The probable acreage of oilseed plantings, according to the 1947 crop goals, may yield over 10 billion pounds. Of course this will not all be available in 1947, but the effect on prices may be evident late in the year.

Announcement of a support price of \$6 per bushel for flaxseed to be planted in 1947 represents a new high in inducements to increase domestic drying oil production. Although this will affect the area which has wheat as its major crop, flax will probably be increased considerably above former levels without unduly curtailing the world's wheat production. With normal weather, a large supply of linseed oil should materialize.

As a result of international commitments, only about 200 million pounds of fats and oils are expected to be imported into the U. S. in 1947. Although this country is the normal market for a larger quantity than that, the recommendations of the International Emergency Food Council and related international programs will keep U. S. imports well under the billion pounds which might otherwise have materialized.

As long as import and export controls continue, a true free-market price level cannot be reached. Congressional policy on world trade controls may be reached during 1947, but in January the foreign trade policy of the new Congress was not yet clear.

Naval Stores

ing a deficit of over Lithough shipments of the large during the close 946, there was little speci ibution throughout for When the winter crisis been passed, and appe undle, repetition of in nav be anticipated in intil the new crop arebia a will undoubiedt a present levels unles business or price iter ntil the 1947 oilseed ca ture. The probable area lantings, according to h goals may vield over H s. Of course this wan ole in 1947, but the : may be evident late an Trepresents a new lid duction. Although this e area which has not crop, flas will protein without unduly artic

wheat products weather, a large style result of interaction and oils are expected into the U. S. a W this country is the maneedations of the large reney. Food Concol act string programs will be seven mader the billion might otherwase have a

g as import and exp inue, a true freemute of the reached. Congrerorld trade contrast ring 1947, but in in trade policy of the not yet clear. **T** HROUGHOUT THE war period, the naval stores industry operated under difficulties including lack of manpower, price controls, restrictions on industrial use, and establishment of quotas for foreign trade. As a result, production of rosin and turpentine dropped continuously in the war years. In the 1945-46 crop year that trend was reversed and a further substantial gain in output is anticipated in the current year.

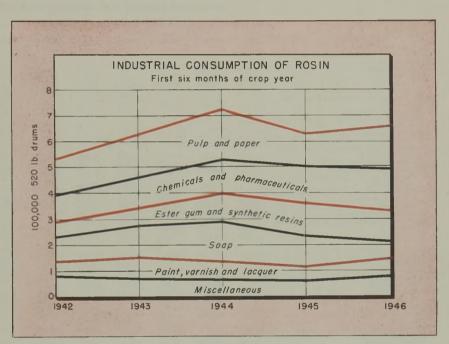
Latest available production data are those of the Bureau of Agriculture and Industrial Chemistry covering the first half of the 1946-47 crop year. The figures are encouraging inasmuch as they show a healthy increase over those for the comparable period of 1945. In the case of rosin, production in the six-month period is reported at better than 17 percent over the total for the preceding season and it is probable that it will cross 20 percent by the end of the crop year on March 31.

Following the usual seasonal trend it is expected that the second half of 1946-47 will record a drop in production of gum rosin as compared with the first half but the rate of decline may be lessened by the return of a free trading market and the prevailing price levels. However, forecasts for a rise in second half operations are based on the improved position of the wood branch of the industry where the overhauling of equipment and the installation of new productive capacities have speeded up monthly outputs so that a new high for that branch seems to be in the making.

Although prices for naval stores were controlled in the war period, they were not stationary and the flexibility of controls made possible a continuation of the rising price trend which started just before the war. The government bureau in its report on production included a price study which shows that the weighted average monthly price at Savannah for gum spirits of turpentine was 25.31c. a gal. for the 1939-40 crop year. An unbroken upward movement is reported for each succeeding year with the monthly average for 1945-46 reaching 86.41c. a gal. In the current season the upward surge was heightened by the demise of OPA and while buyer resistance brought some recession from the peaks, the monthly average for the 12-month period undoubtedly will be far above that of any of the preceding years.

Gum rosin followed pretty much the same price pattern as that reported for turpentine. In 1939-40 the monthly average at Savannah was \$2.37 per 100 lb. It fell to \$1.98 in the following year but from then on it began to climb steadily and reached \$6.45 in 1945-46. Continuing along this line, the monthly average for the first half of the 1946-47 season was \$6.87 and as the second half proggressed the rate of price increase was lifted so it is evident that the average for the full 12 months will establish a new high.

Export trade in rosin in 1946, even under the restriction of quotas, more than doubled that for the preceding year but still was far below the prewar normal. Last month controls over exports were removed and this may clear the way for a material gain in the volume of business with outside countries. In fact some rather ambitious plans for expanding rosin production in the next few years are based on the probability that a large percentage of production will enter foreign trade.



Supply and Distribution of Turpentine and Rosin

		Turpentine,	50-Gal. Bbl.		
- April-	September,	1946	April-Se	ptember, 1	945
Total	Gum	Wood	Total	Gum	Wood
Carryover, April 1 100,749	58,088	42,661	202,546	168,011	34,535
Production	179,255	134,155	281,124	158,981	122,143
Imports 10,081	10,081	-	8,896	8,896	-
Available supply 424,240	247,424	176,816	492,566	335,888	156,678
Carryover, Sept. 30 90,167	48,411	41,756	165,326	123,460	41,866
Apparent consumption 334,073	199,013	135,060	327,240	212,428	114,812
Exports 45,288	32,216	13,072	51,146	42,032	9,114
U.S. consumption 288,785	166,797	121,988	276,094	170,396	105,698
		Rosin, 52	0 lb. drums		
Carryover, April 1 388,682	237,504	151,178	388,266	265,881	122,385
Production 906,366		437,171	774,481	431,055	343,426
Imports	_	_	9,326	9,326	-
Available supply1,295,048	706,699	588,349	1,172,073	706,262	465,811
Carryover Sept. 30 402,513		126,019	473,146	325,937	147,209
Apparent consumption 892,535		462,330	698,927	380,325	318,602
Exports 217,348		64,638	64,678	30,272	34,406
U.S. consumption 675,187		397,692	634,249	350,053	284,196

CHEMICAL ENGINEERING • FEBRUARY 1947 •

Foreign Trade in Chemicals

D URING THE war years, detailed information on our trade with outside countries was not publicly available but now figures for exports and imports are being published again and the accompanying tabulations offer a comparison of the outward and inward

movement of chemicals in the last prewar year, from 1942 through 1945, and for the first nine months of 1946.

The vast change in our export business in the last seven years is shown very clearly in a comparison of dollar values. In 1939 exports of chemicals and related products carried a valuation of approximately \$198 million which had almost doubled by 1942 and increased in the following years until it reached its high of \$558 million in 1944. Estimated from threequarter figures, the total for 1946 will

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EXPORTS

EXPORTS OF CHEMICALS BY PRINCIPAL PRODUCTS

	Quantity	in Thouse	nds (Poun	ds Unless ()therwise S	Specified)	Value (Thousands of Dollars)					
ARTICLE	1939	1942	1943	1944 1	1945 1	JanSept. 1946 1	1939	1942	1943	1944 1	1945	JanSept. 1946)
GRAND TOTAL, VALUE							\$197,840	\$388,133	\$543,305	\$558,279	\$463,620	\$423,388
Chemicals and Related Products (Group 8) Coal-tar chemicals.			• • • • • • •				164,374 14,484	347,727 30,976	474,340 30,544	471,642 36,337	414,313 35,164	370,968 44,904
Denzene (gal.)	12.004	187	44	567	2,945	5,468	1,787	57	17	196	510	1,001
Toluene Phenol	2.058	74,598 19,109	$81,601 \\ 30,839$	114,773 28,723	$39,875 \\ 16,852$	15,996 20,824	281	$3,989 \\ 2,521$	4,379 4,211	5,395 3,423	2,131 1,984	692 2,214
Coal-tar dyes, stains, color lakes, etc.	13,716	15,962	17,711	19,562	22,076	33,042	6,432	12,729	13,338	16,038	19,538	25,740
Medicinal and Pharmaceutical Preparations Vitamins, etc.		2,577	4,668	7,371	9,547	7,479	22,318 830	43,780 9,708	69,027 21,016	105,925 29,484	115,843 29,079	108,686 20,212
			• • • • • • • •	• • • • • • • •		• • • • • • • •	2,637	$3,981 \\ 6,811$	$7,064 \\ 5,099$	9,810	10,769	8.748
Druggists' nonproprietary preparations. Medicinal chemicals						•••••	$6,039 \\ 1,654$	9,260	14,891	8,147 33,392	9,122 36,756	5,239 51,776
Industrial Chemical Specialties.			•••••	• • • • • • • •	• • • • • • • •		$36,044 \\ 3,100$	64,342 6.003	71,140 6,598	72,140 6,093	78,417 7,161	68,201
Household and industrial insecticides.			• • • • • • • • •	•••••	• • • • • • • •							8,377
disinfectants, etc	8,912 10,426	5,306 9,136	$10,518 \\ 8,115$	$17,284 \\ 9,579$	25,887 11,129	$23,929 \\ 12,444$	$1.873 \\ 792$	932 1,310	$1,752 \\ 1,220$	3,628 1,637	11.340 2,054	6,022
Synthetic gums and resins	19,419	39,023	45,696	51,040	51,529	53,821	8,147	20,578	23,471	22,915	21,304	2,547 21,752
Tar acid resins, in powder, flake, or liquid form		6.421	7.168	9.960	10.550	13,152		1.158	1.478	1,864	1,989	
Polymers of styrene, vinyl acetals, etc.		4,846	10,404	8,837	8,531	6,195		2,552	5,111	3,521	3,646	2,560 3,453
Cellulose nitrate	$5,309 \\ 2,213$	6,987 6,624	6,794 5,202	$7,205 \\ 6,818$	5,798 6,974	5,729 6,792	3,636 2,133	6,348 5,462	6,058 4,058	$6,017 \\ 5,164$	4,720 4,975	4,367 4,655
Cementing preparations	4,669	2,401	2,428	6,225	8,186	6,495	607	456	416	1,210	1,544	4,035
Specialty cleaning and washing com- pounds	4,480	6,766	8.327	9.933	11,554	14.036	433	633	693	900	1,060	1,270
Polishes	7,424	6,621	8,363	12,182	13,110	13,563	1,392	1,296	1,669	2,660	2,998	3,428
Ethyl fluid Industrial Chemicals	• • • • • • •	3,560	3,709	2,451	2,698	• • • • • • • •	36,505	14,385 86,191	15,108 115,934	10,239 131,220	10,676 90,872	62,371
Acius and annydrides	49,942	68,378	62,683	99,920	92,290	66,179	2,432	4,979	5,736	5,524	5,568	6,101
Acetic acid. Alcohols and glycols	1,794	725	634	962	1,832	4,857	141 4,092	$115 \\ 28,032$	89 51,398	139 64,833	251 31,514	612 5,613
Methanol (gal.)	1,220	3,764	1,628	2,218	1,832	355	473	1,773	750	609	542	180
Ethylene glycol Butyl alcohol	7,618	$63,020 \\ 14,083$	$71,426 \\ 15,519$	40,156 15,848	$23,580 \\ 6,041$	11,705 3,991	593	7,319 913	7,726 2,736	3,977 3,214	$2,330 \\ 1,221$	1,088 578
Glycerine	7,399	32,638	24,573	9,118	7,598	451	959	5,641	4,411	1,672	1,508	103
Acetone. Synthetic collecting reagents	$23,115 \\ 11,583$	$69,575 \\ 12,682$	34,935 14,228	38,494 15,189	$22,405 \\ 13,829$	$17,486 \\ 10,714$	$1,562 \\ 1,905$	$5,095 \\ 2,387$	2,447 2,894	$3,109 \\ 2,904$	1,818 2,446	1,282 1,918
Butadiene Aluminum sulphate	69,467	88.857	5,222 75,892	$21,164 \\ 82,867$	15,788 75,944	54,366	745		940	4,348	3,817	
Bleaching powders		2,414	6,049	5,081	75,944 5,799	22,119	745	1,103 378	963 454	1,072 436	994 639	682 1,844
Calcium carbide Potassium hydroxide	8,328	$54,923 \\ 6,907$	$23,342 \\ 19,628$	$18,125 \\ 13,379$	24,167 16,726	$51,756 \\ 13,403$	260	2,337 546	1,075	778	1,135	2,154
Sodium compounds, n.e.s	705,563	460,095	809,349	566,611	506,489	379,294 2	14,777	14,807	$1,231 \\ 18,336$	953 14,827	1,187 13,146	960 1 12,425
Sodium borates	182,278 160,113	$38,134 \\ 128,998$	34,051 305,854	$37,222 \\ 158,695$	46,689 140,806	115,900	$3,230 \\ 2,080$	1,072 1,975	1,023 3,758	1,067 2,330	1,310	1.847
Caustic soda	261,000	164,358	327,290	242,748	184,004	93,212	5,535	4,871	7,712	6,107	2,053 4,505	2,490
Caustic soda Sodium phosphate Gases compressed and liquefied	8,906	11,437	9,854	12,930	11,358	12,881	$\frac{385}{1,849}$	$679 \\ 4,422$	$544 \\ 2,104$	787 3,084	762 3,002	810 2,977
Gaseous reirigerants	7,839	4,655	6,199	12,085	14,977	15,422	1,262	910	826	1,504	1,889	1,991
Chlorine Pigments, paints and varnishes	12,001	7,882	10,655	25,609	8,340	7,548	$257 \\ 22,762$	$168 \\ 20,388$	$232 \\ 22.488$	489 25,685	232 30,799	233 37,403
Mineral earth pigments	51,958	47,332	32,096	32,990	33,148	35,052	816	877	914	849	930	1,021
Carbon black or gas black	250,882 203,828	$199,034 \\ 115,635$	$197,095 \\ 104,912$	$237,291 \\ 156,952$	264,536 173,773	284,308 205,258	$12,803 \\ 8,889$	12,441 5,229	12,764 4,824	$14,658 \\ 7,481$	17,883 9,830	21,550 13,531
Titanium dioxide and pigments	8,638	17,740	19,530	21,850	25,648	24,246	698	1,707	1,830	1,851	2,316	2,307 7,720
Ready mixed paints (gal.)	2,607 1,390	1,933 852	2,214 798	2.359 783	2,888 917	3,642 836	4,707 16,991	3,793 14,771	4,504 20.095	4,950 15,314	5,994 18,259	7,720
Nitrogenous fertilizer materials (tons).	165	67	93	36	111	136	4,747	3,461	6,446	2,084	5,592	6,409
Phosphate rock (tons) Superphosphates (tons)	949 95	529 165	358 240	439 184	494 185	455 171	5,233 1,010	3,348 4,882	* 2.875 7,194	3,469 4,871	3,783 4,240	3,802 4,610
Potassic fertilizer materials (tons) Explosives, Fuses and Blasting Caps	122	75	100	98	93	65	4,447	2,184	3,168	3,140	2,987	2,202
Dynamite	22,204	20,131	32,464	51,450	20,411	9,173	4,999 2,857	78,666 2,539	$134,159 \\ 4,030$		16,430 2,281	3,541 1,204
Trinitrotoluene	•••••	96,128	226,617	185,126	35,520			15,125	42,760	25,291	3,258	
Soaps	35,129	29,095	42,592	34,708	92,289	82,951	$10,271 \\ 3,448$	8,613 3,480	$10,953 \\ 4,358$	19,017 5,763	28,529 12,792	28,271 10,105
Toilet soap Dentrifices	$13,041 \\ 2,702$	5,193 1,521	7,560 2,725	13,696 6,729	35,678 2,668	$22,218 \\ 3,935$	1,675	1,113	1,505	3,070	6,742	3,968
Tollet powders				0,729	2,008	3,935	2,100 1,115	1,312 678	2,398 756	4,790 1,329	$2,526 \\ 2,277$	3,752 2,620
Other Related Products	•••••		• • • • • • • •			· · · · · · · ·	33,466 15,094	40,406 12,838	68,965	86,637	49,307	52,420
Rosin. Turpentine (gal.).	392,980	198,003	235,556	128,761	77,447	157,387	8,967	6,522	$13,658 \\ 9,041$	$14,216 \\ 6,375$	$12,963 \\ 4,505$	19,108 10,940
Turpentine (gal.) Drugs, herbs, leaves, and roots	$11,864 \\ 5,196$	$2,377 \\ 2,590$	$2,148 \\ 2.069$	3,180 3,478	4,098 3,700	$3,361 \\ 5,763$	3,174 1,564	1,632 905	1,581	2,740	3,637	3,146 3,781
Linseed oil	2,566	57,753	224,466	313,555	23,982	2,032	253	7,491	32,040	1,458 47,416	2,219 3,554	353
Essential oils and perfume-flavor oils. Peppermint oil	$2.136 \\ 396$	$1,734 \\ 191$	1,879 225	$1,746 \\ 280$	1,989 316	1,957 263	3,1 34 994	6,056 944	7,235 997	8,853	11,093	10,056
Vegetable dyeing and tanning extracts.	41,617	23,857	22,829	20,257	18,548	18,846	1,748	1,262	1,206	$2,018 \\ 1,252$	2,497 1,200	1,908 1,871
Sulphur							11,682	11,854	13,906	13,442	18,278	17,251

¹ Preliminary. ¹ Sodium borates not included in this total. NOTE: Blank spaces indicate either no data available, no separate export classification, or no exports. Source: Complied in the Chemical and Drug Division from data supplied by the Bureau of the Census and the Bureau of Foreign and Domestic Commerce, United States Department of Commerce.

hemic and Allied Materials

ated products came acreased in the follow

1,752 1,220 23,471 1.65 1.65 21.915

1.478 3.111 6.058 4.058 416 「「日本」の

883 1,669 1,169 1,12384 2,755 2,255 2,255 2,255 1,023 3,772 2,255 1,023 3,772 2,255 1,023 3,7712 2,255 2,2148 4,023 3,7712 2,215 4,023 3,7712 2,215 4,023 4,024

1.954 3,521 6,017 5,164 1,210

900 2,660 10,239 131,230

t approximate to surpass even that of the peak year. had almost date A high level for exports of chemicals seems assured for some time to come. trached it has seen as assured for some the situain 1944. Estimate tion. Many countries outside the war the figures, the total of the second much more highly industrialized and have increased their

requirements for chemicals; countries in war areas are in need of large supplies of raw materials with which to rebuild their industries; and countries formerly very prominent no longer have export surpluses and their place must be taken by countries whose pro-

ductive facilities are intact and capable of expansion.

Imports of chemicals also gained in volume in recent years but to a lesser extent. In both cases, increases in valuation was greater than that for tonnage because of higher prices.

IMPORTS

IMPORTS	OF	CHEMICALS	BY	PRINCIPAL	PRODUCTS'

Dilat		Quantity i	n Thousand	ls (Pounds	Except as () therwise S	pecified)-		Val	ue (Thousa	nds of Dol	lars)	
1 10		1020	10.40	1042	1044.		JanSept.	1939	1942	1943	1944 *	1945 =	JanSept. 1946 ¹
0 100	ARTICLE GRAND TOTAL, VALUE	1939	1942	1943	1944 1	1945 *	1946 *	\$142,999		\$280,300	\$257,964	\$261,680	\$204,562
A R R R	Chemicals and Related Products (Group 8) Coal-tar chemicals							79,479 18,942	88,388 5,881	203,540 9,003	$155,259 \\ 11,432$	145,769 11,716	72,986 4,367
	Crudes. Creosote oll (gal.). Benzene (gal.). Intermediates. Coal-tar dyes, colors and stains. Explosives (except smokeless powders)	51,877 326 2,667 5,138 203	7.629 3,066 2,471 873 2,945	2,060 32,452 4,437 603 324	3,236 53,679 8,756 299 3,973	2,237 32,638 696 657 26,108	398 2,319 1,925 726	7,211 5,769 39 3,067 8,058 46	$2,553 \\ 945 \\ 152 \\ 564 \\ 1,879 \\ 818$	5,923 294 2,967 656 1,459 85	8,362 461 3,687 1,389 636 858	6,728 300 2,131 218 1,547 3,181	2,120 55 235 288 1,815
N N N N	Medicinal and Pharmaceutical Preparations Caffein Menthol, natural and synthetic		2 118	265 106	362 541	333 793	225 332	5,506 884	$2,650 \\ 14 \\ 353$	4,894 2,579 874	13,269 3,457 7,448	$10.983 \\ 2,549 \\ 5,968$	5,897 1,365 1,594
	Industrial Chemicals Acetic acid Arsenious acid Tartaric acid Ethyl aleohol (gal.) Camphor. Glycerine. Potassium bitartrate, crude argols, etc. Sodium compounds. Sodium exande.	1,439 29,348 116 1 2,503 11,318 17,370 42,686	11,283 32,700 5 1,034 15 6,105 8,103 69,950	10,455 32,225 2,012 11,917 10,192 638 66,706	6,576 22,107 4,174 30,166 1 6,060 10,123 80,240	15,125 28,496 2,999 34,127 3 9,509 19,609 91,984	4,627 21,851 28 17,758 20,312 13,303 59,540	$17,631 \\ 60 \\ 562 \\ 24 \\ 1 \\ 865 \\ 758 \\ 1,217 \\ 5,258 \\ 3,123 \\$	24,272 694 893 2 362 9 658 1,702 3,723 2,380	28,248 584 877 1,097 6,632 1,059 106 2,917 2,230	38,881 362 570 2,527 19,021 528 1,417 3,329 2,700	38,516 870 713 1,872 18,840 3 739 2,874 3,986 3,128	27,296 244 601 18 12,282 3,614 1,818 2,882 2,169
	Pigments, paints and varnishes							1,519	572	282	1,128	1,054	942
	Fertilizers and fertilizer materials (tons) Nitrogenous fertilizer materials (tons) Ammonlum gulphate (tons) Calcium cyanamide (tons) Sodium nitrate (tons) Ammonium phosphate (tons) Phosphatic fertilizer materials (tons) Potassic fertilizer materials (tons) Potassium chloride, crude (tons)	$ \begin{array}{r} 1.374 \\ 1.090 \\ 109 \\ 133 \\ 604 \\ 35 \\ 24 \\ 212 \\ 84 \\ \end{array} $	$1,186 \\ 1,095 \\ 53 \\ 90 \\ 899 \\ 28 \\ 23 \\ 16 \\ 2$	$1,301 \\ 1,137 \\ 100 \\ 126 \\ 761 \\ 44 \\ 55 \\ 45 \\ 25$	$1,383 \\ 1,161 \\ 104 \\ 102 \\ 712 \\ 92 \\ 140 \\ 14 \\ 4$	1,607 1,358 119 141 850 93 161 7 7	1,008 873 88 118 472 74 50 8 3	$\begin{array}{r} 32,455\\24,666\\2,959\\3,174\\11,213\\1,628\\442\\5,752\\2,314\end{array}$	$25,917 \\ 23,278 \\ 1,806 \\ 2,359 \\ 17,183 \\ 1,150 \\ 406 \\ 418 \\ 40$	32,920 29,058 3,367 3,819 15,189 1,827 452 1,287 706	35,454 31,813 3,207 3,092 15,305 3,942 1,030 398 119	$\begin{array}{c} 41,327\\ 37,307\\ 3,910\\ 4,271\\ 18,559\\ 3,993\\ 1,145\\ 231\\ 230\\ \end{array}$	28,431 25,065 2,940 3,739 9,948 3,295 457 257 103
111	Explosives Smokeless powder		1,593	139	290	20,052		17	998 771	$381 \\ 56$	493 138	8,301 8,063	104 73
10	Fireworks and Ammunition							393	26,644	126,198	52,780	29,402	279
	Soap and Tollet Preparations Soap Perfume materials Perfumery and tollet waters		4,352	8,054	381 	97	6,182	$3,016 \\ 480 \\ 1,983 \\ 396$	1,454 244 998 187	$1,614 \\ 453 \\ 643 \\ 302$	1,822 86 1,348 246	4,470 485 3,031 706	5,670 1,033 3,668 935
	Other Related Products. Bones, crude, ground, etc. (tons) Glues and gelatins. Casein or inctarene. Beeswax, crude. Vegetable tailow and waxes.	75 15,832 4,667 26,944	49 16,819 5,282 24,182	39 28,426 4,409 31,986	60 47,826 4,220 27,016	49 52,023 7,365 27,409	35 37,501 5,347 26,005	63,520 1,490 207 886 904 5,940	80,649 1,400 108 3,500 2,090 12,338	76,760 1,418 62 2,867 1,576 15,178	102,705 2,064 142 4,616 1,595 14,174	115,911 2,004 118 5,393 2,761 14,043	131,576 1,708 362 8,837 2,395 22,757
	Gums, resins and balsams Varnish gums and resins. Turpentine, tar and pitch Chicle, crude. Gum arable. Gum tragacanth	93,330 14,679 9,200 3,065	65,235 14,312 12,833 2,770	23,468 21,347 7,009 1,511	38,219 22,030 8,105 1,930	38,275 13,466 16,813 2,994	48,198 12,359 14,694 2,058	14,338 5,695 146 5,151 635 1,264	21,140 10,014 308 5,255 1,197 1,566	21,006 4,881 484 8,945 661 1,568	30,541 10,963 528 11,570 708 2,392	27,152 8,301 549 9,339 1,389 2,224	$\begin{array}{r} 33,634\\ 13,012\\ 600\\ 9,538\\ 1,429\\ 1,808 \end{array}$
	Crude drugs and botanicals Pyrethrum or insect flowers Oplum, crude Tung oll		9,452 343 8,269	40,389 6,796 299 68	81,075 10,658 360 1,770	88,658 18,439 454 560	95,160 16,322 321 16,890	11,689 3,174 708 11,724	12,470 1,570 1,794 1,914	12.276 1,148 1,616 23	20,371 2,461 2,492 568 7,105	25,406 4,810 4,478 145 7,817	22,294 4,237 2,768 5,600
江田に通知	Linseed oil Essential or distilled oils Dyeing and taming materials Suiphur Pyrites (tons)	49	27,842 57,416 300	66,631 37,315 256	66,539 72 181	79,044 	37,714 69 145	4 6,444 8,328 251 1,315	2,380 9,756 11,750 443 1,360	6,015 4,073 11,091 343 832	7,195 11,031 10,058 10 340	7,817 15,899 14,750 10 413	3,594 16,594 13,465 10 326

¹ Imports for consumption for the years 1939, 1942, 1943, and 1946. General imports in 1944 and 1945.

Preliminary.

* Imports of camphor during the first nine months of 1946 totaled 393 pounds, valued at \$318

· Imports of all fertilizers and fertilizer materials were reported in long tons in 1939.

NOTE: Blank spaces indicate either no data available, no separate import classifications, no imports, or imports of less than 500 pounds or dollara

Source: Compiled in the Chemical and Drug Division from data supplied by the Bureau of the Census and the Bureau of Foreign and Domestic Commerce, United States Department of Commerce.

e export classification d'a Domestic Commerce, In-

VALUE OF UNITED STATES EXPORTS OF CHEMICALS AND ALLIED PRODUCTS

by Groups, Areas, and Principal Countries of Destination, 1939, 1945 and (Jan.-Sept.) 1946

(\$1,000)

Cool-Tar Produces Pharmaceutical Programming Chemical Specialities Industrial Chemical Industrial Chemical Area and Country 193 193 1945 193 1945 1946 1946 1946 1946 1946 1946 1948 1946 1946 1946 1946 1948 1946 1948 <td< th=""><th></th><th colspan="12">Medicinal and</th></td<>		Medicinal and											
		Coal			Pharmace			Chem			Indus		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Area and Country	1020			1 1020						1 1020	104F	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					1939	1945	1946	1939	1945	1946			1946
$ \begin{array}{c cccta Rica}{ccuba} & 111 & 1.33 & 1.28 & 1.163 & 1.827 & 0.612 & 0.144 & 0.184 & 0.543 & 1.548 & 1.788 & 1.788 & 1.587 \\ \hline Cuba cmain & 12 & 86 & 10.4 & 168 & 765 & 717 & 362 & 986 & 700 & 36 & 159 & 130 \\ \hline Cuba cmain & 12 & 86 & 10.4 & 168 & 765 & 717 & 372 & 986 & 740 & 36 & 159 & 130 \\ \hline Cuba cmain & 12 & 86 & 10.4 & 168 & 765 & 717 & 372 & 986 & 740 & 36 & 159 & 130 \\ \hline Cuba cmain & 12 & 86 & 10.4 & 10.138 & 0.377 & 671 & 5.948 & 6.408 & 2.645 & 6.500 & 120 & 117 \\ \hline Panama, C. Z. & 7 & 8 & 9 & 100 & 316 & 327 & 143 & 3727 & 1131 & 38 & 1101 & 117 \\ \hline Panama, Rep. of. & 8 & 26 & 17 & 337 & 1.179 & 786 & 94 & 819 & 842 & 66 & 112 & 79 \\ \hline Panama, Rep. of. & 8 & 26 & 17 & 337 & 1.179 & 786 & 948 & 19 & 842 & 66 & 112 & 79 \\ \hline South America: & 1.567 & 5.075 & 5.428 & 4.577 & 28.140 & 29.623 & 3.652 & 8.968 & 9.919 & 5.691 & 9.068 & 9.942 \\ \hline Argentina. & 53 & 853 & 1.661 & 506 & 750 & 128 & 1230 & 1275 & 1.733 & 1.091 & 2.244 \\ \hline Prazil & 44 & 1.333 & 1.022 & 370 & 6.608 & 701 & 288 & 2.40 & 1.173 & 1.091 & 2.245 \\ \hline Cubie & 235 & 335 & 131 & 213 & 1.697 & 1.276 & 1.431 & 1.323 & 1.419 & 701 & 1.334 & 1.125 \\ \hline Cubie & 207 & 628 & 675 & 1.195 & 6.499 & 5.580 & 431 & 1.323 & 1.419 & 701 & 1.334 & 1.125 \\ \hline Prun & & 44 & 225 & 170 & 226 & 746 & 4.201 & 5.53 & 1.188 & 2.26 & 730 \\ \hline Cuppe: & 5.400 & 9.431 & 16.584 & 41.41 & 30.148 & 20.200 & 13.836 & 15.328 & 16.134 & 9.534 & 46.97 & 20.029 \\ \hline Puro ex. & 5.400 & 9.431 & 16.584 & 41.41 & 30.148 & 20.200 & 13.836 & 15.328 & 16.134 & 9.534 & 46.97 & 20.029 \\ \hline Puro ex. & 5.400 & 9.431 & 16.584 & 41.41 & 30.148 & 20.200 & 13.836 & 15.328 & 16.134 & 9.534 & 46.97 & 20.029 \\ \hline Puro ex. & 5.400 & 9.431 & 16.584 & 41.41 & 30.148 & 20.200 & 13.836 & 15.328 & 16.134 & 9.534 & 45.97 & 20.99 & 1.703 \\ \hline Cellen & 3.4 & 4.77 & * & 747 & 584 & 144 & 28 & 181 & 2 & 3.46 & 2.46 & 2.386 \\ \hline Puro ex. & 5.400 & 9.431 & 16.584 & 4.217 & 1.384 & 14.428 & 181 & 2 & 3.46 & 2.46 & 2.386 & 2.46 & 2.386 & 2.46 & 2.386 & 2.46 & 2.386 & 2.46 & 2.386 & 2.46 & 2.38$					7,199	30,302	23,892	11.480	36.649	32.670			19,103
						6,882	6,546	8,036	20,073	19,956			11,796
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$							612	146	543	493			98
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						6,483	6,473	633	2.352	2,182			1,597
Neth. W. Indies11138110354222145372511213631.510199Panama, C.Z.789001101177864948108426611279Sorrentina1535.825.121.7507728.14429.833.6325.6328.8669.195.6089.0859.842Arrentina81.131.010574.5607.728.14429.833.6423.6138.8669.195.6089.332Parama, R.D.81.131.011.767.5604.311.1321.062.071.8881.122.93Parama, R.D.81.1321.5927.6604.311.2321.4107011.3331.1122.93Parama, R.D.4.441.3351.9027.6614.633.3315.692.8602.7701.8683.1273.377Chile.1325.3612.2376.695.8604.311.3231.4107011.3321.105Punor368.927.11109.237.664.311.3231.4107011.3341.105Punor4.649.9311.65.884.14130.14820.20013.8361.6371.3121.069Punor5.4009.4311.65.884.14130.1482.20213.8361.52816.1349.534 <td></td> <td></td> <td></td> <td></td> <td></td> <td>765</td> <td>717</td> <td>362</td> <td>986</td> <td>790</td> <td></td> <td></td> <td>129</td>						765	717	362	986	790			129
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Mexico.												
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	Panama, C. Z.												
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	Vanezuela												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Europe												
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Belgium												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Czechoslovakia												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	France												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Germany												2,885
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Greece		32	145									E70
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Italy	272											
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Netherlands	232											
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Norway.	83	57										
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Poland	50	5										
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Portugal	47	228	442	98	545							
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Russia			115	1	12.332							
Sweden. 473 1.385 1.526 284 1.423 825 843 2.484 718 2.105 3.211 Switzerland. 80 1.094 3.988 211 931 1.443 825 843 2.484 718 2.105 3.211 United Kingdom. 1.247 745 1.030 2.719 6.801 2.618 9.092 9.140 4.897 4.702 5.192 3.896 Yugoslavia.* 2 31 4.936 504 67 181 204 19 122 121 Asia and Oceania: 2.868 9.714 14.012 5.737 19.326 26.197 5.756 14.580 6.582 7.740 4.717 11.089 Asia and Oceania: 103 188 134 444 879 407 1.286 1.747 823 1.399 907 848 British Malaya 39 -20 277 56 15.64 44 185 15 87 China 1.036 745 5.325 670 724 10.137 309 203 2.780 548 84 6.413 India 132 15 478 403 10 10.34 382 1 324 129 489 India 514 7.995 6.189 1.565 1.524 4.217 541 7.686 418 570 1.173 847 Japa 779 $ -$	Spain			1,086	73	468	715	26	73	94	176	287	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Sweden.			1,526	284	1,304	1,423	825	843	2,484	718	2,105	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Switzerland			3,398	211	931	1,436	157	257	1,210	259		
Asia and Oceania:2.8689.71414.0125.73719.32626.1075.75614.5806.5827.7404.71711.059Australia.1031881344448794071.2861.7478231.399907887British Malaya39 $-$ 20277 $*$ 561564441851587China1,0367455.32567072410,1373092032.780548846.418Hong Kong13213215478403101.03438213241294889India5147.9956.1891.5651.5244.2175417.6864185701.173847Japan779-68-*1.164-*2.215Netherland Indies801023313410821851399281.191189315Philippine Is110431901.6371.5296.778404311819985649765Turkey9944902191.164640111156322295571345Quino So. Atrica829417796647.9274.2741.3402.8922.8967102.8132.008Puilopine Is10043199232.377103 <td>United Kingdom</td> <td></td> <td></td> <td>1,030</td> <td>2,719</td> <td>6,801</td> <td>2,618</td> <td>9,092</td> <td>9,140</td> <td>4,897</td> <td>4,702</td> <td>5,192</td> <td>3.896</td>	United Kingdom			1,030	2,719	6,801	2,618	9,092	9,140	4,897	4,702	5,192	3.896
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Yugoslavia												121
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Asia and Oceania:											4,717	11,089
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Australia.		188										848
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	China Malaya												
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Hong Kong												
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Ianan			0,189		11,524			7,686				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Netherland Indies			222		109							
Philippine Is 110 43 190 1.637 1.529 6.778 404 311 819 985 649 785 Turkey 9 404 902 19 1.164 640 111 156 332 29 571 342 Atrica 82 941 779 664 7.927 4.274 1.340 2,892 2.896 710 2.813 2.208 Egypt 28 199 203 92 3.377 1.003 244 612 497 40 211 179 Union So, Africa 41 429 189 420 2.478 2.115 820 1.640 1.759 335 936 794													
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$													
Africa. 82 941 779 664 7.927 4.274 1.340 2.892 2.896 710 2.813 2.208 Egypt. 28 199 203 92 3.377 1.003 244 612 497 40 211 179 Union So. Africa. 41 429 189 420 2.478 2.115 820 1.640 1.759 335 936 794	Turkey												
Egypt 28 199 203 92 3,377 1,003 244 612 497 40 211 179 Union So. Africa 41 429 189 420 2,478 2,115 820 1.640 1,759 335 936 794	Africa												
Union So. Africa	Egypt												
	Union So. Africa	41											
	Total, All Countries	14.484	35.164										
						110,010	100,000		10,417	00,201	1 30,303	20,070	02,3/1
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8

	Pigments, Paints and Varnishes JanSept.				rtilizers a ilizer Mat	erials	Explos	ives, Fuse			p and To reparation	ns
Area and Country	1939	1945	1946	1 1939			1 1939			1 1020		
Area and Country North America: Canada. Costa Rica. Cuba. Guntemala Mexico. Neth. W. Indies. Panama. C. Z. Panama.	ar	nd Varnis	hes JanSept.	Ferti	lizer Mat		Explos 1939 1,069 161 39 154 12 317 8 71 14 1,462 51 201 201 211 211 211 4		es, etc. anSept. 1966 1,651 165 35 160 7 885 6 83 17 1.298 98 98 75 4 284 225 * 231 264 * 157 22 65 * 19 - 157 28 4 264 * 19 - 10 - 226 * 37 28 4 28 28 28 28 28 28 28 28 28 28	Pri 1939 2,836 697 67 210 200 178 271 265 1,313 44 156 16 313 44 156 16 36 16 367 16 367 16 367 16 367 16 367 16 36 16 16 175 26 313 44 16 16 175 26 313 44 16 16 175 26 313 313 116 156 167 175 26 313 313 116 156 167 175 26 175 26 175 26 175 26 175 26 175 26 175 26 175 26 175 26 16 175 26 16 16 16 16 16 16 16 16 16 1	reparatio: J 1945 7,410 1,027 322 328 298 1,037 625 328 298 1,037 625 3864 4,066 111 886 980 930 244 344 344 80 930 244 345 930 945 955 9,546 921 2231 * 755 608 847 41,760 41,775 608 875 355 237 237 237 237 237 237 237 237	
Africa	1,202	$1,803 \\ 56$	1,856	541	32	121	10	222	60	10 683	3 3,140	2.824
Egypt. Union So. Africa	45	1,031	=	230 187	4	* 6	_	_	=	81	956	382
Total, All Countries	22,762	30,799	37,403	16,991	18,259	17,591	4,999	16,430	3,541	458	1.338	1,692
* Less than \$500.	1 61								-,	10,271	28,529	28,271

* Less than \$500. Source: Compiled in the Chemicals & Drugs Division from data supplied by the Bureau of the Census, U. S. Department of Commerce, PRODUCTS .-Sept.) 1946

Industrial One

1939 144 12.800 27.40 7.856 11.0 m 11.0 m 2.865 10.0 m 11.0 m 2.865 10.0 m 11.0 m 8.0 10.0 m 11.0 m 9.0 m 11.0 m 11.0 m 9.0 m 11.0 m 11.0 m 9.0 m 11.0 m 11.0 m 11.0 m 9.0 m 11.0 m 11.0

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Rubber

1947 Showdown Year

I. V. HIGHTOWER

Washington Correspondent, Chemical Engineering

OVERNMENT'S \$700,000,000-million-ton synthetic rubber busi-J ness, which private industry hasn't shown signs of wanting to pur-:hase under existing uncertainties, oes into 1947 for a show-down with natural rubber.

Most recent opinion is that world vailability of natural rubber next year anay reach 1,200,000 tons, a sharp rise wer the 1946 figure of 850,000 tons. Government regulations controlling he consumption of synthetic are cheduled to expire March 31. Recent eductions in manufacturing costs of GR-S have made it competitive with hatural rubber selling at the present price of 22.5c. Under most economic nanufacturing conditions GR-S may up toon sell, with a profit, at around 17c. However it would not be competitive, *** *** except for limited specialty uses, at hat price if protective legislation were

helved and if natural rubber were to Sagual The helved and it natural tubber were to Preparative sold again in New York, as it did 199 Is in the last few years before the war,

Consumer Acceptance

Consum GR-S's big handicap is the fact that sonsumer acceptance of this rubber in ires is grudging and uncertain. The ttitude might spell disaster for the GR-S market if all protective legislation were to be abandoned and if some 388 SS 1,479 LM dvertisers began featuring 100 percent natural rubber in their products. information is that some tire retailers re stressing the fact that their tires have much higher percentages of natural rubber than they had a year 250 ago. The fact that for numerous purposes GR-S is fully equal or superior to the natural material is not too well known among consumers. Even less familiar is the fact that GR-S, when 加加 blended in proper proportions with natural rubber, produces passenger tires that are at least the equal of prewar all-natural tires.

28 5 1.685 It is GR-S, the product which 10 683 7,14 81 956 458 1,838 10,271 28,529 amounted to 85 percent of total synthetic output in 1946, which is on wthe competitive hot-spot. The Inter-Agency Policy Committee on Rubber

has said that "Both butyl and neoprene have already achieved a position competitive with natural rubber because of their special properties, and the Committee believes that this position is likely to be maintained for some time."

Costs

GR-S is today in a much better position, cents-wise, for its battle with natural rubber. The table shows outof-pocket average manufacturing costs, which exclude amortization, profit, and Washington administrative expense. Data for 1946 are estimated on the basis of 1945 figures and other information.

Cost, Govt. Production, C. per Lb.

	1942-3	1944	1945	1945 Lowest	1946
R-S R-M (neoprene). R-I (butyl)	$35.3 \\ 28.9 \\ 71.2$	$30.7 \\ 23.9 \\ 26.8$	$\begin{array}{c}23.1\\22.3\\16.3\end{array}$	15.7 19.0 13.0	$13.0 \\ 9.0 \\ 12.7$

In general, the out-of-pocket manufacturing costs have dropped from the early high levels as initial operating difficulties have been overcome and as production has climbed. In the case of GR-S the principal reason for reaching the 15.7-cent low point during 1945 was a sharp reduction in the average cost of butadiene.

Other reasons for lowered costs of GR-S center about improved yields in the plants producing butadiene and styrene, increases in the efficiency of utilization of butadiene and styrene in the copolymer plants and economies in the packaging and handling of the rubber. The downward trend of GR-S costs indicates that the rubber may be sold, profitably, at the range of 16 to 18c. per lb. The Office of Rubber Reserve has estimated that on the basis of butylene (raw material for butadiene) costing 10c. per gal. and styrene at a post-war cost of 5c. per lb., the out-of-pocket figure for GR-S may drop to as low as 10.7c. per lb. If to that figure is added an amortization, selling expense and profit item of 6c. (based on GR-S production at or near capacity) a total of 16.7c. is reached.

In February, 1946, the Inter-Agency Policy Committee on Rubber said that "assuming a reasonable amortization and fair profit, it is anticipated that the price of GR-S to the consumer may eventually be approximately 15-16c. per lb." Last summer one of the tire manufacturers estimated that GR-S could be made and sold by private industry at a 600,000 ton per year rate for between 15 and 17c.

How 17-cent GR-S compares in price with the gyrations of natural rubber may be seen from the accompanying table. The period covered includes the first world war, the short depression in the 20's the British Rubber Restriction Period of 1922-28, the 1929-33 depression and the International Rubber Regulation Period of 1934-41. The prices shown are averages. In the period in question "highs" reached the maximum figures of \$1.13 in 1913, \$1.02 in 1916 and \$1.12 in 1925. On the basis of the prices in the table, the unweighted average for 1935-40 was 16.86c. per lb.

New	York	Whole	sale 1	Rubber	Prices
Pl		Ribbed		ed Sheet	з,

	C. per	Lb. (Averages)	
Year	Price	Year	Price
1913	82.0	1928	22.6
1914	65.3	1929	20.6
1915	65.7	1930	11.9
1916	72.5	1931	6.2
1917	72.2	1932	3.5
1918	60.2	1933	5.9
1919	48.5	1934	12.9
1920	35.9	1935	12.4
1921	16.5	1936	16.5
1922	17.3	1937	19.4
1923	30.7	1938	14.7
1924	26.4	1939	17.9
1925	73.0	1940	20.2
1926	48.7	1941	22.3
1927	38.1	1942	22.5

Rubber authorities are optimistic that through further research a general-purpose rubber, perhaps a modification of GR-S, equal to or better than the natural product for all uses will be developed. However, they consider that in the meantime the price of GR-S, now sold by the government at 18.5c., must remain several cents below the price of natural rubber, now 22.5c. if high-volume usage is to remain. Assuming that GR-S were sold, at a profit, at 17.0c., it would still be crowded to the ropes by natural rubber, if freely competitive conditions were allowed to prevail, when and if the natural commodity should again enter the country at the average price of the last five prewar years-16.86c. per lb.

Most rubber officials and rubber manufacturers consider that legislation to succeed the expiring wartime con-trols is essential, though views as to means required differ considerably. Plans for legislation are being whipped into shape in Washington for submission to Congress early in 1947.

DEATH By the Granulator

CROSBY FIELD

Colonel, Ordnance Department Reserves, U.S.A.

STUDY OF THE MISSILES RESULTING FROM ACCIDENTAL EXPLOSIONS YIELDS MUCH INFORMATION AS TO THEIR CAUSES

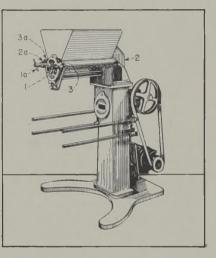
THIS INVESTIGATION started just after midnight, and was completed before sundown. It had its share of misinforming eyewitnesses, its peculiarly hidden missiles, and many conflicting and rationalizing personalities. Although the amount of explosive material was relatively small, nearly a score of persons were killed and three times that number injured.

The product had been manufactured in one part of the plant for a considerable period, but the increasing war demand necessitated use of additional space. Another part of the plant was converted to its production, and this unit had been in operation on a two-shift basis for only two days, when the explosion occurred. The unit consisted of several small buildings constructed of wooden frame with metal, wood or plasterboard sheathing and metal roofs, and separated from each other.

Building No. 1 was divided into three rooms by two wooden partitions extending from east to west (right to left). The northern room was used as a weighing room, the southern as a dry room and the middle for raw material storage. The building was of wood construction and had sprinklers. Access to the dry room was obtained from an outside door on the east wall (right). Raw materials stored in this building were strontium nitrate in drums, magnesium powder in metal containers, shellac in containers, and a small amount of beeswax.

A batch of a standard weight, less than 15 lb. total, was made by screening, weighing and hand blending the strontium nitrate and shellac in specified proportions in Building No. 1. It





The last batch had been placed in granulator when explosion occurred

was carried by hand in galvanized iron pails to Building No. 2. In the former beeswax and carbon tetrachloride also were mixed and carried to Building No. 2. In No. 2 the nitrate and shellac mixture was placed in a steam jacketed mixing machine and the carbon tetrachloride and beeswax were poured on top.

Powdered magnesium was screened and weighed in Building No. 1 and then carried in a conductive rubber container holding the correct weight to No. 2 where it was poured into the mixing machine while it was running. This machine was a miniature of a standard dough mixer having two sigma blade agitators. After this mu had been finished it was carried 65 ft. to the small shed No. 3 for an operation known as granulation.

Granulator

This operation was performed in a machine shown in an accompanying diagram. The operating part of this machine was a 12-mesh bronze screen through which this mix was forced by means of an aluminum rotor having phenol (Texolite) plastic blades. These blades were held in six aluminum arms and the feed hopper and other parts exposed to the mixture were aluminum. The screen was held in position by having its width just

The first of several cases of how Colonel Field and his organization solved the baffling investigations of the causes of accidental explosions during the recent World War appeared in the January issue of Chemical Engineering. A second in the series appears here. These engineers found that when discrepancies arise between stories of eyewitnesses and conclusions forced by a complete missile study, the latter will usually prove to be the more reliable.

qual to the length of the hopper and ie ends being inserted in slots in lafts 2 and 2a. By means of the pins and 1a and the pawl and ratchet and 3a in these shafts the screen was olled up on both shafts until it beime taut against the blades. The otor was given an oscillatory motion, 1at is, the blades rotated one comlete revolution in one direction and ien reversed. This motion was obtined by means of a pinion and segiental gear operated by an arm conected to a crank shaft driven by a lotor through a reducing gear and elt. Trays were placed on the rods rving as arms and these trays were ken individually to the dry room in ie south end of Building No. 1.

ACCIDENTA The day shift was due to be relieved ithin the hour. The last batch had 0 THEIR CAlleen placed in the mixer when the plosion occurred. After the exploon the grounds looked as shown in te picture. Buildings No. 1, 2, 3, 5, 6 and 7 were destroyed. The

ride and beeswar wat ind was blowing from the northwest id it is interesting to note that all wdered magnetim fuildings to the north that were dereghed in Bullin kroyed were damaged only by blast carned in a configuressure and all buildings to the south

amer holding the any both blast pressure and fire. 10.2 where it was poor This explosion was comparatively ng machine while it was y to investigate because it was obvimachine was a mus at first glance that the initial dard dough min kplosion was either in the dry room a blade agitators. Mef Building No. 1 or the granulator in been fmished it mucho. 3. Numerous eye-witnesses saw ne small shed Na 36r heard two explosions, and the naknown as granulation are of the materials and the appearnce of the grounds both indicated

hat there were at least two explosions. Granuleio: contrary to first impressions these did

ot originate in No. 1, although most in some of the damage done was because of the some in the larger quantitiy of explosives in

am. The open is building. ine was a lime Fortunately all steam piping to the set which the matrix ranulating building, No. 3, was of a as of an aluman nuch smaller size than the steam (Texolite) iping to the dry building, No. 1, and se blades were had arge sections of piping were tossed arms and the has bout by the explosion. In each case er parts erposed to he piping leading to No. 3 lay undere dominer The sector the piping originally going to poster to here two is two is the sector of the s

rel Field and his organ

Pipe as Evidence

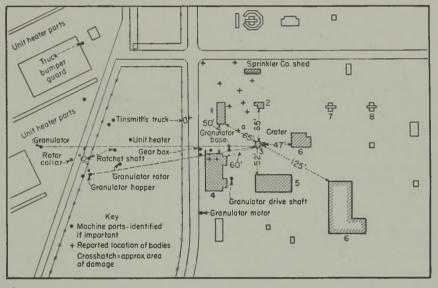
mues of activated by Note that the finding of a few the family interpreters of pipe would not have been the family interpreters of pipe would not have been tial lengths of since when, nowever, tial lengths of pipe were mated in this dories of equilibrium fashion the evidence may be consid-

ly, the latter will pered conclusive.

One of the most intelligent witnesses saw the explosion from his car,



Screen shaft from granulator was found in a tile pipe in a pile shown in the foreground. Other shaft was picked up alongside of nearby trailer



Detailed missile map of principal machine parts in Building Nos. 1 and 3

and was convinced that Building No. 1 exploded first. It was not until we placed him in his car at the spot he said he was and headed in the direction he had been going that he realized he had seen the explosion in his rear view mirror, and had failed to appreciate the left-right inversion in that view.

A detailed missile map of the principal machine parts in both Buildings 1 and 3 was made. The concrete foundation of the granulator remained substantially intact. A 7 ft. x 7 ft. crater about 19 in. at its deepest portion was found directly east of this foundation. The granulator had been held to its foundation by four bolts which had been sheared off in such fashion as to demonstrate that the granulator had left its base in a motion directly away from the crater and

with its eastern side raised slightly. The two east bolts were sheared off directly. The west bolts had bent to the west before shearing, thus showing a slight tilt around the west edge of the foot of the granulator.

Having determined that the granulator explosion occurred first the problem of determining the location of its initiation and its cause was solved by studying the missiles. It will be noted that the granulator hopper, granulator rotor gear box and similar large pieces, traveled almost in a straight line. The survey was made with only a pocket type surveying compass, and lineal distances obtained in most cases by pacing. It was noted that all these parts lay within two radii with the crater as center and separated from each other by an angle of about 10 deg.

Study of the granulator hopper and

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its rotor failed to produce any indication of burning. The bronze screen could not be found. Screen shafts evaded search for a considerable time but the first was found by investigating the interior of a tile pipe in a pile shown in the foreground of the picture. This tile pipe was chipped on its eastern edge and inside the pipe was found one of these shafts. The other shaft was picked up alongside of the trailer nearby.

The shaft found within the pipe had decided markings of flash burning on it near the ratchet and on the ratchet itself. The second shaft showed these same markings but to a lesser degree.

Little in Granulator

It was obvious therefore that the explosion had occurred when there was very little material left in the granulator otherwise there would have been flash or burn markings on the hopper and other parts as well as on the shaft. It is also obvious that this flash communicated itself outside of the granulator proper. What could have caused the mate-

What could have caused the material to flash at this end of the rotor? Examination of the recovered parts of this granulator, and the disassembly of an identical machine and careful consideration of its parts and subassemblies, disclosed rubbing surfaces between which the explosive powder could penetrate.

This penetration could have been increased by any forcing of the material through the screen by additional pressure near the ratchet end of the hopper. Was there such additional pressure and how was it applied?

The body of the operator was found in the location indicated by the cross marked a on the missile map. She had been propelled from her original location with sufficient force to split open her skull against a steam pipe pole support and scatter her brain. She carried with her a sheet rock "cleaning paddle" used not only for cleaning but also sometimes for forcing the last of the mix through the screen. This paddle was found on the ground near her hand.

Because of this high velocity the horizontal projection of her path of flight very closely approximates a straight line. Drawing this in its proper vector relation to the horizontal projection of the trajectories of the granulator parts and the center of the crater shows that at the moment of the explosion she was standing right over the end of the rotor, with her paddle in hand, probably forcing the mix through the screen. There was ample incentive; she was finishing the next to the last batch for her shift; the last batch had already been placed in the mixer in Building No. 2 and would arrive at her granulator within the next few minutes; she could hear the employees in Building No. 1 cleaning up and preparing to leave.

Whether or not she was actually forcing the material is not of great importance, it only makes the ensuing flash more certain, and the burn markings show that such a flash did occur.

But how could so small a flash cause such great damage? Unaccompanied by a most unfortunate set of circumstances it couldn't; at its worst the burning of a pound or two of mix in the tray just under the hopper and the severe (possibly fatal) burning of the operator, was all that could have been expected.

Further investigation of the premises and interrogation of surviving employees disclosed the following facts: Production was being crowded, and about three times the normal weight of granulated mix was being placed in the trays under the granulator screen. This overloading slowed down the next step of the process, the dry room in Building No. 1. Some four or five hours previously the man whose job it was to carry the travs one by one from the granulator room to the dry room found no space left in the racks in the dry room. He stopped his work, and disappeared into the cafeteria (Building No. 4) where he was later killed.

Unexpected Spot

No one in authority stopped the flow of material or took other remedial action. The granulator operator had to put her finished trays somewhere, or stop work. She found a most unexpected spot.

A small room or closet had been added to the east wall of the granulator room by a lean-to type of wooden construction. In this was to have been placed air-conditioning equipment. Considerable piping already had been installed, but worst of all a 2 ft. sq. hole had been cut in the granulator room wall for a flue and this opening was approximately at the level of the trays on their rods under the granulator screen, and a short distance away. Into this closet she piled her trays until she had at least 125 lb. of mix in one pile, and possibly twice that amount. We know however from the size of the crater left by the exploding pile and the damage to adjoining buildings that the amount which exploded was somewhat more than 125 1b.

The course of the explosion is now plain. Starting with a friction produced flash in a small amount of en plosive in the granulator screen, it ignited one or more trays of the min under the screen; this communicated through the hole in the wall to the pile of trays in the adjoining closet this exploded, hurling the granulator parts and other missiles about. Some of these hot high velocity fragments penetrated the walls of the dry room and ignited the contents of some of the trays on their racks. Some of this, (probably the wet material) ignited and burnt. After some five or ten seeonds more had elapsed, the burning material exploded in a mass. This second explosion showered killing missiles all about, and also flaming embers into the blast shattered cafeteria build ing, No. 4, and the work buildings No. 5 and 6, and others to the lee. These buildings, with their blast trapped and injured personnel, took fire.

Corpses

Although the physicians examining the corpses stated that in certain case death was due to fire, which was probably true from a strictly medical viewpoint, yet all bodies thus certified a dying from fire, when further of amined, showed mortal injuries received prior to the fire. These injuries were all of one or two classes, --- (a) the person had been hurled against some solid object with resulting smashing of the skull or other mortal injury or (b) high velocity fragments had penetrated the body. In both cases the deaths were due to movement of solid bodies and not due in any way to the direct effects of concussion on a human body.

Most of the death-dealing missiles appeared to be small sections of pipe and fittings.

Weather data were obtained from the meteorological officer of an air base nearby. These indicated that the temperature at the location of the explosion at the time thereof was probably 59 deg. F., the wind was in the neighborhood of 20 m.p.h. and the dewpoint of the air was 33 to 34 deg. (relative humidity 10 percent).

Many other interesting studies were made of this explosion which eventuated in recommendations for better procedure. The cause may be stated to have been local overheating of a thin film of the mix being granulated at the forward end of the granulator rotor due to extreme pressure at some point be tween the moving rotor and its stationary guide or its screen. This local overpressure may have been increased by manual pressure applied by the operator by means of a rock sheet paddle.

Plastic Fabrics

E. C. FETTER

Assistant Editor, Chemical Engineering

xploded, hurling is and other mode FILTER CLOTH, strainers, trays, texe hot her we veyor belts and other industrial fabrics are now being made in fabrics from Saran, fabrics are now being made in guided the walk of ommercial quantities from Saran, guided the walk of ommercial quantities from Saran, low Chemical Co.'s thermoplastic inyl- and vinylidene chloride copoly-obably the walk of the norm of pipe, fittings and d bunt. After more abing Saran gained wide acceptance is more had down with the nast four or five years on the more had care using Saran gained while acceptance using the past four or five years on the control of its chemical resistance in the strength of its chemical resistance in the strength of its chemical resistance in the strength of the a strength of its chemical resolutions of all acids, alkalis, and solvents all about additioned of the main exceptions being amthe blat defined nonium hydroxide and oxygen-bearing Naturdite missivents like dioxane and cyclohexad and other to the none. (See "Properties and Applicadings, with ther bas ons of Saran Pipe," Chem. & Met., red personnel background of Sarah Tipe, end the fabrics

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in the granulate one or more tran

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every bit as good as the pipe.

Corpse Saran fabric is available in all the imiliar weaves-and many special though the plane mes-from open screen cloth to tight corpses stated that matins, twills, and herringbones. Cona was due to firs, midering the short time it has been on true from a strict the market, the number and diversity t ret all bodies that f applications is surprising. Some of g from he, who hem are: Filter cloth in cider presses, ed, showed more einforcing for the felt belt of a paper d prior to the fire. That chine and for the paper liners of all of one or two dathipping containers, drying trays and on had been hudd ags in the cheese industry, storage object with resulting attery separators, coverings for blowhull or other mostly rs in corrosive atmospheres, and a velocity fragments onveyor belt (which also acts as a hode In hoth are liter) in a phosphoric acid plant. One due to movement of the new fabric's biggest advantages, aut to monutate f course, is its chemical resistance. As s of concession of a lating tank netting (see cut) it shows of the dedde to sign of deterioration after a full ear, where cotton netting lasted only ared to be small set hree or four weeks. Longer life is also ittings. eported for Saran filter cloths being eather data were di used with filter aid on rotary vacuum neteorological officer ilters handling ligneous liquor in the w. These month. paper industry. Chemical resistance is ure at the location Iso important in yet another applicaat the time tilled ion, conveyor belts in a photo develop-F. the will me ng plant, but this one is more interesting in focusing attention on a sece air was 35 to 34 ond of the fabrics chief attributes, the idity 10 percent! ease with which it can be cleaned. an other mierodal. Being woven entirely of monofilae of this epilon ments, it doesn't "soak up" liquids and in recommendation can be cleaned completely and easily due The action with a simple water rinse or even an teen load outdots air jet. For this reason it has been the mit being widely adopted for conveyor belts and end of the grade trays in processes where carry-over ne presente d'all'must be prevented—like the photo dene moving nor veloping plant just mentioned—or ide or is see where it is important that there be re may have be no swapping of odors, colors, or

ns of a rock shed CHEMICAL ENGINEERING • FEBRUARY 1947 •

HEMICAL ENGLY

tastes from one batch to the next, as in the case of the soap drying trays in the illustration.

To wind up the credit side of the ledger, the filaments have reasonably good tensile strength, about 47,000 p.s.i. at room temperature, and monofilaments (it's another story with multi-filaments) have excellent abrasion resistance.

Now on the debit side, the biggest headaches stem from the fact that the material is thermoplastic and a monofilament. Saran doesn't soften and get tacky until 240-280 deg. F., but at 200 deg. F. the monofilament retains only about 70 percent of its roomtemperature tensile strength, and above 150 deg. F: it shows a tendency to shrink. Shrinkage, incidentally, is a consequence of the way the filament is made. After being hot extruded at twice its finish diameter, it is immediately cooled to an amorphous state, then drawn out about four-to-one. Cold drawing causes crystallization and at the same time orients the crystals longitudinally, which gives the filament elasticity and high tensile strength, but also makes it subject to 12 to 15 percent shrinkage.

The disadvantage of being a monofilament shows up in cloths for filtration of very small particles. In the first place, the filaments are elastic and cannot be packed on the loom as tightly as a multifilament natural yarn. And secondly, the process fluid can only pass between the filaments, not through them as it can through a natural yarn. The upshot is that the removal of very fine particles and the maintenance of high flow rates cannot be achieved simultaneously, although either is possible if the other is not required. Multifilament Saran yarn, which would eliminate this shortcoming, can be produced but its abrasion resistance is not yet good enough for filter cloth. Research is in progress and it is hoped that abrasion resistant multifilament Saran will be on the market in a year or two.

At present, the largest weaver of Saran fabric is the Chicopee Manufacturing Co., which got started in the business late in 1940. Throughout the war all monofilament Saran cloth, of which Chicopee supplied by far the largest portion, was drafted for insect screening in tropical areas, where it outlived bronze screening several times over. Come reconversion, the company switched to domestic window screens, launched a colorful line of decorative fabrics, and finally in November, 1945, began pushing industrial applications. Its mill at Cornelia, Ga., completed early in 1946, is the first in the country to be designed and built exclusively for weaving plastics. Except for experimental runs with other plastics, the mill is devoted entirely to weaving a variety of monofilament Saran fabrics, all of which are marketed under the name "Lumite."

Filament diameters for Lumite range from 21 to 8 mils, widths up to 74 in., and cost from \$2.75 to \$4.70 per sq.yd., depending on weight of the material and filament diameter. The tightest cloth now being woven uses 8-mil filament and has 120 warp ends and 56 picks per inch. Closer weaves may soon be possible using 5-mil filaments, which are now being woven experimentally.

Saran screen cloth, framed, makes drying trays for soap (left), catches small objects that drop from plating racks in electroplating tanks (right)



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Commercial Production of ENZYMES

J. A. SHELLENBERGER

Head of the Department of Milling Industry, Kansas State College, Manhattan, Kan.

MANUFACTURING PROCESSES OF A SMALL BUT SIGNIFICANT SEG-MENT OF THE CHEMICAL INDUSTRY ARE GENERALLY OUTLINED

E^{NZYME} production is a little known and highly specialized branch of the chemical industry. Employed in fermentation processes and in leather tanning for centuries, enzymes, in more recent years, have gained commercial significance in a variety of other processes including tenderizing of meat, desizing of cloth, converting starches for sizing of paper and textiles, and in the preparation of corn sirups and fruit extracts. Produced by the life process of living cells, enzymes are unstable complex organic compounds which have the ability to bring about various chemical reactions.

With the exception of those extracted from animal glands, enzymes are obtained commercially from fungal and bacterial growth. Specific processes are required for the manufacture of different enzymes but the flow diagrams shown represent typical commercial methods. Most important of the process variables is temperature and enzymes are easily inactivated when subjected to adverse conditions. Of major importance, too, is the maintenance of aseptic conditions in the incubating chamber to prevent contamination. Many difficulties are involved in preparing and distributing large quantities of sterile medium and of inoculating the medium under aseptic conditions with the desired type of microorganism. Careful process control is essential to successful manufacture of enzyme products.

Fungal Enzymes

Although a variety of carbohydrate raw materials can be used as media for the growth of fungi, wheat bran has been used most extensively. The bran is first cooked for about an hour by direct steam under pressure to gelatinize the starch and sterilize the mash.

After cooling to about 40 deg. C., the media is prepared for transfer co the growing chambers by adjusting the pH, by adding mineral salts and inoculating with the desired mold culture. Although the pH range is not critical, it should be on the acid side. Addition of lactic acid can be used to bring the pH of the mixture to an approximate value of 6. It isn't always necessary to add mineral salts to the medium such as in the production of amylase using wheat bran. If inorganic salts are required, potassium phosphate, magnesium sulphate, sodium nitrate and ferrous sulphate will usually produce the desirable growth conditions.

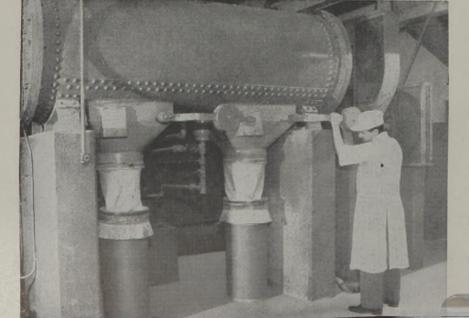
duce the desirable growth conditions. Optimum growth conditions are controlled by regulating the temperature of the chambers. It is usually necessary to warm the moldy bran layer at the beginning and to cool when growth becomes rapid. Temper ature for the first 24 hr. may be maintained at 32 deg. C., but when the cake begins to heat as a result of active growth, the temperature of the growing compartment is reduced to about 26 deg. C. After four days the mold mycelium will have matted the medium together and enzyme production will have reached a maximum.

Moist culture, on removal from the

Left—Enzyme materials are dried in this vacuum dryer before pulverizing

Below—High speed grinder for pulvetizing dried enzyme prior to blending





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am such as in the

ise using wheat bail

growing chambers, is dried in either otary or tray dryers. Highest temperaure of the material should not exxeed 100 deg. C. because, if subjected :o higher temperature, the enzymes would be inactivated. Initial temperature depends on moisture content of the culture, type of dryer and size of charge. After drying, the material is broken up by grinding and may be marketed as is or processed further.

For the production of concentrated and standardized enzyme, the dried mold bran is extracted with water, filtered, and the enzyme precipitated from the filtrate by successive additions of ethyl alcohol. The precipitate is IGNIFICANT then separated from the liquor in centrifuges, dried in a vacuum dryer,

ALLY OUTMand blended to obtain a final product of uniform activity. Here too, drying temperatures must be carefully controlled and should not exceed 55 deg.

trolled and should not entrations that the active and be manufactured by the above or the pH of the misimilar methods include amylase, promale value of 6. I tease, protopectinase and pectinase. ary to add mined

Bacterial Enzymes

Commercial production of enzymes tesium sublate by the action of bacteria on nutrient errous sulphate a medium is a more difficult process to the desirable great control than when molds are employed binum growth for the same purposes. It is more difalled by regulation ficult to avoid contamination in the of the chambers bacterial process and a more complisary to warm the cated plant layout is required.

Soybean meal is a common raw maat the beginning a growth becomes terial for bacterial medium if amylases for the first 24 m are to be manufactured. A slurry of dat 32 deg C, bala water and soy meal is sterilized, cooked s beta ar for about 3 hr. at 15 lb. per sq.in. h, the temperature steam pressure, and predigested by the addition of proteolytic enzymes. After this treatment the medium may be g. C. After four da filtered. The pH of the predigested medium is adjusted to a value of about her and enzyme pa 5.5, nutrient salts added if necessary, and the solution sterilized for 2 hr. oist culture, on and under pressure. When cooled the medium is inoculated under aseptic conditions, with the desired pure bacterial culture and the solution delivered to the growing chamber.

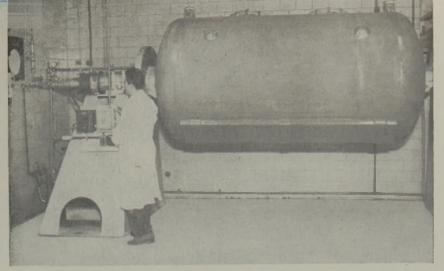
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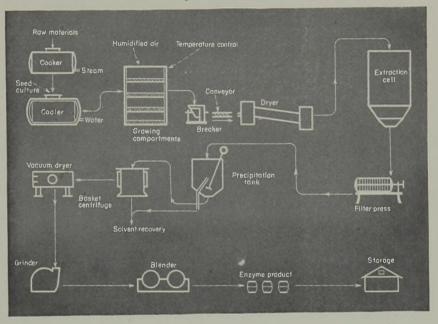
Maximum enzyme development occurs when the medium is placed in m-Hich year shallow containers and the oxygenng dried engree point carbon dioxide tension carefully regulated during the growing period. After a firm pellicle has formed over the medium, production will have reached its limit and the solution can then be centrifuged from the shallow trays.

After the solution is passed through the filter press it may be marketed in liquid form or a precipitated concentrate may be prepared by the same processes as previously described for fungal enzymes.

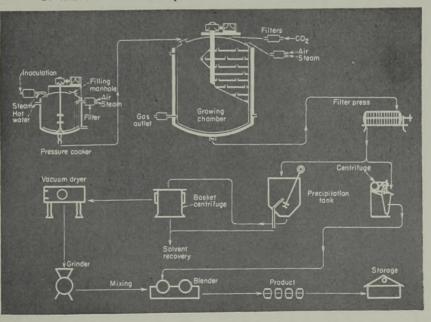


Cooker for preparing material for propagation of enzyme growths

Generalized flowsheet for production of fungal enzyme materials



Generalized flowsheet for production of bacterial enzyme materials



GRAPHITE HEAT EXCHANGERS

C. E. FORD

Asst. Mgr. Specialties Dept., National Carbon Co., Cleveland, Ohio

GENERAL PRINCIPLES OF DESIGN AND SPECIFIC EXAMPLES OF PERFORM-ANCE. THE SECOND OF TWO ARTICLES ABOUT IMPERVIOUS GRAPHITE

EAT EXCHANGERS using impervious graphite can be manufacquired, but in cases where graphite tube sheets are employed the amount of surface area is limited to about 600 sq. ft.---this because the maximum diameter of graphite tube sheets is 29 in. When 600 sq. ft. must be exceeded, the surface should be split into two or more units or a different tube sheet material chosen. In cases where other tube sheet materials will withstand the corrosive condition but are not suitable from the heat transfer standpoint, it is possible to employ packed joints rather than cemented joints, using Neoprene gas-keting material or synthetic rubber between the tubes and tube sheets. By this arrangement shell diameters can be carried to almost any size.

Floating Head Construction

Since graphite has one of the lowest coefficients of thermal expansion of any known material (about one quarter that of cast iron), it is necessary to employ a floating head design when cemented tubes are used in combination with metal shells. One tube sheet is clamped to the shell in fixed position, with latitude of movement allowed at the opposite tube sheet. Typical methods of construction are shown in Figs. 1 to 3. These drawings illustrate principles of construction rather than exact details of design, however.

Fig. 1 shows the floating head enclosed in a metal cover with packing around the nozzle. This principle of construction is extensively used, especially where pressure is relatively high on the shell side.

Fig. 2 shows a double packed joint on the periphery of the floating tube sheet, retained by the fixed dome. Separation of the two packed joints by a lantern ring prevents interleakage of the two fluids. Impervious graphite shell and two-pass flow are shown in this drawing, but the principle of construction is also applicable to metal shells and to single-pass or multi-pass flow, side nozzle in dome, and other modifications. This construction and that shown in Fig. 1 may be preferred where steam is used in the shell.

Fig. 3 illustrates the use of a flexible diaphragm between the shell and the floating head to seal the fluid in the shell and allow for the difference in expansion between the shell and the tube bundle. This construction is often used for condensers, absorbers, and low shell-side pressure applications. It is well adapted to the use of side nozzles on the floating head.

Multi-pass tube flow is readily accomplished by the use of machined impervious graphite domes; and shell side baffling presents no special problem, since all the conventional types of baffling have been used successfully in this equipment.

For the most economical tube layout, a 60 deg. triangular pitch is employed. The minimum distance between outside diameter of tubes (web) is $\frac{3}{2}$ in.

Bundle Sizes

An estimate of the number of tubes in a given tube circle diameter, usually accurate within ± 5 percent can be obtained from the following formula: Number of tubes = $0.91 \times$

$\frac{\text{Dia. of tube circle} - \text{O.D. of tubes}}{\text{Triangular pitch}}^{i}$

Tubes of $\frac{1}{2}$ -in. and $\frac{3}{4}$ -in. I.D. are available in 6-ft. lengths and other sizes in 9-ft. lengths. The maximum length between the inside faces of the tube sheets is 5 ft. $8\frac{3}{4}$ in. for the 6 ft. tubes and 8 ft. $8\frac{3}{4}$ in. for 9-ft. tubes. Where design conditions permit, it is

The first of this pair of articles appeared in January and reviewed the physical, thermal, and corrosion resistant properties of impervious graphite. Now we are interested in seeing how the material works out in the actual design and operation of heat exchangers. We find that through special fabrication techniques, some of which are cited, graphite has been adapted to a wide variety of constructions. Operating data from twelve installations are given as examples of efficiency. most economical to use tubes of maximum length.

Babies are Standard

While larger tube bundles having up to 650 sq. ft. of external surface area are built to specification by heat exchange fabricators, there have been developed standard design seven-tube exchangers in three smaller sizes for pilot plants, pharmaceutical manufac-ture, or for all types of plating, pickling or heating processes to which external heat exchangers of smaller unit surface area are adaptable.

These standard exchangers have seven 1-in. I.D. \times 1¹/₂-in. O.D. tubes PLES OF PERM inside a standard weight 6-in. steel pipe of 36, 72, or 108-in. lengths, and will carry a working pressure of 50 p.s.i. on both the tube and shell sides. Water, brine or steam are suitable on the shell side. The units can be employed interchangeably as heaters, coolers, boilers or condensers and operated either vertically (supported from the flange at the fixed end) or horizontally (supported by a saddle or other device). They have found wide use as heaters and coolers for nickel plating solutions, as heaters and coolers for the chlorination of alcohol in DDT manufacture and as a reflux condenser on the vessel itself.

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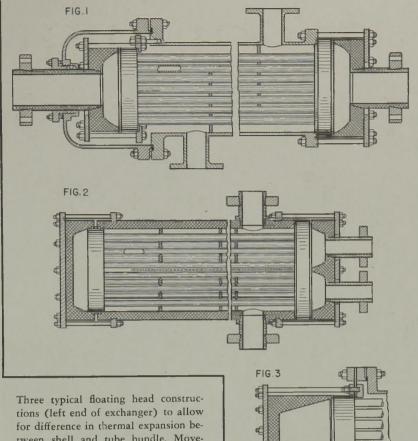
Triangular pitel

equipment. the most economical

> A unique feature of their construction is the combination of the tube sheet, dome and nozzle into one monolithic piece, which eliminates packed joints for the corrosive liquid and reduces the number of gasketed joints on the fluid side to one gasket at each nozzle. Floating head construction is employed with the stuffing box at the floating head end.

> Impervious graphite articles can be used freely in combination with rubber-lined, glass-lined. Haveg or other non-metallics, which makes possible the design of special equipment which formerly was not thermally efficient due to the materials that were available for fabrication. This advantage is particularly useful in the construction of evaporators, which now can be built with tubes and sheets of this material combined with chambers of an allow or of steel lined with rubber. ceramics, glass or lead. This results in heat transfer surfaces of high conductivity combined with insulating surfaces of low conductivity. When used in combination with metals, consideration has to be given to the possibility of electrolytic action.

> The standard nozzle connections on these exchangers permit ready installation with piping connections of almost any material of construction.



tween shell and tube bundle. Movement is permitted in Fig. 1 by metal cover over floating head and packing around nozzle; in Fig. 2 by double packed joint on periphery of floating tube sheet; in Fig. 3 by flexible diaphragm between shell and floating head

Where severe corrosion problems exist, it is often desirable to employ lines and fittings of impervious graphite throughout the entire system.

Cemented joints are usually employed when elements are assembled in the manufacturer's plant and the resulting bonds are normally stronger than the stock. Field joints are readily made with threaded, flanged or with Flexlock* joints. Where connection to elements of the processing system necessitates latitude of movement, standard flexible connections are available. In the rare instances where field repairs are necessary, the casy machinability and adaptability of the maaterial makes any replacement or alteration extremely simple.

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Through the cooperation of a number of leading fabricators of impervious graphite tube heat exchange equipment[†], several examples of impervious graphite tube heat exchanger ratings have been made available and are listed below. The reader should bear in mind that these are application and design data and not just information gained from an occasional test. However, precise details regarding the composition and proportion of the fluids carried may not be disclosed, and users who might attempt designs based on these examples would do well to rely chiefly upon the broad experience of the fabricator who builds their units.

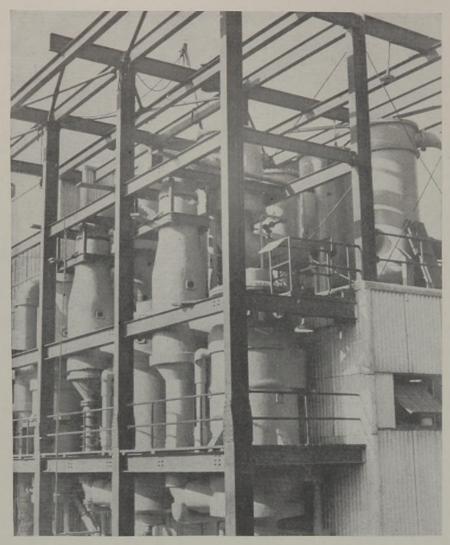
Acetone Condenser

Performance Design - Total heat transferred, 9,300 B.t.u. per hr., con-densing 41.5 lb. per hr. of acetone isothermally at 134 deg. F., and 14.7

CHEMICAL ENGINEERING • FEBRUARY 1947 • MICAL ENGINE

^{*}Registered trade mark of the Flexlock

^{*}Registered trade mark of the Flexlock Orp. The author gratefully acknowledges the cooperation of many fabricating companies which assisted with specific examples and design data as well as editorial review. The leading fabricators in this field are: Alberger Heater Co., American Locomotive Co., Buflovak Equipment Division of Blaw Knox Co., Croll Reynolds Engineering Co., Downingtown Iron Works, Fansteel Metal-lurgical Co., Foster Wheeler Corp., Goslin Birmingham Manufacturing Co., M. W. Kellogg Co., Patterson-Kellev Co., Pfaud-ler Company, Struthers Wells Corp., Swenson Evaporator Division of the Whit-ing Corp., Whitlock Manufacturing Co., Worthington Pump and Machinery Corp., Zaremba Evaporator Co.



Several large single effect evaporators employed in concentrating sulphuric acid solutions. "Karbate" tubes are used in heating elements to provide high heat transfer. Balance of construction is of lead-covered and rubber-lined steel

p.s.i. abs. pressure, using 1,860 lb. per hr. of cooling water heated from 55 to 60 deg. F., at 60 lb. maximum working pressure.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel.

HCl Reboiler

Performance Design — Total heat transferred 1,400,000 B.t.u. per hr., vaporizing 14 percent aqueous HCl at 250 deg. F., and atmospheric pressure, using 1,540 lb. per hr. steam at 50 p.s.i. gage pressure. Vertical thermosyphon reboiler design, with solution vaporizing inside tubes and steam condensing in shell side of unit.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel. Shell size is 21[‡] in. I.D. with 6 ft. long tubes. The solution carried in this unit comes from a bath employed for the treatment of metal foil.

HCl and AlCl₃ Reboiler

Performance Design — Total heat transferred 180,000 B.t.u. per hr., vaporizing 80 percent of the HCl and AlCl_a liquor flowing at 20 g.p.h., at 253.4 deg. F. and atmospheric pressure, using 196 lb. per hr. steam at 40 p.s.i. gage pressure. Vertical thermosyphon reboiler design, with solution vaporizing inside tubes, and steam condensing in the shell.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel. Shell 15[‡] in. I.D. tubes 3 ft. long.

H₂SO₄ Dryer Precooler

Performance Design — Total heat transferred 305,000 B.t.u. per hr., cooling 22,000 lb. per hr. vapor (17,102 lb. per hr. Cl₂, 1,905 lb. per hr.

 CO_2 , 308 lb. per hr. H_2O , 1,785 lb. per hr. air) from 85 to 55 deg. F. at 13,7 p.s.i. abs. pressure with 4 in. H_2O maximum pressure loss, using 122 g.p.m. of cooling water heated from 45 to 50 deg. F., at 50 lb. maximum working pressure.

Construction — Two shells per unit connected in parallel. Tubes, channel, floating head cover, stationary and floating tube sheets all of impervious graphite. Shell and baffles of steel. Shell 23[‡] in. I.D., tubes 9 ft. long.

Alcohol and HCl Condenser

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Performance Design — Total heat transferred, 180,200 B.t.u. per hr., condensing 405 lb. per hr. of ethyl alcohol and 5 percent HCl, cooling it from 95 to 65 deg. F. under 100 mm. vacuum, using 18,020 lb. per hr. of cooling water heated from 55 to 65 deg. F. at 60 lb. maximum working pressure.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel.

HCl Condenser

Performance Design — Total heat transferred 408,000 B.t.u. per hr., condensing 400 lb. per hr. of HCl and water vapor (about 21 percent HCl, 79 water) isothermally at 125 deg. F. under 26 in. vacuum, using 20,400 lb. per hr. of cooling water heated from 59 to 79 deg. F. A vertical installation.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel. Shell 12 in. I.D., tubes 6 ft. long.

Tetrachlorethane Condenser

Performance Design — Total heat transferred 918,500 B.t.u. per hr., condensing 1,884 lb. per hr. of tetrachlorethane and water (1,000 lb. per hr. tetrachlorethane, 884 lb. per hr. water) isothermally at 206 deg. F., and atmospheric pressure, using 33,250 lb. per hr. of cooling water heated from 82.4 to 110 deg. F. Unit installed at 45 deg. angle.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel. Packed floating head design. Shell 10 in. I.D., tubes 9 ft. long.

HCl Condenser

Performance Design — Total heat transferred 915,000 B.t.u. per hr., condensing 1,000 lb. per hr. of HC1 and steam (200 lb. per hr. HC1, 800 lb. per hr. steam) at 118 deg. F. under 28 in. Hg vacuum with 4 mm. Hg per hr. H.O. 1.76 a 85 to 55 deg F. pressure with 4 in pressure loss, an cooling water hea leg, F., at 50 lb an essure.

ction — Two shids in parallel, Tobe, i head cover, station able sheets all dim Shell and head of in. LD., the 94

Alcohol and HCI Cooles

ormance Design — To rred, 180,200 B.t. o song 405 lb, per la o and 5 percent HQ, o 5 to 65 deg. F, order a, using 18,020 lb, pe water heated from 5 at 60 lb, maximum

truction — Tubes, in head cover, fraiting in tube sheets of in Shell and baffle din

HCI Condenser

mance Design – In ed 408,000 B.t. pri 400 Ib. per hr. d H. por (about 21 perm) isothermally at 150 5 in. vacuum, using 10 of cooling water bath deg. F. A vertical and rraction – Tubes, is head cover, floating a tube sheets of an . Shell and baffs i in. I.D., tubes 6 h

errachlorethane Coodene

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pressure loss, using 91.5 g.p.m. of chilled water heated from 40 to 60 deg. F. Vacuum pulled on the system by means of an impervious graphite jet.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel. Shell 17‡ I.D., tubes 9 ft. long.

Electrolyte Heater

Performance Design — Total heat transferred 27,000,000 B.t.u. per hr., heating 1,500 g.p.m. of electrolyte from 116.6 to 150 deg. F. in two-pass operation at a velocity of 6.4 ft. per sec. with pressure drop of 3 p.s.i., using 26,600 lb. per hr. steam at 5 p.s.i. gage working pressure.

Construction — Two shells per unit connected in parallel. Tubes, floating and stationary tube sheets of impervious graphite, channel and floating head cover of rubber lined cast iron. Shell and baffles of steel. Shell 23[‡] in. I.D., tubes 9 ft. long.

Electrolyte Heater

Performance Design — Total heat transferred 300,000 B.t.u. per hr., heating 27.8 g.p.m. of bright nickel electrolyte from 140 to 158 deg. F. in a two-pass operation at a velocity of 5 ft. per sec. with pressure drop of 5 p.s.i., using 314 lb. per hr. steam at 7 p.s.i. gage working pressure. Construction — Tubes, channel,

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel. Shell 6 in. I.D., tubes 9 ft. long.

HCl, HCN, SO₂ and H₂O Condenser

Performance Design — Total heat transferred 48,800 B.t.u. per hr., condensing 72 lb. per hr. of HC1, HCN, SO₂ and H₂O vapors isothermally at 185 deg. F., and 14.7 p.s.i. abs. pressure using 4,880 lb. per hr. of chilled water heated from 55 to 65 deg. F., at 60 lb. working pressure.

Construction — Tubes, channel, floating head cover, floating and stationary tube sheets of impervious graphite. Shell and baffles of steel.

Viscose Spin Bath Evaporator

Performance Design — Total heat transferred 25,460,000 B.t.u. per hr., evaporating 20,800 lb. per hr. of H₂O on the tube side from a feed of 770 g.p.m. of an aqueous solution of H₂SO₄ and Na₂SO₄ (8.5 percent H₂SO₄, 21.0 percent Na₂SO₄) at 3.5 in. Hg abs., condensing 28,000 lb. per hr. steam in the shell at 15 p.s.i. gage pressure. M.T.D. (non-boiling) 115 deg. F. M.T.D. (boiling) 110 deg. F.

Construction — Tubes of impervious graphite held in heavy antimonial lead tube sheets by special ring gaskets. Liquor head of rubber lined steel. Shell of steel. Shell 4 ft. 8‡ in. I.D., tubes 9 ft. long.

CORROSION RESISTANCE OF STEEL AND CAST IRON

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Benzol

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Carbon Carbon

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A. W. SPITZ Engineering Dept. American Cyanamid Co., New York

Chemical Engineering's Twelfth Report on Materials of Construction (Nov. 1946) lists almost 600 materials and gives data on the chemical resistance of many of them. Scant data, however, is given for ordinary iron and steel, which are used for chemical construction more than any of the materials named. The data below have been specially compiled to help fill the gap.

Steel and cast iron are readily available, inexpensive, easily fabricated, and possess good mechanical properties. For some purposes—solvent tanks, piping and pumps, for example —they do not corrode appreciably and are as satisfactory as more expensive materials. Where some corrosion does occur, the rate in many cases is low enough to make iron or steel the most economical selection—provided iron contamination is not objectionable and provided replacement does not have to be made so frequently that installation costs outweigh the saving on material.

The ratings used here are the same as those in the November Report and are intended to serve only as a starting point in determining the suitability of iron and steel for process equipment. Those rated "A" are generally satisfactory; "F" indicates that corro-

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sion may be expected but is usually slow enough to make iron or steel the most economical selection if iron contamination can be tolerated; "V" means that the corrosion rate varies with concentration, temperature, purity, velocity, etc; and those rated "X" are usually regarded as unsatisfactory. Before selecting iron or steel, every effort should be made to check the given rating against actual plant performance data. If this is impossible to obtain, laboratory tests simulating actual conditions should be run, although such tests are frequently unreliable. In no case should the ratings be used as anything more than a preliminary guide.

					-		
prosive Agent	Cast	Steel	Remarks	Corrosive Agent	Cast	Steel	Remarks
	v			_	X	A	Steel A for acid over 75
acid		X	Crude acid only.	Hydrofluoric acid	А	A	percent, low temp.,
anhydride	V	V X					nop-aerated
	X		A	Iodine	x	x	non-seraceo
num chloride	X	X	Aqueous solutions.	Lactic acid	x	x	
inum sulphate		A		Magnesium chloride	F	F	Frequertly used.
	A A	A		Mignesium chioride	A	Â	Less than 20 percent H ₂ O
onia, ammonium Iroxide	A	A		MILKEU SCIU	n	74	and more than 15 per-
onium chloride	F	F	Frequently used.				cent H ₂ SO ₄
opium phosphate		Â	Tribasic only, others F.	Nitric acid	x	x	Celle El2004
onium sulphate	F	F	Tribasic only, others r.	Oleic acid	F	F	
onium suipaave	A	Â		Oxalic acid	F	F	
acid	Â	Â		Phenol. cresol and	Â	Â	Where color is not im-
ine	x	x		similar acids			portant. Do not use
ım chloride	F	F	Frequently used. Inhibi-	BUDINI NOWO			with C. P. acid.
III) CHIOIIGE	т.	r	tors useful in reducing	Phthalic acid	x	X	
			corrosion.	Phthalic anhydride	A	A	
am hypochlorite	v	x	00110010	Phosphoric acid	F	F	Crude only over 70 per-
on tetrachloride	Å	Ā	Dry only.				cent.
nic acid	F	F		Sodium bisulphate	X	Х	
acetic acid	x	X		Sodium carbonate	Α	Α	
ine	A	A	Dry gas only.	Sodium chloride	F	F	Frequently used.
nic acid	F	F		Sodium hydroxide	Α	A	Up to 70 percent sol
acid	X	X					under 200 deg. F., low
er sulphate	X	X					velocities.
acids	X	X	Sometimes used on crude	Sodium hypochlorite	х	Х	
			products.	Sodium nitrate	Α	A	
chlorides	X	X		Sodium sulphate	A	Α	
sulphate	X	X		Sodium sulphite	A	A	
us sulphate	F	F		Sodium thiosulphate	A	A	Do not use if iron con-
aldehyde	F	F	Used where discoloration is not objectionable				tamination is not per- missible.
ic acid	X	X		Sodium sulphide	Α	Α	
ocarbons (ali-	A	A	Standard material of con-	Stearic acid	F	F	
atic)			struction	Sulphur	A	Α	
ocarbons (aro-	A	A	Standard material of con-	Sulphur dioxide	А	Α	Dry gas only.
tic)			struction.	Sulphuric acid	Α	A	Over 90-percent acid.
ochloric acid	X	X		Sulphurous acid	Х	х	
ogen peroxide	F	F		Trichlorethylene	A	A	Dry only.

Handling Solids-Gas Reactions by FLUIDIZATION

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THE AUTHOR PRODUCES EQUATIONS FOR FLUIDIZED SOLIDS-GAS REAC-TION SYSTEMS HAVING EITHER SINGLE OR MULTIPLE REACTION ZONES

In AN EARLIER article (Kalbach, Chem. Eng., Jan. 1947, p. 105) some of the problems involved in the use of fluidized systems for gassolid reactions were considered, along with a discussion of advantages and disadvantages. It was brought out that in such systems temperature control and heat transfer are superior and that higher reaction rates may be secured, as compared with stationary solids beds, but it was also shown that multiple vessel set-ups must sometimes be used, either to reduce needed vessel height, minimize short circuiting or to permit the approximation of counterflow.

It was pointed out that there are two principal sorts of solid-gas reaction that may be handled by fluidizing; the first where one or more of the reaction products remains solid; the second where all of the principal reaction products become gaseous. The peculiarities of each type system were discussed. In addition, the article considered the effect of particle size, methods of obtaining design data, and the determining of reaction order. It was shown that the time t, during which the gas is exposed to the solids is easily calculated as:

 $t_e = W_s / \rho_f A v_g$

where W_{σ} is weight of solids in the fluid bcd; ρ_{τ} is the apparent density of the fluid bcd at gas velocity v_{σ} ; A is the vessel's horizontal cross-sectional area; and v_{σ} is the linear velocity of the gas, conventionally calculated as if the solids were absent.

On the other hand, the time that the solids reside in the reaction vessel is not a simple function, since any given particle may remain for any period up to the length of time that the fluid bed has been in existence. It

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An earlier article (January 1947) laid some of the groundwork for the use of fluidization in chemical industry problems where the fluidized material itself enters into the reaction. Applications of this sort, such as coal gasification and lime calcination, are rapidly becoming of interest, although all previous experience has been gained with fluidized solids used only as a catalyst. Following the general discussion of the first article, the present article carries on with the development of the main equations needed in producing data essential for design.

is necessary, therefore, to determine a relationship by which the proportion of particles that has remained in the fluid bed for various given periods can be calculated.

Single Reaction Vessel

As far as the solids are concerned, the fluidized bed may be considered as an efficient mixing chamber. Ham and Coe showed previously¹ that in such systems,

$$dN_1/d\theta = -aN_1 \tag{2}$$

 $\text{ or } N_1 = e^{-a\,\theta} \tag{3}$

where N_1 is the fraction of feed particles remaining in the zone longer than time θ . The constant a has the significant value

$$a = 1/t_c \tag{4}$$

where t_e is the change-over time of a single vessel or the time during which the vessel would empty itself if the inflow of feed were stopped and the discharge rate continued unabated. The point that t_e is based on the rate of outflow of solids and not on the feed rate is important where solids are gained or lost in the reaction. Constant a has the same dimensions as the unit of space velocity widely used in catalyst work but usually has a much smaller numerical value.

The change-over time t_c can be related to t_c by the following equation:

$$t_c = \frac{v_g t_e \rho_f A}{W_p} = \frac{W_s}{W_p} \tag{5}$$

where W_p is the weight rate of withdrawal of solids from the vessel. A diagram which attempts to illustrate some of the flow peculiarities of a fluid system and to indicate the meaning of certain of the above symbols is given in Fig. 1. The two vessels shown are actually the same vessel, that on the left indicating the straight-through flow of the gas, that on the right showing how the solids constantly mix and recirculate within the vessel.

Returning to the experimental results, instantaneous data from batchwise runs conducted as mentioned in the first article will include analyses of the outgoing gas and of the solid bed. These can be calculated over to give the extent of reaction of the solid particles expressed in terms of i_* , the fraction of the starting solid reactant remaining, and the rate of change of i_* , or $di_*/d\theta$, where θ is the residence time of the solid. By choosing data from various runs corresponding to ons by N

OLIDS-GAS REAL REACTION ZONE

of the groundwork [11 blems where the faik ications of this son, a are rapidly becoming them gained with faik general discussion of b the development of essential for deign

work but usually have umerical value. nange-over time t, col t, by the following op

$$\frac{p/A}{W_p} = \frac{W_1}{W_p}$$

, is the weight at a solids from the vere. w peculiarities of a fai to indicate the men the above symbols The two versely day he same vessel that ating the stragent e gas, that on the new e within the resel ing to the experience s conducted as motion rticle will include antiing gas and of the side be calculated out to of reaction of the pressed in terms dia he starting solid ra nd the rate of day where θ is the real olid. By choosing runs corresponde

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the same temperature, and inlet and outlet gas composition and gas velocity (selected according to tentative process decisions), it will be possible to set up a more or less empirical function:

$$di_s/d\theta = f(i_s) \tag{6}$$

and to solve to the forms

$$i_{\theta} = f'(\theta)$$

and $di_{\theta}/d\theta = f''(\theta)$

(7) (8)

(9)

when
$$r(i, j)$$
 takes the form of a simple linear or power function (i.e., the reaction behaves as if it belongs to a low order, or available reaction surface controls), Equations (7) and (8) will be readily usable later. But, for instance, where shell effects on the particle surfaces are important, these equations become rather awkward and require graphical treatment in later stages of the calculations.

If a value of t, be now chosen, the following relationship holds:

$$dI_s/d heta = (1-\iota)/t_c$$

where $dI_{*}/d\theta$ refers to the rate of reaction of the bed as a whole, as distinct from $di_{*}/d\theta$ which refers to individual particles or to groups of particles having the same residence time in the bed, and ϵ is the fraction of starting solid which it has been decided to tolerate in the product. Note that the fractions referred to throughout this discussion are based on the incoming quantity of solids and do not in general derive directly from instantaneous analytical results.

It is now possible to combine Equations (2), (3), (8) and (9) and integrate as follows:

$$\frac{\mathbf{f} dI_s}{d\theta} = \int_0^{\mathbf{f}} a e^{-a\theta} d\theta f''(\theta) = a(1-\iota) \quad (10)$$

The value of t_c (or 1/a) which satisfies Equation (10) should give satisfactory gas and solid products. The upper limit of integration τ is the value of θ which satisfies Equation (7) when $i_s = 0$. It is infinity in many cases. For simple reaction orders the solution of Equation (10) for a will present no particular difficulties. In other cases graphical integration with trial values of a must be performed.

of a must be performed. Equations (2), (3) and (7) may be combined and integrated as follows:

$$I_s = \int_0^\tau a e^{-a\theta} \, d\theta f'(\theta) \tag{11}$$

The result of solving Equation (6) may be fed into either Equation (10) or (11), the latter being used where a very complete consumption of the solid is desired. The other equation may then be used for checking.

The value of t_o can be converted by Equation (5) to a value of bed height $v_o t_o$, the term W_p/A in that equation being calculated stoichiometrically from the gas velocity and ι . Bed heights as great as 30 to 40 ft. can be handled commercially. If the calculations call for a deeper bed, the use of two or more reaction zones should be considered.

The above calculations may be checked by considering the experimental data from another viewpoint and making use of the values for t_c and t_a already determined.

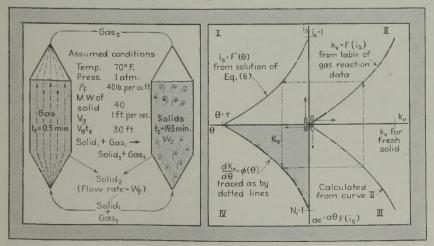
If the reaction data for the gas have been correlated to yield some form of velocity coefficient k_v for each of several degrees of reaction of the solid, a function of i_s can be written:

$$k_v = F(i_s) \tag{12}$$

Since the particles in the bed will affect the gas passing them quite as if the other particles were not present, the properties of the particles in this respect may be summed up by combining Equations (2), (3), (7) and (12) and integrating:

$$K_{v} = \int_{0}^{\tau} a e^{-a \theta} d\theta F \left[f'(\theta) \right]$$
(13)

Fig. 1-Diagram showing how gas and solids flow in fluidized systems Fig. 2-Typical graphical integration for velocity coefficient K_v



Having thus evaluated K_v , the velocity coefficient for the bed as a whole, the gas reaction equations can be used with t_s to determine the degree of reaction of the gas. This should confirm satisfactory efficiency of gas consumption under the selected conditions. A graphical integration as shown in Fig. 2 may be useful at this point.

Multiple Reaction Zones

Aside from any advantage due to a countercurrent arrangement, the merits of compartmentalizing a reaction system in which perfect mixing can be assumed have often been discussed. Formulas for the residence time of material in each of a series of reaction stages with equal change-over times were published by Ham and Coe¹ but the present derivation is slightly more direct. The derivation is extended to cover the case where the reaction zones differ in change-over time. This state of affairs is rather likely to appear in practice, particularly where the products are gaseous and, in general, where a small "clean-up" stage is desired at the end of an operation.

We shall also point out the differences between the interpretation of the formulas for a series of fluid reactors, and for the more usual series of liquid-phase mixing chambers.

Consider first the case where each vessel in the series has the same change-over time. The symbols are defined as follows: N_n is the fraction of material residing in the nth vessel of the series at time θ after its introduction into the first vessel. Σ_n is the fraction of material remaining in a system of n vessels at the same time. Finally, t_{en} is the change-over time of the nth vessel. As in Equation (4),

$$a = \frac{1}{t_{c1}}, b = \frac{1}{t_{c2}}, \dots, z = \frac{1}{t_{cn}}$$
 (4a)

Equations (2) and (4) amount to the logical statement that, considering the infinitestimal quantity of material entering the first chamber at any given instant, the rate of withdrawal of that material at any subsequent time is equal to the quantity of it then residing in the chamber divided by the time needed to empty the chamber if inflow were stopped and outflow continued at the operating rate.

Equation (2) integrates easily to Equation (3), the constant of integration dropping out because $N_1 =$ 1 when $\theta = 0$. Since the history of each bit of material entering the system is the same, Equation (3) is applicable to the bed as a whole.

In the second chamber, still focussing attention on the material which entered the first chamber at $\theta = 0$,

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the amount of that material present will be continually changing by the inflow of particles from the first chamber and by outflow to the third. The differential equation is:

(14)

(15)

$$dN_2/d\theta = aN_1 - bN_2$$

Since a = b = c, and substituting N_1 from Equation (3):

$$dN_2/d\theta = ae^{-a\theta} - aN_2$$

This is readily soluble by methods given in standard texts to the form, $N_2 = e^{-a\theta} (a\theta + c)$ (16)

$$N_2 = e^{-a\theta} (a\theta + c) \tag{6}$$

From the starting conditions, $N_2 =$ 0 when $\theta = 0$, we find c = 0 and

$$N_2 = a\theta e^{-a\theta} \tag{17}$$

Similar derivations show that

$$N_3 = \frac{a^2 \theta^2}{2} e^{-a\theta} \tag{18}$$

and

$$N_n = \frac{a^{n-1}\theta^{n-1}}{(n-1)!} e^{-a\theta}$$
(19)

Since

 $n = N_1 + N_2 + N_3 \dots N_n$ (20) then

$$\Sigma_n = e^{-a\theta} \left(1 + a\theta + \frac{a^2\theta^2}{2} \dots \\ \frac{a^{n-1}\theta^{n-1}}{(n-1)!} \right)$$
(21)

Useful charts and tables giving numerical values for N_n and Σ_n are shown by MacMullin and Weber².

By the same method formulas have been derived from N_1 to N_8 for the case where a, b, and c are all different.

$$N_{1} = e^{-a\theta}$$
(3)

$$N_{2} = \frac{a}{b-a} \left(e^{-a\theta} - e^{-b\theta} \right)$$
(22)

$$N_{3} = \frac{ab}{b-a} \left(\frac{e^{-a\theta} - e^{-e\theta}}{c-a} - \frac{e^{-b\theta} - e^{-e\theta}}{c-b} \right)$$
(23)

These formulas follow a definite pattern but it is not easy to set up a concise formula for N_n . If a = b = c in Equation (23), an indeterminate expression of the form 0/0 results, which can be reduced to Equation (18) by methods given in standard texts.

The retention of material in any one vessel of a series can be expressed by Equation (3) but it should be remembered that only in the first vessel does the feed have a uniform composition and past history.

Equations of this type have generally been developed for the discussion of homogeneous reaction systems or of heterogeneous systems where there is little or no lag of one phase behind the other or difference in flow pattern between the phases. Reaction calculations are then relatively simple because the exposure time of the components of the system to reaction conditions is the same and fractional distribution of the exposure times of all components is expressed by the above equations.

In contrast, a fluid system is characterized by a much shorter residence time of gas than of the solid and, as has already been pointed out, by an entirely diffe ent flow pattern for the two phases. The above equations apply only to the behavior of the solids. In cases where some of the reaction products remain solid, the condition of equal t_{o} for the several vessels will be met by zones of approximately equal size. When, however, the principal reaction products are gaseous, equal values of t, will require vessels which decrease in size in the direction of solids flow. In the comparatively rare case in which solids are formed in the reaction, the vessel size will increase in the same direction.

It is interesting to point out one more difference between a multi-vessel system handling a fluidized solid reactant, and a system handling a true liquid. In the latter, the individual particles whose time-position behavior is described by the equations are molecules which lose their identity in the mass of liquid in each vessel, are invariant as to their individual reactivity and have their chemical properties on an "is or ain't" basis. In the former the solid particles have their past history indelibly written into their chemical composition and what happens to them subsequently is determined thereby.

When it comes to calculating the reactions and dimensions for a series of con- or countercurrent stages, one of several possible attacks is to make a tentative decision as to the analysis of gas entering and leaving each stage.

The calculations may require additional data over and above those needed for estimating a single zone. The data may be provided by batchwise runs in which the feed and product gas composition are controlled in the range predicted for step-wise operation. Continuous runs may be made but the accurate control of solid feed rates on the laboratory scale presents some problems.

Granted the necessary preliminary data, the treatment of the reaction stage into which fresh solids are introduced can be identical with that for a single zone. The calculations will reveal not only the vertical dimension of the reaction stage but also the distribution of particle compositions in the outgoing solids.

As a first approximation the average outgoing solids composition from the above may be considered as if it were the uniform analysis of the particles, and the above calculations repeated for the next stage.

For this purpose the equations require some modification. In Equation (10), $f''(\theta)$ takes the form appropriate to conditions in the second stage and becomes $f''(\theta' + \theta_1)$ where θ' refers to residence time in the second stage and θ_1 is the time obtained by substitution in Equation (7), written for conditions in the second stage, of the value of I_s corresponding to the feed conditions of the second stage. Equation (10) then becomes:

$$\frac{dI_s}{d\theta'} = \int_0^{\tau - \theta_1} f''(\theta' + \theta_1) \ be^{-b\theta'} \ d\theta'$$

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Equation (11) becomes:

$$I_{\bullet} = \int_{0}^{\tau - \theta_{1}} f'(\theta' + \theta_{1}) \ b e^{-b \theta'} d\theta' \quad (25)$$

Equation (13) becomes:

$$K_{\boldsymbol{v}} = \int_{0}^{\boldsymbol{\tau} - \theta_{1}} F\left[f'(\theta' + \theta_{1})\right] b e^{-b \theta'} d\theta'$$
(26)

It is more precise but much more troublesome to treat each portion of solid entering the second stage as a separate feed and sum the resultant products.

In those fortunate examples of reactions with gaseous products, where the reactivity of the solid does not change too markedly as it passes through the process, it will be a reasonable approximation to treat the whole system of several stages as if it were actually one. For (ae^{-a}) in Equations (10), (11), and (13) is substituted $(-d\Sigma_n)$ or (zN_n) , this expression being taken from Equations (19), (22) or (23) as required.

In the development of any given chemical process utilizing the fluid technique to achieve a solid-gas reaction there is considerable latitude for ingenuity in circumventing the various special problems that arise. The attempt here has been merely to point out some general methods of calculation and some interesting similarities and differences as compared to longer-established techniques. There has been no discussion of actual process flow sheets, but the patent literature is rife with suggestions along these lines.

In conclusion, thanks are due to Paul W. Garbo for helpful suggestions in the writing of this paper.

References

1. Ham, A. and Coe, H. S., Calculation of Extraction in Continuous Agitatien. Chem. & Met., 19, 663 (1918.) 2. MacMullin, R. B. and Weber, Jr., M., Theory of Short Circuiting in Continuous Flow Mixing Vessels in Series, Trans. A. I. Ch. E., 31, 409 (1935).

THE PLANT NOTEBOOK

Theodore R. Olive, ASSOCIATE EDITOR

\$50 CASH PRIZE FOR A GOOD IDEA!

Until further notice the editors of Chemical Engineering will award \$50 cash each month to the author of the best short article received that month and accepted for publication in the Plant Notebook. The winner each month will be announced in the issue of the next month: e.g., the February winner will be announced in March, and his article published in April. Judges will be the editors of Chemical Engineering. Non-winning articles submitted for this contest will be published if acceptable, in that case being paid for at applicable space rates.

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Kererensee and Coe, E. S. Off in Continuous U 19, 663 (1918) , R. B. and Webe, , t. Circulting in U seels in Series, In-(1935).

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Any reader of Chemical Engineering, other than a McGraw-Hill employee, may submit as many entries for this contest as

JANUARY WINNER

A \$50 prize will be issued to

IOHN G. KIRKPATRICK Instrument Engineer, Koppers Co. Pittsburgh, Pa.

For an article describing an ingenious application of a differential pressure controller to interface control, that has been judged the winner of our January contest.

This article will appear in our March issue. Watch for it!

December Contest Prize Winner

AUTOMATIC SEPARATOR FOR IMMISCIBLE LIQUIDS AVOIDS POSSIBILITY OF SIPHONING

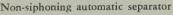
GERALD V. O'CONNOR Evans Chemetics, Inc., Waterloo, N. Y.

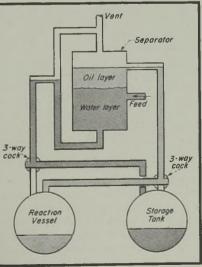
PROPOSED new organic synthesis included a steam distillation step in which the operation was to be divided into two stages. In the first phase, the light oil layer was to be returned to the reaction vessel, and the heavy water layer sent to storage. In the second stage, the water layer was to be returned to the reaction vessel, and light oil sent to storage.

The problem called for the design of an automatic separator to do both jobs, with a maximum amount of insurance against the siphoning effect present in many separator and piping designs, and with a minimum amount of attention from the operator. The separator described on page 197 of "Chemical Engineering for Produc-tion Supervision" (Pierce, McGraw-Hill) is not siphon-proof, since any connection to the heavy liquid discharge line which is run below the separator will cause the entire contents of the separator to discharge by siphoning. We would, in effect, have a Sohxlet extractor on a large scale.

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To make such a separator work, it would be necessary for the operator to watch the apparatus continuously, periodically opening a valve in the discharge line each time an appreciable amount of heavy liquid had accumu-





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 considered.

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 Plant Notebook Editor, Chemical Engineering, 330 West 42nd St., New York 18, N.Y.

lated, and closing the valve before any light liquid could discharge. If this siphoning effect could be eliminated, no valves at all would be necessary on the separator itself, and the valves on the tanks would need to be touched only between the first and second operating stages.

The drawing given here illustrates the design of a separator to do this job. This separator could be made of glass for visual observation of the course of the reaction if desired. To return light liquid to reaction vessel and store heavy liquid, it is only necessary to turn both three-way cocks to the horizontal position. To return heavy liquid to the reaction system and store light liquid, both cocks are turned to the vertical position. If desired the cocks can be mechanically interconnected.

THREE COMPONENT MIXING COMPUTED GRAPHICALLY

MURLIN T. HOWERTON College Station, Texas

I^N CERTAIN blending operations, it is frequently necessary to produce a three component mixture in which two properties are within certain specified limits. In gasoline blending for example, isopentane, and alkylate, and a straight run gasoline are blended to give a mixture of specified octane number and vapor pressure. The cal-

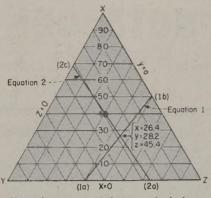


Chart for ternary mixture calculations

culations, involving three equations and three unknowns, require considerable algebraic manipulation to obtain a solution. Without impairing the accuracy, the calculations can be greatly simplified by a graphical solution.

The equations involved are of the general type,

$$x(A_x) + y(A_y) + z(A_z) = 100(A_m)$$
 (1)

 $x(B_x) + y(B_y) + z(B_z) = 100(B_m)$ (2) where x, y, and z represent weight, volume, or mol percent; and A and B represent additive properties of the individual components and the final mixture.

A third relation, x + y + z = 100, is a fundamental property of the triangular coordinate system used in the graphical solution.

Since the equations are linear, only two points are necessary to plot one equation. The two end points of each curve are readily found by applying the following conditions:

(a) Let x = 0 in Equation (1) and in Equation (2):

(1a)
$$y(A_y) + z(A_z) = 100(A_m)$$

 $y + z = 100$
 $y = 100 \frac{(A_m - A_z)}{(A_y - A_z)}$
(2a) $y(B_y) + z(B_z) = 100(B_m)$
 $y + z = 100$
 $y = 100 \frac{(B_m - B_z)}{(B_y - B_z)}$
(b) Let y = 0 in both equations:
(1b) $x = 100 \frac{(A_m - A_z)}{(A_z - A_z)}$
(2b) $x = 100 \frac{(B_m - B_z)}{(B_z - B_z)}$
(c) Let y = 0 in both equations:

(c) Let
$$z = 0$$
 in both equations

(1c)
$$x = 100 \frac{(A_m - A_y)}{(A_x - A_y)}$$

(2c) $x = 100 \frac{(B_m - B_y)}{(B_x - B_y)}$

From the statement of the problem it will be evident that two of the above six conditions will give negative or otherwise impractical solutions.

Sample Calculation — A gasoline blend having an octane rating of 100

and a vapor pressure of 7.0 psi. abs. is to be made from a straight run gasoline of 85 octane, and 0.6 vapor pressure; isopentane of 90 octane, and 21.0 psi. abs.; and an alkylate having an octane rating of 115 and a vapor pressure of 2.0 psi. abs. Let x = molpercent gasoline; y = mol percent isopentane; z = mol percent alkylate; and the blend = 100 percent.

Then:

A

A

x	=	85 octane	$B_x = 0$	6 psi. abs.
v	=	90 octane	$B_y = 21$.	0 psi. abs.
× .			D O	0 . 1

 $A_x^{*} = 115 \text{ octane } B_x^{*} = 2.0 \text{ psi. abs.}$ $A_m = 100 \text{ octane } B_m = 7.0 \text{ psi. abs.}$ Substituting in the equations derived above for Equation (1) and noting that z cannot be 0,

(a) When
$$x = 0$$
,
 $y = 100 \frac{(100 - 115)}{(90 - 115)} = 60$
(b) When $y = 0$,
 $(100 - 115)$

$$x = 100 \frac{(100 - 115)}{(85 - 115)} = 50$$

Substituting in the equations derived above for Equation (2) and noting the y cannot be 0,

(2a) When
$$x = 0$$
,
 $y = 100 \frac{(7-2)}{(21-2)} = 26.3$
(2c) When $z = 0$,
 $x = 100 \frac{(7-21)}{(0.6-21)} = 68.6$

Equations (1) and (2) are plotted in the accompanying diagram. The intersection of the two lines gives the desired composition. Reading from the figure, x = 26.4 mol percent gasoline; y = 28.2 mol percent isopentane; z = 45.4 mol percent alkylate.

GRAVITY AND pH SAMPLER FOR CLOSED VESSELS

F. L. CULLER, JR. Chemical Engineer, Oak Ridge, Tenn.

I^T is often necessary to measure the pH and specific gravity of the contents of a closed reaction vessel. To draw off a sample for analysis at some location remote to the reactor is time consuming and cumbersome. The use of the sampler shown in the sketch makes it possible to obtain instantaneous measurements of pH and specific gravity at the reactor. This system also works to advantage with a small vessel in which a submersion type pH electrode assembly would require too much space, or in a unit where agitation would make the accurate measurement of pH impossible.

The sampler is constructed of a standard 4 in. to 1 in. Pyrex reducer with a stainless steel cover flange into which the outlet for the air-vacuumwater manifold is welded. A stainless steel pH electrode holder is attached to the 1-in. end of the Pyrex reducer

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Stopped to consider how little time it takes to rough out the pertinent points of a good Plant Notebook idea that may win a \$50 prize?

by means of a standard adapter flange for 1-in. pipe. The electrode holder is fabricated from 1-in. stainless steel pipe, and a 1-in. stainless steel welding flange, annealed after welding. The dip pipe in the reactor should extend to within 3 or 4 in. of the bottom of the reactor. A tee with two stainless valves is installed at the base of the electrode holder as shown. The pH meter electrodes are inserted in the holders through a synthetic rubber stopper. A bulb type hydrometer is installed in the 4 in. to 1 in. Pyrex reducer.

In order to obtain a sample, the sample line valve is opened and blown out by cracking the air valve on the manifold. The air valve is closed and the vacuum valve then opened. Solution is drawn into the sampler until the hydrometer floats, then the valves on the sample and vacuum lines are closed. Readings of pH and specific gravity are then taken. The solution is blown by compressed air into the reactor. Wash water is then admitted to the sampler, then drained either to the reactor or to waste through the drain valve. After the drain valve is closed, more water is added to cover the pH meter electrodes until the next sample is taken.

Materials of construction can be changed, of course, to agree with the dictates of economy and specific corrosion conditions.

Combination pH and gravity sampler serves a closed reaction vessel

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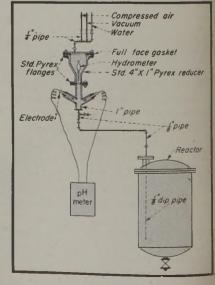
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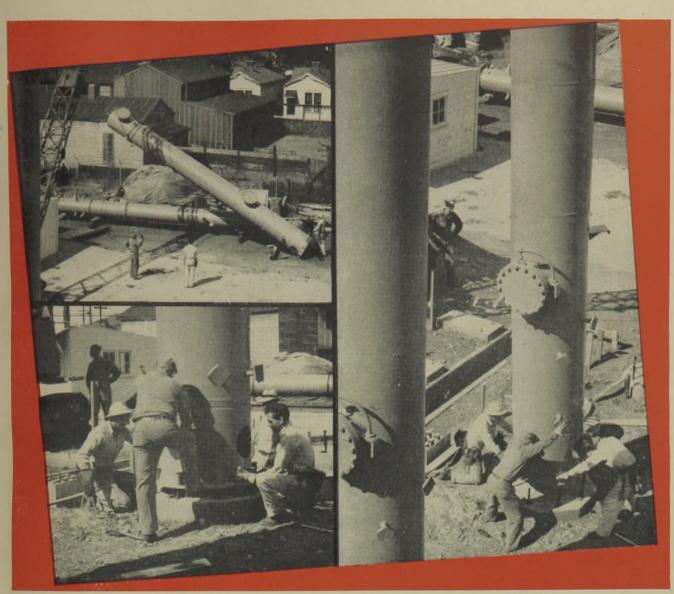
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FLOWSHEET

15,000-bbl. per day delayed coking unit at General Petroleum Corp's Torrance, Calif., refinery, It is the largest unit of its kind in the world

DELAYED COKING

TREND in petroleum refining is a more extensive cracking of residuum fraction. It has been estimated that this trend, in the next decade or two, will reduce the average percentage residuum from the present 26 to some 10 percent. It is not expected that this cracking of heavier stock will so much replace light oil cracking as that it will provide the requisite charge stock.

The General Petroleum Corp. has contributed to this trend by installing a 15,000 B/D delayed coking unit to process 300-700 ft. SSF/122 deg. F. straight run residuum. The gas oil thereby obtained will serve to supply part of the feed stock to the four TCC Units. The coking unit was designed, engineered, and constructed by M. W. Kellogg Co., and incidentally is the largest unit of its kind in the world.

The description of the general process may best be followed by referring to the flowsheet. The coking portion of the unit is divided into two sections each with its own furnace and pair of coke drums to be used alternately. The cracked products from the two coking sections enter a common bubble tower for fractionation into an overhead product of gasoline and lighter, three gas oil draw products, and

a bottoms recycle product. The straight run residuum charge, or reduced crude charge as it is also called, is introduced into the bubble tower for further reduction with the bulk of it appearing in the bottoms for furnace charge. Three strippers for the sidedraw streams and a gasoline debutanizer complete the fractionation equipment.

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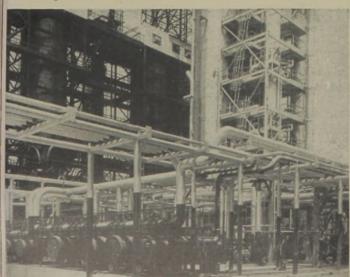
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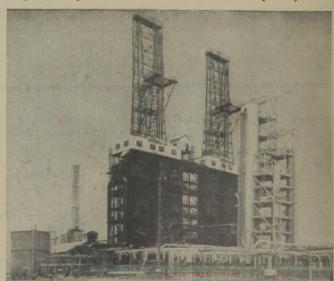
The unit is quite flexible in that it can be used either as a coker, a visbreaker, or any combination of these two. For any operation other than full coking a higher inlet to the coke drum would be used. The rate of residuum withdrawal from the bottom of the drum would determine the amount of coking permitted. In a full visbreaking operation, it is also possible to charge the fresh feed directly to the furnace along with the recycle. Under this arrangement, the residuum would be removed from the bubble tower bottom and the recycle from the bottom draw.

> CHEMICAL ENGINEERING February, 1947 PAGES 142 TO 145

ground before entering bubble tower at two points



Reduced crude is preheated in heat exchangers in fore- 2 Charge from tower (right) bottom goes to furnaces (left). Vapor and liquid from furnaces enter coke drums (center)



All piping equipment for every need ...on one order to CRANE

SOURCE OF SUPPLY

STANDARD OF QUALITY

GAUGES

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RESPONSIBILITY

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STEAN

Yes, sir!... one order gets you everything for the job... good, dependable material down to the last item. But that's just one way the truly complete Crane line helps to simplify all your piping jobs.

For example, take this heat reclaim system. At every step of the installation—from design to erection to maintenance—standardizing on Crane equipment pays big dividends. They're assured by this 3-way advantage—

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The straight mark ge as it is also called at or further reduction oms for furnace char ms and a gasoline dear upment.

in that it can be used any combination er than full coking a build be used. The a e bottom of the draw oking permitted. Is also possible to dray nace along with the residuum would here m and the recycle b

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m goes to fumics (e coke drums (centr)

ONE SOURCE OF SUPPLY gives you the world's most complete selection of valves, fittings, pipe, accessories and fabricated piping for all power, process, and general service applications.

ONE RESPONSIBILITY for piping materials helps you to get the best installation and to avoid needless delays on jobs.

OUTSTANDING QUALITY in every item assures uniformly high performance in every part of piping systems.

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Deaerator type beat reclaim system

FLANGES

(Right) YOUR CHOICE OF CHECK VALVES of every type -brass, iron, steel-in the complete Crane line. For severe services-steam, water, oil, or gas-up to 200 lb. at 450° F. and 400 lb. cold, use No. 35 Brass Regrinding Swing Check shown here. Easily reground in the line. Listed in your Crane Catalog, page 57.



FOR EVERY PIPING SYSTEM

PIPE

RELIEF

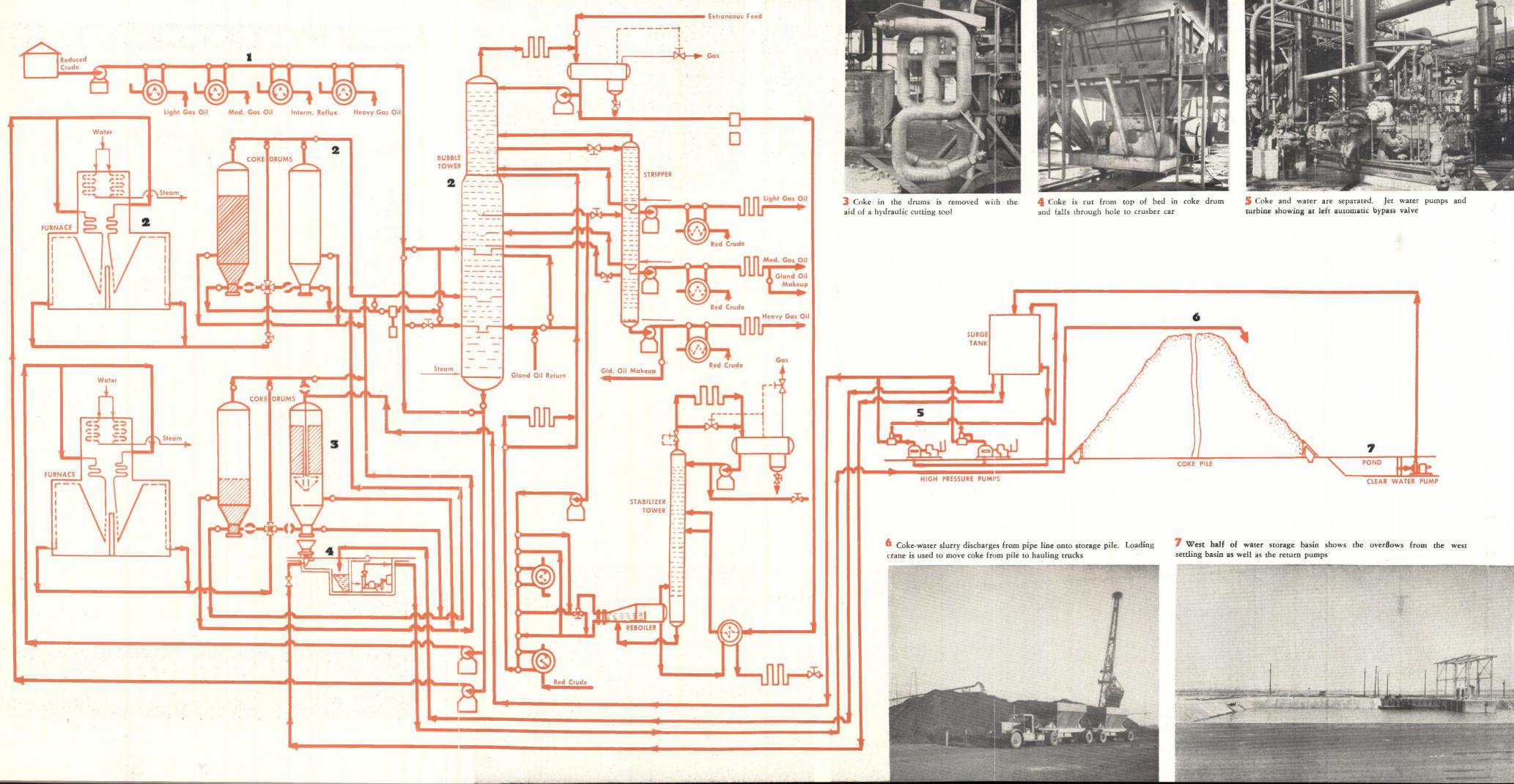
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VALVES · FITTINGS PIPE · PLUMBING

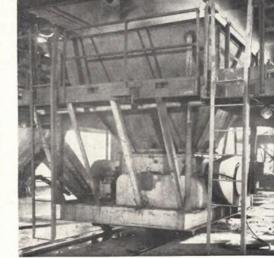
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CHEMICAL ENGINEERING • FEBRUARY 1947 •

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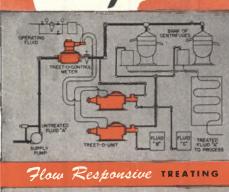






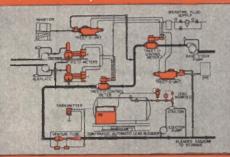
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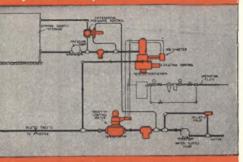


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Flow Responsive SAMPLING



Flow Responsive BLENDING



Flow Responsive DILUTING

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ERE, in one attractive, novel bulletin is all the information an engineer needs to specify automatic, flow responsive proportioning equipment for today's continuous processes. %Proportioneers% Bulletin 1200 shows how to combine fluid meters and proportioning pumps so that your process will be continuous with all units synchronized and controlled from a single source. It illustrates proven methods of treating, sampling, blending and diluting and by ingenious charts, diagrams and tables enables the engineer himself to select and size the equipment required. Get this new bulletin and write your own prescription.

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All piping equipment for every need ... on one order to CRANE

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Yes, sir!... one order gets you everything for the job ... good, dependable material down to the last item. But that's just one way the truly complete Crane line helps to simplify all your piping jobs.

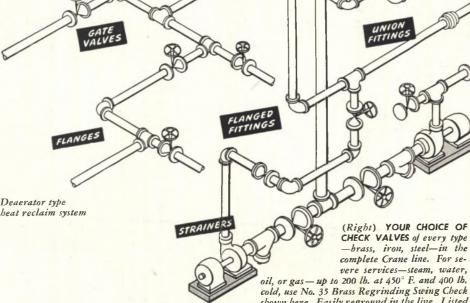
For example, take this heat reclaim system. At every step of the installation-from design to erection to maintenance-standardizing on Crane equipment pays big dividends. They're assured by this 3-way advantage-

ONE SOURCE OF SUPPLY gives you the world's most complete selection of valves, fittings, pipe, accessories and fabricated piping for all power, process, and general service applications.

ONE RESPONSIBILITY for piping materials helps you to get the best installation and to avoid needless delays on jobs.

OUTSTANDING QUALITY in every item assures uniformly high performance in every part of piping systems.

Crane Co., 836 S. Michigan Ave., Chicago 5, Illinois. Branches and Wholesalers Serving All Industrial Areas.

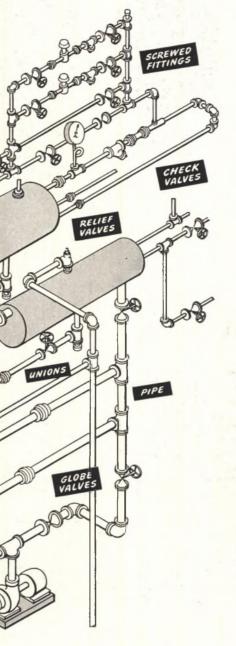


shown here. Easily reground in the line. Listed in your Crane Catalog, page 57.



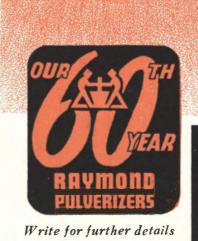
CHEMICAL ENGINEERING • FEBRUARY 1947 •



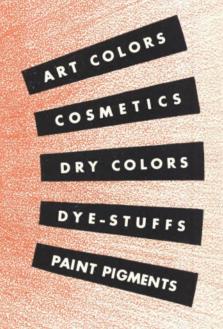




FOR EVERY PIPING SYSTEM



L PULVERIZING OF FOR THE PIGMENTS



PIGMENT GRINDING is a "made to order" job for the Raymond Roller Mill with built-in whizzer separator. This combination unit enables you to meet maximum specifications of superior quality by reason of the following:

- It reduces the material to extreme fineness and uniformity.
 Improves quality of product in the form of better texture, low oil absorption and smooth spreading properties.
- (3) High capacities, instant fineness adjustments and wide range control, with low operating costs

The Raymond Roller Mill represents the modern method of producing paint powders, including white lead, lithopone and titanium pigments. It is equally efficient in the pulverizing of finely ground fillers used throughout industry, such as limestone, natural or synthetic chalks, barytes, clay, talc and many others.

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147

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• FEBRUARY 1947 • CHEMICAL ENGINEERING

PROCESS EQUIPMENT NEWS

Theodore R. Olive, ASSOCIATE EDITOR

AUTOMATIC ELECTRODE

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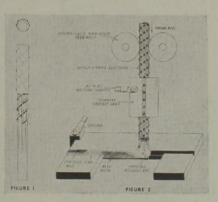
WHAT is claimed to be a revolutionary advance in automatic electric arc welding is the Shield-O-Matic process introduced by Hollup Corp., a division of National Cylinder Gas Co., 218 East Ontario St., Chicago 11, Ill. The new process makes use of a new type coated electrode which is produced in continuous lengths for use in auto-matic welding machinery This elec-trode is claimed to combine all the advantages of the manual shielded-arc welding process, with the requirements for continuous automatic welding. As in the former, the new electrode incloses the welding arc in a crucible-like sheath produced by a heavy flux coating on the wire core, but special means are provided for making electrical contact through the flux from the core to the current contact jaws of the machine.

The construction of the electrode is indicated in the accompanying illustration. In Fig. 1, it is evident that a metallic grid construction binds the flux coating to the wire core, enabling the electrode to stand extreme flexing and bending without loss of flux, but at the same time forming a path for the welding current. The fin-ridge construction of the electrode core also provides for the conduction of unusually high welding current. The design is said to cause the electrode and base metal to melt at a much faster rate than conventionally, thus permitting greater automatic welding speeds. Fig. 2 shows in diagrammatic form

Sky-Lift electric truck



CHEMICAL ENGINEERING • FEBRUARY 1947 •



Automatic welding electrode and method of use

how the electrode is fed automatically and how the welding current is conducted to it. The drawing also shows the crucible-like action of the flux coating where it surrounds the arc and protects the depositing metal from the action of oxygen and nitrogen in the atmosphere. Having served its crucible function, the flux, of course, melts and forms a slag over the finished weld, as in manual shielded-arc welding.

The new method is claimed to yield welds of unusually high strength and ductility, of exceptionally uniform quality. The weld metal is claimed to be finer in grain than produced by former automatic welding methods and the actual heat input less, resulting in reduced residual stresses and distortion. The process is said to be suitable for both light gage and heavy plate welding for both low and medium carbon steels as well as low alloy highstrength steels.

HYDRAULIC FORK TRUCK

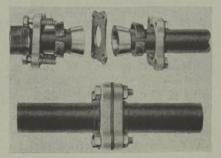
DESPITE its standard collapsed height of 83 in., enabling it to pass through a 7 ft. doorway, the improved Sky-Lift hydraulic-lift electric fork truck recently introduced by Automatic Transportation Co., 149 West 87th St., Chicago 20, Ill., is able to lift pallets to a height of 130 in. above the floor. Thus, with the same machine, it is possible to tier to ceiling heights in box cars and low clearance buildings, as well as to extreme heights where headroom is available. The design emphasizes simplicity of control, paralleling the types of controls used on an automobile as far as possible. A new control of pneumatic type, operating as the electric counterpart of an automobile gearshift, is employed to start and accelerate the truck in forward or reverse direction. The brake pedal and foot accelerator are both identical with those on an automobile and two additional levers, one controlling both lift and tilt and the other forward and reverse direction, are similar to the steering column gearshift of newer cars. In addition to its new high-pressure hydraulic system, the Sky-Lift includes other special features such as silicone varnish insulation of the electrical system, a newly-developed disk-type trac-tion brake, special flow control valves in the hydraulic system and full "deadman" control.

STAINLESS TUBE FITTINGS

ANNOUNCED by Tri-Clover Machine Co., Kenosha, Wis., a new type of industrial flange-type conical end fitting, fabricated from Type 316 stainless steel, has been developed for use with light-gage stainless steel tubing. These fittings encompass a complete line including ells, tees, crosses, return bends, Y's, laterals, ferrules, reducers and adapters. They are suitable for use with commercial tolerance stainless steel tubing having outside diameters from 1 to 4 in. All of these fittings can be readily adapted to a variety of other fitting and valve types, including conical glass tubing, iron-pipe-size fittings, and welding fittings.

For use with the new conical end fittings is a new flanged coupling, available in both aluminum and stainless steel, and built to withstand working pressures up to 250 psi. As shown in the accompanying illustration, this

Flanged coupling for conical end fittings



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coupling makes use of simple gaskets between the conical end fittings and the flange itself to produce a joint which is said to be completely tight under either pressure or vacuum.

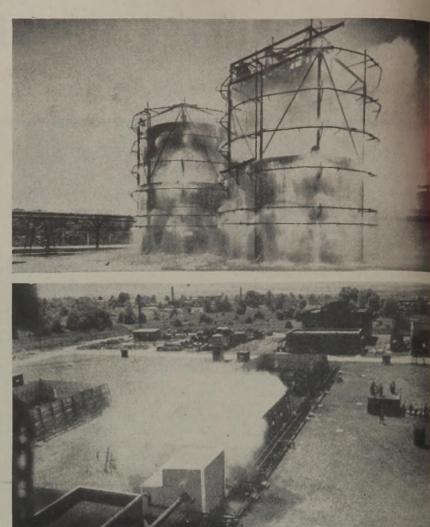
FLY ASH COLLECTOR

DESIGNED to collect cinders, fly ash and dust, as well as to quench sparks and flame, a new collector designed primarily for foundry cupolas, but also suitable for electric furnaces and stacks of various kinds, has been announced by C. C. Hermann & Associates, 5731 Somerset Drive, Detroit 24, Mich. This device is essentially a watercooled cap constructed concentric with a steel shell which is open at the top and adapted to fit over the top of the stack. Water under low pressure is pumped to the unit through pipe connections at the lower periphery of a water-cooled cone arranged centrally within the upper, open portion of the collector. The water flows upward through a jacket on the cone and gushes out of a circular opening at the cone apex. Curved vanes secured to the top plate of the jacket then serve to distribute the water evenly over the entire top surface of the cone, keeping this surface clean. The water then flows over the edge of the outer periphery of the cone, forming an effective water curtain through which gases from the stack must pass. This water is collected in an annular launder around the upper end of the stack proper, together with sludge which is removed from the gases by the water.

The equipment has no nozzles or other mechanical devices for distributing the water, requiring only a pump or other source of water pressure at approximately 40 lb. About 75 gal. per min. is required.

PRESSURE BLOWER

Two NEW groups of axial-flow, direct-driven pressure blowers, designated as Series 16 and Series 24, have been announced by the Moore Co., 544 Westport Road, Kansas City 2, Mo. These blowers are available in a variety of corrosion resisting constructions, including Monel, stainless steel or aluminum. The Series 16 type is available in diameters from 36 to 60 in., for delivering up to 40,000 cfm. of air at static pressures up to 4 in. wg. The Series 24 is available in diameters from 4 to 8 ft. for delivering up to 100,000 cfm. at static pressures up to 4 in. wg. The design employs a weather-proot, nonoverloading, direct-drive motor with the rotor carried on permanently sealed ball bearings requiring no



Butadiene Storage System

These views show a new storage and fire protection system for butadiene recently installed at a cost of about one-half million dollars at the Goodyear-operated synthetic rubber plant of Rubber Reserve Corp. at Akron, Ohio. This installation, produced through the collaboration of the Automatic Sprinkler Co. of America (designers of the equipment), Goodyear technicians, the National Board of Fire Underwriters, and the Factory Insurance Association, was financed by the Rubber Reserve. The system employs storage facilities which are submerged under water, together with butadiene pipelines passing through a series of canals. The entire system extends over nearly three acres. For gaseous butadiene which is contained within water-sealed gas holders, similar protection is used. The protection method is to employ numerous waterfog nozzles coupled with a gas-leak and fire-detecting system of extreme sensitivity. This set-up is entirely automatic and is designed to operate its 15 individual waterfog systems simultaneously, or in series.

The fire detecting circuit employs numerous heat actuator devices which react instantly with any increase in temperature. In addition, a fully automatic gas detecting unit constantly samples the air in the storage area and when any concentration of butadiene **above 60 percent of its lower explosive limit is detected, sounds an alarm, indicates the** leak location by flasher lights and, if gas concentration rises higher, ignites the vapor by an automatic spark so as to affect the heat actuators and release the waterfog units. The system is capable of applying water at rates up to 5,000 g.p.m. in a completely enveloping fog of fine water droplets.

maintenance. Motors are provided in speeds from 300 r.p.m. to 1,800 r.p.m., and horsepowers from 1 to 60. Motor ventilation is afforded by ventilating air from outside the air stream. Motor mounts are of synthetic rubber to reduce motor sound.

OUTDOOR MOTORS

A COMPLETE line of outdoor, weather-proof, totally-inclosed motors in the larger sizes ranging up to and above 2,000 hp. is now being produced by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The principal change in these motors in the larger ratings is a complete redesign of the ventilation-heat transfer system. All air passages are said to be practically self-cleaning and pockets in which water or other liquids might be trapped have been eliminated. The air passage tubes are designed for easy cleaning with a brush or with an air

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For that IMPORTANT PROCESSING



MAXIMUM PROCESSING FLEXIBILITY

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*Resistant to all acids, except HF. *Six standard sizes—5 to 100 gals. *Jacketed construction.

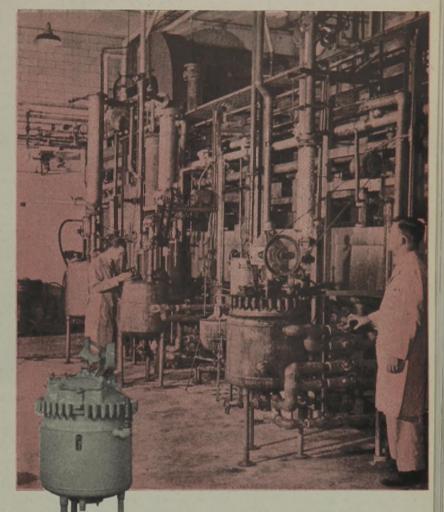
*Top-heads, agitators and drives optional.

The completeness of Pfaudler's line of standard glass-lined pilot-plant kettles permits a selection which enables you to predict the behavior of processes on a plant scale. They duplicate larger equipment so that yields obtained on a pilot-plant basis can be accurately projected.

Resistant to acid attack, "P" Series kettles provide great chemical flexibility. Reactions involving neutral as well as acid reagents may be handled as desired. Easy to clean, they may be switched from one process to another, time after time.

Mechanical flexibility is another feature of this equipment since any unit may be used with or without top-head, agitator and drive. Top-heads are provided with handhole, agitator opening and ample product openings. Two types of agitators are available—the glass covered anchor type and the two blade impeller. The latter may be used with or without adjustable baffle, depending on the type of has mixing action desired. Gas absorption, suspensions and emulsions are handled efficiently with the use of baffles.

Pfaudler



Pfaudler type "P" kettles in one of the Pilot plants of Abbott Laboratories, Chicago, Ill. Inset: A 100 gallon unit.

Specifications of Pfaudler ``P'' Series

Rated Cap. Gals.	Cap.		Pressure	Jacket Heating Surface Sq. Ft.
5	5	30	110*	3.5
10	10	25	95*	5.4
20	20	35	100*	8.4
30	32	30	90*	11.7
50	53	25	75*	16.4
100	116	25	75*	26.9

*Jacket pressures coincident with internal vacuum must be reduced 15 lbs. from those listed. Higher pressures available as special units.

THE PFAUDLER CO., Rochester 4, New York. Branch Offices: 330 West 42nd St., New York 18, N.Y., 111 W. Washington St., Chicago 2, Ill.; 1328 Howard St., San Francisco 3, Calif.; 818 Olive St. St. Louis 1, Mo.; 7310 Woodward Ave., Detroit 2, Mich.; 1318 1st Nat'l Bank Building, Cincinnati 2, O.; 1041 Commercial Trs. Building, Philadelphia 2, Pa; 751 Little Building, Boston 16, Mass.; Box 982, Chattanooga 1, Tenn.; Enamelled Metal Products Corp., Ltd., Artillery House, Artillery Row, London, S.W. 1, England.

PFAUDLER CO., ROCHESTER 4, NEW YORK THE LE ANGE ENGINEERS AND FABRICATORS OF CORROSION RESISTANT PROCESS EQUIPMENT INGlass-Lined Steek Stainless Steels . . . Nickel . . . Inconel . . . Monel Metal

or water hose. These motors are of all-fabricated steel construction and are designed primarily for large draft fans and chemical industry use. With their waterproof joints and new cooling systems, they are expected to be as effective as cast iron motors.

PO. 7 # 17 PO. PO. P.

HEATED GAGE

TO PREVENT liquid level gaging operations from encountering trouble with liquids which must be heated or cooled in the level gage itself, Jerguson Gage & Valve Co., Somerville 45, Mass., has developed gage columns of both the reflex and transparent types having a separate tube arranged concentrically with the gage, through which either a heating or cooling medium can be passed. The construction is evident from the accompanying illustration which shows also how the gage valves are jacketed to permit their being heated or cooled with the same medium that passes through the gage proper. According to the manufacturer, gages and valves of this type find frequent application in process plants where the liquid in the gage may be too sluggish for proper reading or where, because of low boiling point, it would tend to boil and thus cause incorrect reading. In addition, the gage is useful in cold climates where the liquid in a standard gage might freeze. Such gages are produced in a full range of sizes for pressures as high as 3,200 psi. and for temperatures as high as 1,000 deg. F.

METALLIC PACKING

FOR TEMPERATURES not exceeding 450 deg. F., and for steam and air rods, centrifugal pump shafts, valve stems and expansion joints, the Asbestos Textile and Packing Division of Raybestos-Manhattan, Inc., Manheim, Pa., has developed the new No. 920 type of flexible metallic packing which is suitable where surface speeds do not exceed 600 ft. per minute. The new packing is resilient, incorporating a cross-sectional composition of nonfrictional metallic foil, combined with asbestos yarn. High-temperature-resistant lubricants and flake graphite are used for sealing effect and reducing frictional wear. The compressible characteristic is said to result in a packing sensitive to gland adjustment.

SEALING PLUG

A RAPID sealing device for closing openings in pressure vessels before they are to be subjected to hydrostatic or air testing has been announced by Mechanical Products Corp., 168 North Ogden Ave., Chicago 7, Ill. This device, which is known as the "Hydro-Matic" test plug, is self-sealing, being oper-



lydro-matic sen-seamig test plug

Reflex type heated gage



Flexible metallic packing

ated by the pressure within the tank. It is designed so that it may be inserted or removed within one or two seconds, according to the manufacturer. The effective pressure area within the cylinder shown in the accompanying illustration is greater than the area of tank opening so that the tank pressure forces the flexible sealing element against its seat with sufficient force to insure a leak-proof seal. These test plugs are designed to fit any standard opening from $\frac{1}{2}$ to 2 in. I.P.S. and are suitable for testing pressures up to 500 psi.

INJECTION MOLDER

WHAT is described as its first production under its own name in the plastics field is a new 2-oz. injection molding machine, designed by Warren Gross, and introduced by Hydraulic Machinery, Inc., Dearborn, Mich. The new machine, built with a 50 percent overload capacity to enable it to handle a wide range of small plastic parts, is equipped with two electronic controls to regulate the heat in the chamber and nozzle indefinitely, without danger of burning the material. A new type electronic control mounted on the machine panel is said to guarantee an accuracy of plus or minus 2 deg. Means for handling mold clamping, platens,

Welder for thermoplastic



2-oz. injection molding machine

metering of material, timing and othe factors have all been designed in suc a way, it is claimed, as to produce machine which can be operated suc cessfully by people with little or no experience in the plastics field.

THERMOPLASTICS WELDER

TYPE K3S is the designation of a new 2½-kw. Thermatron dielectric heat sealer for sealing, bonding or welding thermoplastic sheets that has been introduced by the Thermatron Division of the Radio Receptor Co., 251 West 19th St., New York 11, N. Y. The device eliminates thread-stitched seams, produces airtight, water-tight seams stronger than the thermoplastic sheets themselves, and may be used on a wide variety of thermoplastics such as Vinylite, Koroseal, Saran, Velon, and others. The 22-kw. dielectric unit may be provided with several standard types of sealing press mounted on the unit and operated by foot controls. A wide range of seams of various lengths can be handled. Sheet thicknesses from 0.002 to 0.040 in. can be handled. Features of the device include special air-cooled tubes, oversize casters, safety interlocks, and simplified controls. The same type of power unit may be provided with a special oven









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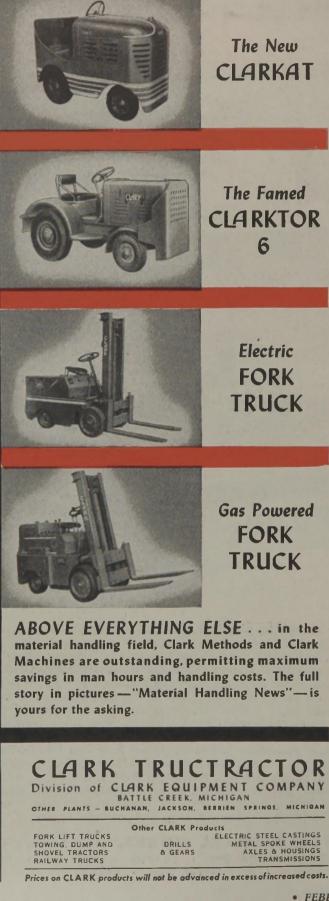
PLASTICS WELDE KSS is the design kw. Thematra i er for sealing has thermoplastic ske

> Victor Phosphates play important and varied roles in the manufacture and enrichment of food products. Cereals, flour, prepared mixes, and food beverages, for example, are enriched with essential calcium, phosphorus, and iron by the addition of Victor Calcium and Iron Phosphates. Calcium phosphates also provide the necessary leavening acid in prepared flour mixes. Disodium phosphate serves as an emulsifier in the production of process cheese and condensed milk. ¶ Victor chemicals employed in the food industry include: **Ammonium Phosphates** (yeast, vinegar, yeast food), **Dicalcium Phosphate** (mineral fortification), **Disodium Phosphate** (process cheese, condensed milk), **Hicalcium Phosphate** (calcium-enriched flour and bread), **Iron Phosphates** (mineral enrichment), **Monocalcium Phosphate** (mineral supplement, leavening acid, baking powder), **Phosphoric Acid** (yeast, sugar, soft drinks, imitation jellies, gelatine), **Sodium Acid Pyrophosphate** (acid ingredient in commercial baking powders, prepared doughnut and cake flours), **Tricalcium Phosphate** (conditioning salt, soda, and powdered sugar).

> VICTOR CHEMICAL WORKS, 141 W. Jackson Blvd., Chicago 4, III. NEW YORK • KANSAS CITY • ST. LOUIS • NASHVILLE • GREENSBORO, N. C. Plants: NASHVILLE • MT. PLEASANT. TENN. • CHICAGO HEIGHTS. ILL. • VICTOR. FLA.

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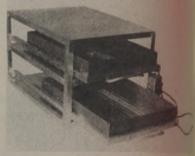
Cut Cost Factors with Clark Tructractors



for heating plastic preforms, plywood rubber, or other materials susceptible to dielectric heating.

INFRA-RED PREHEATER

FOR PRODUCING thermostatically controlled low temperatures up to 380 deg. F. for low-temperature drying applications, preheating plastic preforms, and drying paints and metal finishes, Delt-Calesco Co., Far Hills N. J., is offering a new infra-red preheater which is built in the form of



Infra-red preheater for low temperature

an open framework containing drawers which are separately removable from two sides. The bottoms of these drawers consist of aluminum-carbon alloy heating elements, fused in tempered glass, which are said to produce an even over-all plate temperature. Materials may be placed above or below a plate, or rest directly on its surface. The unit is designed b allow ready escape of release moisture.

RADIOACTIVITY PROBE

For GENERAL radioactivity survey. Instrument Development Laboratories, 817 East 55th St., Chicago 15. Ill., has developed a portable betagamma count-rate meter which is said to be useful in locating radioactive health hazards or in finding strar radioactive materials. The meter has

Beta-gamma radioactivity probe



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THESE FACTS CUT COSTS



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EASY TO SEE! Auto-Lite Thermometers are equipped with capillary tubing for remote reading. Install the indicating head where observation is most convenient. Pointer indicates temperature at bulb. Ask for details.

Are temperatures higher or lower than necessary? Are they maintained uniformly at all hours? Temperature is a vagrant at heart . . . it needs watching and regulating. Know what temperature is up to—keep it efficient in your employ—use AUTO-LITE Thermometers. Indicating and recording types, both shown here, are priced low—serve dependably.

THE ELECTRIC AUTO-LITE COMPANY INSTRUMENT AND GAUGE DIVISION CHRYSLER BUILDING, NEW YORK 17



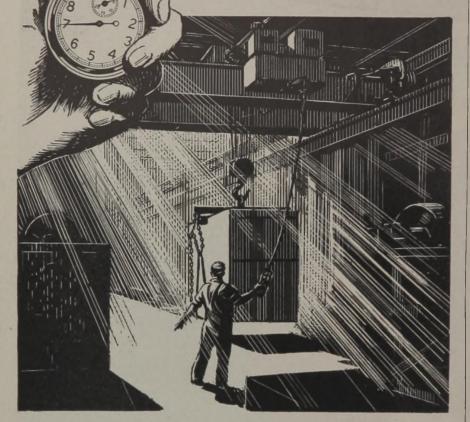
AUTO-LITE Indicating and Recording THERMOMETERS

AUTO-LITE

Indicating Thermometer

AND ADDRESS AND

Ever use a Stop Watch on a CRANE?



It isn't necessary to work in fractions of a second but it will pay you to check the time it takes to move heavy materials from one spot to another. No matter how efficient you are in operations involving manufacturing, processing or fabricating, there's bound to be a waste of time, money and manpower unless your handling costs are kept down.

Let trained, experienced Shepard Niles engineers assist you in making a study of your handling problems. Over a period of many years America's oldest builder of electric cranes and hoists has assembled data on the handling of materials in thousands of businesses. All

this experience is available to you, without obligation, to help you select the crane best suited to do your job with ease, economy and efficiency.

Every hoist application is different. With a background of experience in installing electric hoists in every type of business, Shepard Niles can give you invaluable assistance in planning. This assistance is available without obligation.



three ranges, 0.2, 2.0, and 20 m roentgens per hour full scale. A tachable probe on a 4-ft. cable is for holding the Geiger-Mueller The device readily explores locat not accessible to larger instrume To distinguish between beta gamma rays, an adjustable shield the probe can be set to prevent particles from affecting the tube. T instrument is portable and bath operated, with the battery giving average operating life of 500 hr. normal use.

EXPANSION JOINT

ADDING to its various series of pacless expansion joints, MagniLastic Division of Cook Electric Co., 27 Southport Ave., Chicago 14, Ill., ha



Offset expansion joint

announced a standard line of offer joints for joining pipes that are out o line, due either to accumulated exem tolerances in piping sections, settling and shifting, to thermal co pansion and contraction, or to van tions in operating conditions. The ne joint avoids possible stresses which might otherwise result from the al tempt to bring misaligned pipes to gether. As shown in the accompanying illustration, the joint is constructed with an equal number of expansion flanges on either end of an insert section. The length of unit and number of bellows flanges are determined by the conditions to be corrected. Joints are available for pipe sizes from 1 to 24 in., for pressures from vacuum to 1,000 psi.

INCLINED CONVEYOR

For ELEVATING and lowering commodities between floors, Standard Conveyor Co., North St. Paul 9, Minn., has introduced the standardized In-

Floor-to-floor belt conveyor



• FEBRUARY 1947 • CHEMICAL ENGINEERING

ges, 0.2, 2.0, and s per hour full scale probe on a 4-ft, cal ing the Geiger-Mee vice readily explores essible to larger in tinguish between rays, an adjustable be can be set to pr s from affecting the ent is portable z d, with the batter operating life of use.

NSION JOINT DING to its various ser xpansion joints, Mar of Cook Electric



Other expansion joint

aced a standard line for joining pipes the ue either to accumin ces in piping an and shifting, to the and contraction, an operating condition voids possible stress otherwise result has o bring misaligned As shown in the aco on, the joint is a e length of unit mit rs flanges are deten itions to be conet ble for pipe size b T pressures from W

CONVEYOR EVATING and love

etween floors, Stat North St. Paul luced the standar

sor-to-floor belt correct

8-344

Setting Boiler Standards for 80 Years

When the first B&W boiler — a 50 hp. unit — went into service in 1867, a new era in safe, efficient steam generation began. Since then, B&W has never outgrown its original habit of advanced thinking... of having new ideas... of pioneering developments that steadily raised the standards in boiler making and operation. The welding of boiler drums and X-ray inspection of welds: the development of high-pressure boilers, research in high-pressure, high-temperature steels; and perfection of better methods for producing clean, dry steam are notable examples of B&W's contribution to progressive steam generation. These and other refinements are widely found in B&W boilers including the Integral-Furnace, the Radiant, and the Open-Pass boilers, which were introduced by B&W. This background of leadership is one of the reasons so many power men have been coming to B&W first for so many years ... for lasting satisfaction.

Two B&W Open-Pass boilers of this design went into service in an eastern central station in 1946. Each is capable of delivering 1,000,000 lb. of steam per hour.

The original Babcock & Wilcox boiler, sold in 1867, was of only 50 hp. capacity. Contrast the relative size of this first successful water-tube boiler with the modern unit illustrated below.

TITTT

BABCOCK

& WILCO

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THE BABCOCK & WILCOX CO. GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6. N.Y. WORKS: ALLIANCE AND BARBERTON, O.: AUGUSTA, GA.

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

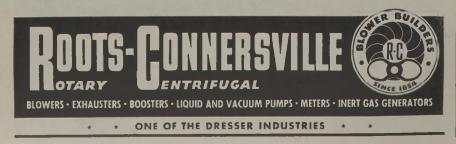


This freight car packs hurricanes! It's loaded with a Roots-Connersville Centrifugal Blower that in just one minute can push the air out of a 10' circular tunnel, 450 feet long. Or, it can blow a gentle breeze, too, if that's what is wanted.

Not all industrial blowers are that big. But whether they're big or little, Roots-Connersville builds them down to the small Rotary Positive units delivering only ten cubic feet per minute. With both Rotary and Centrifugal equipment to choose from, our engineers can recommend the size and type that will precisely match your requirements. That's R-C dual-ability.

For any problem involving the profitable movement of air or gas, call on R-C *dual-ability*, based upon almost a century of specialized experience.

ROOTS-CONNERSVILLE BLOWER CORPORATION 703 Illinois Avenue, Connersville, Indiana



clinebelt conveyor. A rough-surface belt is furnished for the conveyor which is permanently set at 28 deg. Two belt widths are available: 14 in. for commodities up to $15\frac{1}{2}$ in. wide; and 24 in. for commodities up to $25\frac{1}{2}$ in. wide. Both widths are made in lengths suitable for floor-to-floor elevations of 8 to $14\frac{1}{2}$ ft. inclusive. The machines can be furnished with or without the horizontal feed section at the bottom shown in the accompanying illustration. The top end is curved like a gooseneck to provide for horizontal feed or discharge.

SIGHT FITTINGS

A NEW DESIGN of sight-glass fitting for pipelines, known as Series 4000, has been announced by Jacoby-Tarbox Corp., 205 East 42nd St., New York 17, N. Y. These compact fittings,



Sight-glass fittings for pipelines

which permit the operator to know what goes on inside his pipeline, are produced in sizes ranging from $\frac{1}{2}$ to 1 in. I.P.S. They are available for iron, brass or stainless steel lines and are designed for safe operating pressures up to 200 psi. Pyrex glass is used in all standard fittings.

REMOTE SERVO

A NEW servomechanism for remote indication or control has been announced by G. C. Wilson & Co., 2 North Passaic Ave., Chatham, N. J. This device consists of three units which are shown in the accompanying



Remote control servomechanism

illustration. In the illustration, from left to right, they are: (a) the torque unit, (b) the amplifier unit, and (e) the control unit. The position of the shaft on the torque unit is controlled by the amplifier to correspond to the control unit. The system is said to be sensitive to 1 percent changes in the control unit, the latter requiring about 1 oz.-in. of torque for operation. The torque unit, however, develops a maximum of 50 lb.-ft. of torque. A safety t Blow-Knox ficient, comple through proc ad plant cons

THE KEY TO CHEMICAL PLANT CONSTRUCTION

Let Blaw-Knox build your process into an efficient, complete plant. From your flow sheet —through process analysis, engineering design and plant construction—a single responsibility.

L ENGINE

Our organization of engineers, covering many phases of engineering, and each a specialist in his own field, has proved to many satisfied clients that you can depend on Blaw-Knox.

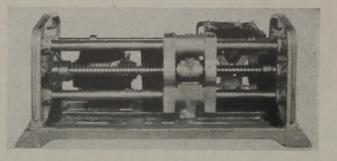
At your request, a Blaw-Knox engineer will call to discuss your plant construction project.

BLAW-KNOX

CHEMICAL PLANTS DIVISION

OF BLAW-KNOX COMPANY 5001 BAUM BOULEVARD PITTSBURGH 13, PA.

Over 950 GEARY-JENNINGS SAMPLERS In Use Today



Yes—nearly one thousand of these sturdy machines are successfully sampling Ore, Mill Pulp, Scrap Metal, Corn Grits, Malt, Coal, Corrosive Solutions, Potash, Textiles, Cement, Phosphate . . . in plants throughout the world.

Solution of these 950 sampling problems has provided a Galigher background for the solution of your toughest sampling requirements. Does your sampling problem involve explosion hazard—extreme dustiness—corrosion—moisture? Then remember—GEARY-JENNINGS has been adapted to operate under all these sampling conditions.

Fill Inquiry Form and Mail to Address Below

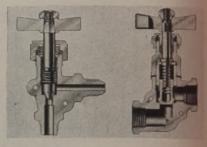
Type of MaterialSp. Gr.
Size of Largest Particle%
Free Drop Sample Stream to CutterFt.
Stream WidthIn. Stream DepthIn.
Amount of Material per Hour
Amount Sample Desiredlbs. or %
Electrical Characteristics

THE GALIGHER CO.

Home Office 48 South 2nd East St. Salt Lake City 1, Utah Eastern Office 921 Bergen Avenue Jersey City 6, N. J. feature in the form of a signal light associated with the control unit is provided to indicate correct functioning of the system, which operates on 115. volt, 60-cycle power, supplied to the amplifier.

INDUSTRIAL VALVES

A LINE of valves for industrial use, produced in pipe sizes from $\frac{1}{2}$ to 1 in., and in tubing sizes from $\frac{1}{2}$ to 1 in., including both needle and globe types in both angle and offset designs, has been introduced by Parker Appliance



Industrial valves in needle and globe types

Co., 17325 Euclid Ave., Cleveland, Ohio. These valves are said to be unusually small and compact by reason of having forged brass bodies. Both the needle and the shut-off types are produced in six variations of connection arrangements. The straight-line types are made with female pipe threads, or tubing threads for use with flexible tubing. The angle types are provided with female pipe threads, with tubing threads, or with male pipe threads at the inlet, and either tubing or female pipe threads at the side outlet. The variations permit the valves to be directly connected into either pipe or flexible tube systems without the necessity for extra nipples, adapters, and the like.

PEDESTAL PUMP

To MEET the needs of a wide range of users who require a pump of moderate capacity, the Allis-Chalmers Mfg. Co., Milwaukee, Wis., has developed a line of Pedrifugal pumps which are cast-iron, bronze-fitted, pedestal-type centrifugals produced in 1-, 2- and 3-in. sizes. The capacity of the pumps range from 10 to 500 g.p.m. with

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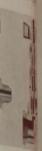
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Belt-driven centrifugal pump



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ALVES lives for indeoc sizes frog hi izes from 1 to needle and give and offset dear



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quire a pump di a ne Allis-Chame e, Wis, ha dei fugal pomps da ze-fitted, pelet oduced in ly l capacity of the m

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ENGINE

Another report of satisfaction

from a user of SIMPSON MIXERS

> The accompanying letter typifies the satisfactory performance that users are getting from their Simpson Intensive Mixers. Actual results prove that these heavy duty mixers not only stand up

ADTINEUS DE ANTRICAL ADRAGINES AND SER

TONAWANDA NY

National

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D. M. Ratanas

Enclosure: 4 Photo

Automal Engineering Company 43 W. Washington Siva, Hicago C. Illinois

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Attention of Kr. Z. A. Feterain

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THE EXOLON COMPANY

BACIATACLOFY.

Yours very truly THE EXOLON CONFANY

November 18, 1946

under the constant grinding and wearing action of materials like abrasives...but that they do a more thorough job faster, at extremely low operating and maintenance costs.

> Ask to have a National Engineer show you how Simpson Mixers can solve your mixing problems involving dry, semi-dry and plastic materials

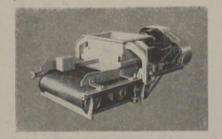
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ENGINEERING 604 Machinery Hall Bldg. • Chicago 6, Ill.

Manufacturers and Selling Agents for Continental European Countries — The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia — August's Limited, Halifax, England. For Canada — Dominion Engineering Co., Ltd., Montreal, Canada, For Australia and New Zealand — Gibsen, Battle & Co., Pty., Ltd., Sydney, Australia

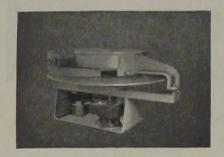
CHEMICAL ENGINEERING • FEBRUARY 1947 •

CONSTANT-WEIGHT FEEDERS **ARE 99% ACCURATE**



Hardinge Constant - Weight Feeders measure by weight, not volume, thus eliminating all variations due to changes in specific gravity, bulking, or size of material. Afford automatic feed control for crushers, pulverizers, mixers, dryers, kilns, furnaces, and conveyors. Capacities from 1 pound to 1000 tons per hour. Catalog 33-D.

HARDINGE ALSO BUILDS **Disc Feeders**



Particularly suitable for handling bulky, sticky hot materials. Simple, sturdy, easily adjusted, economical in cost, requires minimum of head room. Catalog 33-D.



heads from 10 to 100 ft., and power requirements from 1 to 15 hp. Pump and motor are mounted on a fabricated steel base, employing a V-belt drive to permit a range of capacities regulated by size of sheaves and power supply. The pumps are compact, operate in any position and can handle material containing a considerable volume of solid matter. Shaft leakage is prevented by means of a mechanical seal rather than by the use of conventional packing rings. Pumps can be supplied alone or with base and motor.

EOUIPMENT BRIEFS

CAPACITIES from 2,000 to 8,000 lb. per hour can be handled by the new No. 8 Mikro-Atomizer, a machine for grinding in the size range of 1 to 25 microns, which is produced by Pulverizing Machinery Co., 55 Chatham Road, Summit, N. J. This new machine has approximately four times the capacity of the company's No. 6 model which was introduced about two years ago and was previously described in this magazine. It employs a 75-hp. motor and without cyclone or piping occupies a space about $8x7x5\frac{1}{2}$ ft.

PRESSURES from 29 in. vacuum up to several hundred pounds can be handled with a new double-impeller rotary pump introduced by Thomson Pump & Equipment Co., 717 West 11th St., Los Angeles 15, Calif. In this pump the two impellers operate at slow speed without churning action, while the internal pumping chambers are large, to permit handling liquids that contain foreign matter or solids. A variety of construction materials including iron, nickel alloy and stainless steel may be used.

DESIGNATED as Hardweld 50 A.C. and 100 A.C., a new line of high-carbon electrodes for building up worn steel parts by welding with low-voltage a.c. transformers (as well as d.c.) has been announced by Lincoln Electric Co., Cleveland 1, Ohio. The new electrodes have a heavy extruded shieldedarc-type coating and produce flat, smooth beads and deposits that can be hot forged.

To PERMIT a 15-to-1 adjustment range without changing parts, the pneumatic pressure and differential pressure transmitter produced by Re-public Flow Meters Co., 2240 Diver-sey Parkway, Chicago 47, Ill., can now be furnished with an adjustable weigh beam, permitting the range of the transmitter to be changed by merely sliding the adjustable pivot along a calibrated scale to the desired setting. This beam is double, having the adjustable pivot between the two CASE HISTORY No. 12

One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON

(Per	Ton) 100-lb, Drems \$14.00	100-la Poper lo \$2.60	
Labor cost	4.16	1.01	
Total bag and			
labor cost	\$18.16	\$3. 6	
Saving per ton,			

paper bags over drums \$1

CLASS OF PRODUCT PACKED

CEMENT	FERTILIZER
CHEMICALS	FOOD
FEEDSTUFFS	MISCELLANE

PRODUCT CHARACTERISTICS

ABRASIVE	GRAN
CORROSIVE	HEAV
DELIQUESCENT	HYGE
FLUFFY	LIGHT
FREE-FLOWING	VISCO

ST. REGIS PACKAGING SYSTEMS are designed to meet a wide range of product requirements and plant layouts. Packers are available in a variety of sizes and types, with filling speeds as high as twenty-four 100-lb. bags per minute - with one operator. Nearly 400 products - rock products, fertilizers, chemicals, foods, and feeds are now being packaged in sturdy, low-cost multiwall paper bags.

SMAL MANUFACTURER

makes big savin

ST. REGIS PACKAGING SYSTEM

Small manufacturers, as well as large ones, can benefit by the economies and efficiency of a St. Regis Packaging System.

An outstanding example of how successfully the system was applied by one small manufacturer is found in the case of the Stevens Soap Corporation, of Brooklyn, N. Y. This company manufactures soap powder which is used as a general purpose cleaning agent and as an ingredient of abrasive cleaners.

Faced with the high cost of drums being used for packaging of the powder, and confronted by a shortage of labor, the Company installed a labor-saving 100-LS St. Regis packer in 1944 and switched to multiwall paper valve bags. Here are some of the immediate results:

• Container costs dropped from \$14 to \$2.60 a ton - a saving of 81%.

Packaging output, although limited because of material shortages, increased from 2,500 to 6,000 lbs. per hour.

- Packaging costs went down 80%.
- Labor requirements dropped from five to three men.

Much valuable storage space was saved by compact Multiwalls.

Dust was eliminated from the packaging operation.

So satisfied is the Company with its St. Regis Packaging System that it has ordered and received shipment of another 100-LS packer in anticipation of increased output when shortages of ingredients are eliminated.

Mail this coupon to get the detailed picture story of how a St. Regis Packaging System helped this small manufacturer achieve economical and efficient packaging.

RUNT READER

ASE HISTORY No. 1 One in a series of factual o patiences of a group of lut can examplactures with the

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Left: One man operates the St. Regis 100-LS packer. Right: Conveyor takes filled bags to loading point.

ST. REGIS PACEADINE are designed to need a wa produce requirement un outs. Packers are milde riery of sizes and open w peeds as high as overpe 123 per alaute - with a Nearly 400 produ enulgers, denials for are now being package Low-cost autowa

EMICAL ENGINE



HEW YORK 17: 230 Park Ave.

CHICAGO 1: 230 No. Michigan Ave. EALTIMORE 2: 1925 O'Sullivan Bidg. SAN FRANCISCO 4: 1 Montgomery St

Mail this coupon for the complete story

Alianteen Atlanta Birmingham Boston Cleveland Dallas Denver Deroit Pranklin, Va. Los Angeles Nazareth, Pa. New Orleans No. Kanas City, Mo. Ocala, Fla. Oswego, N. Y. Seattle Toledo IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal, Vancouver.

Without obligation, please send me full details regarding "Case History" No. 12, outlined above.

NAME.

COMPANY___

ADDRESS___

Reclaiming Waste with **FASTER** HEAT

MONEY IN WASTE BY-PRODUCTS

Transmuting waste matter into profitable by-products has inspired the ingenuity and imagination of industry for many years. Industrial waste which once cost (and still does in many plants) hundreds of thousands of dollars a year for removal, now represents a new source of income with yearly profits in the millions.

DRYING EQUIPMENT ESSENTIAL

Most of the reclamation processes, such as reclaiming distillery refuse for cattle food, turning mill plant residue into vitamin products, citrus fruit peel into cattle feed and citrus molasses, etc., require steam drying apparatus. Operations can be speeded up, uniform control established and fuel saved by the use of the C-B System of Condensate Return.

C-B SYSTEM SPEEDS DRYING—SAVES FUEL

This consists of a high pressure drainage jet pump which removes the accumulated condensate under suction pressure before it can cool the dryers and returns it in a closed circuit under high pressure and high temperature direct to the boilers. This naturally results in faster heat, more uniform heat, increased production and extraordinary fuel savings.



C-B installation on steam tube dryers in citrus waste drying process.

Write for a copy of Publication No. 3250 COCHRANE CORPORATION 3113 N. 17th St. Philadelphia 32, Pa.



halves. Through its use, for example, a differential transmitter having a minimum range of zero to 1.0 in. of water can be changed to any range up to zero to 15.0 in.

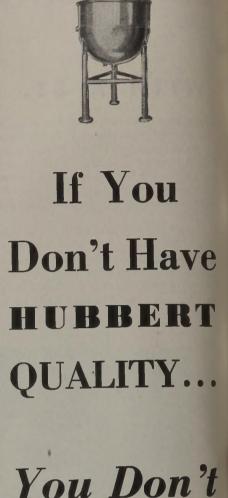
DESIGNATED as Type 46, a new heavy-duty spray gun, designed for the application of extremely heavy materials at high speed, is being offered by Eclipse Air Brush Co., 404 Park Ave., Newark 7, N. J. Said to require minimum air volume and pressure consistent with the job, the new gun handles roofing compounds, fibrated bitumastics, emulsified asphalts and other materials usually considered too heavy to spray.

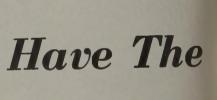
FOR HEAVY-DUTY industrial use, the B. F. Goodrich Co., Akron, Ohio, has announced a new oil-proof industrial apron of particularly heavy construction, made of Ameripol synthetic rubber. The new apron, which is 34×47 in. in size, weighing $1\frac{1}{2}$ lb., supplements the light-weight Ameripol industrial apron previously made.

To sound an alarm whenever predetermined industrial processing conditions, such as temperature, level or pressure, are reached, Brown Instrument Co., Philadelphia, Pa., is now providing a new signalling assembly known as Air-O-Larm. This assembly, mounted in an explosion-proof housing, is adapted to inherently dangerous processing and is capable of providing either audible or visual warnings.

AN ELECTRONIC recording, indicating and controlling tachometer, said to be especially suitable for use on rotating machinery in the process industries, has been announced by Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio. The tachometer consists of a heavy duty magneto generator, used in conjunction with one of this company's standard electronic recorders. The recorder may be placed at any convenient location in the plant and connected electrically to the generator. Generators operate under low load and are said to achieve long life and low maintenance.

PROTECTION both against flame failure and dangerously low boiler water level is afforded by the new type F18TS Fireye combustion control introduced by Combustion Control Corp., 77 Broadway, Cambridge 42, Mass. The device employs an electric eye to "see" the flame and to cut off fuel or sound an alarm with flame failure. In addition, it employs a single probe mounted parallel to the boiler water column and wired to the control unit for water level cutoff.





Best.



B. H. HUBBERT & SON, Inc. Baltimore 24, Md.



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CONSTRUCTION and DESIGN

CORRUGATED AND SOLID FIBRE BOXES FOLDING CARTONS KRAFT GROCERY BAGS AND SACKS KRAFT PAPER AND SPECIALTIES

Standard of the Packaging Industry

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CHEMICAL ENGINEERING • FEBRUARY 1947 •

HEMICAL ENGINE

HERE'S A FIRST LOOK AT SIXIDE

a new and exceptionally powerful insecticide

CONTROLS many sucking and chewing insects with one application. Especially deadly to weevils.

ACTS in three ways—as stomach poison, contact poison, and fumigant.

COMBINES many values of arsen-

icals, nicotine, rotenone, and several fumigants now in use.

CSC

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RE, remarkably effective for control of most agricultural and horticultural insect pests.

DEADLY to many insects affecting man and his habitations.

PROTECTS domestic animals

from lice, ticks, and sucking flies.

LESS toxic to warmblooded animals than many other insecticides.

SOLUBLE for use in preparing liquid sprays.

EVAPORATES gradually, leaving no dangerous residue on fruits and vegetables.

MIXES readily with usual dust diluents for application to agricultural crops.

> OMMERCIAL SOLVENTS Corporation 42nd Street, New York 17 N 1

Production now in the pilot plant stage, benzene hexachloride will be manufactured in commercial quantities under the trade name SIXIDE.

NEW PRODUCTS AND MATERIALS

Richard W. Porter, ASSISTANT EDITOR



VINYL ETHERS

PRODUCTION of a new series of vinyl ethers by the Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York, N. Y., is expected to start early in 1947. These new chemicals are: vinyl ethyl ether to be available in commercial quantities; vinyl iso-propyl ether to be available in pilot plant quantities; and vinyl ethylhexyl ether to be available in experimental quantities. Vinyl ethers have been considered almost laboratory curiosi-ties in this country, although their util-ization has been developed to a considerable degree in Germany. The known vinyl ethers range from vinyl methyl ether which is a gas boiling at 5 deg. C. to wax-like balsams such as the vinyl ethers of alcohols from naturally occurring waxes. While only one of the cthers, vinyl ethyl ether, will be available in commercial quantities in the near future, these compounds should find many uses when more fully investigated.

The vinyl ethers are claimed to be extremely reactive chemically, and their polymerization and hydrolysis are catalyzed by acidic materials. Since they are relatively unstable the vinyl ethers as shipped are stabilized with small percentages of high boiling al-kaline materials such as triethanolamine or di-2-ethylhexylamine. The inhibitor can then be removed by simple distillation, but in doing this it must be remembered that the vinyl ethers may form peroxides. Because of their reactivity, the vinyl ethers offer in-teresting possibilities both in chemical synthesis and in polymerization. The polyvinyl ethers are pale yellow to light brown materials ranging from liquid to rubbery solids and wax-like balsams. Polymerization may be accomplished in either the liquid or vapor phases, using a variety of catalysts. Characteristics of the resultant polymers may be varied by changing conditions or catalysts, and by proper choice of the monomeric ethers.

The polyvinyl ethers have found applications as adhesives and plasticizers, coating and lubricants. Vinyl ether polymers may find use in plastic compositions as modifiers of vinyl resins and polystyrene. Vinyl ethyl polymers have been used as plasticizers and tackifiers for synthetic rubber, nitrocellulose and other resins and synthetics, in synthetic polishing waxes, for giving lustrous appearance to resin coatings, and for impregnating paper and textiles. Liquid polymers and vinyl ethers have been suggested for replacing oils in subsoil and submarine cables. They undergo most of the reactions typical of unsaturated compounds and unite with many compounds having active hydrogen atoms.

THERAPEUTIC CHEMICALS

RECENTLY put into commercial production by Cutter Laboratories, Berkeley, Calif., are two new therapeutic products. The first of these, known as Chemozine, is used for the treatment of anaplasmosis in cattle, and is a dye metal complex whose active ingredients consist of alcohol, crystal violet (dye), copper acetate, and lactic acid. Developed originally for the treatment of human malaria, extensive field trials in the treatment of anaplasmosis in cattle has shown favorable results. Only small doses of this agent are required for treating this serious cattle disease caused by a micro parasite which lives in and attacks the red blood cells. Chemozine is now available for this purpose.

The second new product is a substitute for morphine and is used to give relief from post-operative pains without the complications of gas pains. This material, known as Alco-Dex, is a combination of 10 percent alcohol, 5 percent dextrose, and vitamin B-complex. It is claimed to satisfactorily replace the old standby morphine. Use of the material is applied intravaneously. Using intravaneous alcohol is claimed to increase the respiratory rate and give protection against pulmonary complications. In addition to the analgesic and sedative effects, Alco-Dex is said to supply nourishment because it contains vitamins and calories. While its action is slower than that of morphine, it has been found that its effect is more prolonged and that its use practically climinates the distension and gas pains attributable to morphine. It is not habit forming.

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STABILIZER FOR VINYL RESINS

MANUFACTURED by the National Lead Co., 111 Broadway, New York, N. Y., are two new chemical stabilizers for vinyl compounds. Both of these are lead compounds. The first of these two stabilizing compounds known as Tribase is basic lead sulphate. This material is a hydrous, tribasic lead sulphate which, possessing a high degree of basicity, makes its useful for applications requiring a white, highly reactive basic lead salt. Having a total lead content equivalent to 90 percent lead oxide with an available lead oxide content of 67.3 percent, Tribase is considered to have a number of good possibilities and is claimed to be an excellent stabilizer for vinyl plastics. Its white color makes it readily adaptable in a wide variety of uses where stability to light, heat and moisture is important, and where the electrical characteristics are important. Properties of Tribase are shown in the accompanying table.

Properties of Tribase

Formula	3 PbO . PbSO4 . H2O
Form	extremely fine powde
Color	white
Molecular weight	990
Specific gravity	7.1
Refractive index	2.1
Lead content (% Pb)	83.7
Lead content (% PbO)	90.1

The second of these two products known as Plumb-O-Sil is co-precipi-

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values of arsen-

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SOLVENTS

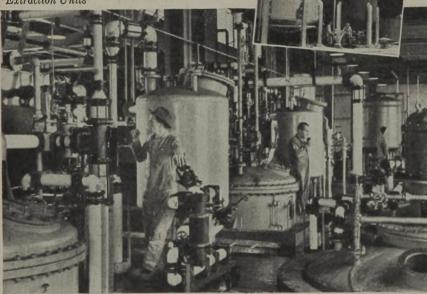
EMICAL ENGLY

CONTROLLING CORROSION IN STREPTOMYCIN PRODUCTION...

When the engineers for a leading pharmaceutical company designed the first large scale streptomycin plant, they knew they faced critical corrosion and contamination problems. For equipment, they used rubber lined tanks and porcelain pipes, with pumps and filters of special alloys. To stop corrosion from spills, drips and fumes, they used Prufcoat Protective Coalings.

This is one more example of the way Prufcoat teams up with the other good materials available to the chemical process engineer interested in controlling corrosion and contamination.

*Extraction Units



APPLIED BY BRUSH...BY YOUR OWN MAINTENANCE CREW

Prufcoat is a special formulation of synthetic resins that airdries by evaporation of the volatile solvents. One material for application to all surfaces — concrete floors, walls, ceilings, structural steel, tanks, pipes, ducts, machinery and equipment. Available in a variety of standard colors for identification of lines or equipment, Prufcoat costs only slightly more per gallon than ordinary paint, costs no more to apply, and has been performance-proved in America's leading chemical process industries, including Hanford and Oak Ridge.

Write today for descriptive bulletin. Prufcoat Laboratories, Inc., 63 Main Street, Cambridge, Massachusetts. Sales Office: 50 East 42nd Street, New York City.





Fermented Broth Tanks

The Prufcoat film formed after polymerization has virtually a zero acid number, saponification number and water absorption rate

SPECIFICATIONS V Acid Proof V Alkali Proof V Alcohol Proof V Oil Proof V Water Proof V Flame Proof

Applies like paint to masonry, metal, wood tated lead orthosilicate and silica gel in the form of a soft white powder. It is a stabilizer for use with vinyl chlorides and vinylidene chloride polymen, and is particularly adaptable for use in the production of clear plastics. It is available in two forms, A and B, which differ in refractive index. Either type may be used where the application requires a stabilizer without tinting strength and one which will cause minimum impairment either to dye or other pigment additions. Properties of Plumb-O-Sil A and B are shown in the accompanying table.

Properties of Plumb-O-Sil

Plumb-O-Sil A	
Lead content (% PbO) Silica content (% SiO ₂) Specific gravity Refractive index	60 to 61 39 to 40 4.1 1.67
Plumb-O-Sil B	
Lead content (% PbO) Silica content (% SiO ₂)	49 to 50 50 to 51 3.3

1.58-1.60

FORMALDEHYDE POLYMER

Refractive index

ANNOUNCED several months ago as being available in limited quantities, Trioxane is now in commercial production by the E. I. du Pont de Nemours & Co., Wilmington, Del. Trioxane is a colorless, plastic, crystalline solid with a sweet odor resembling that of chloroform. It has no trace of formaldehyde odor. It ignites instantly and burns with a very hot, non-luminous, clean, odorless flame, a property suggesting its utility as a packaged fuel for campers, picnickers, and hunters. It is readily soluble in alcohols, ketones, ethers, esters, chlorinated hydrocarbon solvents and aromatic hydrocarbons. In the molten state, Trioxane is a good solvent for many organic substances, including phenol, naphthalene, vege-table oils, fatty acid amides, urea, and other materials. Its solubility in many organic materials makes possible its use as an intermediate in organic reaction media. Small amounts of strong acids or acid-forming substances cause it to depolymerize to monomeric formalde hyde at a rate that may be readily controlled by regulating the amount of catalyst and the temperature. By this means, Trioxane added to a reaction mixture forms a system that is stable until the required catalyst is added to cause depolymerization.

DYEING AGENT

RECENTLY developed by the Dexter Chemical Corp., 819 Edgewater Road, New York, N. Y., is a new dyeing agent and detergent. Known as Clav anol, this material is a non-ionic synthetic detergent of a high molecular weight condensation product of polyethylene glycol. It is soluble in warm a soft white pa for use with is for use with is didene chloride i alarly adaptable in or clear plattic on of clear plattic woo forms, A and in on ot clear plattic woo forms, A and in active index. End where the spaimpairment either ment additions. In O-Sil A and B are mpanying table.

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LDEHYDE POLYMER UNCED several month ailable in limited a is now in comment the E. I. du Pont de ! Vilmington, Del. T ess, plastic, crystallin m. It has no trace of ith a very hot, non-la dorless flame, a proper ts utility as a packaged picnickers, and hunt v soluble in alcoholt, i sters, chlorinated hydro and aromatic hydrocuri ten state, Trioxane ist for many organic subs g phenol, naphthalen, s, fatty acid amides, un aterials. Its solubility at naterials makes possible termediate in organie # Small amounts of strong orming substances can enze to monomene in a rate that may be read by regulating the ann and the temperature, Trioxane added to a m e forms a system that a he required catalyst is a depolymerization.

G AGENT NTLY developed by the I Com, 819 Edgewater k, N. Y., is a new detergent. Known a material is a non-iou rgent of a high mou lensation product of col. It is soluble in FOR ECONOMICAL PIPING

Pipe + ESCO PT* Adapter + Tubing = Economy

The cost of your new piping system can be greatly reduced by ESCO PT* adapters. These make possible the joining of IPS piping and fittings to thin wall tubing, which often can be used instead of the more costly IPS piping. ESCO PT* adapters...

Permit thin wall tubing to be used in combination with IPS piping and screwed fittings.

Resist corrosion - cast of ESCO alloy 45 (type 317) stainless steel.

Smoothly machined inside walls for use in food processing and chemical plants.

Moderate cost - little more than ordinary stainless nipples.

Hexagonal section for use with wrenches.

Provide easy pre-fabrication and quick disassembly of piping systems.

STAINLESS STEEL FOR ULTIMATE ECONOMY

ELECTRIC STEEL FOUNDRY

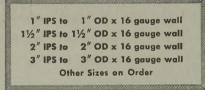
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ESCO PT* adapters are cast in four sizes:



Perhaps ESCO PT* adapters can save money for you in your piping system. It's easy to find out—just fill in and mail us the coupon below, or write for data and prices.

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Please send data and prices of
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EMICAL ENGINEERCHEMICAL ENGINEERING • FEBRUARY 1947 •



4 machines in one efficient unit

Our various customers fill more than 150 different kinds of materials on the Universal Filler . . . Drugs . . . Cosmetics . . . Foods . . . and other household products. Powders and pastes and free-flowing materials—products which must be packed and crowded into the container; products which must be handled gently, without pressure. (In fact, everything but solids and liquids). And, so versatile is this Filler that one customer fills 38, another 31, and another 24 different kinds of materials on one machine!

Fills practically any kind of container with almost any kind of material!



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FILLING : PACKAGING : WRAPPING MACHINES
Speeds to suit your needs — 15 - 30 - 60 - 120 per minute
"Better machines for better packages"

or cold water and has good emulsifying properties. Available in the concentrated form and as a solution of the concentrate, this material is recommended for use in the dyeing of cotton and rayon. In addition to its detergent effect, Clavanol is claimed to retard the exhaustion of direct dyes from the dye bath by forming unstable aggregates with the dyestuff. In the dyeing of rayon and cotton mixtures, the addition of Clavanol to the bath tends to minimize the difference in dye affinity of the two fabrics. This material may be used with advantage in the dyeing of cotton and rayon with diazo colors as well as with acetate colors.

16

LOW PRESSURE MOLDING RESIN

DEVELOPED by the Goodyear Tire & Rubber Co., Akron, Ohio, a new resin known as GRM-2 can be molded at low pressures ranging from 15 to 40 lb. per sq.in. instead of pressures in the range of 100 lb. per sq.in. often used in this type of work. This mate-rial, a derivative of a complex organic glycol, can be laminated with a considerable variety of materials including paper and various fabrics such as canvas and glass fiber. A laminated plastic of glass fiber and GRM-2 showed a tensile strength of 38,000 lb. per sq.in. as compared to a tensile strength of 21,000 lb. per sq.n. for aluminum. Because the new resin can be molded at low pressure, it is possible to carry on the laminating operation with the aid of inexpensive wooden molds. The usual process is to build up layers of fabric saturated with the resin over a form. The completed fabrication is then transferred to the mold where pressure is applied with the aid of an inflatable rubber bag.

ENAMEL STRIPPER

DEVELOPED to remove synthetic enamels from all types of surfaces, in-cluding metal and wood, is a new spot enamel stripper now available from Enthone Inc., 442 Elm St., New Haven, Conn. Known as Enthone Enamel Stripper S-45, it is recommended for stripping of enamel on large parts that cannot be easily immersed in a stripping solution. This material is a slightly viscous liquid that can be brushed on. sprayed or applied by dipping to the work to be stripped. It contains a nonwaxy evaporating retardent that keeps the stripper on the work until action is completed. It causes a wrinkling action so that the enamel can be brushed, wiped or scraped off. S-45 is claimed to have fast action on most synthetic enamels as well as certain nitrocellulose coatings. Modified formaldehyde, and alkyd coatings are rapidly removed. No waxy residue is left to interfere with

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ENGINE

New reference book Alloys and Mill Products

FOR design engineers, production men, and purchasing agents, this new reference book brings invaluable data on aluminum.

It contains 248 pages, 106 tables, 20 writin an photographs, chock-full of specific facts about Aluminum Alloys and Aluminum Mill Products.

The information is arranged accords to build ing to type of product . . . sheet and with the man plate; extruded shapes; roll-formed mpleted third shapes; tubing and pipe; wire, rod and to the main bar; forging stock; press forgings; ingot lied with the in metal for sand casting, permanent mold casting and die casting. For each product, the book shows alloys and tempers, bend radii (for sheet), pressure calculations (for tubing), manufacturing methods, annealing and heat-treating cycles, weights, size and tolerance ranges, chemical compositions. It also covers physical and mechanical properties including densities, coefficients of expansion, thermal and electrical conductivities, yield and ultimate strengths, hardnesses and much other information.

> This reference book on aluminum is the latest of several authoritative handbooks about aluminum recently published by Reynolds. You will find them all immensely valuable.

> To get your copy, just fill out the coupon below with check or money order and mail to Reynolds Metals Company, Louisville 1, Kentucky.

4

'HEAT-TREATING ALUMINUM ALLOYS'' The "What, Why and How" of the metallurgy and heat treatment of all types of aluminum alloys written for both the non-technical man and the technician. Tables, illustrations, charts cover 96 different alloys and tempers. Price: \$1.00

"MACHINING ALUMINUM ALLOYS" 124 pages packed with up-to-date facts about machining aluminum alloys. Eight double-page data charts on tooling, speeds and feeds for eight important types of machine operations. Price: \$1.00

"WELDING ALUMINUM" This new handbook gives detailed information on

11 aluminum welding processes through all stages from edge preparation to finishing. Fully illustrated with photographs, charts and tables. Price: \$1.00

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"ALLOY SELECTOR" At your finger tips: mechanical properties, chemical compositions, physical constants, thermal treatment, and specification numbers of 18 aluminum alloys. Price: \$1.00

"METALS WEIGHT CALCULATOR" A handy metal weight calculating device ... simple ... accurate ... fast. Calculates weights of aluminum, magnesium, steel, brass, copper, and nickel. \$.50

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AND MILL PRODUCTS

DATA BOOK

CHEMICAL ENGINEERING • FEBRUARY 1947 •

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adhesion on subsequently applied finishes. Linseed oil paint, phenol-formaldehyde enamels, or vinyl type coatings are not satisfactorily handled by this stripping agent. On recommended applications it is claimed that most enamels are thoroughly loosened in about five minutes, although some may take longer and require several applications of the stripper. The material must be handled with care since it is harmful to hands or eyes. It must be stored at temperatures lower than 100 deg. F. and is available in 1-, 5- and 53-gal. non-returnable containers.

RESIN FROM PETROLEUM

RECENTLY announced by the Esso Laboratories of the Standard Oil Co. (New Jersey) 30 Rockefeller Plaza, New York 20, N. Y., is a new synthetic resin from petroleum which is said to be successfully applied as a protective coating to iron, brass, bronze, alu-minum and highly polished metals in addition to wood and steel. Having the brand name of A-Resin, this material was developed to meet the specifications of the paint and varnish industry. Manufactured from crude petroleum, A-Resin is claimed to have good qualities of adhesion, flexibility and wetting power which make it useful on surfaces difficult to paint with ordinary coating materials. Tested as a baked priming coat on automobiles, it is said to be hard, durable, lightfast and chemically resistant. Steam at 15 lb. pressure and 250 deg. F. does not affect material coated with this resin. The resin is also resistant to the high acidity of grapefruit and other fruit and vegetable juices. Quick air dry films using A-Resin are said to have good light fastness and will retain a high and lasting gloss. A commercial size plant is being planned for produc-tion of A-Resin in its various types and forms.

COLORS FOR PLASTICS

ANNOUNCED by the Wilmington Chemical Corp., 10 East 40th St., New York 16, N. Y., is a group of coloring materials for use in plastics. Under the brand name of Poly-Tint Stains, these new materials are light-fast, and are selected for their compatibility with one another, purity of shade, and general stability. They are applied by dipping. The 600 Series of Poly-Tint Stains were developed for coloring cellulose acetates, cellulose acetate butyrate, ethyl cellulose, polyvinyl chloride, and other materials in the same class. The second type, the 700 Series, is used for coloring methyl methacrylate and polystyrene. Each of these two types is produced in four standard colors: red, blue, yellow and black, from which other colors may be pro-

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Corrosion Gannot Start without a starting place!

DTOP IT at the start—by denying it the pin-point opening it needs. A Coating based on VINYLITE Brand Resins accomplishes just that—provides an intact film, tough, resilient, non-cracking, amazingly resistant to the abrasions or surface-breaks that give corrosion the chance it seeks.

Tank interiors impose a special problem—particularly when they contain fluids that can attack steel or be contaminated by it. In such uses, VINYLITE Plastic linings work both ways protecting tank and contents one from the other—and maintaining integrity and bond through years of hard service.

protecting tank and contents one from the other—and maintaining integrity and bond through years of hard service. Engineers place great faith in tough linings based on VINYLITE resins—and no wonder. Again and again they have demonstrated their inherent superiority in these and similar uses—in oil well casing that plunges deep underground in chemical processes where tanks and pipes must be kept inert as well as intact. Such coatings are resistant to strong acids, nearly all chemicals, and for short periods, to temperatures as high as 300 deg. F. Write Department BQ-46 for detailed technical data, formulations and information on suppliers of VINYLITE Plastic coatings.

BAKELITE CORPORATION. Unit of Union Carbide and Carbon Corporation UES 30 East 42nd Street, New York 17, N.Y. CHEMICAL ENGINEERING • FEBRUARY 1947 • 173

TRADE -MARK

PLASTICS

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AL ENGINE

You can avoid hidden weaknesses in the processing equipment you purchase by selecting a fabricator with specialized experience in working with this alloy. Stainless steel is a tricky metal to work. When you bend it, form it, weld it, your fabricator must use shop procedures that safeguard the original properties of the metal. And he must have the plant machinery, engineering skill, and trained manpower to carry out these protective procedures.

PROTECTING YOUR

STAINLESS STEEL EQUIPMENT

As custom builders of processing equipment working exclusively with stainless steel alloy-we offer this specialization to our customers. It assures you processing equipment with no hidden weaknesses—equipment that lasts longer, works more efficiently for your application. Consult with us.

S. BLICKMAN INC.

602 GREGORY AVE., WEEHAWKEN, N. J.



duced by blending. They are best used at a normal room temperature and should not be used above 110 deg. F.

Another material now available from this company is a group of pigment dispersions in liquid form for the coloring of latices and aqueous dispersions of natural and synthetic rubber polyvinyl chlorides, polyvinylidine chlorides and similar materials. Known as Poly-Tint Aqueous Dispersions, these materials are highly fluid using light-fast and stable pigments. They are available in four basic colors, red blue, yellow and black.

PHENOLIC RESIN COATING

Now AVAILABLE to fabricators in this country through Phenoglaze Sales Corp., 315 Broadway, New York 7. N. Y., is a phenol-formaldehyde protective coating manufactured in England for use on all types of wood and metal products. Various tests have been made on this new product which is known as Phenoglaze, and it is claimed that this material is impervious to heat, moisture and chemical action such as that of salt, gasoline. oil, alcohol, turpentine, acetone and various corrosive agents. It is said to offer complete protection against termites, marine borers, cosmetics, cigarette burns and contraction and expansion caused by extremes of temperatures. This new material is applied by spray, brush, or by dipping and is available as a clear or colored liquid. Phenoglaze is said to have high resistance to galvanic influences, to acids and alkaline solutions, has been used in the manufacture of such products as furniture, station wagon bodies, wood or steel boats, radio cabinets, etc. It is air drying and cold setting.

AGRICULTURAL CHEMICAL

A NEW agricultural spray has been announced by the B. F. Chemical Co., Rose Bldg., Cleveland, Ohio. Consisting of a mixture of Good-Rite p.e.p.s. (polyethylene polysulphide), recently announced in these columns, and zinc-dimethyl dithiocarbamate and cyclohexylamine, it is used to thin excessive and undesirable fruit and is non-injurious and non-caustic to both fruit and tree. This permits the remaining fruit to attain larger size and improved quality.

PHENYL MAGNESIUM BROMIDE

ANOTHER of the series of Grignard reagents recently announced by Araphoe Chemicals, Inc., Boulder, Colo., is phenyl magnesium bromide. Both phenyl magnesium bromide and methyl magnesium bromide are now available for immediate delivery in drum lot quantities.

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THURSDAY

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RESIN COATING

NAILABLE to fibri ry through Phenod 5 Broadway, New a phenol-formalde ating manufactured ise on all types of m ducts. Various be on this new produc as Phenoglaze, m at this material a at, moisture and a as that of salt a , turpentine, aut osive agents. It is ete protection ne borers, cosmetr and contraction used by extreme This new material ay, brush, or bit ible as a clear or a oglaze is said to ha galvanic influen el boats, radio a

AL CHEMICAL

VANO

DESIGN "C"

VENTILATOR-

EXHAUSTER

in tanks, tank cars, drums, etc.

in underground cable manholes.

on coke ovens.

in aeroplane fuselages, wings, etc.

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the series of Ga announced ? Inc., Boulder, U ium bromide. bromide and mide are novi delivery in .



VANO Design "A" VENTILATOR

Vano Design "A" cooling interior of furnace, supplying fresh air through 10 feet of "Ventube" to provide safely and comfort during repair work.

1 Course

Vano Design "A" supplying fresh

supplying fresh air in Reactor Room of Synthetic Rubber Plant.

Vano Design "A" Ventilator supply-ing fresh air to men working in wing compart-ments, fuselages, etc.

COPPUS ENGINEERING CORP., 222 PARK AVENUE, WORCESTER 2, MASS. Please send information on the Blowers that clear the air for Action.

Vano Design "C" equipped with 8" discharge tubing removing welding fumes.

Vano Design "C" equipped with two suction lines removing welding fumes for opera-tors' safety.

general man cooling. around cracking stills.

exhausting welding fumes.

stirring up stagnant air wherever men are working or material is drying.

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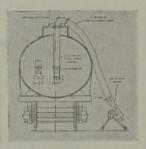
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ADDRESS

Vano Design "A" delivering fresh air to cable manhole, expelling sewer gas, making entrance safe in a few minutes.

Vano Design "A" Ventilator plus a few accessories feeds large air volume into tank car, driving out fumes, stagnant or hot air for workers' safety and comfort.



Powered by a 1/2 hp motor, and equipped with the exclusive Coppus axial-flow propellertype fan, this general-purpose blower delivers 1500 CFM of fresh air. It supplies ventilation for tanks, tank cars, drums, vats, underground cable manholes, pipe galleries, airplane wing compartments and fuselages, and other confined places. Weighs only 103 lbs. Uses 8"-diameter flexible canvas tubing ("Ventube").

For withdrawing welding fumes

from confined places or di-

rectly from the welding rod

... or for expelling fumes or hot air from enclosed vessels. You can get it with 8" suction inlet

for 8" non-collapsible tubing

... or with multiple inlet nozzles for 5", 4" or 3" suction hose.

The discharge outlet takes 8"

"Ventube". Powered by a ½ hp

motor, it weighs only 85 lbs.

(Write here any special ventilating problem you may have.) COPPUS "BLUE RIBBON" PRODUCTS—Designed for Your Industry, Engineered for You

on steam-heated rubber processes.

on boiler repair jobs.

COOLING: motors, generators, switchboards.

wires and sheets.



Steel Shortage Emphasizes Need for –

Better plant maintenance More care in storing steel More ingenuity in adaptation

Today's shortage points up as never before the importance of using every available pound of steel to best advantage. It's the responsibility of buyer and seller alike.

Because a machinery breakdown may necessitate replacements not readily available under present conditions, extra maintenance care is essential. Regular painting of exposed surfaces and thorough lubrication of working parts will often prolong the useful life of plant property and equipment considerably.

Industry can cooperate by more careful storage and handling of its steel inventories. Many manufacturers have some steel on hand, but inadequate protection and poor handling facilities may cause deterioration and sometimes the stocks are not in satisfactory condition when needed.

Ingenuity in adapting steel on hand to needs of the moment is a third essential today. Steel buyers can help by specifying cut size on orders for stock



lengths, allowing steel-service plants to draw on their inventory of shorts. And the steel warehouse itself can make wide use of adaptation. For example, Ryerson plants continue to carry fair stocks but orders for popular sizes of many products are so numerous that the demand cannot always be met. When this happens, we can often suggest alternate kinds or sizes to do the job. An alloy bar replaces a carbon bar. Two angles form a square tube. In one way or another we may be able to help keep production moving despite the steel shortage.

Our organization is constantly on the watch for ways to make the available steel supply useful to more customers. We promise no miracles, but we will certainly do everything in our power to serve you when you call.

> Joseph T. Ryerson & Son, Inc. Steel-Service Plants al: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

RYERSON STEEL

CHEMICAL ENGINEERING NEWS

DOW PURCHASE OF VELASCO STYRENE PLANT APPROVED

THE Dow Chemical Co. position as a major producer of polystyrene appears bulwarked with the purchase from the War Assets Administration of the government styrene plant at Velasco, Tex., just given final approval by the Department of Justice. These facili-ties, added to Dow's styrene plant here, are said to give the company a styrene capacity in excess of 200 million pounds annually. Company officials explain, however, that acquisition of the Texas property does not foreshadow an immediate increase in the volume of polystyrene which has been in short supply since the plastic was released from war materials lists. Dr. Willard H. Dow, said that while buna requirements are gradually diminishe planis b Velasco production will continue to d the steel ma the Rubber Reserve for an indefinite ptation Fuer also showing much interest in new carry fair star nonplastic uses for the versatile liquid, nany products among them being laminating resins, annot always impregnation of magnesium castings and the replacement of drying oils in ften sugget a paints.

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ENGINE

In addition to the styrene plant, a square the Dow also acquires a portion of the ble to help be eel shortage. The actual metal producing units are not acquired and are to be held in tly on the set standby condition by the government. Dow's bid on the property, most of which was built in 1942, was \$35 milno miracles lion.

NORTHWEST FERROSILICON PLANT DECLARED SURPLUS

THE GOVERNMENT-OWNED ferrosili-, Philodelphia) con plant at Rock Island, Wash., ten miles south of Wenatchee has been declared surplus by WAA, and will be e, S. Louis In offered for sale or lease at an early date. Built during the war at a cost of \$2,-000,000, the plant had a design ca-pacity of 16,200 tons of 75 or 85 per-cent ferrosilicon annually. The ten buildings are situated on approximately 40 acres, and plant facilities

include eight reduction furnaces. Previously, WAA rejected a bid for the sale of the plant to an undisclosed company because the bidder proposed to dismantle the plant for export. At one time WAA had also proposed the scrapping of the plant, but the proposition was dropped after vigorous protest by the Washington State Advisory Commission. One firm, according to reports, has made a survey to determine feasibility of converting the unit to the production of phosphate fertilizer.

COMMITTEES APPOINTED FOR DCAT DINNER IN MARCH

COMMITTEE appointments for the 21st Annual Dinner of the Drug, Chemical & Allied Trades Section of the New York Board of Trade, to be held Thursday, March 13, at the Waldorf-Astoria, have been completed as follows: Dr. Carle M. Bigelow, American Cyanamid Co., chairman of the section, Robert B. Magnus, Magnus, Mabee & Reynard, Inc., chairman of the dinner arrangements committee; Fred J. Stock, Chas. Pfizer & Co., Inc., vice chairman of the section and chairman of the recep-tion committee; Lloyd I. Volchening, Ivers-Lee Co., chairman of the publicity; and Guy L. Marsters, chairman of the program committee.

EUROPE WANTS U. S. ENGINEERS AND HAS DOLLARS TO PAY

CHEMICAL engineering is one of the most prized American skills in Europe today and dollars are available in payment for such services, accord-ing to Dr. Ralph Landau of the Scientific Design Co., Inc., who has returned from an extended European tour. Conferences with British and continental chemical companies on new expansion programs convinced him that American engineering, particularly chemical engineering, is held in great esteem. An opportunity awaits American contractors and consultants who are willing to study this European market and adapt their methods to its requirements.

COMMERCIAL SOLVENTS BUYS CHEMICAL PLANT

PURCHASE by Commercial Solvents Corp. of the Pennsylvania Alcohol and Chemical Co. was revealed recently. The new unit will operate as an independent division, augmenting the manufacturing and distribution facilities of Commercial Solvents. The plant purchased is at Carlstadt, N. J.

PMMA ELECTS OFFICERS AT ANNUAL MEETING

AT ITS annual meeting, John R. Hoover of Cleveland, vice president of B. F. Goodrich Chemical Co., and Dr. D. S. Frederick of Philadelphia, vice president of Rohm & Haas Co., were elected president and vice president respectively, by the Plastic Mate-rials Manufacturers Association, Inc. F. H. Carman was reelected general manager and John E. Walker, secretary-treasurer with headquarters in Washington. The seven-man board of directors includes: Mr. Hoover, Dr. Frederick, M. G. Milliken, Felix N. Williams, Harry Hrehbiel, C. J. Romieux, and W. Stuart Landes.

HELIUM CRYOSTAT USED FOR LOW TEMPERATURE STUDY

RESEARCH at very low temperatures will be made easier by the Collins helium cryostat, which can maintain any temperature down to that of liquid helium, -457 deg. F. Arthur D. Lit-tle, Inc., has undertaken to construct several of these newly developed instruments for industrial and institutional laboratories. In addition, the company plans to inaugurate a program of research at low temperatures, where it is possible to observe many phenomena which are obscured by the effects of heat at higher temperatures.

CALIFORNIA OFFERS COURSE IN ATOMIC ENGINEERING

RECOGNIZING an immediate need for engineers trained in the basic engineering of chain reacting piles and their application to power plants, the University of California extension at Los Angeles has inaugurated a unique course in designing and developing the various chain-reacting piles and their application as power sources for practical commercial uses. Called "Theory and Design of Chain React-ing Piles," the course is divided into two sections, one on the UCLA campus and the other at the University Extension in downtown Los Angeles. Instructor for the course is Leo H. Ohlinger, consultant in nuclear design for a southern California aircraft com-

CHEMICAL ENGINEERING • FEBRUARY 1947 •

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Removal of tramp iron from material to protect your product, your machinery, your employes—concentration of ores and minerals for improved values — purification of material — moving material safely, quickly and economically with lifting magnets—control of machinery with magnetic clutches and brakes—these are some of the many profitable uses for Stearns Magnetic equipment that will reduce your producution costs.

Consult Stearns Magnetic engineering and laboratory facilities for advice on how our equipment can help you.

Write for Bulletin 800.



pany, and for four years connected with the Manhattan Project at Hanford Engineer Works where he made basic designs for the plutonium plant.

CHEMICAL CAPONIZERS GET O.K. FROM FDA

ALTHOUGH viewed with understandable alarm in some quarters (see Chem. Eng. Jan. 1947, p. 116), the Federal Food and Drug Administration has ruled that it is all right to eat even the livers of capons produced non-surgically by the administration of the female sex hormones—dimethyl ether of diethyl stilbestrol or dianisyl hexane. General Mills worked out this chemical caponizing at its Rockford, Ohio plant where Maxwell L. Cooley is chief chemist. Other researchers, according to Business Week, have been "tenderizing" chickens by planting pellets of one or the other of these hormones in their necks, where they are gradually absorbed. B.W. reports

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CONVENTION CALENDER

- Technical Association of the Pulp and Paper Industry, annual meeting, Hotel Commodore, New York, N. Y., February 24-27.
- American Society For Testing Materials, spring meeting, Benjamin Franklin Hotel, Philadelphia, Pa., February 24-28.
- American Institute of Mining and Metallurgical Engineers, world conference on mineral resources, Waldorf-Astoria Hotel, New York, March 17-19.
- American Society of Lubricating Engineers, annual meeting, William Penn Hotel, Pittsburgh, Pa. March 17-19.
- American Society of Metals, western metal congress and exposition, Civic Auditorium, Oakland, Calif., March 22-27.
- National Association of Corrosion Engineers, annual meeting, Palmer House, Chicago, Ill., April 7-10.
- Electrochemical Society, spring congress, Brown Hotel, Louisville, Ky., April 9-12.
- American Chemical Society, 111th national meeting, Atlantic City, N. J., April 14-18.
- Second National Plastics Exposition, Coliseum, Chicago, Ill., May 6-10.
- American Institute of Chemical Engineers, regional meeting, Coronado Hotel, St. Louis, Mo. May 11-13.
- Pacific Chemical Exposition, Civic Auditorium, San Francisco, Calif. October 21-25.
- Exposition of Chemical Industries, 21st exposition, Grand Central Palace, New York, N. Y., December 1-6.

• FEBRUARY 1947 • CHEMICAL ENGINEERING

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Formaldehyde-Heyden

...means *Good* synthetic resins for <u>bette</u>r plastics

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Synthetic resins made with FORMALDEHYDE-HEYDEN serves the plastics manufacturer, whether he is using Casting resins, Laminating resins or resins suitable for injection or compression molding.

Because it is consistently low in acidity, iron and copper content, and high in uniform-

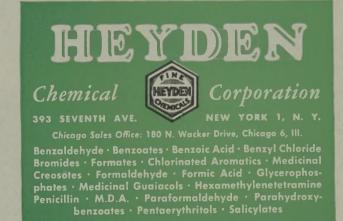
ity, FORMALDEHYDE-HEYDEN makes the finest Phenolic, Melamine and Urea Resins.

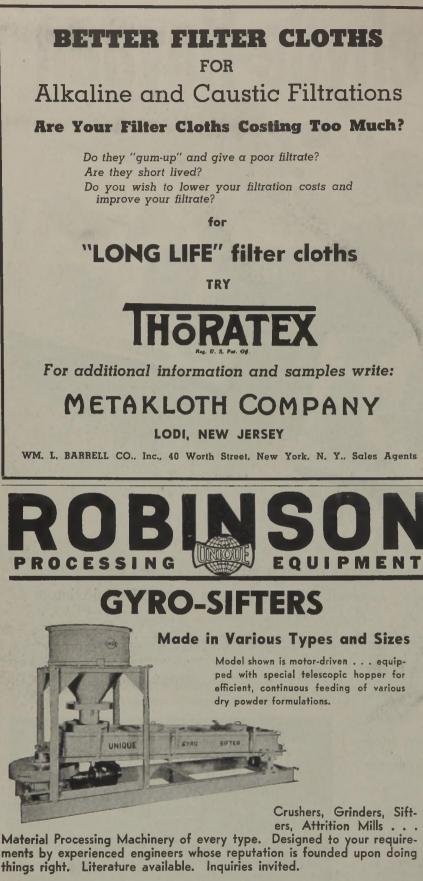
FORMALDEHYDE-HEYDEN serves also in the production of casein plastic, used largely in buttons, buckles and costume jewelry.

FORMALDEHYDE-HEYDEN is available in amounts to meet any requirement: Tank Cars and Trucks, Carboys and Drums, as well as in Bottles for small quantity users. Further information, also Technical Data Sheets will be sent upon request.

MELAMINE RESINS

HEATHER





ROBINSON MANUFACTURING CO. Plant: Muncy, Pa. SALES REPRESENTATIVE MERCER-ROBINSON COMPANY, INC. 30 CHURCH ST., NEW YORK 7, N. Y. that this "makes old hens act like spring fryers. But the most successful application commercially is to make cockerels effeminate and as tender as their sisters." Thus the way has now been cleared for further advance of American living standards through this contribution of the synthetic organic chemical industry.

NAUGATUCK CHEMICAL LOCATES IN WEST

For the purpose of processing and distributing specialty aromatic chemicals used in rubber, cosmetics and soap, plastics and other products, the Naugatuck Chemical Div. of United States Rubber Co. has established manufacturing facilities and Western headquarters in Los Angeles. Plant space, obtained from RFC at the Los Angeles synthetic rubber project, has already been completely converted for the chemical operations. Investment in plant and inventories will exceed \$250,000.

Initial operations will be confined to supplying rubber chemicals to fabricators on the Pacific Coast, it was stated. These products include a chain modifier for GR-S rubbers, a synthetic rubber antioxidant and stabilizing agent, and various rubber accelerators. Synthetic latex, procured from the Los Angeles synthetic rubber polymerization plants, will be processed by increasing percentage of solids from 30 to 65 percent through a creaming method.

ST. REGIS PURCHASES THREE PAPER MILLS

THE St. Regis Paper Co., has completed the purchase of the three paper mills from Time, Inc. This transaction will add 180,000 tons to St. Regis' annual output of printing, publication and converting papers, doubling its present production of these grades. By this purchase St. Regis acquired the Maine Seaboard Paper Co., Bucksport, Me.; Hennepin Paper Co., Little Falls, Minn., and the Bryant Paper Co., Kalamazoo, Mich. The contract provides that an annual maximum of 85,000 tons of St. Regis publication paper will go under long-term contracts to Time, Inc., for the publications of its magazines.

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MONSANTO BUILDS NEW WOOD FLOUR PLANT

THE plastics division of the Monsanto Chemical Co. announced it has under construction a new plant for production of wood flour, ingredient of phenolic-type plastics. The new three building facility will free Monsanto from dependency on outside

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FROM De Laval's large line of highly specialized centrifugal machines, which includes more than a dozen distinct types and sizes, every problem of applying centrifugal force can usually be met in the most efficient, economical manner. The types and varieties of problems solved by De Laval engineers are far more comprehensive than the examples listed above but the benefits in all cases are fundamentally the same.

In addition to speeding up operations by converting a process to a continuous basis, De Laval centrifugals have two additional advantages worth noting: (1) they effect material savings and (2) generally, if not invariably, they improve the product.

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 MONTREAL PETERBOROUGH WINNIPEG VANCOUVER

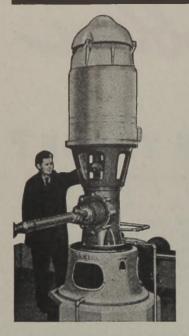
When writing, please specify whether you are most interested in separation, clarification or concentration.

De Laval Centrifugal Machines PROCESSING FOR

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PUMP NOTES by DEMING



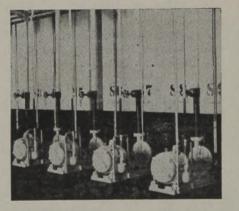
"DAY & NIGHT SERVICE" View at right shows part of a battery of Deming side suction centrifugal pumps operating on a 'round-the-clock schedule in a large refinery. Write for illustrated catalog bulletins on Deming Centrifugal Pumps.

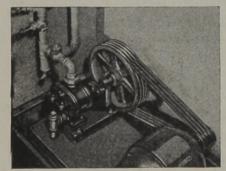
POWERED FOR EMERGENCIES

The Deming deep well turbine pump illustrated (at left) is equipped with a combination motor and gear head to assure continuous factory water supply at all times.

Should electric current fail, the pump is operated by an auxiliary engine direct-connected through a flexible coupling to a gear head between the discharge head and motor drive. A flat belt pulley can be substituted for the gear head if the engine is used only occasionally for driving the pump.

Deming deep well turbines can also be equipped with direct current motor head or steam turbine head. Write for illustrated Bulletin 4700-8.





MISSING ... THREE OILERS

The Deming High Speed Rotary Pump shown at left is the heart of an ingenious oiling system that keeps 300 machines automatically lubricated in a large metal working plant. Formerly a crew of four men were kept busy on the oiling job. Now only one man is required to operate the complete system. Write for complete data on Deming High Speed Rotary Pumps.



DEMING DISTRIBUTORS LOCATED EVERYWHERE

Close cooperation between Deming field engineers and Deming Distributors makes a hard-to-beat combination of sales-engineering "know-how" to serve your pumping needs. If you don't know where to locate the nearest Deming Distributor, write us.

THE DEMING COMPANY • 213 BROADWAY, SALEM, OHIO



sources and at the same time permit control over product quality. During the past year the wood flour market has been extremely erratic with de mand frequently exceeding supply. The new plant will eliminate one of several factors adversely affecting production of phenolic molding compounds. It is expected to be in production by May 1

CASE SEEKS TO CHANGE NAME OF SCHOOL

CASE School of Applied Science, Cleveland, will become Case Institute of Technology in early 1947 provided a petition filed December 30 in Common Pleas Court by Frank A. Quail, president of the college's trustees, is approved. The court's permission is necessary since changing the name departs from the provisions of the founder's, Leanard Case, Jr., trust established in 1877. No opposition to the change is expected.

WYANDOTTE HOLDS SECOND ANNUAL SEMINAR

MEETING at the Detroit Statler in January, staff members of the Wyandotte Chemicals Corp. research department held an all day seminar on coordination of sales, development, and research. Dr. Thomas Vaughn, director of research, discussed advertising, sales, production, and development activities of the company and explained their relationship to the research department of the organization. Other speakers at the seminar were: C. B. Robinson, Bert Cremers, M. E. Clark, H. F. Roderick, L. D. Dodson, M. A. Thompson, Dr. P. E. Burchfield, Robert Raine, and W. F. Torrey.

At the dinner following the meeting. Dr. Clair S. Boruff, technical director of research and development, Hiram Walker and Sons, Inc., spoke on "Research on Alcoholic Beverages."

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INCO BROADENS COOPERATIVE EDUCATIONAL PROGRAM

BROADENING of International Nickel Co. cooperation with universities and colleges in the U.S. and Canada in the field of engineering education through the distribution of technical literature was announced last month. The new program will make available useful material for classroom instruction in training students in scientific fields. It has been offered to, and accepted by, a number of important institutions which give accredited courses in mining, metallurgy, chemical engineering and one or more other engineering courses. As rapidly as possible the program will be offered to all engineering schools. It will be an activity of the company's developd at the same to er product qualiyear the wood & extremely enable quently exceeding it will eliminate one adversely affecting olic molding compo d to be in production

SEEKS TO CHANGE OF SCHOOL

se School of Apple cland, will become Car echnology in early 1947 tition filed December 3 Pleas Court by Freel ident of the college's w roved. The court's peressary since changing the s from the provision nder's, Leanard Case, h ished in 1877. No. change is expected.

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OADENING OF Internation cooperation with mina es in the U.S. and Ca field of engineering a igh the distribution of a ture was announced by new program will make ul material for classrous in training students n It has been affertil ted by, a number of a tions which give a s in mining, metallog incering and one of a ring courses. As a the program will gineering schools. ty of the company

Is this happening TOO OFTEN in your plant?

Condenser Tubes of Alcoa Alclad Aluminum may be the answer to your corrosion problems

The idea's not new. Condenser tubes of Alcoa Aluminum are already employed in all manner of processing plants. The aluminum safeguards product quality. And it offers high resistance to the attack of corrosive cooling waters and of materials being processed.

Now, a new development in tubing is offered -Alcoa Alclad-strong aluminum combined with a highly protective interior coating of aluminum. An even greater number of gases

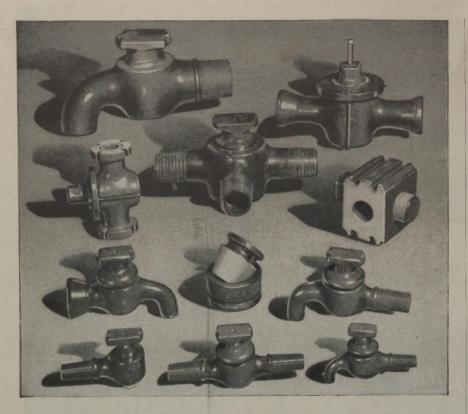
Replacing corroded condenser tubes.

and liquids can be handled by aluminum condenser tubes than before. Why not try aluminum tubes in one of your condensers? In addition to being long-

lived, tubes of Alcoa Alclad are surprisingly low in first cost. See our nearest sales office or write Aluminum Company of America, 2151 Gulf Building, Pittsburgh 19, Penna.



CHEMICAL ENGINE CHEMICAL ENGINEERING • FEBRUARY 1947 •



ACID-PROOF VALVES

Maurice A. Knight supplies stoneware piping and valves for pipe lines, tanks and other installations where acids or corrosives are handled. The entire body of Knightware valves is acid-proof.

Shown in the picture are straightway types, bibs, a block cock, drop valve, spigot and two Knight Nordstrom lubricated plug cocks. Each valve is hydraulically leak-tested. There are no metal parts for acids to corrode. Flanges may be either conical or bolt-hole type with standard ASME or special bolt holes.

Threaded connections are for use only with lead, rubber, wood or similar soft materials into which the stoneware can cut its own threadway.

When writing for estimates on Knightware acidproof valves, piping or stoneware, please give us engineering data and the purpose for which they are to be used.

MAURICE A. KNIGHT 102 Kelly Ave. Akron 9, Ohio



ment and research division, with Dr. W. A. Mudge, assistant director of technical service on mill products. directing. Prof. Wm. B. Plank, head of the Department of Mining and Metallurgical Engineering, Lafayette College, Easton, Pa., and recently a member of the Engineers' Council for Professional Development, will act as consultant.

SUN OIL ISOTOPE PLANT TO BE COMPLETED IN APRIL

RECENTLY Sun Oil Co. announced that its plant under construction for the production of Carbon 13 is expected to be completed April 1. Because of the time involved in reaching equilibrium in the plant, it will be about July 1 before production is obtained. Carbon 13 will be put out in the form of a solution of potassium bicarbonate. The concentration of Carbon 13 as based on total carbon will be about 10 percent.



Mills-Packard type sulphuric acid plant at Moultrie, Ga., completed late in 1946 as part of a new superphosphate plant of C. O. Smith Guano Co. Andrew M. Fairlie, of Atlanta, was consulting and supervising engineer

SEATTLE FIRM NOW OPERATES SALEM ALUMINA PLANT

THE \$5,000,000 Salem, Ore., alumina plant has now been leased to Columbia Metals Corp. of Seattle and has been operating since the first of the year as a private industry. Originally built for the experimental production of a reduction-grade alumina from Oregon high-alumina clay, the plant was put in standby condition last July, but the unit was allowed to continue production of ammonium sulphate fertilizer for UNRRA and domestic agricultural uses.

domestic agricultural uses. Currently, the U. S. Treasury Department is purchasing 34,000 tons of the fertilizer, which is being docked in Portland for shipment, chiefly to the Orient. A. W. Metzger, plant manager, reports that an average of 70 KODEL"DA" (part net desing, can be ninte...6 to 12 ; re blivered to B.A alystable for varie sepping of servin a tope washed.

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MODEL "D A" (portable)—One operator, filling and closing, can handle 2 to 4 100-lb. bags a minute ... 6 to 12 a minute where filled bags are delivered to BAGPAKER conveyor (quickly adjustable for various bag sizes). Starting and stopping of sewing operation is automatic, no tape wasted.

MODEL "A" - Completely automatic - extremely accurate weighing. Saves on "give away" material, labor and bag costs, thus paying for itself quickly. Machine capable of filling and closing 100-lb. bags at the rate of 15 per minute . . . needs one operator.

At absolutely no obligation to you, a BAGPAK engineer will gladly discuss your packaging machinery and multiwall paper bag requirements ... show you the best methods of weighing, closing and handling bags.

*Manufacturers of famous CUSHION STITCH OPEN MOUTH MULTIWALL PAPER BAGS



Sales Representative: INTERNATIONAL PAPER PRODUCTS DIVISION, INTERNATIONAL PAPER COMPANY, 220 EAST 42nd STREET, NEW YORK 17

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CHEMICAL ENGINEERING • FEBRUARY 1947 •



tank carloads of anhydrous ammonia and 115 tank cars of sulphuric acid are being received at the plant monthly and that from this is produced 6,000 tons of sulphate. In addition to foreign shipments, some 1,000-1,500 tons a month are being sold for consumption in California, Oregon and Wash. ington.

STAUFFER CHEMICAL REPORTS WESTERN EXPANSION

PROGRESS of the \$835,000 expansion program of Stauffer Chemical Co. has recently been announced. The program consists of expanding facilities for producing superphosphate ferti-lizer at the firm's Stege and Vernon plants, a new agricultural research laboratory in California, and expanded facilities for producing sulphur, insecticides and other agricultural chemicals at Berkeley and Portland.

Just completed is the \$370,000 plant expansion at Vernon, Calif., for increasing output of superphosphate fertilizer. At Stege, Calif., a \$160,000 expansion program is in progress which, together with the Vernon project, will essentially double the firm's superphosphate capacity in the West. The Stege program, which will probably be completed by late Spring, will enable the plant to operate present superphosphate manufacturing equipment at greater capacity. Foundations for the new building at Stege have been poured, and steel construction is under way.

In Berkeley, construction has been completed on a warehouse building for San Francisco Sulphur Co., a wholly-owned subsidiary. Additional manufacturing equipment has also been installed that will increase this plant's capacity by at least 20 percent. Construction of a new agricultural research laboratory near Los Altos, and Calif., is planned to get under way in seture February.

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DIAMOND BUILDING NEW **HEADQUARTERS UNIT**

DIAMOND ALKALI CO. made known its intention in January to build an administrative office and a research and development laboratory near Cleveland, Ohio, at an estimated cost of \$2 million. This newest project of the company will be built about 12 mi. east of downtown Cleveland, and 18 miles from Painesville.

ILLINOIS TECH OFFERS GRADUATE AWARDS

To FURTHER stimulate graduate study in science and engineering. Illinois Institute of Technology is again offering fellowships, scholarships, and s of anhydrou k cars of sulphur ved at the plan om this is produ lphate. In addite ients, somé 1,0001 are being sold for alifornia, Oregon a

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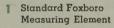


TOW . . . automatic control of simple processes can be economically justified with the introduction of this new Foxboro M-41 Controller. It has been designed from start to finish for the control of simple processes that do not involve complex process lags.

On simple processes, the majority of which call for on-off control, performance depends primarily on the precision of the on-off control action. The Foxboro Model 41 Controller has been designed to give the most precise on-off action possible. For certain purposes, however, it may be conveniently adapted on-the-job to give proportioning action between 1/4% and 10% of scale.

The engineering design and quality of construction of the M-41 Controller are on a par with other famous Foxboro Instruments . . . some of its parts are interchangeable with them. All parts are engineered with typical Foxboro care.

Wherever you have simple processes that involve the control of temperature, pressure, liquid level or relative humidity, consider this new Foxboro Economy Controller. It offers, through automatic control, the advantages of greater uniformity of product and higher plant efficiency with lower cost. Write for Bulletin 388 for complete details. The Foxboro Company. 16 Neponset Ave., Foxboro, Mass., U.S.A.



- 2 4" Scale
- Sturdy, simple easy-toremove control unit

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- 4 Proportioning Mechanism that moves on single center of motion as control setting knob is changed
- 5 Control Relay ... same as M-40
- 6 Exclusive Foxboro Ball Linkage
- Exclusive Foxboro Dual Pressure Gauge

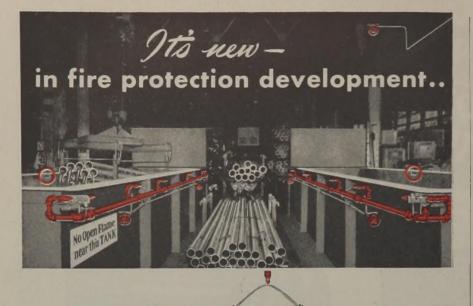
Rotax (electric) Controllers in matching cases also available.



CONTROLLING INDICATING .

WICAL ENGINE CHEMICAL ENGINEERING • FEBRUARY 1947 •

RECORDING



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• IT BLANKETS • IT ISOLATES • IT QUENCHES

ERE'S an actual photograph of the newest development in the art of fire protection. It's a combination "Automatic" FIRE-FOG and FOAM system which is safeguarding hazardous tube cleaning operations at one of this nation's largest metal producing plants. The FOAM unit is attached directly into the FIRE-FOG piping, thus giving immediate application of both FIRE-FOG and FOAM from one and the same control system. Sensitive heat detectors allow for the system's actuation; and protection of equipment and adjacent areas, as well as control and extinguishment of fire . . . all realized within a moment's time.

An installation such as this is further proof of "Automatic" Sprinkler's leadership in fire protection development. Always, the difficult problems have been brought to "Automatic" and, with

the difficult problems have been brought to "Automatic" and, with their solution, a wealth of experience has been accumulated — through the test of service.

Have you some fire hazard problem that's causing concern? Why not let our engineers and technicians assist in its solution? Write or call "Automatic" Sprinkler Corporation of America, Youngstown 1, Ohio.

"Automatic" Sprinkler devices and systems are listed by Underwriters' Laboratories, Inc., and approved by Factory Mutual Laboratories.



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particularly for use in manufacturing, mercantiles, warehouses, churches, schools, offices, hospitals, piers and other establishments where positive fire protection is a must.

*Trademark Registered U. S. Patent Office



assistantships for the term beginning Sept. 22, 1947. Among the fellow ships which permit advanced study with unusual experience in special fields of research leading to either a master of science or a doctor of philosophy degree are: Illinois Institute of Technology Research Fellowships. Universal Oil Products Fellowship in Chemistry, Westinghouse Educational Foundation Fellowship in Power Systems Engineering, Institute of Gas Technology fellowships in cooperation with the affiliated Institute of the Gas Technology, and Armour Research Foundation Industrial Research Fellowships. Although all fellowships have different stipulations and provide varied stipends, the basic requirement is a bachelor of science degree from an accredited college. Selection is made on the basis of personal qualifications and interests as well as on the scholastic ability of the candidates. All applications must be submitted to the Dean of the Graduate School, 3300 Federal St., Chicago 16, Ill. by March 15. Application forms and further information may also be obtained from the office of the dean.

CELANESE ACETATE YARN PLANT NOW UNDER CONSTRUCTION

FIELD work on the site of the new Celanese cellulose acetate yarn producing plant at Rock Hill, S. C., has begun. Construction of the new plant received final CPA approval last November. Upon completion the Rock Hill plant is expected to cost about \$37 million and to employ about 3,000 persons. A contract for the general building construction has been awarded the Daniel Construction Co., Greenville, S. C.

MONSANTO ADDING TO DETERGENT OUTPUT

CONSTRUCTION of a \$3 million plant in Monsanto, Ill., to expand production of synthetic detergents was announced recently by Monsanto Chemical Co. The one story, concrete building under construction will be in operation this year. The company's plant at Nitro, W. Va., is being enlarged to increase further their production of detergents.

NATRIUM CWS PLANT LEASED TO GLYCO

THE Marshall Chemical Warfare Service plant at Natrium, W. Va., used during the war for the large scale production of chlorinated aliphatic solvents and hexachlorethane, has been leased from the government by the Glyco Products Co., Inc., Brooklyn, N. Y. The plant covers an area of over

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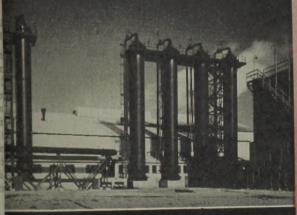
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Basic Chemicals

VIEW OF SPENCER'S NEW WORKS AT PITTSBURG, KANSAS, OCATED IN THE GEOGRAPHICAL CENTER OF U.S.A.



SECTION OF WATER SCRUBBERS



VIEW OF THE "AMMONIA LAB"

ARE YOU READY FOR 1947?

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2-Amino-3-Methylpyridine, 2-Amino-4-Methylpyridine, 2-Amino-5-Methylpyridine, 2-Amino-6-Methylpyridine, 2-Aminopyridine, 2-Amylpyridine, 4-Amylpyridine, 2-Aminopyridine, 2-Amylpyridine, 4-Amylpyridine, N-n-Butylcarbazole, Dipyridylethyl Sulfide, 2-Ethanolpyridine, 4-Ethanolpyridine, N-Ethylcarbazole, 2-Hexylpyridine, Isoquinoline, Lepidine, 2,6-Lutidine, 3-Methylisoquinoline, 2-(5-Nonyl)Pyridine, 4-(5-Nonyl)Pyridine, Alpha Picoline, Beta Picoline, Gamma Picoline, 2-Wercaptoethylpyridine, 2-Propanolpyridine, 4-Propanolpyridine, Pyridine, Quinaldine, Quinoline, 2-Vinylpyridine.

• Listed above are a few of the many refined coal tar chemicals that have been made available to industry through REILLY research and development. These products, which are supplied in 90% or higher purity, have a wide range of applications, including the manufacture of pharmaceuticals, antiseptics, insecticides, fungicides, rubber chemicals, photographic compounds, dyestuffs, plastics, printing inks, the synthesis of organic chemicals, and as additives to gasoline and lubricants.

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This 56-page booklet and supplement describing the complete Reilly line of coal tar chemicals, acids, bases, oils and intermediates, will be sent on request.

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84 acres adjacent to the Ohio River and is composed of 14 buildings. Manufacturing operations are expected to start about March 1.

BUREAU OF MINES EXTRACTS MAGNESIA FROM OLIVINE

DEVELOPMENT of a commercially feasible process incorporating a new time-saving filtration method for the extraction of magnesia from olivine, found in extensive deposits in western North Carolina and in the Puget Sound region of Washington, was announced recently by Dr. R. R. Sayers, Director of the Bureau of Mines.

The Bureau magnesia extraction method involves the digestion of sized olivine with hydrochloric acid solution and the subsequent elimination of impurities such as iron and nickel by their precipitation as hydroxides. In developing this process, Bureau engineers overcame one of the primary barriers to acid decomposition of silicates which has been the prohibitively low filtration rates of the reaction slurries. By the use of a newly-developed multistage digestion innovation, a 10-fold increase was effected over normal filtration rates.

SALT LAKE ALUMINA PLANT TO BE SOLD

BIDS have now been received by WAA for sale of the Salt Lake City, Utah, alumina plant, one of the four government - financed experimental plants erected during the war for production of alumina from non-bauxite domestic ores. Operated by Kalunite, Inc., and costing \$4,905,000, the plant was still in preliminary stages of operation when it was ordered shut down. Designed annual capacity was 72,000.-000 lb. of alumina. Situated on 79 acres, plant facilities include sulphuric acid recovery plant, waste disposal facilities, a furnace house containing seven multiple-hearth Skinner type furnaces, a chemical and thickener building containing filters, crystallizers, rotary dryers and Dorr classifiers, and a crusher building containing jaw crushers and hammer mills.

PAPER PLANT EXPANSION APPROVED BY CPA

A NEW plant addition that will increase the production of paper 100 to 150 tons per day will be constructed for Gulf States Paper Corp. by the H. K. Ferguson Co. at Tuscaloosa, Ala. Included in the new construction will be the installation of a new paper machine, together with the necessary pulp production facilities, recovery capacity and other auxiliaries. The

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INCIDENTS FROM SMITHway PRESSURE VESSEL RESEARCH

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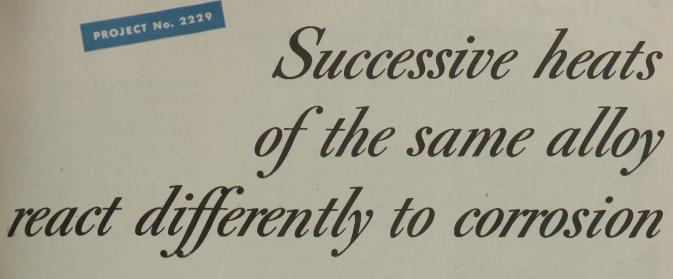
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PAPER PLANT EXPANSION APPROVED BY CPA

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CELANESE SETS UP CHEMICAL ENGINEERING FELLOWSHIP

ESTABLISHMENT of the Celanese Corp. Fellowship in Chemical Engineering at the University of Michigan, Ann Arbor, Mich., was announced in January. The fellowship is for a term of five years from the time of the appointment of the first recipient, and the subjects to be investigated under the fellowship shall relate to the field of plastics and high polymers. The company established a fellowship in the general field of chemical engineering at Princeton University in June, 1945.

GRADUATE RESEARCH PROGRAM ON FLOTATION AT M.I.T.

A FUND of \$12,000 for a graduate research program in the fundamentals of mineral flotation has been established at M. I. T. by Armour and Co. This program will concentrate on the operation of cationic collectors, particularly amines and amine salts. These cationic collectors when dissolved in water give hydrocarbon-chained ions that are positively charged. Most flotation reagents such as the xanthates, soaps and fatty acids give negatively charged hydro carbon-chained ions. A. M. Gaudin, Richards Professor of Mineral Dressing, will direct the program.

MONSANTO EXPANDS RESIN FACILITIES IN SEATTLE

TO BE built in Seattle, Wash., the first unit of a \$2,000,000 Northwest expansion program by Monsanto Chemical Co., has now received CPA approval. To cost some \$1,000,000 this unit will include two structures for the manufacture of soy bean glue and wood preservatives. Construction is scheduled to start this spring. The new facilities, it is reported, will not affect operations of the firm's present Laucks plant in Seattle which has been a long-time producer of soy bean and casein glues and resin adhesives of the phenol-formaldehyde, urea-formalde-hyde, resorcinol and melamine types. Most of the output of this plant has been used by the Northwest plywood industry. Also just announced is the formation of a Western division of Monsanto in Seattle to supervise West Coast operations. Consisting of four plants, the new division will handle the Northwest manufacture of plywood glues, paints, and wood preservant production rate at the tons per day. The project norized to proceed by the tract awarded to the Feers engineering, consistallation of process equ

LANESE SETS UP CHEMIN NGINEERING FELLOWSE

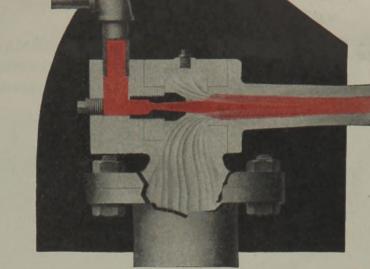
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GRADUATE RESEARCH PROG ON FLOTATION AT MIT

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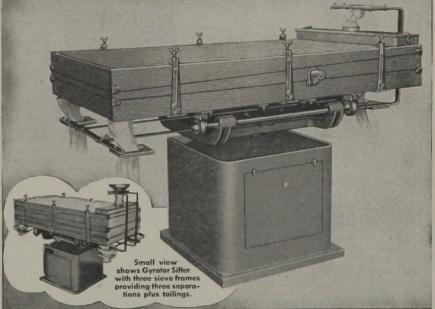
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atives. General manager of the newlyformed Western division is Harry P. Banks.

GEORGIA ERECTS MEMORIAL TO CHARLES HERTY

GEORGIA paid its respect to Dr. Charles Holmes Herty, one of the State's greatest scientist whose timber product discoveries created new industrics, recently when a bronze memorial was unveiled in the State Capitol.

Ex-Governor Arnall spoke informally at the ceremony of the great work of Dr. Herty, whose research pioneered development of Southern pine into newsprint. The memorial was unveiled by Charles Holmes Herty, III, son of the scientist.

READERS' VIEWS and COMMENTS

SILICONE GASKETS

To the Editor:

Sir:—We were very interested in your article in the November 1946 issue on chemical and heat resistance of gasket materials. We were particularly interested in the tabular material on the resistance of the silicones which we feel is an excellent presentation of their resistance to various chemicals.

We feel, however, that the statement "The recently developed silicone compounds are said to be useful as high as 575 deg. F., but because of their scarcity their current applications have been rather limited" is not entirely correct. This company has manufactured quite a large number of gaskets into silicone rubbers by molding, extruding and dieing out silicone coated Fiberglas fabrics. In some cases the quantities of these gaskets have run into hundreds of thousands.

The material is not particularly scarce, but it is difficult to manufacture and highly expensive. These factors have tended to limit the use of the silicone rubbers in gasketing to those cases where the heat problem is such as to warrant the added expense.

The fabrication of the silicone rubbers is so new that we are afraid many engineers feel with you that the material has a limited application. Actually, production is growing rapidly and it is finding a broadening field that has not been adequately covered by earlier gasketing materials.

J. A. MOFFITT

President Connecticut Hard Rubber Co. New Haven 9, Conn. Ceneral manager of ed Western division i

ORGIA ERECTS MEMORIA CHARLES HERTY

Georgia paid its respect barles Halines Herty, ou tate's greatest scientist whose roduct discoveries created to nics, recently when a bronze a as unveiled in the State Cer By at the ceremony of the Dr. Herty, whose research m evelopment of Southern cwsprint. The memorial was Charles Holmes Herry, IL ic scientist.

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NEWS FROM ABROAD

FURTHER DROP IN COAL SUPPLIES HAS FORCED SHARP DECLINE IN BRITISH CHEMICAL OUTPUTS

Special Correspondence

TRANSFER of Britain's nationalized coal mining industry to the Stateowned National Coal Board on January 1 coincided with the worst fuel crisis yet experienced in the country. The absence of reserve stocks and transport delays due to exceptionally cold weather threatened to cause extensive stoppages, and it was only by last-minute emergency shipments that greater harm was avoided. The fuel shortage is due to increased consumption as much as to lower production. Outputs at most mines are indeed increasing, though the overall labor force in British collieries tends to decline. Even so there is a gap of 300,000 tons weekly between supply and potential demand and no hope of early relief.

To meet the emergency, the old system of fuel quotas had to be abandoned, and the general 5 percent cut of industrial coal and electricity consumption imposed before the end of 1946 gave way as from January 20 to a "realistic" system of allocations, related to anticipated deliveries, which gave increased power to regional fuel officers. As early January deliveries in some districts lagged 40 percent behind quotas, the change to a new allocation basis was generally welcomed. Luxury and semi-luxury industries must submit to severe cuts, but chemical works are given priority. Subject to local variations, they will rank on an equal footing with iron and steel plants and industrial coke ovens, which are to get 20 percent less coal.

The opinion expressed at one important chemical factory in the sorelytried northwest was: "It will probably mean less coal, but it is very important that we should be sure of our allocations." This comment is typical, since hand-to-mouth dispositions are singularly ineffective in big chemical works. The precarious coal position forced producers of soda ash to ration their customers, and similarly drastic cuts would have become necessary for caustic soda but for substantial end-of-year stocks.

The allocation system in operation now necessitates far-reaching rearrangements in British chemical works fol-

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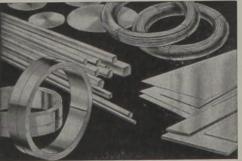
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lowing the sharp output cuts effected earlier. In one big alkali plant production was cut by 35 percent in five weeks and this reduced consumption had to be lowered by a full quarter because coal receipts went down to one. third of the amount needed for proper plant operation. Another factory owned by the same big company had to close temporarily owing to exhaustion of stocks. Coal-tar distillers are faced with a bleak prospect because of curtailed operation of industrial coke ovens; many coke producers try to effect coal economies by neglecting byproduct recovery. Coal-tar distillers, though faced

with an excess of demand over supply, will thus be forced to cut down operations. As usually at this time of the year, many of their customers have placed long-term contracts covering the next six or twelve months, and from the volume of new business placed it appears that little of the dis-tillers' output will be left for export. Before the close of 1946 shipments of creosote to U.S.A. and pitch to France increased, partly as a result of a cut in production of pitch-creosote fuel, but this increase is unlikely to be main-tained in 1947. This is regretted in official quarters because coal-tar products are among the few chemicals with a ready market in dollar countries. The supply of derivatives like phenol and cresols also is less than adequate to meet home demands; hence export licenses are granted in exceptional cases only.

Cut in Coal-Tars

In the organic chemical field difficulties are accentuated by the coal shortage and reduced throughput of coal-tar distillers. While the quantita-tive problem may be expected to be gradually overcome, prices are likely to rise; the new home market contracts for 1947 contain escalator clauses for automatic adjustment to the prices ruling at the time of delivery, while exports command altogether higher prices. Such price increases cannot but be reflected through the whole range of organic chemical manufactures down to the finished products.

Raw material difficulties, together with shortages of plant, labor and essential services, are the principal obstacles to a speedy execution of the postwar plans of the organic chemical industry. As Lord McGowan, chair-man of Imperial Chemical Industries Ltd., points out in a survey of Britain's opportunities in this field: "More than almost any other industry, we stand to suffer from any deficiency of coal, for coal is our primary material."

This fact and the need for research into the chemical utilization of coal



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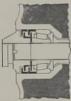
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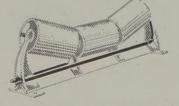
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PATENTED NUT

Patented malleable iron nut has several functions. Provides accurate means of

adjusting bearings; forms one passage of labyrinth grease seal; spaces and protects inner grease seals. Socket recess in nut fits over supporting bracket to tie brackets together and at the same time allows rolls to be easily removed.



INVERTED "V" CONSTRUCTION

Basic design of Continental Idlers is the inverted "V." Spillage of materials over edge of

belt—even wet sand and cement—shed off like rain on a steep roof. No more pilling up of spilled materials to interfere with proper performance of the rolls.



RUGGED Strength

Heavy ribbed certified malleable brackets to absorb shock are jig-welded to heavy angle base. Socket recess in patented nut ties rolls to

bracket, gives the practical equivalent to one-piece construction throughout.

EASE OF LUBRICATION

Extended grease pipe from center roll is standard construction. This permits greasing of all rolls from outside for safety. All grease pipes may be extended to one side for convenience. Alemite button head fittings are standard.



is not overlooked by the National Coal Board, as is shown by the appointment of a prominent scientist to the new post of Director of Carbonisation Research. The organic chemical industry is viewing the long-term prospect with great confidence. In the words of Lord McGowan: "We enter the era of peace with a powerful research backing and an invaluable manufacturing experience . . . Britain is active and alive to the opportunity that is afforded by continued progress and research . . . We have the essential foundation of research, the industrial experience, and the manufacturing resources necessary to bring out discoveries quickly on to the market. We possess the managerial enthusiasm and drive that spring from sound knowledge and an unbounded confidence in the ability of our employees."

Wartime Growth

When war broke out, Lord Me-Gowan remarks, the British dyestuffs industry was established in the markets of the world. The war gave the British organic chemical industry an opportunity of entering the pharmaceutical market on a good scale; methods of making established drugs were worked out and manufacture begun, and many new drugs were developed. Impressive advances have been made in the development of insecticides of unparalleled power and selective weed killers evolved out of research into plant hormones. In the plastics industry Britain is in the forefront of progress. Lord McGowan mentions mepacrine and Paludrine, the anti-malarials Perspex and polythene, among plastics, and Terylene, the new synthetic fiber.

This distinction between short-term and long-term programs is typical of the policies pursued in Britain to deal with the aftermath of the war. The current demand for goods of all kinds is so great that it permits no slackening, while on the other hand the omissions of wartime at the same time call for prompt initiation of a large reconstruction and re-equipment program. The National Coal Board, faced with this twofold task, is making a clear distinction in its plans accord-ingly, and many leading chemical producers in the British Isles are confronted with a similar complex of tasks. While the customers' urgent need for supplies is big enough to keep the whole labor force of the chemical industry, swollen as it is by wartime additions and postwar re-instatements, fully employed, executive and technical staffs are kept busy drawing up extension and modernization schemes to cope with the anticipated more stringent demands of tomorrow.

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• CHEMICAL ENGINE

INTERLAKE

What is it ?

How is it Done?

What advantages

Esineering

Interlake **Resineering** is the functional engineering of a resin to meet the *specific* requirements of your job.

There are four steps in Interlake **Resineering**— **1.** Analysis of your problem followed by our recommendation. **2.** Development of a resin for your particular application. **3.** Testing this resin on the job, in *your* plant, working with *your* operating men. **4.** Stabilizing its production for continuous uniformity in performance.

Interlake *Resineering* assures dependable, uniform production at all times. It completely eliminates the expensive delays encountered when using resins which must be "adjusted" every time a new run is started.

Other important phases of Interlake's service include analytic inspection reports with each shipment and helpful consultation on your use of resins.

BASIC APPLICATIONS OF INTERLAKE RESINS INCLUDE

BONDING — wood, veneer, corestock, cellulose waste and fibrous materials. SURFACING — wood, paper and fabric. LAMINATING — fabric, paper and wood. IMPREGNATING — wood, plaster and other cellular materials.



INTERLAKE will help you solve your resin problem. We also will be glad to discuss the possible advantages of adopting the use of resins in any new operation. Write Interlake Chemical Corporation, Union Commerce Building, Cleveland 14, Ohio.



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othe one-piece solid meta] supplements woven цц perforated ч smooth strong; soldering bricated of end th د د ۲, tough, limi dimensions weldin භ mesh the ls It is stiff, electro-deposition wire beyond stamping, standard hole for industrial 120S V of h drawing, accuracy in ravel. finer ĥ mesh by in the to uses mbines high fabricated b structure screen made 400 other combines applicable to 40 and WOVON readily 1 In sizes 4 cation Lektromesh is metal strainers Lektromesh most product with no specifi 1s 15 and processes. and filters, your face, metal mesh

We will be pleased to send you samples of LEKTROMESH for your further consideration.

THE C. O. JELLIFF MFG. CORP. Southport, Connecticut



SOUTH AFRICAN CHEMICAL PLANTS DEVELOPING NEW PROCESSES IN SOAP PRODUCTION FROM SLUDGE

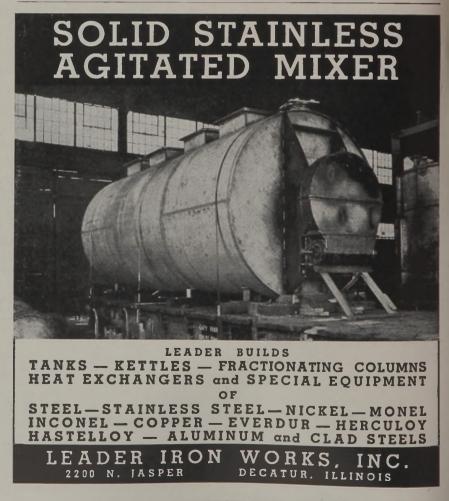
Special Correspondence

S^{OUTH} AFRICAN chemists at the Johannesburg sewage disposal works at Cydna have been experimenting with the recovery of fat from sewage to make soap. The chemists estimate that, if sufficient equipment is made available, they will be able to produce more than 100,000 lb. of soap a year.

The soap produced is to be used to help the municipality to overcome the present soap shortage. This is the first time the experiment has been attempted in South Africa. It has been undertaken as the result of the research of J. H. Wilson, the biochemist in charge of the laboratory division of the Johannesburg city council. Mr. Wilson is assisted by a staff of 11 chemists, one micro-biologist and two technical assistants. Farmers may also soon benefit from the work of these city chemists, as the city council has voted £10,000 for experiments on the sterilizing of sludge to produce a safe fertilizer.

Mr. Wilson said: "We can claim that Johannesburg is leading the world in the utilization of sludge gas." In 1945 the chemists at Cydna produced their first sample of methyl alcohol from sludge gas. As a result of experiments carried out in Johannesburg, a large firm has signed a 25-year contract with the city council to use 300,000 cu. ft. of sludge gas daily, from which half the amount of cyanide needed for the Witwatersrand gold mines will be produced.

Soap may not be imported into South Africa even though other countries may have surplus supplies. A Cape Town importer said he was offered 1,000 cases of soap a month by a manufacturer in Portuguese East Africa. He said arrangements were made with the Portuguese authorities to permit the export of the soap to the Union, but the Soap Controller in Pretoria stated that it could not be imported. It was explained that if soap were imported, South Africa's allocation of raw materials from overseas would be reduced correspondingly. That would decrease local production and cause unemployment in the industry. The country would also have less glycerine and cattle feed. which were byproducts of the manufacture of soap. The Brazilian consul



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YOUR SAFEGUARD IN QUALITY ALKALIES



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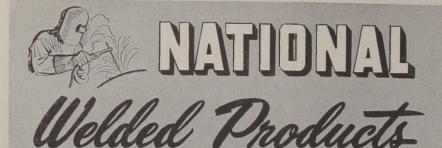
PETROLEUM INDUSTRY

Calcium Chloride Caustic Potash Caustic Soda Chlorine Soda Ash Sodium Bicarbonate Sodium Nitrite



SOLVAY SALES CORPORATION Alkalies and Chemical Products Manufactured by The Solvay Process Company 40 Rector Street, New York 6, N. Y.

CHEMICAL ENGINEERING • FEBRUARY 1947 •



From OPEN HEARTH-STAINLESS-ALLOY and CLAD STEELS



WASHINGTON, PENNA.

in Cape Town said he had received many inquiries about the possibility of importing soap from Brazil, which had plentiful supplies. He was inquiring whether Brazil would be prepared to export soap to the Union and on what terms, but he did not know whether the importation of soap would be permitted by the Union authorities.

Red oxide to the value of nearly £5,000, which is being mined on a farm in the Bethal district of the Transvaal, is being exported to the United States and Britain. A geophysical survey which started there some months ago is still being conducted on behalf of a finance and development company in Johannesburg. What the survey has so far disclosed is being kept secret, but the company recently paid out large fees in respect of options it has leased over mineral rights in the district.

A government control which may be established in South Africa shortly is that of soda ash. A small amount of soda ash is produced in the Pretoria district, but the bulk of the Union's requirements is obtained from the Magadi Mines in Kenya. Other countries which formerly imported soda ash from Britain are also making heavy demands on the Magadi Mines, with the result that the Union's quota has lately been greatly reduced. Hence the control of soda ash seems inevitable.

New Soda Ash Plant

A £1,000,000 soda ash plant is to be established in the Union. Marble, Lime and Associated Industries announces in its annual report the conclusion of negotiations for the establishment of a soda ash plant, which is to receive encouragement by the Union Government. The chairman, Dr. P. Snideman, has left for America to obtain the plant. Shareholders are to be given subscription rights in the projected Alkali Chemical Corp.

The chairman of the Iron and Steel Corp. announced that its subsidiary, the African Metals Corp., at Vereeniging, had succeeded in making synthetic bone-meal. "We lose a large number of cattle because of the lack of bone-meal," he said. "It was now being made from basic minerals, and will save our cattle industry." As soon as possible works would be built and enough synthetic bone-meal would be made for every animal in South Africa.

Marble, Lime and Associated Industries, Wright Boag Street, Johannesburg, have erected a factory at Merebank, Durban, where it has installed modern plant for the manufacture of chrome tanning salts, bichromates and chromic acid. These products are being exported overseas and the manufacturers claim that the new plant will enable them to proQUARTER

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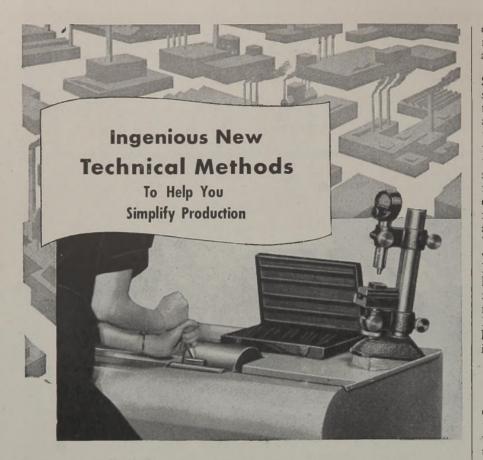


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CHEMICAL ENGINEERING • FEBRUARY 1947 •

CHEMICAL ENGINE

TAYLOR



New Centerless Lapping Machine Gives Precision of Less Than 2 Micro-Inches!

Now it's easy to lap cylindrical piecesquickly-accurately-without specialized operator skill! The new Size Control Centerless Lapping Machine handles pieces from .010" to 10" diameter without costly set-ups.

The operator merely holds piece between lapping rolls with stick. Pressure applied determines quantity of metal removed. Small roll turns piece at slow constant rate. Large roll turns more rapidly to remove minute quantities of metal. Ideal for lapping oversize gages, worn gage plugs to next smaller size, bearings, bushings or shafts. Roll speeds easily changed. Adjustable for tapers.

Ideal also to save time on the job, is chewing gum. The act of chewing aids the workers' concentration; seems to make work go easier. Furthermore, chewing gum may be used even when both hands are busy—increasing worker safety—and reducing work interruptions. That is why many plant owners have made Wrigley's Spearmint Gum available to all.

> You can get complete information from Size Control Company 2500 Washington Blvd., Chicago 12, Ill.



Centerless Lapping Machine



AB-56

duce quantities sufficient to meet demand while retaining quality standards.

The present shortage of paint in South Africa is expected to continue some time in 1947, when the first shipments of linseed oil from Argentina are expected. The price of the Argentine oil will probably be high, and the price of paint will probably have to be increased. Hundreds of thousands of gallons of paint are needed not only for new buildings but for ordinary maintenance demands. In the meantime local paint manufacturers are rationing their customers severely. The price of dehydrated castor oil, which is being imported in place of linseed oil, has recently risen to as high as 19s.6d. a gallon. South Africa formerly bought most of its linseed oil from India. Now India is exporting to Britain all the oil she does not use herself in the development of her own industries.

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The war has dealt kindly with the ochre mines of the Riverside district of the Cape. Their supplies to the paint and distemper factories of the world brought in £20,000 a year ten years ago. Now the figure is about £50,000 a year. Possibly the market would have expanded still further if shipping difficulties had not hamstrung the industry for about six years. Now the leeway is being made up, as the South African product meets with strong demand in the face of competition from Spain. Spain's price is lower, but the Union product is held to be of superior quality.

Two concerns are operating the five mines which produce South African supplies. All are within an area of about 12 by 8 miles. The refining is done at Congella, Durban. Production was limited during the war. On the other hand, exploration was stepped up. Large deposits were traced, and sufficient to meet all demands for another 25 years at least were found. The industry used to employ white labor. Now it finds colored workers more suitable. The mines produce some useful sidelines. Large deposits of china clay and kaolin are extracted, as well as supplies of fuller's earth. Silica, which rock overburdens the ochre, finds its way mainly to the Witwatersrand, where it is used to make furnace bricks. The industry was pioneered by a firm in Bristol, England, through whose activity extensive quarrying was started 16 years ago. The ochre is produced cheaply, for labor and transport are not high. It is easily quarried, and a high grade is maintained by the proper selection of the material by hand.

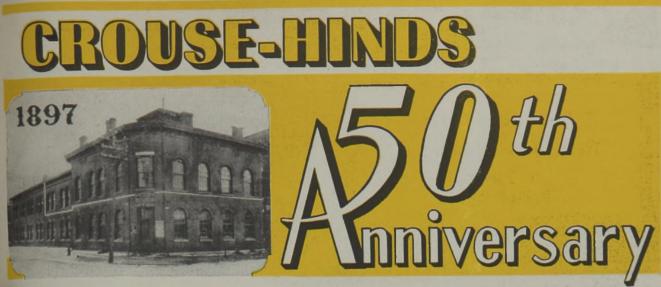
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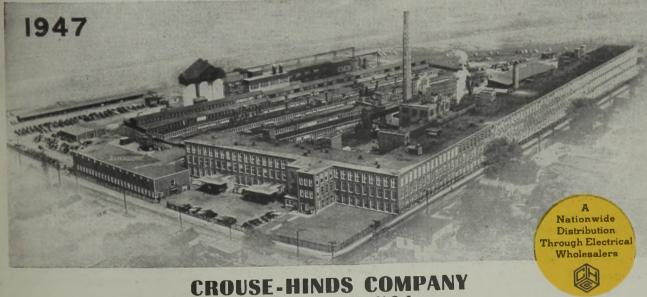
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HALF A CENTURY OF ACHIEVEMENT

- 1897 Fifty years ago two men each had an idea. Huntington B. Crouse had an idea. He wanted to be a business man. Jesse L. Hinds had an idea. He wanted to manufacture articles for the electrical trade. A mutual friend brought the two men and their ideas together and on January 18, 1897 the Crouse-Hinds Electric Company was born. It manufactured electrical switches, panelboards. switchboards. and the patented Syracuse Changeable Electric Headlight for trolley cars. The headlight was the forerunner of the extensive line of lighting equipment manufactured later.
- **1903** The partnership was replaced by a corporation Crouse-Hinds Company.
- **1906** A newly invented line of electrical conduit outlet bodies with threaded hubs was now manufactured. A new name was needed, so the word "CONDULET" was coined. It was adopted as a trade mark and registered in the United States Patent Office. Condulets were destined to revolutionize electrical conduit installation practice.
- **1910** Mr. Crouse formulated a firm policy of equal discounts to all distributors and equal prices to other purchasers. Revolutionary in those days, it has since been generally adopted by the electrical industry.

- **1911** On a 25-acre plot of land the cornerstone of the present plant was laid. Additional acres and buildings have been added since.
- **1915** Crouse-Hinds made the first of its now extensive line of floodlights.
- **1922** Crouse-Hinds built the first modern four-way threesection traffic signal.
- 1927 Crouse-Hinds developed equipment especially designed for airport lighting.
- 1929 Pioneer in sports lighting, Crouse-Hinds installed a complete lighting system in a major college football stadium – at Syracuse University.
- 1932 Crouse-Hinds issued the first complete catalog of a line of Explosion-Proof Condulets.
- 1943 Upon the death of Mr. Huntington B. Crouse, Mr. William L. Hinds succeeded him as Prezident of Crouse-Hinds Company.
- 1947 Now, after fifty years, the Crouse-Hinds Company has the same objectives with which it started – to make a good product better and to deal fairly and honestly with all.



Syracuse 1, N. Y., U.S.A. lices: Birmingham — Boston — Bulfalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianopolis — Kansas City — Las Angeles — Milwaukee — Minneapolis New York — Philodelphia — Pittsburgh — Partland, Ore. — San Francisco — Seattle — St. Lauis — Washington. Resident Representatives: Albany — Allanta — Charlotte — New Orleans CROUSE HINDS COMPANY OF CANADA, LTD., Main Office and Plant: TOBONTO, ONT.

CONDULETS . TRAFFIC SIGNALS . AIRPORT LIGHTING . FLOODLIGHTS

CHEMICAL ENGINEERING • FEBRUARY 1947 •

CHEMICAL ENGINE

WHAT IS A COLLOID MILL?

A colloid mill is a precision machine, capable of effecting in a confined clearance an intense shearing action on the particles and the particle structure of a processed mass, whether the particles



be liquid, semi-solid or solid. This intense shearing action generated between the faces of a moving rotor and fixed stator reduces the particle size to the "colloidal range" of a few microns down to invisibility under the ordinary microscope and coincidental with this reduction in particle size, further produces a combination of forces within the mass which bring about the phenomena of dispersing, wetting, emulsifying and homogenizing.

The Premier Colloid Mill is a gravity-fed vertical mill that can be adjusted to any degree of clearance between rotor and stator. It may be run at high or low speeds.

What will it do in my plant?

It will emulsify and homogenize. It will disperse and disintegrate and grind. It will mix products evenly and uniformly. And, if the mill you use is a Premier, you can expect it to improve your product's quality, increasing its fineness and giving it stability. You can expect this while costs are being lowered and processing efficiency raised.

Where can I find out more?

By asking for information from Premier Mill Corporation. The more you tell about your dispersion problems, the more complete and helpful the reply will be.



AUSTRALIAN CHEMICAL INDUSTRY IS EXPANDING DESPITE LABOR AND MATERIAL SHORTAGES

Special Correspondence

A T PRESENT Australian chemical manufacturers are faced with a shortage of raw materials and manpower. Serious industrial unrest both in the coal mines, and on the waterfront has aggravated a nationwide shortage of bituminous coal, which has affected all Australian industry, particularly the chemical industry.

Several times during the past 12 months emergency power rationing measures have had to be introduced to maintain essential services resulting in a complete cessation of industry till coal reserves could be rebuilt to a workable figure.

While some industries have turned to oil as an alternative source of power, others have become interested in various sub-bituminous grades of coal. Recently Australian Paper Manufacturers Ltd., who are already using 1,500 tons of brown coal a week in its Victorian Works, announced they had acquired the brown coal reserves at Bacchus Marsh in Victoria, and were experimenting with its use in their boilers using spreader stokers. In South Australia, which possesses no high grade coal resources, the government has developed by open-cut mining methods, the deposit of sub-bituminous coal at Leigh Greek, 250 mi. north of the principal industrial area. This fuel shortage, together with

This fuel shortage, together with an ever increasing demand, has resulted in a nation-wide shortage of soda ash and caustic soda. With supplies from overseas suspended, so serious has this shortage become that a rationing system has been introduced to ensure an even distribution of whatever stocks are available. Highest priority has been awarded to industries connected with housing. Unless imports of these commodities soon become available, the rate of expansion of chemical industry in this country will be seriously retarded.

Paint ingredients, especially lithopone, are reported to be in short supply. The sodium sulphide position is acute and local users are almost entirely dependent on irregular shipments from overseas producers. The shortage of amyl acetate, which was for some time embarrassing manufacturers of penicillin, has now been relieved by supplies being made available by a western Australian manufacturer.

Meanwhile the acute shortage of

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SPECIAL EQUIPMENT pols can be perchand rite covers and if desired cas he be ers to make them potsike for complete specification to

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HEMICAL ENGINE

• Saves Oil

- Improves Durability and Adhesion
- Better Water Resistance
- Fuller Gloss
- Freedom from Skinning or After-Yellowing

This new chemical plasticizer for varnishes will help extend your existing oil supply 50% to 100% without sacrificing film properties.

Write for sample and details

THE NEVILLE COMPANY PITTSBURGH, 25, PA. Chemicals for the Nation's Vital Industries

BENZOL · TOLUOL · XYLOL · TOLLAC · NEVSOL · CRUDE COAL-TAR SOLVENTS HI-FLASH SOLVENTS · COUMARONE-INDENE RESINS · PHENOTHIAZINE · TAR PAINTS RUBBER COMPOUNDING MATERIALS · WIRE ENAMEL THINNERS · DIBUTYL PHTHALATE RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

A-24

DRACCO Dust Control Recovers Many VALUABLES



In many industries valuable materials are recovered with DRACCO Dust Control. Among them are chemicals, lead, zinc and many other materials. In many plants valuables recovered paid for the installation in a few months, and in others where recovery is not a factor, DRACCO Dust Control has paid its way by increasing production and improving working conditions. If you have a dust control and recovery problem it will pay to get in touch with DRACCO Engineers. They have had more than 30 years of experience.



building materials is curtailing the building of new plant and the expansion of existing ones. Housing has first priority in all building materials, which are controlled under strict government supervision. To overcome this difficulty many firms have leased government munition plants which have closed down since V-J Day. Taubman's chemical division have

Taubman's chemical division have acquired the government TNT plant at Villawood, N. S. W., which they will use to house their new DDT plant. Allen & Hanbury's Ltd., England, will soon commence manufacture of pharmaceuticals and medical supplies at St. Mary's munition factory, N. S. W. It is reported that a section of the extension Salisbury explosive factory has been reserved for the British Rocket Mission who have recently established a rocket experimental range in central Australia.

Equally serious as the shortage of raw material is the shortage of manpower. Although apparent throughout the Commonwealth, it is particularly acute in South Australia.

After several years research by the Council for Scientific & Industrial Research into the production of furfural, a pilot plant for its manufacture from wood chips is being constructed by the Associated Pulp and Paper Co. at Burnie, Tasmania. It is understood that Jas. Hardie & Co. intend to erect a larger plant of approximate capacity of 70 tons per year, using corn cobs, oat hulls and rice hulls as these materials become available. At the moment these materials command a relatively high price as cattle fodder and it is doubtful whether furfural so produced at this stage would be economical.

Sulphuric Acid

Broken Hill Associated Smelters Pty. Ltd., at Port Pirie, S. A., have announced manufacture of large quantities of sulphuric acid for zinc purification from waste furnace gases during the sintering of lead ores. It is hoped to eliminate the need for importing high priced sulphur from overseas.

Tantalum Industries Holding Pty. Ltd., has secured options over western Australian leases and assets of Tantulite Ltd., and are applying to Canberra to register a company with nominal capital £500,000. Research work has been commenced by the company's technical staff, which has produced on a pilot plant scale the metals and alloys to be made by the large public company. Previously these ores from western and northern Australia, which have a much higher Ta_2O_5 content than that mined in South Dakota, the Ural Mts. and Greenland, were exported to overseas countries for processing.

overseas countries for processing. Considerable interest has been aroused by the first annual report of

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AN EDWARD CONTRIBUTION TO BETTER VALVE PERFORMANCE-THE IMPACTOR HANDWHEEL

How the Edward Impactor Handwheel closes big

valves in little spaces

Where great torque is necessary to close a valve against high pressures -particularly in cramped areas-

no operating device is as effective as the Edward IMPACTOR handwheel.

The IMPACTOR handwheel, an exclusive and patented Edward development. sees to it that a valve shuts tight against extreme pressures without extension levers, gear series, cumbersome toggle tops, or space-stealing large diameter wheels.

- how the two heavy lugs, cast integrally with the wheel at 180°, strike simultaneous ham-Notice mer-blows on the cross arm attached to the
- stem —making a positive shut-off. ample strength for any operating emergency.
- closure indicator and test button.
- how simple and well balanced the whole
- mechanism is, how little space it takes up. Edward IMPACTOR equipped valves, in most sizes, also have Edward patented EValthrust yoke bushing for additional thrust capacity

and smooth operation.

CLOSURE

INDICATOR

Edward stop, non-return, stop-check and gate valves are regularly furnished with IMPACTOR handwheels, in the

following sizes and pressures:

TEST

BUTTON

5 in. and larger 1500 lb; 6 in. and larger 900 lb; 8 in. and larger 600 lb; 10 in. and larger 300 lb.



Jalves, dward Subsidiary of Rockwell Manufacturing Company

CHEMICAL ENGINEERING • FEBRUARY 1947 •

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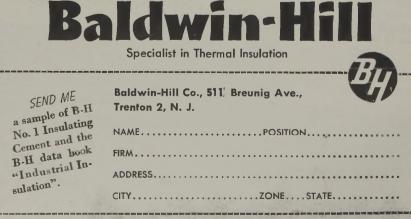
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SIMPLY add water, mix and you're ready to do a fast-covering, efficient job with Baldwin IIill No. 1 Insulating Cement. To save time for your maintenance men, it sticks instantly-does not slide off bottom-surfaces or roll up behind the trowel. To save btu's for you, it's compounded of finely nodulated black Rockwool-a 3-inch application, for example, reduces 800°F surface temperature to 158°F. Important, too, B-II No. 1 takes expansion and contraction of the insulated surface in stride-without peeling or cracking. And, a special rust inhibitor prevents corrosion, insures a permanent bond even when applied while the surface is hot.

It will pay you to put B-H No. 1 Cement to work on valves, fittings and other irregular surfaces where heat loss is costing you money. Packed in convenient 50-pound multi-wall bags ready for instant use. The coupon brings descriptive literature and a working sample.



the Aluminum Production Commission, which was recently tabled in the House of Representatives at Canberra The Commission has chosen the Bayer process as the one most suitable to Australian conditions and have shown that Tasmanian and Victorian bauxite can be used the Tasmanian hydroelec-tric power for the economic production of aluminum at a price which compares favorably with overseas costs. The Dorr Co. of America has tested two samples of Australian bauxite and has offered to design, erect and initiate all the plant necessary for local production of aluminum. Further investigations are being conducted in the Commission's recently established developmental laboratory to confirm that the two samples tested are representative of local supplies. Estimated cost of the project is 3 million pounds. In this respect Australia is fortunate because of its ideal position for trading with the Far East, and the improved supply of dollar exchange due to the demand for wool.

FRENCH REFINING PLANTS **INCREASING PRODUCTION**

SINCE the first of 1946, petroleum imports have been irregular. However, the rate of crude oil to finished products has increased continuously. In France a wise refining policy is necessary since this industry can save the country a considerable amount of foreign currency and help develop many other industries. France has started on a program to restore her refining industry that will be carried out in two steps. They are: (1) Quick restoration of undamaged or slightly damaged plants, (2) reconstruction of destroyed plants with purchases of foreign equipment.

Plants at Chourchellettes and Dunkerque have been completely destroyed. Others on the lower Seine are returning to large scale production slowly. Port Jerome has returned to full prewar capacity. The tanks de-stroyed by fire in 1940 have been reconstructed and the equipment re-moved by the Germans has been repaired or replaced. The factory at Petit Couronne has been restored to a production capacity of 800,000 tons, while Gonfreville and the plant at Notre Dame de Gravanchon are producing. On the Atlantic Coast plants at Pauillac and Bec d'Ambeze have been destroyed and the Plan of Modernization will have to settle on their fate. Mediterranean factories were practically untouched by the war and provide the largest part of the French production. Martigues has gone beyond its production in 1938 and now has a production capacity of 600,000 tons. The l'Avera has modern equip-

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TEMICAL ENGINE

NEW PULVERIZED-ANTHRACITE-FIRED STEAM GENERATING UNITS ---WEATER DUTLET HEADER TA SUPERHEATER INTERMEDIATE SUPERIEATER INLET EXTENDED SURFACE BOLER SECTION ALLEN LE CURLER LE CARRIER AIR AND FUEL FROM MILL 0 CINDER RETU ERHAUSTER AR HEATER FEEDER T 旧 Engineered and built by Foster Wheeler according to specifications of Engineered and built by Poster Attended according to specifications of Pennsylvania Power & Light Company — Ebasco Services Incorporated, Engineers — a 1,600,000 lb. per hour boiler plant will be installed at the new Sunbury Steam Electric Station at Shamokin Dam (near Sunbury) Pa. Each of the four 400,000 lb. per hour steam generating units will be equipped with two Ljungstrom Air Preheaters, full load exit gas tempera- \odot ture 311 F.

THE AIR PREHEATER CORPORATION

Executive Offices: 60 East 42nd Street, New York 17, N.Y. • Plant: Wellsville, N.Y.

CHEMICAL ENGINEERING • FEBRUARY 1947 •

ment and a capacity of 600,000 tons and the Houdry catalytic process unit has a production capacity of the same amount. In Alsatia the Merkviller plant has resumed its activities.

Orders have been placed in the United States which will bring production capacity back to prewar levels. A Modernization Committee for the Fuel Industry has prepared a plant that includes a 1,400,000 ton plant in the North Departments, a group on the lower Seine producing 1,700,000 tons, another group in the Mediterranean departments with a capacity of 4,150,000 tons and the refinery at Pechelbronn using the natural re-sources which amounts to 75,000 tons. This makes a yearly total of 13,000,-000 tons. Estimates on production for 1955, which is the year chosen as a normal one for the modernized French refineries, are set at 11,719,000 tons.

RUSSIA PLANS TO SUPPLY HER OWN RUBBER NEEDS

Russia will shortly be producing all its own rubber needs, both natural and synthetic, within the borders of the U.S.S.R. according to Soviet officials. This is expected to materialize within 24 to 30 months, assuming that Russian engineers can keep pace with the construction program for the rubber industry as outlined under the current Five Year Plan.

By 1940 Soviet engineers were able to step up synthetic and natural rubber production to fill about 80 percent of the country's total requirements.

The Russians report that under the current Five Year Plan rubber production will be doubled over the 1946 figures by 1950.

Before the war, the Soviet Union was a leading producer of synthetic rubber, constituting the bulk of rubber used in the country. In 1933, the output of synthetic rubber totalled only 2,000 tons, but this figure jumped to 25,000 tons in 1935. Most of this was produced by the "Sovpren" plant in Leningrad which turned out 20,000 tons from ethyl alcohol.

Calcium carbide provides the raw material for synthetic rubber that is being produced at the Yerevan (Armenia) gigantic plant. Armenia's synthetic rubber industry is scheduled to produce by 1950 four times as much rubber as before the war.

In the Soviet East, synthetic rubber plants are situated at Magnitogorsk in the Urals, using Kuznetsk coal, at Cheremkhovo in Eastern Siberia where rubber is made out of calcium carbide, and at Aktyubinsk in Kazakhstan, which is one of the fastest growing centers of synthetic rubber production in the Soviet Union.

The Five Year Plan calls for the

SPECS ΠΟΟ TIFF?



If you ever end up with final specifications which are perfect for the job but which demand equipmentoperating conditions unusual for your plant ... look to CHEMICAL ENGINEERING CATALOG. Its pages are the catalogs of manufacturers who turn out varieties of almost anything your plant desires.

Nearly 600 suppliers have made their complete facts available to you in the current CEC. Their products run the gamut of goods from abrasives to zinc, and CEC's triple-index will lead you quickly to your problem's answer.



REINHOLD PUBLISHING CORPORATION



fumes do not impair working efficiency or slow down production. Exhaust from refining, smelting, varnish cooking, pickling, plating, mixing, etching and other dust and fume-creating operations is readily and efficiently handled with Schneible collector equipment.

Where nuisance elimination only is desired, units of standard steel construction are recommended; using an alkaline solution as the recirculated liquid. If conditions require it, the collectors are fabricated of corrosionresistant materials. Schneible engineers are qualified by broad experience to make correct recommendations.

CLAUDE B. SCHNEIBLE COMPANY 2827 Twenty-Fifth St., Detroit 16, Mich. Engineering Representatives in Principal Cities



This Schneible Multi-Wash System controls a troublesome fume condition in a process plant.



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EMICAL ENGINE

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SEALING AGAINST MOISTURE

That was the problem. Engineers knew for years that a close-coupled motor-pump unit for under-water operation deep down in the well was the logical answer to shafting troubles... but how to seal the electric motor? Finally, in 1928, an idea was developed into a simple, positive seal and the amazing BJ Submersible Pump was born. 18 years of outstanding Submersible performance is a direct commentary on the success of the unique Submersible electric motor. Capacities: 50 to 20,000 gpm; Heads: to 1500 feet; Motor sizes: to 400 hp.

SUBMERSIBLE ADVANTAGES

NO PUMP HOUSE REQUIRED NO WATER CONTAMINATION SILENT OPERATION UNAFFECTED BY FLOODS OR ATMOS-PHERIC CONDITIONS SAFE AGAINST VANDALISM YEARS OF TROUBLE-FREE **OPERATION** NO WELL TOO DEEP

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LOS ANGELES 54, CALIFORNIA **Offices in Principal Cities**

SUBMERSIBLE PUMP

A close-coupled motor-pump unit that operates entirely submerged in water at any well-depth. The only basic improvement in deep-well pump design...since BJ introduced the deep-well turbine in 1901.

INGENIOUS MERCURY SEAL keeps the water out and the

oil in the motor.

LUBRICATING OIL

of high dielectric strength fills motor case, prevents water from contacting motor. The oil is also a cooling agent, circulating continuously to carry heat from windings to the water-cooled outer shell.

ROTOR

of relatively small diameter means low moment of inertia and quick acceleration. Ideally adapted for Full Voltage starting.

ONE THRUST BEARING carries entire thrust load of pump and motor.



"HELIX-SEAL" PULVERIZERS

> Williams "Helix-Seal" Mill viewed from above. Note how the cover can be raised providing access to the interior for repairs and adjustments.

- GRIND WET OR STICKY MATERIALS
- FINE GRIND—100 TO 325 MESH
- NO OUTSIDE SEPARATION NECESSARY
- INEXPENSIVE TO INSTALL

The Helix-Seal Mill grinds extremely fine, without the aid of outside separation. This is largely due to the long grinding surface, adjustable grinding parts and high speed of the hammers. Due to the screw feeder, which acts both as a feeder and seal, sealing the intake opening against the in-rush of air, no air is sucked into the machine and consequently there is no resulting dust carrying draft expelled from the discharge. Built in nine standard sizes, capacities 200 pounds per hour and up.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO. 2706 North Ninth St.

CHICAGO 37 W. Van Buren St.

Sales Agencies Include NEW YORK 15 Park Row

St. Louis 6, Mo.

PHILADELPHIA 11 N. Fourth St. annual production by 1950 of 88.6 million pairs of rubber footwear, or 30 percent more than before the war. To boost production, factories manufacturing rubber soles are to be built and put in operation before 1950 in Kiev, Kalinin and in a western Siberian town.

The rubber industry as a whole plans to double its output by 1950, as compared with 1940. Since reconstruction is still to be completed, this aim will actually be achieved, if things go according to plan, in $2\frac{1}{2}$ to 3 years of actual production. The things that will help out are the introduction of new types of raw materials and new tech-nical developments in the rubber industry, particularly automatic control of the production of automobile tires, as well as maximum possible mechanization of production processes. Mechanization will be stressed particularly in the production of synthetic rubber and the manufacturing of automobile tires.

Another expected development is the launching of the production of chemicals needed in the rubber industry, and not hitherto produced in the Soviet Union, as well as the production of certain complex chemical machinery and power equipment.

VISCOSE RAYON PLANT UNDER CONSTRUCTION AT BOMBAY

THE National Rayon Corp. plant to be built near Bombay by Lockwood Greene, New York, under the technical advice of Skenandoa Rayon Corp., Utica, N. Y., at a cost of about \$9,000,000 will use the pot system of manufacture of viscose yarn, turning out about 8,000,000 lb. of 120 and 150 dernier yarn annually. Present plans call for the plant to go into operation late in 1948 or early in 1949.

Power for the factory, which will be situated in the industrial suburb of Kalyan, will come from the grid of the Tata Hydr-Electric Co. whose dams and powerhouses in the hills south of Bombay have an installed capacity of 120,000 kw. Water for the plant, about 9,000,000 gal. daily, will be pumped from the Ulhas River which is fed by the tailwaters of one of the Tata Dams about 35 mi. upstream. Chemically contaminated afflu-via will be discharged into Thana Creek which flows to Bombay.

In the initial stages the plant will use sulphite woodpulp imported from the U.S., Canada or Scandanavia while tests are being carried out on indigenous raw materials such as waste cotton, bamboo and bagasse.

It is proposed to set up a 15-20 ton sulphuric acid plant and a 5-ton carbon bisulphide plant to fill the factory's requirements.

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EMICAL ENGINE



We'd have no wood at all ... if it weren't for decay

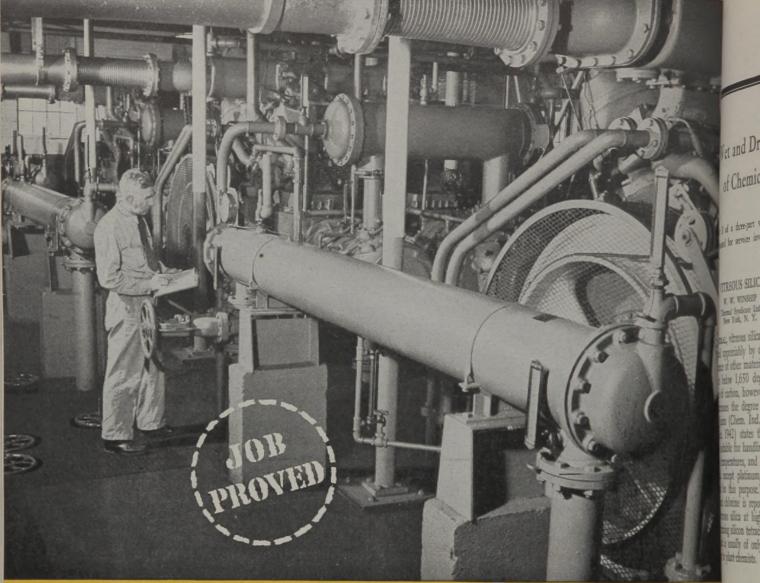
No matter how it seems, decay isn't always a villain. A Harry D. Tiemann, senior wood physicist at the U. S. Forest Products Laboratories said, "Think what a forest would be like if wood did not decay. As trees were blown down by wind and felled by ice storms and fire, such an accumulation of jackstraws would occur in a few years as to make the forests impassable . . . Fire would no doubt enter periodically . . . which would soon exterminate the forest completely."

Decay may be a good servant ... but it is a bad master. It does almost incalculable damage to structures... and the tragic part is that this loss can be largely avoided. Koppers pressure-treatments can fortify wood against this enemy, as well as against termites, marine borers, acid attack and fire. You'll find the complete story on treatments available, and where pressuretreated wood is serving and saving, in our book "Economical and Permanent Construction with Pressure-treated Wood." Ask for a copy.

KOPPERS PRESSURE-TREATED WOOD

KOPPERS COMPANY, INC. Pittsburgh 19, Pa.

Compressing Maintenance Problems



SUN COMPRESSOR LUBRICANT ...

Keeps Compressors Operating Four Years on 24-Hour-a-Day Schedule

Twenty thousand and ten hours of trouble-free operation were piled up by one unit in a big, industrial plant operating a battery of heavyduty 400 horsepower compressors. There was no time out except for routine inspections. Sun Oil was used from the very first hour these compressors were installed. When they were finally shut down for major overhauls, no wear was apparent and no major parts had to be replaced.

Sun "Job Proved" industrial lubricants are making similar impressive records in all kinds of industrial plants, keeping production on an even, round-the-clock basis, holding down maintenance and operating costs. If you have problems concerning the lubrication of compressors, power plants, machine tools or other industrial equipment — remember the Sun Engineer is at your service without obligation on your part. Just phone the nearest Sun office or write Dept. CE-2. . .

SUN OIL COMPANY · Philadelphia 3, Pa. Sponsors of the Sunoco News-Voice of the Air — Lowell Thomas



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Edmond C. Feller, ASSISTANT EDITOR

Wet and Dry Chlorine vs. Materials of Chemical Plant Construction

Part II of a three-part symposium in which representative materials are evaluated for services involving wet and dry chlorine and chlorine water

VITREOUS SILICA

W. W. WINSHIP Thermal Syndicate Ltd. New York, N. Y.

I ceneral, vitreous silica is not at-tacked appreciably by chlorine in the absence of other materials at temperatures below 1,650 deg. F. The presence of carbon, however, apprecibly increases the degree of attack. R. J. Quinn (Chem. Ind., 51, 872-876, Dec. 1942) states that "fused silica is suitable for handling chlorine at high temperatures, and is the only material, except platinum, that can be used for this purpose."

Atomic chlorine is reported to attack vitreous silica at high temperatures forming silicon tetrachloride but this fact is usually of only academic interest to plant chemists.

WORTHITE W. E. PRATT Worthington Pump and Machinery Corp. Harrison, N. J.

-a-Day Sched

em

WORTHITE is definitely not suitable for contact with wet chlorine gas. Dry chlorine gas at normal temperatures would not attack Worthite, but since steel is suitable for handling dry chlorine gas, as well as the liquid, there is no economical application for Worthite in these environments.

In the form of alkaline bleach solutions (sodium and calcium hypochlorites) as commonly used for bleaching textiles and paper, Worthite pumps are widely used with excellent results. Recommendations for Worthite are:

Sodium hypochlorite, cold, 3 percent max. available chlorine.

Calcium hypochlorite, cold 31 percent max. available chlorine.

Worthite is not recommended for use in the manufacture of these hypochlorites in the concentrated form involving 15 to 23 percent available chlorine.

Worthite is not visibly attacked by weak chlorine water at ambient temperatures. Oil field salt water which has been chlorinated prior to reinjection into the oil sands, has been pumped for many years in Worthite pumps without any signs of corrosion.

TANTALUM LEONARD R. SCRIBNER

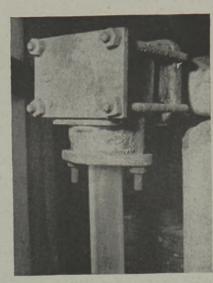
Fansteel Metallurgical Corp. North Chicago, Ill.

ANTALUM has been found inert to Tchlorine gas, either dry or wet, at all temperatures up to 300 deg. F., and to chlorine water. It has also been found immune to all chlorides with which it has been tested or used.

One of the first uses of tantalum was in diaphragms and needle valves for proportioning the flow of chlorine into municipal water supplies. It is still used extensively for this purpose.

Tantalum heat exchangers have been used since 1935 for reacting chlorine with ammonia to produce chemically pure ammonium chloride. Tantalum heaters and condensers are used in numerous other applications where either chlorine or chlorides present a corrosion or contamination problem.

While dry chlorine is not especially corrosive, wet chlorine, as well as many chlorides in the presence of moisture, becomes acidic. It is the acids thus evolved which pose the cor-



Gaskets of Silastic withstand steam at 220 deg. F. and a 90-95 percent concentration of wet chlorine gas

rosion problem, and very few metallic materials will withstand sustained attack to any practicable extent, especially if contamination of the product is a factor. Tantalum, being inert to hydrochloric acid even at boiling temperatures, easily withstands the relatively low strength or dilute acids evolved from chlorine and chlorides.

SILICONES

J. A. McHARD Dow Corning Corp. Midland, Mich.

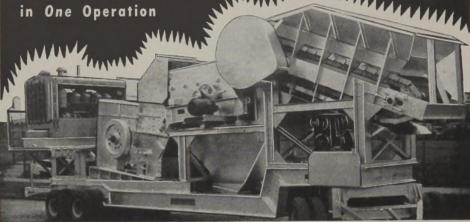
SILICONE materials in various forms have been tested for resistance to saturated chlorine water at 77 deg. F. and to wet and dry chlorine gas at atmospheric pressures and at a tem-perature of 77 deg. F. Samples of various silicone materials were exposed to wet and dry chlorine gas for seven days and immersed in chlorine water for seven days according to ASTM D 543-43. The results of these tests are tabulated below.

The resistance of silicone fluids to chlorine water is not currently available. The effects of wet and dry chlorine gas on the silicone fluids

CHEMICAL ENGINEERING • FEBRUARY 1947 •

NOW! A Great NEW Portable Crusher

Reduces More Quarry Run Stock at Less Cost



FEATURES of the Dixie Portable Crusher as Installed at Porter Brothers Quarry, Roscoe, Illinois.

Feed is direct from shovel. No intermediate conveyors or trucks needed, Plant includes: 40" x 10' apron feeder; 4' by 8' two-deck vibrating screen; 36" belt conveyor; Diesel engine. Complete unit mounted on chassis with 24 pneumatic-tired wheels. Crusher driven by V-belts from engine. All other equipment driven by

individual electric motors.

DIXIE'S NON-CLOG CRUSHING PRINCIPLE



Fine material produced in one operation

From stem to stern this Big Bruiser on Wheels is all business! Crushing 100 to 150 tons per hour (40% to 60% agstone) Dixie's Portable Crushing Plant reduces stock to minus 1 inch or to agstone size in one operation and does it better, faster, more economically. Produces any combination of sizes from 85% rock to 100% agstone...taking wet or sticky material without slowing production or clogging the feed. Whatever your requirements you can always depend on a Dixie Hammermill for remarkably increased crushing efficiency. Write today for full information and complete catalog.



Table I—Resistance of Silicone Fluids to Chlorine Gas at 77 Deg. F.

		Viscosity		1
Туре		Increase,	Evalu-	
Fluid	Reagent	%	ation *	
DC 200	dry gas	-0.6	good	(1)
	wet gas	1.5	good	AT E
D C 500	dry gas	4.7	good	UFAI
	wet gas	2.0	good	THE.
DC 550	dry gas	2.4	good	
	wet gas	2.6	good	
DC 703	dry gas	17.9	fair	
and the second	wet gas	2.5	good	
LC 710	dry gas	-1.3	good	
	wet gas	10.0	fair	

* Ratings are based on observation of the condition of test samples as well as measura-ble changes in viscosity.

Table II—Resistance of Silicone Resins to Wet and Dry Chlorine Gas and Chlorine Water

		Wt. In-	Vol. In-	
Туре		crease,	crease,	Evalu
Resin	Reagent	%	%	ation
DC 993	dry gas	2.8	0	good
	wet gas	1.5	0	good
	chlorine water	7.1	38	poor
DC 996	dry gas	2.1	0	good
	wet gas	0.3	0	good
	chlorine water	3,4	0	fair
DC 2103	dry gas	1.6	0	good
	wet gas	0.4	0	good
2.4	chlorine water	0.2	0	good

* Rating is based on a consideration of measurable changes and changes in physical appearance of test samples.

reported in Table I may be taken as an index to the resistance of various silicone greases to chlorine. Of par ticular interest is the effect of chlorine gas on DC plugcock grease especially designed for pressure lubricated valves. This silicone lubricant has been used effectively in valves handling low pressure chlorine gas at atmospheric temperature. Conflicting reports have been received concerning its effective ness in contact with high temperature and high-pressure chlorine gas.

The values reported in Table II (Tabar He were determined on samples of solid and replacing resins. DC 993 and DC 996 are the two Dow Corning silicone varnishes for bonding and impregnating silicone insulation components and silicone insulated electric machines. DC 2103 is the silicone resin used to bond glass and asbestos cloth in the fabrication of rigid electrical laminates.

The resistance to chlorine of Silastic silicone elastomer, is given in Table III. Of the stocks reported in this table Silastic 120 and Silastic 125 are produced in the form of a paste for coating and laminating. The other stocks are produced in the form of crepes for molding, extruding and friction calendering. Silastic 181 is especially designed for use as a gas keting material. Chlorine resistance was determined on molded and cured Silastic samples.

The values given in Table III support the statement that, in general, Silastic has very good resistance to chlorine gas both wet and dry at atmospheric pressures and at 77 deg.

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• "Karbate" Heat Exchangers will help you end the expense and delay of constantly replacing corroded heat exchangers!

CUT HEAT EXCHANGER REPLACEMENT COSTS WITH

BRAND

"Karbate" Heat Exchangers are chemically inert. They are free from corrosion scale formation. Thus, they will stay on the job indefinitely-saving substantial replacement costs over the years.

"Karbate" Heat Exchangers have other stand-out features: A remarkably high rate of heat transfer • Extreme heat shock resistance • Light weight • Strong, sturdy - able to take rough treatment . Can be made in a variety of sizes and types from the simple plate to the large tube-bundle types.

For complete description of "Karbate" Heat Exchangers, write Dept. CE.

"KARBATE" MATERIAL UNAFFECTED BY

HEAT EXCHANGERS-HEY LAST Indefinitely

IF

Hydrochloric ... sulphuric ... lactic ... acetic ... hydrofluoric acids ... and by special caustic vapors...and other corrosive liquids and gases.

NUTS! EVEN MY PET ACIDS CANT EAT INTO THIS STUFF!

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Of the stocks report Silastic 120 and Slat

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samples.

IEMICAL ENGINE



NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation The words "Karbate" and "National" are regis-tered trade-marks of National Carbon Co., Inc.

UCC

30 East 42nd Street, New York 17, N.Y. Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco



made to *improve* production and processing lines

WHEN you've got your pencil in hand figuring replacement costs or new installations, don't overlook the advantages of large diameter Trentweld stainless steel tubing wherever high temperatures, high pressures or resistance to corrosion are job factors. You can have Trentweld in any size up to 30" diameter in wall thicknesses up to 3/16'' and specifically engineered to meet the service specifications of the application you have in mind. In general, think of Trentweld as being unusually uniform in composition and structure. It is conditioned for use by the chemical industry by precisely controlled annealing and pickling operations. The carbon content of certain of the stainless steels can be as low as 0.02-0.03.

Full data on stainless steel alloys or Inconel is yours for the asking. Without obligation, address Department 10 or write for the Trentweld Data Bulletin.

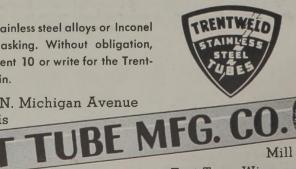
Sales Office-664 N. Michigan Avenue Chicago 11, Illinois



Resistant to High Temperature



Great Strength + Lightweight



East Troy, Wisconsin

Mill at

Table III-Resistance of Silastic to Wet and Dry Chlorine Gas and Chlorine Water

		Wt.	Vol.	Shore	
		In-	In-	Efficiency	
Silastic		erease,	crease,	Retained,	Evalu-
Stock	Reagent	%	%	%*	ation †
120	dry gas	0	0	87	good
	wet gas	0.4	0	129	good
	chlorine water	4.5	0	106	good
125	dry gas	0.5	0	92	good
	wet gas	0.2	_ 0	109	good
	chlorine water	3.8	0	93	good
150	dry gas	1.2	0	85	good
	wet gas	0.9	0	82	good
	chlorine water	8.0	0	72	fair
160	dry gas	1.3	0	79	good
100	wet gas	0.8	0	81	good
	chlorine water	0.4	0	122	good
160	dry gas	1.4	0	67	fair
(Red)		0.7	0	85	good
(1004)	chlorine water	19.8	51	57	DOOL
167	dry gas	0.7	0	61	fair
107	wet gas	0.2	0	66	fair
	chlorine water	9.3	20	38	DOOL
180	dry gas	0.4	0	71	good
100	wet gas	0.8	Ō	72	good
	chlorine water	3.5	Ő	100	good
181	dry gas	0.1	õ	82	good
101	wet gas	0.8	ő	74	good
	wet gas	4.0	õ	106	good

*Percent of Shore efficiency retained = (100) (hardness × elasticity of treated sample)/(hardness × elasticity of un-treated sample). †Rating is based on changes in weight and volume, changes in durometer and elastometer readings, and ob servation of the physical condition of the test sample.

F. and to concentrated chlorine water at 77 deg. F. Generally speaking, resistance is rather better to wet than to dry chlorine gas. In one industrial application, gas-

kets of Silastic 180 are used to seal the connection between a glass pipe and a ceramic elbow in a line carrying steam at 220 deg. F. and a 90 to 95 percent concentration of wet chlorine gas. In this service, black rubber gas kets hardened and started to leak after two or three days. Gaskets of Silastic 180 are still flexible enough to give a tight seal after six weeks of service (see cut page 219).

RUBBER LINING O. S. TRUE United States Rubber Co. New York, N. Y.

R UBBER-LINED tanks, pipes and fit-tings, using both natural and synthetic rubbers, have been widely used in industrial installations involving wet and dry chlorine gas and chlorine water. Sodium and calcium hypochlorite solutions are also han

dled successfully by these materials. The dry gas has very little effect upon rubber linings. Wet gas, on the other hand, does react with the surface to form a skin of rubber chloride. Chlorine water reacts the same as the wet gas-the extent of the reaction of course being dependent upon the concentration of the solution. The character of this reacted surface and the depth to which the reaction occurs can be controlled by specific compounding of the rubber. Soft rubber vulcanizates react most readily and tend to form a skin of



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RUBBER LINING

O. S. TEUE United States Rubbe G. New York, N. Y. BER-LINED tanks, ppr

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CHEMICAL ENGINEERING • FEBRUARY 1947 •

k Sullivan moressors for Compact Powe

Rugged ... Heavy Duty ... Economical

DELIVERING AIR UP TO 3,656 CFM

AND STATIONARY AIR COMPRESSORS

SULLIVAN DIVISION

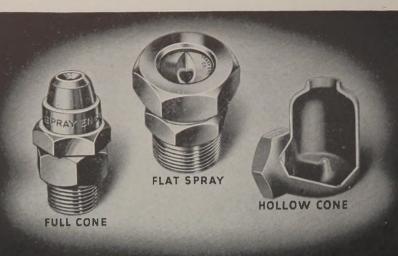
GENERAL OFFICES: HENRY W. OLIVER BUILDING, PITTSBURGH, PA.

KES LESS FLOOR SPACE—HAS HIGHER CAPACITY

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W&D 1504

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Write for NOZZLE CATALOG to SPRAY ENGINEERING CO. 115 CENTRAL STREET • SOMERVILLE 45, MASS.

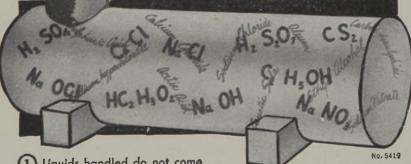
THIS VERTICAL PUMP

Oleum, Concentrated Sulphuric and Mixed Acids, are successfully handled in a practical manner by Taber VERTICAL Pumps, because:

(3) Repacking interruptions are

reduced to the lowest minimum.

(4) Damaging vibration is pre-



① Liquids handled do not come in contact with pump stuffing box.

To compensate for non-lubricating properties of liquid or other chemical solutions pumped, larger bearings are used.

bearings are used. vented by larger shaft diameters. FOR COMPLETE INFORMATION PLEASE WRITE ON YOUR LETTERHEAD FOR HELPFUL TABER Bulletin V-837



Chlorine tanks lined with rubber

chloride which is brittle and quite strongly adhered to the unreacted rubber beneath. Semi-hard and hard rubbers react more slowly and to a lesser depth than the soft rubbers, however the chlorinated surface tends to powder off more readily. In services involving abrasion, these hard products are sometimes subject to more rapid disintegration than soft rubber for the reason that the reacted surface is readily abraded away thus exposing more unreacted rubber.

In such cases, soft rubber is preferred despite its greater susceptibility to chlorination. The reason, as noted above, is that the reacted surface is more resistant to abrasion and is firmly anchored to its parent material.

In the majority of industrial services involving chlorine, abrasion is not a factor and semi-hard or hard rubbers are best suited. The initial reaction is rapid but the surface reaction product forms a protective film which inhibits further attack.

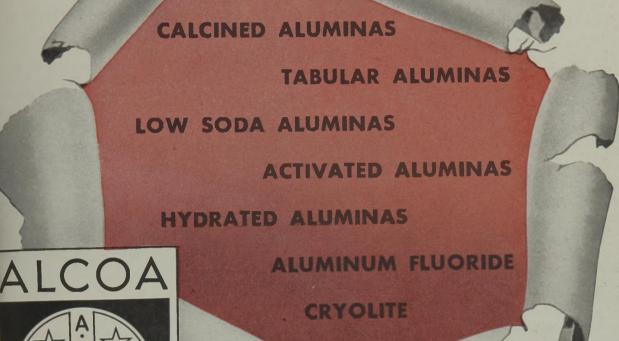
The solubility of chlorine in water varies from 0.98 percent at 50 deg. F. to 0.0 percent at 212 deg. F. and the higher the concentration the greater the severity of attack on the rubber. Rubber linings are available which will handle this entire range of conditions.

Outstanding examples of the use of rubber linings for severe chlorine

LI ENGD

Since

A FAMILY OF HARD-WORKING CHEMICALS FOR INDUSTRY



ALCOA ALUMINAS are versatile chemicals. They are used as hard-biting abrasives . . . high-temperature refractories . . . catalyst carriers . . . used for drying gases and liquids . . . making both rubber and ceramics tough and strong.

ALCOA FLUORIDES are used in the production of glass, aluminum, vitreous enamels and chemicals . . . for laundry compounds . . . preserving wood . . . plating and heat treating metal.

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THE TRADE NAME 'ALORCO' FORMERLY SOLD UNDER CHEMICAL ENGINEERING • FEBRUARY 1947 •

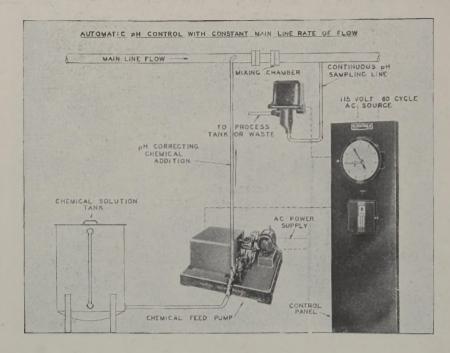
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Automatic pH CONTROL with Constant Main Line Rate of Flow



Milton Roy Pumps are controlled volume metering units, designed to meter and pump practically any liquid in volumes as low as 1 pint per hour to as high as 23 gallons per minute per pump side and against pressures as high as 20,000 lbs. per square inch. Because of the high degree of accuracy of volumetric measure made possible by the Milton Roy step valve design, these pumps have found many applications as components of automatic chemical feed systems.

Automatic pH control systems use Milton Roy controlled volume pumps both to measure the quantity of material required to maintain a desired pH value, and to transfer the chemical, injecting against pressure where desired.

On these systems, the pH meter and controller may function to either change motor speed, or to automatically change the length of the stroke of

the pump. Control of stroke length is normally preferred for this type of system. Proper design of such a system is essential. Milton Roy chemical engineers are fully qualified to assist and recommend designs for such installations and to furnish the complete pH control system including pH meter, controller, and controlled volume pump.

For further information . . . on automatic pH control with varying main line rate of flow . . . on automatic proportioning and ratio control systems . . . and on pumps and other equipment for other automatic chemical feed systems ask for new Bulletin 468, also Technical Paper No. 54 "An Application of Electronics in Automatic Chemical Feed Systems."



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services may be found in the paper industry. Both batch and continuous chlorine pulp bleaching systems are widely used. Experience has shown that rubber-lined steel is the best and most economical construction for these installations.

> GLASS-LINED STEEL O. I. CHORMANN The Pfaudler Co. Rochester, N. Y.

R EACTIONS requiring the use of dry chlorine gas may be successfully performed in glass-lined steel equipment.

The capacity range of this equipment is very good—from 350 to 2,000 gal. Working jacket and internal pressures vary with the particular type of glass-lined steel unit selected for carrying out the reaction, 150 psi. being about the maximum internal pressure for standard units. The temperature range may be considered to be from 300 to 350 deg. Agitation can be provided in all units by means of glass coated steel agitators and baffles.

Reactions involving the use of wet chlorine gas or chlorine water may also be successfully conducted in glasslined steel units. Standard capacities and pressures range up to 300 gal., 75 psi. in the jacket, and 38 psi. in the tank proper.

CARBON, GRAPHITE L. C. WERKING National Carbon Co., Cleveland, Obio

CARBON, graphite, and Karbate brand impervious carbon and graphite are unattacked by dry chlorine.

Carbon and graphite are used in reactors employing dry chlorine at temperatures ranging as high as 3,000 deg. F. with no measureable attack. Such applications involve linings, tubes, heating elements, crucibles, porous carbon and perforated diffusers, and a variety of special parts. The use of graphite tubes for the introduction of chlorine into molten metallic baths for fluxing operations is standard practice.

With the exception of avoiding strong oxidants (at the specific temperatures involved) there are apparently no limits on gas concentration, temperature or contaminants. For example, any mixture of chlorine and air can be used up to the temperatures at which carbon and graphite are subject to oxidation in air, i.e., 625 and 800 deg. F., respectively.

The corrosion characteristics of Karbate are similar to those of carbon and graphite, with the exception that the temperature of the material is limited to a maximum operating temnesi than that



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LASS-LINED STE O. L. CHORMANN The Plaudler Co. Rochester, N. Y

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HEMICAL ENGLY

SCORES

in hockey aren't made with baseball bats!

The business of making "home-runs" calls for much different equipment than that with which "goals" are scored. Even though baseball bats and hockey sticks are both made of wood, they are "engineered" for different objectives. The various physical and chemical characteristics that make MOSINEE papers win in a wide range of highly specialized industrial uses, are also definitely engineered into these essential papers. MOSINEE paper technicians are equipped with scientific laboratory and production controls, plus practical "know how" based on broad experience in creating papers of many characteristics, such as extreme stretch without loss of tensile strength, high absorbency, moisture repellency, controlled pH for desired alkalinity, acidity, or neutral reaction, etc. * * *

> In many industries MOSINEE paper technicians are helping manufacturers and converters to improve products and production. Call MOSINEE.



your letter 'Attention Dept. C''

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FULLER SYSTEMS WILL CONVEY THESE MATERIALS

BY AIR... THROUGH PIPE LINES

Alum Ammonium sulphate Arsenic Ash (fly) Ashes Asphalt filler dust Bag fume Bark Bark chips Bark fibre Barley Baroid Barytes Bauxite Beef cracklings Bentonite Blood (dried) Bone (steamed) Bone char Borax Catalyst Celite Cellulose acetate Cement (Portland) Cement raw materials Clay (dried) Clay (air-floated) Coal (crushed) Colox Copper converter dust Copra Corn Corn flakes Dextrine Dolomite Ferric sulphate Ferrous sulphate Flax-seed Fuller's earth

Grain (dry spent) Grits Gypsum (calcined) Gypsum (raw) Iron oxide

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THE AIRVEYOR



Commonly used for unloading fine, crushed and granular materials from cars and ships; reclaiming from bulk storage. Saves difference in cost between bag and bulk shipments, handling and storage. One man can operate the system.

FULLER-KINYON PUMPS Stationary and Portable



Used to convey dry pulverized materials from pulverizers, collector screws, bins, silos, hopper-bottom cars, etc. Capacities to 300 tons an hour. Convey materials as far as 3600 feet; elevation to 300 feet.

FULLER-KINYON UNLOADER



For unloading Portland cement and other dry pulverized materials from box cars, ships, barges and flatbottom storage bins. Operated by remote control, operator need not enter car or bin . . . out of danger from slides of material and dust. Lime (hydrated) Lime (pebble) Lime (pulverized) Limestone Magnesite Malt Manganese dioxide Meat scraps (dried) Middlings Oats Ore (pulverized) Phosphate rock Phosphate (tetra sodium) Record scrap

Record scrap Resin (synthetic) Rice Rock dust Rye Salt Salt cake Sand Saw dust Shale Shellac (dried) Shellac (garnet) Silex Siliceous powders

Soap chips Soda ash Soy beans Starch (powdered) Starch (pearl) Stucco (hydrocol) Sugar (anhydrous) Syrup (dry crude) Syrup (dry pulverized)

Volcanic ash Wheat Whiting

Wood chips Wood flour

Zinc calcine

Zinc sulphide



Chicago 3 - 120 So. LeSalle St. San Francisco 4 - 421 Chancery Bidg. Washington 5, D. C. - 618 Colorado Bidg. perature of 340 deg. F. This material is used extensively in systems involving the chlorination of hydrocarbons. It is especially valuable in those reactions where hydrogen chloride is a byproduct since it is equally inert in chlorine and hydrochloric acid at all concentrations. Diffusers, heating or cooling elements, condensers, piping, valves, pumps and byproduct hydrochloric acid systems are regularly used in connection with the chlorination of alcohols, acetic acid, and aliphatic or aromatic hydrocarbons.

While carbon, graphite and Karbate are unattacked by chlorine, their behavior in hypochlorous acid is more variable, ranging from no attack to reasonably rapid oxidation. This is to be expected because of the oxidizing action of the reaction

HOCl \rightarrow HCl + O (active). As a generalization it may be stated that Karbate is most resistant to this oxidation, followed by graphite and carbon in descending order.

Since the equilibrium of the reaction

 $C_2 + H_2O \rightarrow HCl + HOCl$ is far to the left, it follows that as the chloride ion concentration increases, the amount of HOCl and available active oxygen decreases. Also, it is apparently true that for the concentrations of HOCl generally present in wet chlorine, its decomposition increases with temperature at least to the boiling point. While no definite pattern of attack versus concentration and temperature has been worked out, it apparently follows these general principles.

For example, Karbate tubes, towers, piping, etc. have operated over a period of years in 30 percent hydrochloric acid in the presence of free chlorine at temperatures up to boiling without evidence of attack. Over a period of two years the same material has shown no significant deterioration in cold saturated chlorine water, while in chlorine saturated brine at atmospheric boiling point a corrosion of 3/16 in. has been noted in a two-year period and a slightly higher rate of corrosion has been noted in uncooled wet chlorine from cells.

> HASTELLOY C. G. CHISHOLM Haynes Stellite Co. Kokomo, Ind.

A TNORMAL temperatures, dry chlorine gas can usually be handled efficiently by iron, steel, 18-8-3 molybdenum stainless steels, Monel metal, bronze, and copper. As soon as appreciable amounts of water are added to chlorine gas, however, it becomes one of the most corrosive agents

19.424 Scrubber m squipped with Bermas.

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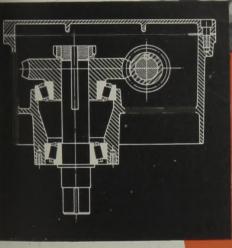
> HASTELLOY C. G. CHISHOUN Harres Stellite Ga Rahares, Ind

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HEMICAL ENGINE

PROMOTE EFFICIENCY, PREVENT ACCIDENTS

Finnell No. 424 Scrubber and Dryer equipped with Timken Bearings.



Application of Timken Bearings on the worm gear shaft of Finnell Scrubber and Dryer.



Dirty, greasy, slippery floors are not tolerated in modern factories; they are a menace to efficient operation and the safety of personnel. Factory floors can be kept clean and dry easily and economically with equipment like this Finnell No. 424 Scrubber and Dryer.

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Thus the entire Finnell line uses Timken Bearings at vital hard service points to eliminate friction and wear; to carry radial, thrust and combined loads; and to hold moving parts in constant alignment.

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said.



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OLDBURY ELECTRO-CHEMICAL COMPANY

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PHOSPHORUS SESQUISULPHIDE

Manufactured to strict specifications for the Match Trade

> Plant and Main Office: NIAGARA FALLS, NEW YORK

New York Office: 19 RECTOR ST., NEW YORK 6, N. Y. known, and few materials can resist it adequately. Rubber, glass, silver. and platinum can be used for this purpose, but these materials either lack the physical and mechanical prop-erties required by the usual com-mercial standards, or they are too expensive. One alloy, however, that does possess the necessary corrosion resistance and physical properties for handling wet chlorine gas is Hastelloy alloy C.

One of the standard procedures for checking the corrosion resistance of Hastelloy C during production stages is exposure of individual heats to wet chlorine gas. This test consists of suspending a specimen in a closed flask, just above the water line, and bubbling a constant stream of chlorine gas through the water. When conducted at room temperature, this is one of the toughest corrosion tests that can be made. In spite of these stringent conditions, the maximum rate of corrosion on an approved heat of Hastelloy C is only 38 mils per yr.

When this same test was conducted at elevated temperatures-at 104, 140, 176, and 212 deg. F.-a reflux condenser was used to prevent the evaporation of the water, and the atmosphere in the flask was maintained at a controlled temperature. Results of these experiments showed an appreciably accelerated rate of attack at 140 deg. F., but extremely low rates of corrosion at 176 and 212 deg. F.

A second test procedure is immersion of two flasks in an oil bath at controlled temperatures. One flask contains water and the second flask contains a specimen and no water. Chlorine gas is passed into the flask containing the water and then into the flask containing the specimen. The highest corrosion rates, as a result of this test, were obtained at temperatures of approximately 176 and 212 deg. F. The corrosion rates obtained at 104 and 140 deg. were about 38 mils per yr.

It is difficult to duplicate test data with wet chlorine gas at elevated temperatures, because the exact amount of water vapor present has a decided bearing on the actual corrosion rate at these temperatures. It is desirable, therefore, to run tests under actual operating conditions whenever pos-sible. Under some conditions Hastelloy C has shown up very favorably in handling chlorine gas at temperatures as high as 1,800 deg. F., where, of course, very little moisture is present.

Hastelloy C has been successfully and extensively employed for han-dling chlorine, both wet and dry, in such equipment as valves, piping, ves-sels, cracking tubes, and feed pipes. It is used in one form or another for

PROCESS PLANTS **Planned to Produce Profits**

Complete Service and Complete Responsibility

DESIGN • ENGINEERING • CONSTRUCTION

This grain alcohol and feed extraction plant typifies the thoroughness and advanced thinking which are so evident in the process projects handled by the Chemical Division of J. F. Pritchard and Co.

Inspect a few Pritchard-built projects in any phase of the chemical processing fields to understand the full meaning of "Pritchard Plants Produce Profits." They're PLANNED so, in every detail. From drafting room to completion, seasoned staffs are alert to the owner's objectives. Well versed in standard practices, familiar with new trends and having sound ingenuity of their own, these men are experienced in production of organic chemicals, in production and processing of gases, in drying and evaporation, in liquid dehydration and purification, in fermentation and distillation processes and in related chemical operations.

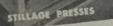
This broad experience is augmented by that of the other Pritchard divisions serving the Petroleum, Natural Gas, Power and Refrigeration Industries.

See Sweet's Industrial Files, Chemical Engineering Catalog, Refinery Catalog, ASH&VE Guide, ASRE Databook, or write for specific information.

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STILLAGE SCREENS





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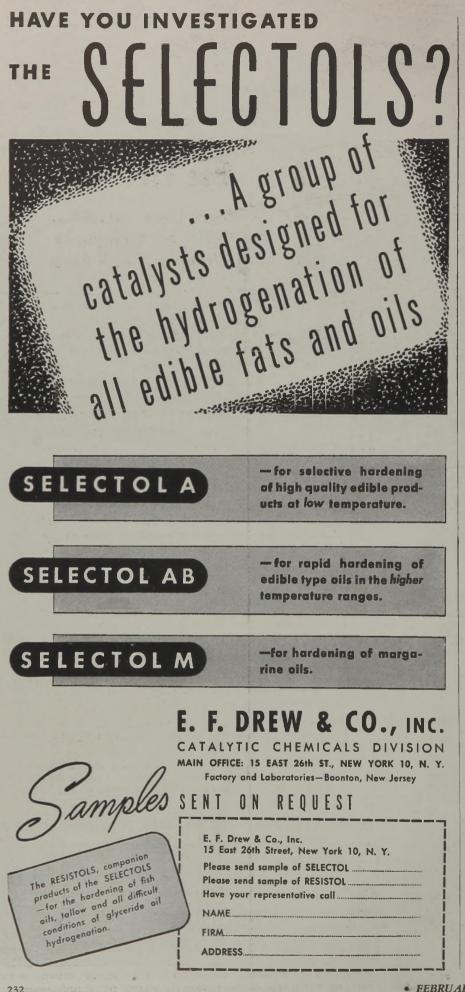
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chlorinating equipment, used for water purification. Chlorinating tubes, for bubbling chlorine into sodium hydroxide to produce bleaching agents. is an outstanding application for this alloy. One precaution, however, should be mentioned here in connection with this type of service. In a few instances where the stronger bleaching compound has been used the alloy has tended to catalyze the sodium hypochlorite, causing decomposition of the sodium hypochlorite solution. Although this condition has occurred in only three out of several hundred installations, it is suggested that this possible situation be checked before using Hastelloy alloy for this service. Decomposition seems to occur only in the very strong bleach solutions containing 15 to 18 percent free chlorine

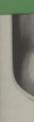
Because of the physical limitations of rubber and glass, and the high cost of such rare elements as silver and platinum, Hastelloy C has proved one of the most outstanding alloys available for handling chlorine. This alloy is available in cast and wrought form, thus making it possible to design any type of equipment required for resisting this severe corrosive agent.

WOOD TANKS S. E. CHANEY National Wood Tank Institute Chicago, Ill.

I^N MANY industries where wet and dry chlorine gas and chlorine water are used, wood tanks are used in the process and available records show that some tanks have been in constant. use for over 40 yr. All quality tank manufacturers require the lumber producers to follow their associations' rules and lumber specifications governing tank stock for specific purposes. Consequently, where chlorine is to appear in the flowsheet, such fact must be stated so that the tank manufacturer may make the tank for the particular purpose.

Chlorine is used in systems where domestic water requires purification and in some instances wood tanks have been used in this service.

Concrete-lined wood tanks are used to make up chlorine solutions and for the storage of sodium and calcium hypochlorites. Where solutions are not always alkaline, wood tanks are generally used and are satisfactory. Sodium hypochlorite is made commercially by the reaction of liquid or gaseous chlorine in a solution of caustic soda. Where rubber-lined steel tanks are used in its manufacture, great care must be exercised in the design of the tanks and other equipment to eliminate the possibility of iron compounds contacting



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This one fluid-cleaning unit — no larger than the usual partial-flow type — handles *full flow* of practically any fluid.

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NEW YORK Goslin-Birmingham 350 Madison Ave. New York 17, N. Y.

the solution because iron causes serious decomposition of sodium hypochlorite. Rubber-lined wood tanks can, and are being used for such installations.

One of the largest users of chlorine. and of wood tanks, is the pulp and paper industry. Chlorine is used in connection with the direct bleaching of the pulp, as a deodorant for sulphate pulp, and sometimes for algae and slime control. A survey of pulp and paper mills disclosed that wood tanks have been highly satisfactory in these services.

The pulp and paper industry prefers the durable woods, redwood and cypress, for tanks because of their high decay resistance, smaller shrinkage, uniform structure, and high insulating properties, as well as their resistance to various process chemicals. It is also advantageous that redwood and cypress tanks can be built in large dimensions from thick members of all heartwood. The sapwood in any conifer species is subject to premature decay, wherefore quality wood tank manufacturers only use clear all heart grade.

In the pulp and paper industry red. Inder An a wood and cypress are satisfactorily used for stock chests, storage tanks in milk of lime processes, agitator and mixing tanks, beaters, pulp thick-eners, water storage and sprinkler tanks, and many others.

One paper plant reports a tank 3 ft. 4 in. wide, 40 ft. long, and 1 ft. high made of 3-in. redwood. It has to use de been in service for 14 yr. and is in good condition. The tank handles semi-bleach and natural stock. The stock includes chlorine. Temperature of the solution is maintained at 70 deg. F. The tank was not lined originally, but after six years of service the interior showed a slight softening due to the action of the chlorine. The tank was then lined with lead and is still giving good service.

Another company, a manufacturer of knit goods underwear has seven wood tanks made of 3-in. cypress. The inside dimensions are 9 ft. 9 in. long, 6 ft. 4 in. wide, and 4 ft. 2 in. high. The solution carried contains 3 percent available chlorine. Temperatures range from 70 to 212 deg. F., the maximum temperature being maintained for 4-6 hr. daily. The tanks have half-round 3-in. brass hoops and §-in. brass stay rods. Cotton knit goods are bleached in these tanks with chlorine and neutralized cloth with sulphur dioxide gas. The front part of the tubs disintegrated first because the bleach solution was added at that point. It has been suggested that when replacements are made thicker lumber be employed on the front of the tanks.

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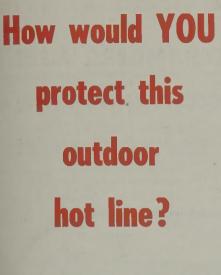
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stock chests, store of lime processes, and tanks, beaters, pabl water storage and = nd many others. paper plant report : wide, 40 ft. long al ade of 3-in. redwood The method to use depends upon service for 14 vr. ml geographical location and job conondition. The tank in ditions. In climates where weather ach and natural stud conditions are very severe or on cludes chlorine. Tenzi jobs where the insulation is subsolution is maintained. ject to possible abrasion, extra pro-The tank was of tection is often necessary. lv, but after six year d interior showed a slight canvas, even with a weatherproof e to the action of the paint, does not provide sufficient ink was then lined a protection for outdoor work. A still giving good service layer of weatherproof paper is conther company, a man sidered by most engineers to be it goods underwear but practical for a majority of weather tanks made of 3 in our conditions. Or this type of weatherdimensions are 9 H. 9 a proofing can be used even in severe in. wide, and 4 ft. Inc climates if the line is not subjected colution carried contain wailable chlorine. Texpo from 70 to 212 dec. num temperature beg d for 46 hr. daily. The half-round 3-in bras him brass stay rods. Cota are bleached in these bal ne and neutralized def r dioxide gas. The ha tubs disintegrated fix h ich solution was added It has been suggest placements are make e employed on the b

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pulp and paper internets the problem: An 8" line carrying saturated nd carrying at 250° F. is insulated with 85% Magnesia covering. The line is outdoors and exposed. The plant is located in the Midwestern section of the country. What method would

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The paper should be securely wired

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you use to protect the insula-tion against the weather?

in place with the lap at the side so as to form a watershed, and all joints should be sealed tightly with asphalt emulsion.

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For outdoor lines that are exposed to bumping or abrasion, or to unusually severe weather, such as hard hail storms, the additional protection of metal jackets is often worth while. Metal jackets also are used in refineries and chemical process plants because the metal will not absorb inflammable gases and create a fire hazard.

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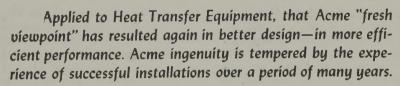
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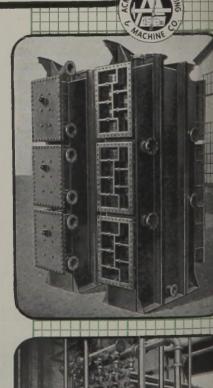
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• FEBRUARY 1947 • CHEMICAL ENGINEERING

FROM THE LOG OF EXPERIENCE

Dan Gulleben, ENGINEER

THE SUGAR SURPLUS was so great in 1930 as to depress the price to a level that threatened bankruptcy to large producers. Congress promulgated a new tariff under which Cuban 96percent raw sugar was dutiable at \$40 per short ton, being \$10 below the full duty collected on imports from non-preferred countries. At the same time a tariff was imposed on mixtures of raw sugar and water. When the density of this mixture was below 50 Brix (i.e., about 5 lb. of sugar per gal.), the tariff was fixed at one quarter cent per gal., which the Congressional mind may have visualized as a stimulant for increasing the production of alcohol and dry ice. The tariff on a 500,000gal, cargo of 48 Brix sirup from Cuba would thus be \$1,250 compared with \$50,000 if evaluated as sugar. This had alluring prospects which Uncle Sam's nephews could be depended upon to exploit.

THE "OLD MAN" called the Congressional Tariff Committee's attention to the fact that if the dilute solution could be transported without too much inversion and subsequent fermentation, the intent of the tariff law would be almost voided. The newspapers announced that the \$120,000,000 annual revenue from raw sugar imports could thus be reduced to \$2,200,000. A West Coast sugar refiner submitted an claborate report to the Committee setting forth methods of procedure including the proposition of shipping the situp at 70 Brix and manipulating it with water to 48 Brix just before the twelve-mile limit is reached. The ship would then make a dash for the refinery and the sugar would be extracted before inversion could progress appreciably. The Committee shrugged its shoulder.

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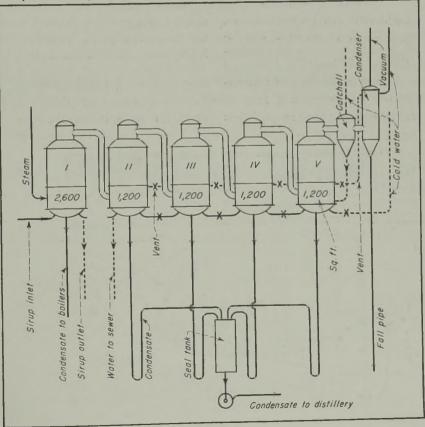
HAVING INFORMED the Committee of his intention, the Old Man dispatched a tanker to Cuba for a 350,-000-gal. cargo. He sent chemist Harvey ahcad to direct the procedure and subsequently to sit on the deck of the returning tanker with a supply of lime, formaldehyde and HTH to restrain inversion if possible. By the time the ship arrived at home, foam and CO_{2}

were oozing out of the deck manholes and fermentation had evolved alcohol in the sirup. In anticipation of this, a quintuple effect sweet water evaporator had been prepared with some piping alterations as shown. The sirup passed through the first effect where it was rapidly heated to the boiling point, pasteurized (to check fermentation), slightly concentrated and freed of its alcohol content, and then delivered to the molasses storage tank for distillery supply. Cold water entered by way of the liquor outlet of the 5th effect, flowed successively through the liquor spaces of the 4th, 3rd and 2nd effects and thence out of the old liquor inlet to the sewer. The last four effects thus served as a four-stage condenser. The vapor from the first effect was con-densed in the 2nd and so on. The condensates containing the alcohol were delivered to completed fermenters and pumped with the wort into the still. The operation of pumping the sirup through the evaporator required one day and one night.

IN THE GLOOM of low twelve, the watchman at the condensate pump stooped to tighten the stuffing box and thus got a whiff of the potency of the water. In an unbelievably short time a line of sugar craftsmen formed at the pump bearing milk bottles, lunch pails and even felt hats. The happy condition, however, was short lived as the end of the cargo had been reached by the time the discovery was made and a rumor had gone forth that the chief had just arrived at the front gate. As a producer of profit the operation was a flop but the byproduct alcohol and dry ice reduced the cost of the experience sought.

CURIOSITY could not be satisfied by half facts and so the Old Man sent the

Evaporator arrangement for removing alcohol from fermented sirup (G. T. Reich)



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tanker to Cuba for another cargo. This time about half the sirup was loaded at 46½ Brix and the remainder at 66. The raw sugar was affined before melting. When the tanker got within two days of the home breakwater, the thick sirup was manipulated with water from the ships's tanks to 48 Brix. Under Harvey's accumulated experience both the thin and the thick sirups arrived in good condition. The cargo was promptly entered into the refinery melter along with enough affined raw sugar to reach the usual 65 Brix.

THE PROFIT was not spectacular but the possibitilies glittered. Then the Old Man exposed the facts to the Committee and sat back while the Savannah refinery prosecuted a test case. They imported nine drums of 48 Brix sirup well doctored with chlorine and paid a duty of \$1.68 thereon. The duty on sugar basis would have been \$116. After a considerable lapse of time the court set a date and declared that after that date the sirup would be dutiable as sugar. There wasn't enough time left to get another cargo before the deadline. The prosecuting attorney threw out his chest and proclaimed that he, single handed, champion of the "peepul," had frustrated the evil intent of the malefactors!

During the War, and some time previously, when the demand for industrial alcohol was very great, the difficulty of importing sugar for alcohol without prohibitive tariff was overcome by inverting the sirup in Cuba before export. Uncle Sam trusted his nephews with this sirup as invert cannot be converted into sucrose, and alcohol cannot escape from the distilleries which are licensed and closely guarded by U. S. revenue officers.

FHE PHILIPPINE LIBERATION in

1898 threw upon the Army the task of cleaning up the Islands and teaching the heathen how to work. A tough Scotch ex-sergeant was foreman in an organization approximately similar to the late WPA and he won a reputation of superior accomplishment with material far below par. On the other hand the foreman of a neighboring camp achieved mediocre results al-though he used the same volume of profanity. The Scotch sergeant however instead of cussing his men, cussed his bad luck, the poor equipment and in fact every thing but the men. Among the jobs was an I-beam bridge of 40-ft. span, designed to shorten one of their "cow paths" by a half hour's journey. When the job appeared to be nearing completion, burro carts began forming in line on both sides. By the time traffic was given the green light there were at least 50 carts with

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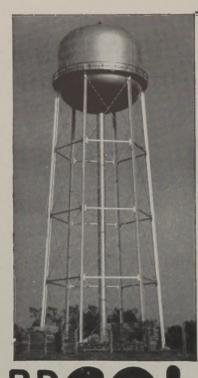
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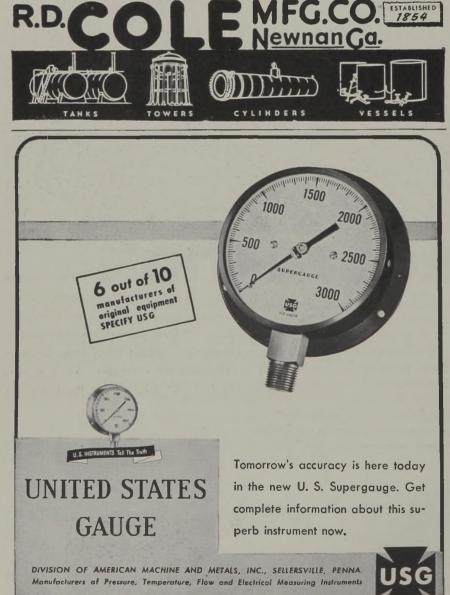


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burro and driver on each side, some of which had been in line three days and nights in their eagerness to save a detour of 30 minutes.

RIGGER BILL possessed so great a degree of skill as to make him indispensable in spite of a certain upsetting weakness. Every morning he came to the job with a quart of whiskey on his hip and an unknown amount within. The boss occasionally fired him but each time retracted. Once aloft, Bill's wobbliness disappeared and erection proceeded with dispatch. He even enjoyed his midday siesta stretched out on some beam or plank high above the ground. When plant operation began, Bill was a past master. Every morning he cached his quart in some dark corner for convenient reference. One day the superintendent determined to make an example of him. He saw Bill hide his bottle near the melter. Examination showed that the bottle was full and the seal intact. All day the super and his assistant watched and when Bill checked out, the bottle was still there but it was empty. A few years later the boss fired him. The sudden discharge provided the shock that cured him. He transferred his boundless energy to a job in the U. S. Department of Agriculture soil conservation department and thereafter performed with great satisfaction.

THE MOLASSES tank farm was subjected to playful kids and an occasional marauding derelict who baled black strap through the roof manholes by the dark of the moon during the Volstead era. The monkey instinct of the kids was promoted by the presence of the ladders. The 100-ft. circles, without railing, 60 ft. above the ground provided a fine race track. The four tanks were near enough together so that the kids could negotiate the gap by a running jump. However we had an aversion to dead kids and so we surrounded the farm with a corrugated steel fence having the top edge cut sawtooth fashion and having a row of ³/₄-in. steel bars at 6-in. c. to c. driven into the ground just inside of the fence. This did not stop the kids but smearing of the tanks with molasses ceased. It was not possible to build a fence that the kids could not scale so we built a baseball field in the empty lot behind the tanks and provided some benches and a back stop built of heavy discarded planks securely spiked to the posts. This was effective except that in the course of the cold winter the wood disappeared. In the spring we substituted a steel frame covered with heavy mesh. The mesh satisfied the instincts and kept the monkeys off the tanks.

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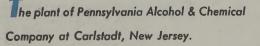
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Pennsylvania Alcohol & Chemical Company will operate as an independent division, augmenting the manufacturing and distribution facilities of Commercial Solvents Corporation.

• FEBRUARY 1947 • CHEMICAL ENGINEERING

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COMMERCIAL SOLVENTS CORPORATION * 17 EAST 42nd STREET, NEW YORK 17, N.Y.

NAMES IN THE NEWS



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NEW YORK

CHEMICAL ENGIN

G. B. Armstrong

George B. Armstrong has been named manager of the carbon dioxide division of The Mathieson Alkali Works, succeeding Charles T. Longaker, resigned. He is now located at the Mathieson main offices in New York.

John P. McWilliams, Cleveland industrialist, has been elected to the board of directors of Union Carbide and Carbon Corp.

Glenn S. Watson has been appointed chief chemist of the Marietta, Ohio, works of the Calco Chemical Division, American Cyanamid Co.

Melvin E. Clark, director of market research Wyandotte Chemicals Corp. and former assistant editor of Chem. & Met., will after March 1 become manager of caustic soda, soda ash and bicarbonate sales for Wyandotte's Michigan Alkali Division.

Richard S. Shutt is now director of research for Foote Mineral Co., Philadelphia.

Webster N. Jones, director of the College of Engineering, Carnegie Institute of Technology, and August C. Klein, engineering manager of Stone & Webster Engineering Corp., received honorary doctor of engineering degrees from Stevens Institute of Technology on February 1.

Armand J. Abrams is now a chemical consultant to the research department of the Koppers Co. in Pittsburgh.



R. H. Noel

Roland H. Noel has been appointed director of control for Bristol Laboratories, Inc., Syracuse, N. Y. Mr. Noel, who joined Bristol last year, was formerly chief control chemist at Burroughs-Wellcome Co. in Tuckahoe, N. Y.

L. F. Dobry is now with the De Leuw, Cather and Co., consulting engineers of Chicago, Ill., as chief chemical engineer. He had been formerly with Johnson and Johnson.

Vannevar Bush, president of Carnegie Institution of Washington, and wartime director of the Office of Scientific Research and Development, was 1946 winner of the Hoover Medal, jointly awarded by AIEE, ASCE, AIME and ASME. It was formally conferred on Dr. Bush January 20 in New York.

M. L. Crossley, director of research, American Cyanamid Co., with headquarters at the Calco Chemical Division, Bound Brook, N. J., has been unanimously selected to receive the 1947 gold medal of the American Institute of Chemists.

Frederick D. Schreiber, formerly general superintendent of the Pittsburgh Coke & Chemical Co. at its Neville Island operations, has been made manager of the coal chemicals division.

G. Bosschieter has joined the R. M. Hollingshead Corp., Camden, N. J. as technical director of the coating division.



H. D. Holler

Homer D. Holler, one of the leading authorities in the field of underground corrosion, has been appointed to the staff of the National Bureau of Standards. Dr. Holler will work with Dr. I. A. Denison of the underground corrosion section. He joins the Bureau's staff from the Westinghouse Electric Corp. where he has been responsible for corrosion investigation and control since 1929.

Stuart L. Parsons has been appointed chief engineer for the tungsten and chemicals division of Sylvania Electric Products at Towanda, Pa. In the newly created post Parsons will direct divisional engineering including research and equipment design for the production of tungsten salts and fluorescent powders.

Joseph E. Bludworth, director of petroleum chemicals research and development of Celanese Corp. of America, has left Celanese to establish offices in Corpus Christi, Tex., as an independent consulting engineer to the petroleum and chemical industry.

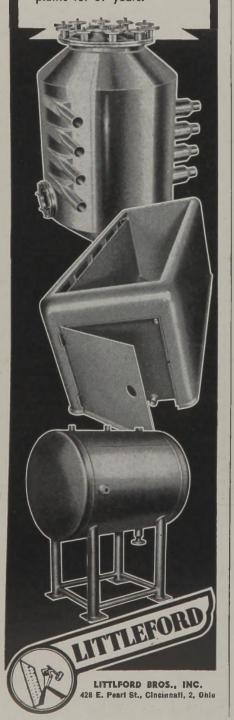
H. K. Dice and Vincent T. Anwyll have been promoted by Celanese Corp. of America. Mr. Dice has been moved from the Chemcel plant at Bishop, Tex., to the Celanese Research Laboratory. Mr. Anwyll has been made production superintendent at Chemcel.

Chester K. Rosenbaum has been appointed research manager in charge of

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When designing new processes, or replacing worn out units, remember Littleford experience in fabricating Tanks of plain or alloy metal is at your service. Tanks for the chemical industry have been made in our modern plants for 67 years.



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the semiworks process development and product development sections of the Du Pont plastics department. Edward B. Cooper is new research manager in charge of the physics and analytical sections.

H. Martin Friedman has been appointed research director in charge of the development and application of new synthetic chemicals for the textile division of Emkay Chemical Co., Elizabeth, N. J.

Fraser M. Moffat, Jr., is now manager of the export department of the Calco Chemical Division, American Cyanamid Co. it has been announced.

Henry P. Reid, assistant to president, has been appointed chief engineer of the Universal Atlas Cement Co.

Joseph S. Bates has been elected president of Ciba Pharmaceutical Products, Inc., of Summit, N. J. Dr. Bates succeeds J. J. Brodbeck, who recently resigned as president to return to Switzerland to take up his permanent residence there.

Ben Wilcoxon, formerly in charge of plant facilities for the Chemical Division of WPB and since June 1945 a technical investigator in Frankfurt and more recently at Karlsruhe, Germany, for FIAT, sailed for the United States, February 15. He will return to his home in Grass Valley, Calif.

John R. Callaham, Pacific Coast Edi-tor of Chemical Engineering, has been elected chairman of the Northern California chapter of the American Institute of Chemical Engineers.

A. H. Tenney has returned to the New York offices of Carbide and Carbon Chemicals Corp. as a technical representative for the fine chemicals division. He will specialize in the development of markets for new chemicals being developed by the research laboratories. Dr. Tenney has just completed three and a half years with the Manhattan Project at Oak Ridge, Tenn., and was previously associated with Carbide and Carbon in a sales development capacity.

James T. Power has been appointed director of the development department of Atlas Powder Co., succeeding W. E. Fletcher, who retired on February 1. Mr. Power continues to direct sales research activities, which he has headed since October 1943.

Frederick C. Abbott has been appointed manager of labor and personnel relations for the Pennsylvania Salt CONTINUOUS

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The Zenith Pulp Press, with capa-

city up to 26 tons per hour, thoroughly dewaters wet pulps

Beet Pulp • Citrus Wastes

• Tomato Pomace • Cherries o Corn Fibre • Paper Pulp

Heavy screw-type spindle applies

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pulp or slurry against selective

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pulp losses to minimum. Ball thrust

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evaporator, made entirely of Republic EN-DURO Stain!ess Steel.

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An examination of the turbine design shows why it is possible for a single machine to perform these two distinct operations. Liquid is broken up into "oros



minute globules by high velocity impact at top of turbine. Suspended material is mechanically sheared by the rotor and stator teeth, and hydraulically sheared by the final smooth surfaces of rotor and stator.

Eppenbach Mills are available in laboratory and production sizes. Capacities range from 1/2 to 3600 gallons per hour or higher.

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Manufacturing Co. Before his new appointment, Mr. Abbott was assistant production manager. Previously, he was manager of the new products division.

Frank Austin Lidbury retired January 30 as president, treasurer and general manager of the Oldbury Electro Chemical Co. of Niagara Falls. He was succeeded by Walter Wallace who has been vice president and assistant manager.

Harry B. Cummings has been appointed manager of the tar department of the tar products division of Koppers Co.

Walter L. Sturtevant has retired from his position as chemical engineer at the Manhattan Rubber Division plant, Raybestos-Manhattan, Inc., Passaic, N. J.

Frank L. Magee, general production manager for Aluminum Co. of America, has been made a vice president of the company.

F. R. McMillan, director of research of the Portland Cement Association's scientific research staff since 1927, has been promoted to be assistant to the vice president for research and de-velopment. H. F. Gonnerman, manager of the Association's research laboratory in Chicago for the past 19 years, is now director of research and William Lerch, senior research chemist in the Chicago laboratory since 1940, was promoted to be manager of the department of applied research.

Robert A. Kemmerer has joined Bristol Laboratories Inc. penicillin plant as head of the engineering and maintenance division.

L. E. Van Sickle, head of the kraft paper department of West Virginia Pulp and Paper Co., retired last month after 45 years' service with the company.

Charles M. Slack has been appointed director of research for the Westinghouse Lamp Division. Dr. Slack succeeds Harvey C. Rentschler, who is approaching retirement and who will devote himself to completing certain research projects in addition to serving in an advisory and consulting capacity.

Robert L. Richards has been appointed assistant general manager of the rayon department of E. I. du Pont de Nemours & Co. A series of other personnel changes in that department has been announced. Willis Shackelford, manager of the acetate division, succeeds Mr. Richards as an assistant

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Providing accurate, tested methods for the preparation of pure inorganic com-pounds, this book offers valuable re-search help to chemists that is not availableelsewhere. Eighty-one synthein full detail, and a general discussion of an entire field of



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of an entire field of inorganic chemis-try is included where the compound requires it, such as in the case of the rare earths, carbonyls, the metal derivatives of 1, 3-Dikestones, etc. For dependability, each synthesis has been double checked in a laboratory other than that from which it was submitted. This book is the second volume in a series developed to fill a definite research need for the inorganic chemist.

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RISING STEM WITH NICKEL ALLOY

WEDGES AND RENEWABLE NICKEL

ALLOY SEATS. SIZES 1/2" TO 2".

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> the specially designed hard nickel alloy seats and wedges provide the ideal combination for corrosion and erosionresistance that extends valve life, reduces maintenance costs, eliminates service interruptions.

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the Union Bonnet Construction permits the easiest and quickest valve dismantling for inspection, cleaning, or replacement of parts. A heavy octagonal union nut and radial bonnet joint assure pressure tightness and perfect alignment of all parts.

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and deep ... filled with moulded asbestos packing and fitted with a heavy, brass follower gland. Gland is held tightly against packing by wrought brass packing nuts. Valve can be repacked under pressure when wide open.

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For complete information about this outstanding line of valves write for Bulletin V-230. The Fairbanks Company, 393 Lafayette St., New York 3, N. Y.; 520 Atlantic Ave., Boston 10, Mass.; 15 Ferry St., Pittsburgh 22, Pa.; 748 M&M Bldg., Houston 2, Texas.

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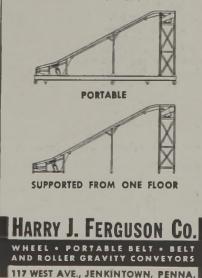
Speed THE HANDLING OF MATERIALS from FLOOR-TO-FLOOR with this



30° INCLINED BELT CONVEYOR



Reversible—this "Streamliner" Belt Conveyor operates either up or down at constant speed of 45 feet per minute. Its rollers can be "SET HIGH," for oversize packages, or "SET LOW" to provide a protective guard rail on both sides of the durable rough top rubber belt. Unit is available in standard sizes up to 30" wide . . . has manual take-up for belt slack . . . may be equipped with casters for portability . . . or can be supported from one floor. Write for full information.



manager of the department. G. W. Filson, assistant manager of the rayon division, succeeds Mr. Shackelford, as manager of the acetate division and George E. McClellan, director of production of the rayon division, succeeds Dr. Filson. Mr. Richards succeeds Charles A. Cary who was elected a vice president, director and member of the company's executive committee in December.

L. A. Mikeska, of the chemical division of the Standard Oil Development Co. is now senior research associate. The title awarded Dr. Mikeska is one that will be given from time to time by Standard to those who merit it as part of a system to give greater recognition to noteworthy technical achievements by its staff.

Robert C. Lyon, formerly service superintendent at the New Brunswick works of the fine chemicals division of the organic chemicals department of E. I. du Pont de Nemours & Co., has been appointed manager of the works. He succeeded Frank A. Canon who retired January 1.

Frank H. Ernst is now director of production of the rayon division of E. I. du Pont de Nemours & Co. He succeeds George E. McClellan with whom he served the last two years as assistant director. Mr. McClellan was recently appointed assistant manager of the division.

O B I T U A R I E S

Arthur F. Wirtz, 46, secretary-treasurer of the Atlas Mineral Products Co., died suddenly of a heart ailment December 16.

William C. Kabrich, 51, retired brigadier general of the CWS and plant manager of the Morristown Branch of the Flintkote Co., died in Cedar Knoll, N. J., last month.

Maurice E. Lyons, 77, president of the J. H. Day Co., Cincinnati, died January 4.

William E. Hartman, 72, consulting engineer with the Wilputte Coke Oven Corp. died in New York January 13.

Richard W. Levenhagen, 66, chairman of the executive committee of the Glidden Co., Cleveland, died January 17.

Elmer S. Johnson, 46, an assistant treasurer of the West Virginia Pulp and Paper Co., died in New Rochelle, N. Y., January 24.



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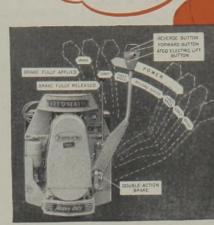
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"Automatic" engineers through intensive research have developed an electric-lift motor and hydraulic electric-lift motor and hydraulic pump, which uses less current than the reserve left in the famous TRANSPORTER standard battery at the end of a full day's operation. Therefore, the TRANSPORTER still provides maximum power for a (bill day's bauling and yet uses calfull day's hauling and yet uses only a light socket for charging battery.

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REVERSE BUTTON and guide handle eases Transporter below skid or pallet, and load is ready to be raised to moving level. Requires no skill, no muscle work—just thumb pressure.

ONE HAND, ONE MOTION OPERATION



4000 and 6000 capacity platform model and 4000 pound capacity platform model, TRANSPORTER also comes in com-

TRANSPORTER also comes in com-panion models equipped with the ATCO Foot Lift at lower cost. Let an ATCO SPECIALIST show you how TRANS-PORTERS end back-breaking, gruelling toil, release critical labor for more pro-ductive work, cut your material han-dling costs in half! Mail the coupon for complete facts. No obligation.

FOREFINGER PRESSES the ATCO Electric Lift, and your material is raised, ready to move. Human energy expenditure: practically nothing.

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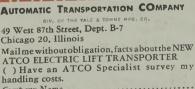
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FORWARD BUTTON starts the load—4000 to 6000 pounds of materials glide along at safe walking speed. You deposit it with the same easy "touch-of-the-fingers" control.

Muscle Mike is the mighty midget of power in the TRANSPORTER that gets your material where you want it with new ease and lowest cast. Diagram shows how IN ONE MOTION and WITH ONE HAND, operator effort-lessly controls every move-ment of your product with new ATCO ELECTRIC LIFT Model TRANSPORTER.

New double-position brake—applied either by raising or lowering guide handle, provides steering and braking leverage at the same time for hauling on leverage at the same time for halling on ramps. All controls—forward and re-verse speed, lift, steering and brake are so arranged they may be regulated by one hand and operated in one motion, simply by touching the buttons and guiding the handle. Available in three standard units. Available in three standard units,

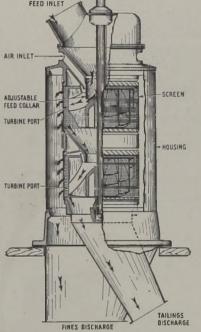


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Operating at high speed on the turbine principle, the Abbé-Blutergess Sifter diffuses the material through turbine parts centrifugally against a cylindrical screen through which the "fines" pass, leaving the "tailings" to drop for resifting, if desired. No shaking, vibration or brushes are necessary; no clogging of screen or balling up of material.

Any material to 300 mesh can be sifted with minimum power, labor and space. Users report from 2 to 5 times faster sifting than with other machines. Built in sizes to handle from 30 to 10,000 lbs. of material per hour. Operation with an Abbé-Blutergess makes sifting a profitable instead of costly and troublesome.



INDUSTRIAL NOTES

Borg-Warner Corp., Chicago, is increasing its Marbon Corp. production capacity by the erection of four new plant buildings at Gary, Ind.

Young Radiator Co., Racine, Wis., has added the Carl H. Roath Co., Denver, to their list of distributors.

General Mills Inc., Minneapolis, Minn., has named Sewall D. Andrews, Jr., vice president of the chemical division.

International Nickel Co., Inc., New York, announces H. J. French named assistant vice president of the International Nickel Co. of Canada, Ltd.

Mixers Inc., Philadelphia, is the new name of the Hottman Machine Co.

Sun Tube Corp., Hillside, N. J., announces that John H. Friden, vice president and a director of the company has been made executive vice president; and R. Smith Schenk has been elected vice president.

Farrel-Birmingham Co., Inc., Ansonia, Conn., has appointed Arthur B. Pike Boston area representative. His office is at 1736 Massachusetts Ave., Lexington, Mass.

Athol Manufacturing Co., Athol, Mass., has made Robert M. Tyler sales manager.

American Cyanamid Co., New York, has created a new sales unit, the rubber chemicals department, at the Calco Chemical Division in Bound Brook, N. J. The rubber chemicals department of the American Cyanamid Co. has been merged with the new Calco sales unit. Bancroft W. Henderson, manager of the rubber chemicals department, American Cyanamid Co., has been named to head the new Calco Department.

Johns-Manville Corp., New York, has begun construction of the second and main units of its research center near Bound Brook, N. J.

General Electric Co., Pittsfield, Mass., has changed the organization of the chemical department by establishing the plastics division and the compound division in place of the former plastics divisions. George P. Lehmann will manage the plastics division and John

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Economic Analysis of Requirements • Process Development • Process and Equipment Design Fabrication and Erection • Initial Operation For Production and Recovery of Alcohols, Organic Acids, Esters, Aldehydes, Ketones, Ethers, Glycols, Phenols, Hydrocarbons, Chlorinated Hydrocarbons



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Valuable, work-wise hands are the flesh, bone and *skin* of industry.

Help keep them busy.

Take no chances with the surface skin especially.

Guard this skin against the annoying and profit-eating effects of industrial dermatitis due to specific skin irritants, such as chemicals and other materials.

Give it a gentle glove of advance protection with West Protective Creams.

Professional medical advice has determined that West Protective Creams are compounded with scientific accuracy to protect exposed skin areas to the fullest possible extent.

West Creams fall into six distinct types ... and depending on the need, they supply either "skin surface" or "skin-penetrating" protection against every major specific irritant to which the human skin is sensitive.

West Protective Creams comprise part of a large list of "skin safeguards" developed in the West laboratories.

One of West's 350 technical safety consultants throughout the country will be glad to help solve your dermatitis problems.



L. McMurphy the compound division. Both men will make their headquarters in Pittsfield.

American Chemsol Corp., Coraopolis, Pa., is a new firm producing industrial solvents and thinners. The president of the company is Leonard Messer.

E. I. du Pont de Nemours & Co., Arlington, N. J., has appointed W. D. Maginnes sales manager for the nylon monofilament section to succeed W. W. Perry.

Watson-Stillman Co., Roselle, N. J., has selected C. Huizing as New England representative.

Interchemical Corp., New York, has elected Ernest W. Pittman to the new office of chairman of the executive committee. Herbert B. Woodman succeeds him as president.

Liller, Neal & Battle, Atlanta, has moved from the Chamber of Commerce Bldg. to the Walton Bldg. tented .

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Ladish Co., Cudahy, Wis., is the new name for the Ladish Drop Forge Co.

Weston Electrical Instrument Corp., Newark, N. J., has appointed John H. Miller vice president and chief engineer. He succeeds W. N. Goodwin, Jr.

Falleen Drop Forge Co., Inc., Philadelphia, announces the appointment of R. J. Swing as director of sales.

Tube Turns Inc., Louisville, Ky., has added Donald A. MacNeil to the sales staff of the forging division. His headquarters will be in the Utilities Bldg., 327 South LaSalle St., Chicago.

Hewitt- Robins, Inc., Buffalo, N. Y., and Mc Kiernan-Terry Corp., Harrison, N. J., have announced an agreement under which Mc Kiernan-Terry acquires the Robins Conveyors' Mead Morrison division.

Fairbanks, Morse & Co., Chicago, has appointed John S. King manager of the Chicago branch to succeed Frank V. Roy who retires on March 1.

Borden Co., New York, has appointed A. M. Freeman director of technical service of the Casein Co. of America, division of the Borden Co.

Nichols Engineering & Research Corp., New York, announces the appointment of F. B. Schilling, vice president, as vice president in charge of sales and general manager; R. W. Rowen, vice president, as vice presi-

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CHEMICAL ENGINE

here it is...

(Patented)

The New, Modern TRI-CLOVER Conical End Stainless Steel Fitting

The cut-away section above shows the unique fabrication and simple assembly of both conical end fittings and flanged couplings now offered by Tri-Clover for use wherever liquid conveying lines require corrosion-resistant properties. The lightweight aluminum coupling assembly provides an extremely compact, quickly assembled, flush, leaktight union designed to withstand working pressures up to 250 psi.

Tri-Clover conical end fittings are fabricated from stainless steel type 316, for use with commercial tolerance light gauge (16-10) tubing having *outside diameters* from 1" to 10". Conical ends and adapters are quickly and easily installed on tubing by means of simple expansion tools (1"-4") or socket welding (5"-10").

For the most modern, corrosion-resistant conveying lines at lowest cost, see your Jobber, or write:



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A complete line, including ELLS – TEES – CROSSES RETURN BENDS – LATERALS "Y's" – FERRULES – REDUCERS ADAPTERS

Stainless Steel light gauge O. D. Tubing... LOW COST SIMPLE LIGHTWEIGHT STREAMLINED POCKETLESS EASY TO INSTALL LEAK-TIGHT READILY ADAPTABLE TO OTHER FITTINGS

Ask about ... Bephyrweld STAINLESS STEEL WELDING FITTINGS for permanent installations

Available in a complete line, in sizes from 1" O.D. through 18" O. D., fabricated from stainless steel type 304, 316 or 347". No mitre joints—sweep ell design—no internal threads or pockets—joints are flush. *Above 4" only 316 or 347.



Just two simple quick-acting clamp screws to loosen, and your diaphragm casing is off. Tight-sealing clamp ring eliminates multiple bolts completely. Duo-seal molded diaphragm lips are automatically self-sealing.

67 years of control engineering "know how" produced this revolutionary new KONTROL MOTOR . . . featuring these design innovations:

- Pressed Steel Diaphragm Casing ... lighter . . . tougher, more durable.
- Rigid Welded Steel Tubular Yoke.
 Long calibrated Steel spring...fully enclosed.
- Enclosed ball bearing Spring Adjusting Screw.
- Streamlined Flow Valve Body with high capacity . . . unrestricted flow areas.
- Super-finished Disc Guides, honed guide bushings, top and bottom ... for minimum friction; increased life.

Used with air operated instruments or auxiliary pilot units, the K & M KONTROL MOTOR regulates the flow of steam, liquids or gases — efficiently and sensitively. Send us your control problems. We'll show you how the KONTROL MOTOR valves will solve them. Write for new KONTROL MOTOR bulletin.



Kepr	Represented in							
New	York City							
Detroit	New Orleans							
Cincinnati	San Francisco							
Houston	Chicago							
Los Angeles	Baltimore							
Rochester	Dallas							
Pittsburgh	Denver							
Tulsa	Portland							

dent in charge of engineering and research and S. Burgess as vice president in charge of field operations.

Standard Oil Co. (Indiana), Whiting, has consolidated the light oils projects group and heavy oils projects group of the Whiting refinery. The groups will be known as the projects division. R. T. Myrick will direct the activities and Roy Diwoky will be superintendent.

Bemis Bro. Bag Co., St. Louis, has announced the opening of a sales office at 6070-71 Jenkins Arcade, Pittsburgh, under the management of Ellis H. Deitrick.

Monsanto Chemical Co., St. Louis, has named Dan J. Forrestal, Jr., assistant to the director of industrial and public relations.

Warren Steam Pump Co., Warren, Mass., announce that the Parkman A. Collins Co., has been appointed the authorized district agent in the territory formerly handled by the Boston office. The address remains the same.

Thomas C. Wilson, Inc., Long Island City, N. Y., appointed the Harang Engineering Co., 840 Lake St., San Francisco, its representative in the northern California area.

Carbozite Protective Coatings, Inc., Pittsburgh, formerly known as Carbozite Co., have moved to their plant at 811 South Main St., Greensburg, Pa.

Darsyn Laboratories, Paterson, N. J., has elected W. M. Stieh president. The company is affiliated with the Metalsalts Corp., Paterson. Dr. N. Grier will be in charge of all research work and C. Casalbore in charge of production.

E. I. du Pont de Nemours & Co., Wilmington, has announced four organizational changes in the nylon division. Truman C. Welling, district sales manager at Charlotte, N. C., was appointed sales manager in Wilmington. P. D. Atwood, district sales manager at New York, is now promotion manager in Wilmington. A. J. Smith, Jr., promotion manager, succeeds Mr. Atwood at New York. David B. Hardin, of du Pont's rayon division in New York, succeeds Mr. Welling at Charlotte.

Monsanto Chemical Co., Springfield, Mass., has appointed Carl F. Graesser sales manager of thermosetting molding materials for the company's plastics division. He will be succeeded as assistant sales manager by C. L. Rich-

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nto Chemical Co., Spin has appointed Carl F.G. anager of thermosettas rials for the company's He will be succeeded lles manager by C. L.

CHEMICAL ENGINE

*George Armstrong Custer, one of our youngest and most gallant Brigadiers, died with his men at the Little Big Horn, Montana Territory, June 25, 1876.

announce that the Pate 5 Co., has been appoint ized district agent in the ormerly handled by their The address remains the

Years Before Custer's Last Stand* 29

CHASE was manufacturing Better Bags

• Years before the Indian Campaigns, when army supply trains carried precious supplies in bags, Chase was one of the country's leading manufacturers of textile bags. 1947 marks one hundred years' experience in this business.

This experience is important to you because it assures you better containers for your products. It'll pay you to check with your Chase Salesman, for Chase makes bags of all kinds-each container specifically designed for more economical and more efficient packing of your product.

Remember, for Better Bags . . . better buy Chase. lt's more than a slogan, more than a catch phrase—it's your positive assurance of an improved container.



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CLEVELAND . CROSSETT, ARK. . DALLAS . DENVER . DETROIT . GOSHEN, IND. HARUNGEN, TEXAS . HUTCHINSON, KAN. . KANSAS CITY . MEMPHIS . MILWAUKEE . MINNEAPOLIS . NEW ORLEANS . NEW YORK OKLAHOMA CITY . ORLANDO, FLA. . PHILADELPHIA . PITTSBURGH . PORTLAND, ORE. . REIDSVILLE, N. C. . ST. LOUIS . SALT LAKE CITY . TOLEDO

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HOW TO CUT COSTS

in the venting of industrial gases, fumes, vapors

PLANT ENGINEERS in many industries are finding the answer to the problem of high venting costs in Transite Industrial Vent Pipe.

That's because this durable asbestos-cement pipe is highly resistant to many of the corrosive fumes, vapors, dusts and gases met with in industrial operations. It is rustproof and requires no painting, whether used indoors or out. Moreover, it is light in

Dairy

weight and easy and economical to install.

Transite Industrial Vent Pipe is made in a range of sizes up to 36" in diameter. A full line of Transite fittings provides corrosion resistance throughout the system.

Data Sheet DS Series 336 gives all the facts and is free

on request. Write Johns-Manville, Box 290, New York 16, N.Y.

Typical industries in which Transite Industrial Vent Pipe is used

Gas

- Aircraft Automobile Bakina Bleaching Boiler Works Brewing Canning Ceramic Chemical
 - Drug Glass Electrical Laboratory Explosive Laundry Farm Machinery Leather Food Foundry Metal Furnace Mining **Furniture** Paint

Petroleum Potash Pulp & Paper Quarrying Railroad Meat Packing Rayon Refrigeration Rubber

Shipbuilding Shoe Smeltina Soap Soft Drink Sugar Refining Textile Tool Sewage Works Water Works



ards, Jr., formerly branch manager of the division's St. Louis office.

Cal-Fin Co., South Pasadena, Calif., announces that new equipment has been installed for the manufacture of Tilco-Fin heat transfer tubing as developed by Extended Service Division of David E. Kenney, Inc., Brooklyn, N. Y.

Container Testing Laboratories, Inc., Los Angeles, has opened an office at 9047 Wilshire Blvd., under the direction of Leo M. Smith, who for many years was associated with Fort Wayne Corrugated Paper Co.

Hyster Co., Portland, Ore., has named Ray Ronald as western division sales manager at Portland. V. G. Lindenberg has been appointed industrial lift truck manager at the Seattle, Wash., office.

R. M. Hollingshead Corp., Camden. N. J., has added Clarence D. Kirkeby to the coating division.

Dow Chemical Co., Midland, Mich., announces personnel changes in New York and Chicago. Frank L. Brown of the New York office will supervise plastics sales in the eastern region which includes Boston, New York and Philadelphia. Gage Olcott is in charge of plastic sales in New York. Joseph E. Russell directs plastics sales in the midwest region including Cleveland, Detroit, Chicago and St. Louis offices. Floyd J. Gunn heads plastics sales in Chicago.

Sun Oil Co., Philadelphia, has appointed Laurens H. Fritz as industrial advertising manager.

Joseph T. Ryerson & Son, Inc., Chicago, named Park Sanderson manager of the Boston plant. He succeeds Herbert C. Wills, who is retiring.

Austin Co., Cleveland, has elected Harold A. Hallstein to the new post of executive vice president. Two new members of the board of directors are Laurence E. Cooney, vice president and general manager of sales, and Harold A. Anderson, vice president and eastern district manager.

Babcock & Wilcox Co., New York, has moved the Babcock & Wilcox Tube Co., Los Angeles office from the Banks Huntley Bldg. to Petroleum Bldg., 714 West Olympic Blvd.

Hilliard Corp., Elmira, N. Y., has appointed S. L. Powers, 606 Williamson Bldg., Cleveland, as their representative.

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Corp., Elmira, N.Y. h S. L. Powers, 606 Wiles leveland, as their repres

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FOR TEMPERATURES AND PRESSURES

This is the new Brown *Electr-o-Vane* Control Unit. To users of electric contact control Thermometers and Pressure Gauges, it offers a high degree of control performance never before attained. A true triumph in control, this electronic unit is not merely

an adaptation of a known principle but an achievement in design by which all the shortcomings of similar devices are eliminated. Added to the Brown Thermometer and Pressure Gauge line, the Electro-Vane Unit provides a control instrument of unequalled

performance. No instrument of this type can equal its dependability in service, its precision in operation or its safety features. Brown *Electr-o-Vane* Thermometers and Pressure Gauge Con-

Brown *Electr-o-V ane* Thermometers and Pressure Gauge controllers are available *at no premium cost*. With all the exclusive features of these instruments, why compromise with less than the best.

The NEW CATALOG fully describes the operating principle, features and models of the Brown *Electr-o-Vane* Controller. A copy will be sent to you without obligation. Write today for Catalog 6001.

THE BROWN INSTRUMENT COMPANY, a division of Minneapolis-Honeywell Regulator Company, 4478 Wayne Avenue, Philadelphia 44, Pa. Offices in principal U. S. cities and in Toronto, Canada; London, England; Stockholm, Sweden; Amsterdam, Holland.

HERE ARE THE FACTS



The Brown Electr-o-Vane Control unit operates on the principle that when a metal vane is interposed between two oscillator coils, the state of oscillation can be made to change or stop in an electronic circuit. This change or stopping of oscillation causes the electronic circuit to operate a load relay.

The oscillator coils are the heart of the controller. Brown oscillator coils are molded in bakelite and are thus moisture-proof—an exclusive Brown feature. A knife-edge control action is provided that does not drift. Control action is precise. It never varies. It is unaffected by moisture conditions.





Only the circuit used in the Brown *Electro-Vane* Control Unit causes an actual stop in oscillations. That is why this is the only instrument of its type providing real *snap action*—an important factor for precision control.

Brown *Electr-o-Vane* Control is contained in a neat, compact unit. It is self-contained, easily removed as a unit and unaffected by unit dust or ditt.





AND PRESSURE GAUGES



come. they see... and they locate in Missouri...state of opportunity!

Last year alone, nearly 2,700 new businesses were incorporated in the State of Missouri. And this year, Industry is becoming more and more alert to the advantages offered by this great commonwealth. For good reasons, too!

Missouri citizens are friendly and cooperative. A new, up-to-times Constitution favors industry. Taxes are low. Skilled labor is plentiful. There is every mode of excellent transportation . . . rich markets ... a wealth of natural resources ... low-cost power . . . and 350 communities with the Welcome mat out and ready with friendship and cooperation. Now is the time to find out about YOUR opportunities in the State of Missouri.

the Heart of America

For specialized, confidential service to industrialists, write to Missouri State Division of Resources and Development, Dept. R-55, Jefferson City, Missouri. 52

CONVENTION PAPER ABSTRACTS

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FISCHER-TROPSCH COMPLICATIONS

FLOW diagrams do not illustrate vividly enough the tremendous amount of equipment required in the conventional German Fischer-Tropsch process. The Merbeck plant, for example, having an installed capacity of about 1,500 bbl. per day of total product had 11 gas preparation units covering 2½ acres of land, and in addition: 4 parallel sets of hydrogen sulphide removal towers each 30 ft. high by 35 ft. in diameter; 5 parallel sets of organic sulphur removal towers 30 ft. high and 12 ft. in diameter; 100 Fischer-Tropsch reactors, each 8x10x15 ft. in size; 2 adsorption systems each containing 7 towers; 2 stabilization systems; and 2 distillation plants.

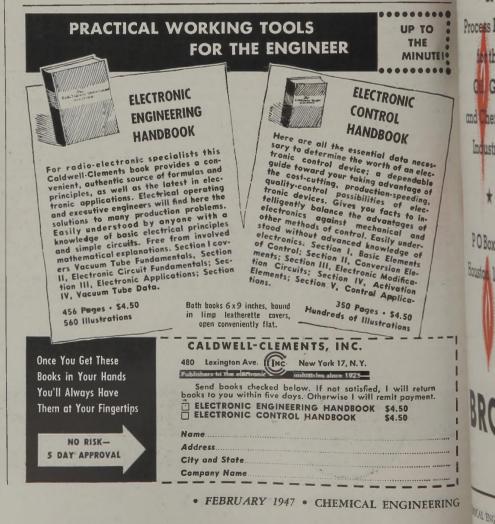
Heart of the Fischer-Tropsch plant is the synthesis chamber and nothing shows the complexity of the German process more than this section of the plant; 100 of these are required for 1,500 bbl. per day capacity. These chambers are small and complicated, designed to remove the enormous heat of reaction which is about 7,000 B.t.u. per lb. of product. Each chamber consists of an array of metal fins about 0.28 in. apart. Transversely through these fins are cooling tubes about 1.5 in. in diameter through which water flows as a cooling agent. The amount of steam obtained in this manner is practically enough to supply the war requirements of the plant. Catalyst, cobalt-thoria, is packed between the fins.

From these data, it is readily seen that German Fischer-Tropsch plants were quite complex and actually made up of many small units. For example the daily capacity of a single synthesis unit averaged about 15 bbl, which is hardly more than pilot plant size. The plants in general were very sparsely instrumented and necessitated the employment of large operating staffs for

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MODERN OIL FIELD HARVEST



All Or Any Step In Design, Engineering, Fabrication Or Erection of Process Plants

tor the Oil, Gas and Chemical Industries

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Flare Gas

Like the pioneer days when they stripped the hide and tallow from range cattle and left the beel on the prairies, the days of burning off gas in open flares after it has lifted one load of oil to the surface will soon be gone forever.

Process plants to harvest valuable hydro-carbons from gas now wasted, releasing the dry gas for fuel or storing it back in the ground for future use, have doomed the squandering gas flares.

In the field of repressuring and recycling, Brown & Root, Inc., offer complete service, from design through engineering, fabrication and erection, all in one good organization

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when you react odium silicate nd chlorine.

RESULTS Activated silica sol for water coagulating aid Bedium hypochlorite merilizing.

THE ACTIVATED SILICA SOL (our N-Sol-C Process) you use as a coagulant aid in treating water to produce increased quantities of clearer, more sparkling water. Any available chlorine in the sol is entirely absorbed in the coagulating treatment.

The No. 2 product, hypochlorite, retains the same oxidizing power produced by normal chlorine sterilization. It is applied for sterilizing and oxidizing organic materials in the water.

How do you treat water? Be sure to look into these benefits, better quality water at low cost. Other reactants for preparing activated silica sol are ammonium salts, alum, sodium bicarbonate and other acid-functioning chemicals. Details are yours for the asking.

PHILADELPHIA QUARTZ COMPANY DEPT.A, 119 SOUTH THIRD STREET, PHILA: 6

Get information also on the silicatehypochlorite uses in bleaching textiles and in bleaching paper pulps. Here profit-making advantages are improved whiteness and reduced cost.



WORKS: Anderson, Ind. • Baltimore, Md. • Chester, Pa. • Gardenville, N. Y. Jeffersonville, Ind. • Kansas City, Kans. • Rahway, N. J. • St. Louis, Mo. • Utica, III. hand control. Such plants are too expensive, complex and too small in unit size to fit in with American standards of petroleum production.

of petroleum production. The optimistic tone with which American versions of the Fischer-Tropsch process are discussed today indicate very strongly that these processes have come a long way from the cumbersome and expensive German process.

R. C. Alden, Phillips Petroleum Co., before California Natural Gasoline Association, Los Angeles, Oct. 11, 1946.

PREPARATION OF PHOSPHORS

ALTHOUGH there are naturally occurring minerals which have luminescent properties, most phosphors are prepared synthetically. Carefully controlled chemical purity is absolutely essential in the preparation since the presence of minute amounts of certain clements destroys the luminescent properties. Iron, cobalt and nickel are especially detrimental to the luminous efficiency of zinc sulphide since the presence of any of these elements in concentrations of the order of one part per million decreases the efficiency of the phosphor.

For zinc sulphide phosphors a common method of preparation is to precipitate the sulphide with pure hydrogen sulphide from a solution of a zinc salt. This zinc salt solution is purified carefully by chemical or electrolytic methods before precipitation. Another method of preparation is to fire pure zinc oxide and sulphur together at elevated temperatures. The direct firing method generally is used to prepare zinc silicate (willemite) from zinc oxide and silicon dioxide.

Although careful purification is necessary to remove certain elements which "kill" the luminescence, other elements, called activators or phosphorogens, are added to increase the luminescence or change the color of the emitted light. These activators are added in solution to the zinc salt solutions and then are coprecipitated with the sulphide. When direct firing methods are used a salt of the activator element is mechanically mixed with the other components before the firing operation. For zinc sulphide the common activators are copper, silver and manganese; and the latter is the usual activator for zinc silicate. The amounts of copper or silver used vary from 0.001 to 0.05 percent while the optimum amount of manganese for activating the sulphide or silicate runs about 1 percent. According to modern theory copper and silver atoms go in between the atoms of zinc and sulphur in zinc sulphide, while the manganese atoms substitute for the zinc atoms.

Zinc sulphide, as it is precipitated, does not show luminescent properties;

• FEBRUARY 1947 • CHEMICAL ENGINEERING



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Single Roller Supports Preserve LONG-LIFE EFFICIENCY OF TRAYLOR ROTARY KILNS

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Alden, Phillips Petrol

Los Angeles, Oct. 11,

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The perfect alignment of Traylor kilns is preserved by specially designed single roller supports. Shell strength and rigidity are retained . . . less power is required for operation.

Wide faces of large diameter steel rollers provide generous contact with the riding ring. The roller shafts turn in water cooled, renewable bronze-lined bearings lubricated by automatically circulated oil. The bearings are oversize with resultant low pressure per square Mounted on a fullinch.

welded frame of heavy Hbeams, these supports are quickly adjusted for perfect alignment on installation and whenever necessary throughout the long life of the kiln. This has assured economical operation and maintenance... minimum idle time for every inch of the 45,000 feet of Traylor Rotary Kilns now in use around the world.

Built to fit your individual needs, Traylor kilns present other advantages for your calcining operations. Our representative will be glad to call at your convenience and explain them . . . or write for Bulletin No. 115.

WE BUILD Rotary Kilns,

Coolers, Dryers, Slakers,

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Crushers, Crushing Rolls, Ball Mills, Rod Mills,

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April 1947

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eations A discussion of nine widely used reactions from the preparative point of view. Includes scope and limitations, experimental directions, side reactions, tabluation of results. An extensive bibliography follows each chapter, as well as tables listing compounds prepared by or sub-ject to the reaction under discussion.

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it is necessary to fire the material at elevated temperatures. The firing op-eration performs three functions: It determines the particle size, causes the activator to diffuse into the lattice of the host compound, and determines the crystal structure. Phosphors are fired in platinum or porcelain crucibles or in quartz dishes, either exposed to the ordinary furnace atmosphere as in the case of zinc silicate, or covered and in a reducing atmosphere as with zinc sulphide. About 2 to 5 percent of a flux, usually salt, is added to the phosphor before firing.

J. R. Spraul, Armour Research Founda-tion, before Chicago Section, American Chemical Society, Evanston, Ill., Jan. 24, 1947.

CURARE FOR POLIO SUFFERERS

IN THIS country, chemists are currently investigating curare, the deadly arrow poison of the South American Indians, with an eye to preparing it in pure form. Curare attacks the nervous system, first affecting the muscular action of the neck and then spreading to other parts of the body until finally it causes paralysis of the respiratory system. Prolonged artificial respiration at the final stage enables the victim to live until he has recovered from the effects of the poison.

Just how curare causes its paralysis was not known until recently when it was discovered that the drug temporarily destroys communication between nerve and muscle, although neither is directly affected.

Curare injected along with Pentothal, a sleep-producing drug, has proved to be an extremely effective anesthetic in surgical operations on the head and neck when it is essential that the muscles remain relaxed.

Curare promises to help polio sufferers by relieving spastic twitching. Small amounts of curare tend to block abnormal nerve impulses that cause twitching but do not interfere with voluntary movement.

Donalee L. Tabern, Abbott Laboratories, before the Peoria Section, American Chem-ical Society, Peoria, Dec. 19, 1946.

MILITARY APPLICATIONS OF ELECTROPLATING

MANY thousand dies, gages, molds, forming and cutting tools were plated with hard chromium. Very little bright chromium was employed. Of special interest is the chromium plating of calibre-50 gun barrels. Porous chromium plate was applied to cylinders of aircraft and of diesel engines. Important applications of nickel plating were made for the Manhattan Project. Copper plating was used ex-tensively to protect steel surfaces during case hardening. An important appli-

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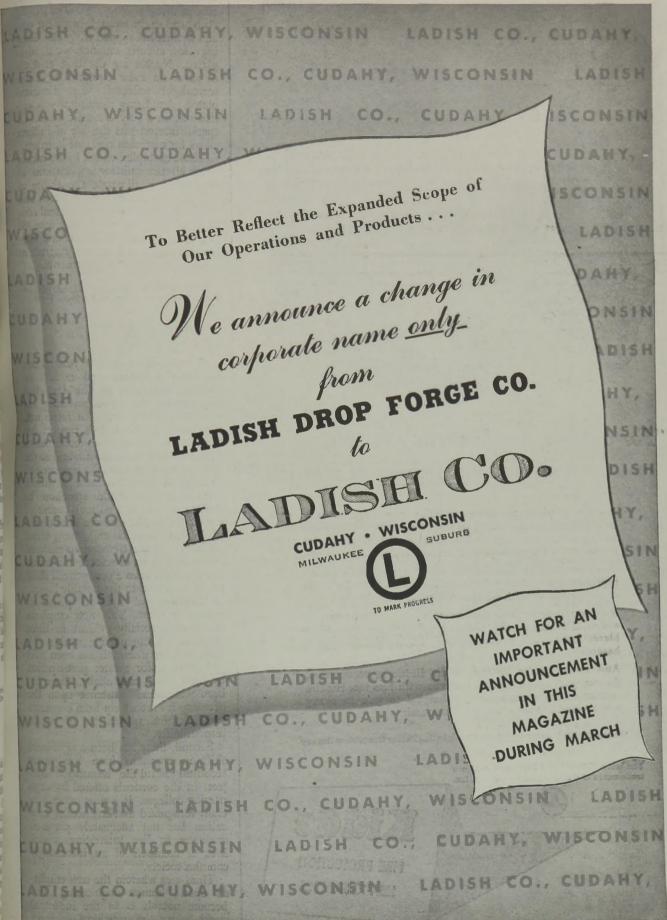
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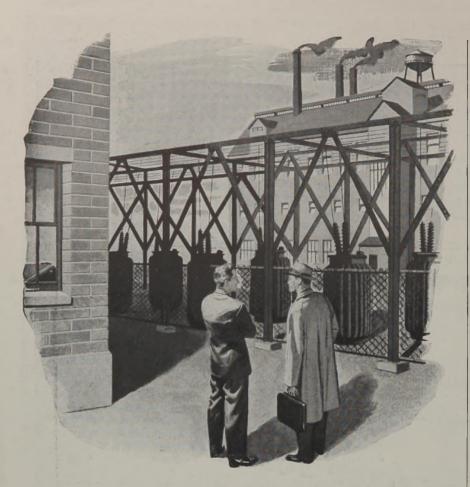
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cation of zinc plating was on steel cartridge cases. Lead took the place of zinc in many applications. Tin plating strip steel saved many tons of tin over and against hot-dipped tin plate. Bearings for aircraft engines were silver plated. Noable are the thin coatings of silver on radar equipment. Large searchlight reflectors were rhodium plated. Anodizing aluminum was carried out on a very extensive scale. Of special interest was the use of indium alloys for corrosion resistant bearings.

These examples, which by no means cover all the military applications of electroplating, illustrate the ability of this industry to adapt its methods and products to meet new and unusual conditions. The interest thereby aroused in plating by both producers and consumers, augurs still further progress in meeting peacetime requirements.

William Blum, Bureau of Standards, before The Electrochemical Society, Toronto, Oct. 16, 1946.

THE HUMAN SIDE OF ENGINEERING

WITHIN the past few years, there has been a sudden and rapidly in-creasing awareness of the fact that the human side of engineering has been grossly neglected. In retrospect, it is now clear that this neglect has been due to the intense preoccupation with technological problems and to the tacit assumption that the human and sociological problems were of minor consequence or would somehow be worked out in the natural course of events. Since the decisive final events of World War II and the general realization of the tremendous material accomplishments of science and industry, there has been a very general shifting of attention to the notably lagging sociological and political phase of human progress. This new emphasis has been especially evident in three areas in the engineering world:

First, more attention has been paid to the need for greater participation by engineers in civic affairs. There has been widespread insistence upon the necessity for more help from engineers and scientists in matters of public responsibility.

Second, there has been a significant shift in emphasis from the purely technical toward the "humanistic" subjects in the curricula offered by engineering colleges. It is now rather generally recognized that engineering cducation has not adequately prepared graduates to live interesting, useful lives as members of an increasingly complex society.

Third area wherein the new emphasis upon "human engineering" has become notable is in the industrial world, where the individual engineer

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is frequently almost submerged in large corporate organizations. There was a time, not many years ago, when it was generally assumed that if a technical employee was assigned to a job with a reasonably well-defined responsibility at a salary in line with the prevailing level of the industry he could be relied upon to adjust himself to his environment and work out his personal problems with very little further attention from the management. When unmistakable signs of restlessness and discontent began to appear among these young engineers, many of their elders over-simplified the matter by charging it entirely to a desire for higher wages. It has become abundantly evident, however, that the adjustment of the individual engineer to his environment in an industrial organization is quite a complex process, which requires considerable time and cannot safely be left to chance.

W. Julian King, Cornell University, before Conference on Engineering and Human Affairs, Princeton, N. J., Oct. 3, 1946.

USES OF FLUORSPAR

LATEST complete breakdown of fluorspar consumption in the United States is for 1943 and gave the following percentages: Steel industry including basic open-hearth, electric furnace steel and bessemer steel, 60; iron toundries and ferro alloys, 3; hydrofluoric acid and derivatives, 29; primary aluminum and magnesium, 1; and ceramic industries, glass and enamels, 6. This adds up to 99 percent of a total 400,000 tons in round numbers. Miscellaneous industries including cement accounted for the small remainder.

The iron and steel industries are the largest consumers of fluorspar and will probably retain that position for a long time to come but it is interesting to note that whereas, during the period 1922 to 1928 the consumption was about 7.4 lb. CaF₂ per ton of steel, in the period 1939 to 1943 the requirement was 5.8 lb. per ton, a drop of about 22 percent which drop is due to increased operating efficiency.

From the above figures it is evident that the manufacturers of hydrofluoric acid and its derivatives are the second largest consumers and the rapid increase in consumption by that industry during recent war years is indicated by the fact that immediately prior to Pearl Harbor the annual consumption of anhydrous hydrofluoric acid probably did not exceed 15,000 tons, whereas the 1944 consumption of the acid was estimated at about 60,000 tons, and the present consuming capacity of the acid making industry is around 150,000 tons per year. Fluorine is engaging the attention



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What kind of Acid Valve do you need?

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1 "United" Type R Valve? This ingenious valve, recently introduced by National Lead, offers advantages unobtainable with valves whose body and seat are cast as an integral unit. Because of its split-body construction it can be installed either as a "Y" or Angle pattern. All you do is reverse the position of the body section, as shown in the illustrations below. Thus, your supply stock can be held to a minimum by standardizing on one valve with two uses. Another feature is the removable seat and plug disc. Both can be replaced easily at nominal cost. Finally, seat and plug can

be supplied in any alloy or material you specify. For normal applications, the valve is furnished in three standard ways: 1. Lead plug disc and stem integral; 2. Removable lead plug disc; 3. Removable rubber plug disc.

Two valves in one! Simply reverse the position of the body sections and the "United" Type R Valve is changed from a "Y" pattern to an Angle pattern. Available in hard lead or lead-lined cast iron or cast steel.

2 "United" Chem - Rayon Valve? This valve is manufactured in both "Y" and Angle design. The body is cast hard lead. Fins of the same metal reinforce and greatly increase the strength of body and flanges, while holding weight to a minimum. The stuffing box is of exceptional depth. Packing can be replaced under pressure. Steel and bronze bonnet are completely covered (except wheel and bushing) with hard lead. Available with removable plug discs of rubber or lead.



We also supply check, foot and diaphram valves in hard lead, cast iron, and cast steel lead lined.

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3 "United" Type C Valve? The important difference between this type and the "United" Chem-Rayon valve is in the materials used

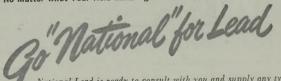
for the body and bonnet. In the Type C valve these are made of cast carbon steel or cast iron heavily lined with lead. Furthermore, the body is cast oversize in order to allow a full flow area after lining. All parts of the two valves are interchangeable. Available in both "Y" and Angle patterns.



4 "United" Gate Pattern Valve? This is a most efficient gate valve, available with body and bonnet in hard lead, leadlined cast steel or lead-lined cast iron. It is designed for use wherever an absolutely drip-proof acid valve is a "must." The seat is hard lead, cast integral with the body lining. This valve can be furnished with disc made of acid-resisting rubber, bakelite, or special alloys as required. You get a satisfactory seal at all times.



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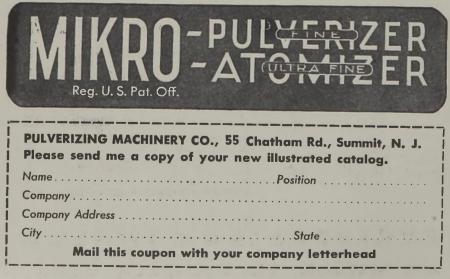
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and research on the part of the chemical industry. The fluorination of petroleum oils, the formation and properties fluorocarbons and compounds of fluorine with many organic substances are all subjects of intensive study and research. All of this work is being aided by the production of elemental fluorine by electrolysis.

The market for hydrofluoric acid and its compounds is expanding rapidly due to these and other new uses for new organic derivatives of hydrofluoric acid. One of the very interesting new uses, and a wasting one, is as a solvent and propellant for DDT, dichlorodiphenyl-trichlorethane. Freon, a synthetic organic compound of fluorine and chlorine which is also used as a safe domestic refrigerant, is used as a propellant for aerosol insecticides which are solutions of pyrethrum ex-tract and sesame oil. Freon production capacity is approximately 29,000 tons annually according to estimates and, based on a 90 percent recovery from ores, represents the consumption of about 20,000 tons of acid grade fluorspar.

Roy L. Cornell, California Testing Lab-oratories, before American Institute of Mining and Metallurgical Engineers, Los Angeles, Oct. 25, 1946.

HYDROCARBON PEROXIDES

CONCENTRATED peroxides prepared from selected petroleum fractions and marketed under the name of Uniperox are liquids and contain 60 to 65 percent peroxide. From data supplied by many experiments, it is evident that Uniperox is composed mainly of cyclic hydrocarbon hydroperoxides containing six to eight carbon atoms. For purposes of calculation, the molecular weight may be assumed to be 130, which corresponds to the empirical formula, C7H13OOH.

At temperatures below 90 deg. C. Uniperox is stable; but in the neighborhood of 100 deg. C. the rate of decomposition is approximately one percent per hour. At about 110 deg. C. the decomposition is exothermic and extremely rapid. The rate of decomposition of Uniperox was found to be two or three times that of Uniperox M, a pure peroxide, in various hydrocarbon solvents at 145 ± 1 deg. C. The rates of decomposition were smallest in benzene and greatest in cyclohexene with intermediate rates in n-hexane and methylcyclohexane.

In a series of experiments, Uniperox was reduced with ferrous sulphate, sodium sulphite and hydrogen; the main reaction products were mixtures of alcohols. Mercaptans and thioethers reacted readily even in very dilute mineral oil solution. Uniperox has been found to be effective as a polymerization catalyst, and it has been

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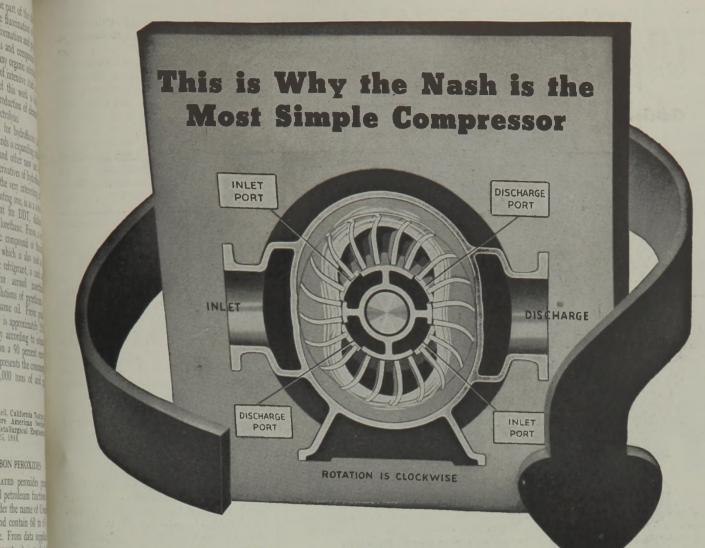
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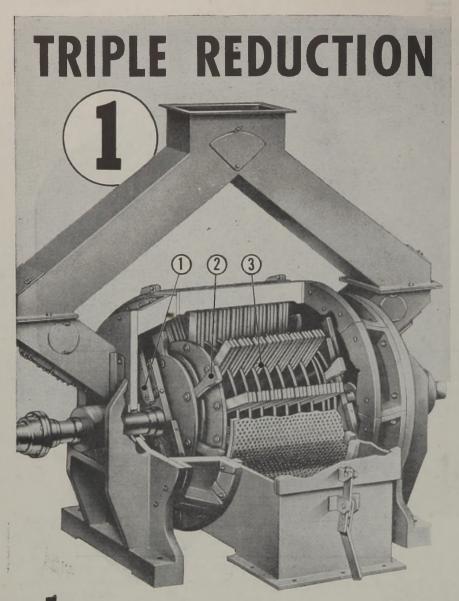
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tested in a number of commercial resins which require peroxide-type catalysts.

Since Uniperox 60 and Uniperox M were found to be effective in increasing the cetane numbers of various isooctane-cetane numbers, the crude peroxide concentrate has been tested as as diesel fuel additive, known as Union Diesel Additive 698. The addition of 0.5 percent peroxide (0.835 percent of crude 60 percent concentrate) to 25 different diesel fuels raised the cetane number of the fuels from 4 to 13 units, the average being nine. During a storage period of five to seven months, 19 of the 25 fuels containing 1 percent of peroxide (cetane number gain, 12 to 20 units) lost four units or less of this gain.

less of this gain. During this same storage period, the loss of peroxide was in some fuels very appreciable. The loss in the cetane number increase, however, did not vary directly with the peroxide content. Experiments showed that the peroxide decomposition was lowest in the treated samples containing the least amount of sulphur. Addition of the reaction products

Addition of the reaction products of butyl sulphide and Uniperox and alkyl thiophanes and Uniperox to diesel fuels caused an increase in the cetane number of the fuel almost as great as was caused by the addition of an equivalent amount of peroxide. This explains why the cetane numbers of peroxide-doped fuels changed relatively little during storage although an appreciable portion of the peroxide disappeared.

The peroxides have a very favorable effect upon the cold starting characteristics of diesel fuels. No adverse effects such as pitting of injector nozzle caps, valves or seats, or excessive carbon deposits were observed in engines fueled for several hundred hours with Uniperox-doped diesel fuels.

Adalbert Farkas, Andrew I. Smith and Arthur F. Stribley, Jr., Union Oil Co. of California, before the Petroleum Group, American Chemical Society, Berkeley, Calif., Sept. 9, 1946.

EVALUATION OF ABSORBER OPERATING EFFICIENCY

IN THE classical Absorption Factor Chart of Souders and Brown, upon which almost all industry evaluations of absorber efficiencies have been based, it was assumed that an effective individual absorption factor could be developed which would average out the differences of the L/V and K values throughout an actual column, and that the operation of a column could then be directly related to a parallel-operating theoretical column. Unfortunately, experience has shown that the number of theoretical trays required to match the operation of an

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actual column shifts markedly with the percentage of key components recovered, and that the degree of shifting varies widely for different columns.

In seeking an improvement on the conventional absorber evaluation method, it was concluded that the continued use of the mean absorption factor, based on the recent work of Edminister, offered the best method for correlating the major variables associated with the absorber operation, and that the solution lay in substituting correlation data factors from actual operating data, on a chart, for older theoretically calculated factors.

A special empirical chart was constructed, in which the scale was developed from the operating data of 40 columns, ranging in operating pres-sure from 35 to 1,800 lb. gage. With this new chart, (1) all component re-coveries between 75 and 99 percent plot as a straight line for any given tray as long as its basic tray efficiency remains constant;(2) all such straight lines, irrespective of number of trays employed or degree of efficiency, can be drawn through a single convergence point for any given absolute pressure; (3) the characteristic operating lines remain fixed for any given column over wide ranges of lean oil temperatures, and for all types of intercooled columns as long as the intercooling is confined to the upper 75 percent of column; (4) the column which exhibits the steepest slope for a given operating pressure is the most effective, and when several columns containing the same number of trays are concerned, the most efficient. Proper utilization of these relationships makes it possible to specify accurately, and check, a column's effectiveness without the need of running a precise quality of feed stock, or effecting a precise recovery of a given key component.

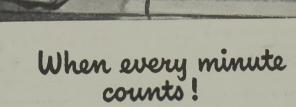
E. G. Ragatz, and J. A. Richardson, Bechtel Brothers McCone Co., before 21st annual meeting of the California Natural Gasoline Association, Los Angeles, Oct. 11, 1946.

AIR ENTRAINMENT IN CONCRETE

AIR bubbles in concrete may not seem a very desirable method of improving that product, but civil engineers, who have been putting them there purposefully for several years, are obtaining increasingly beneficial results with that practice.

The process is the most popular subject of thought and discussion in the concrete fraternity at the present time, and so much progress has been made in its study and use that the time has arrived for emphasizing the increased requirements for accuracy in the design and control of the mixture used to produce bubbles.

It has been established as a fact, that



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CHEMICAL ENGINEERING • FEBRUARY 1947 •

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TANKS 18-8 Stainless Steel. Highly polished No. 4 finish inside and out. Pitched bottom, self-draining. Stainless Steel covers. Stands pipe leg type. Built-in agitators for fast or slow speed, if desired. 25, 35, 50, 60, 100, 160, 200, 300, 400 and 500 gallon sizes . . . also built to special specifications.



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Immediate Delivery CONSOLIDATED SIPHON SUPPLY CO., INC. DEPT. C., 22-24 WOOSTER ST., NEW YORK CITY the presence of widely dispersed spheroids of air in concrete will increase the resistance of the hardened mass to frost action and to chemical action by salts used for de-icing pavements far beyond that achieved with non-air-entraining concrete. It is perhaps less widely accepted as factual that purposeful airentrainment will benefit concrete structures of other than the pavement type. However, air-entrainment used with appreciation of it sensitivity is beneficial in all types of concrete.

The purposefully-created bubbles constitute an additional aggregate in the mixture possessing complete flexibility of shape. The process reduces the "water-of-convenience" in concrete better than any other means yet discovered. The improvement in uniformity of bond offsets completely the possible slight reduction in bond strength, and reinforced concrete is benefitted by use of air-entrainment.

The process generally is described as one in which pine resins, animal or vegetable fats and oils and other saponifiable matter are added to the cement or at the concrete mixer.

Charles E. Wuerpel, U. S. Engineer De-partment, before American Society of Civil Engineers, Kansas City, Oct. 17, 1946.

FOREIGN LITERATURE ABSTRACTS

PHENOL-ALDEHYDE RESINS

ALTHOUGH the manufacture of resinous products by condensation of phenols with aldehydes is one of the oldest branches of the synthetic resin industry, it still occupies an important place in this industry. The high mechanical strength, as well as the ready availability, of these resins explains their recent popularity in aircraft and ship construction, as well as other industries. Recent work was carried out in this field to study the rate of reaction of phenol with formaldehyde (in the form of formalin) in the presence

of small quantities of alkali catalysts at low temperatures and with very little excess aldehyde. At temperatures not exceeding 50 deg., formaldehyde combines with phenol to form nonviscous solutions containing approximately 35 percent water, 15 percent phenol, and 50 percent of the simpler phenol alcohols, namely saligenin, paraoxybenzyl alcohol and dimethylol phenols, with a predominance of the latter. These solutions mix with water in all proportions, are readily absorbed by fibrous fillers and undergo resinification at 80-100 deg. with the formation of resol resins, so they can be used

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Trans. Am. Inst. Chem. Engrs. Vol. 16, Part 1 Page 101

• FEBRUARY 1947 • CHEMICAL ENGINEERING

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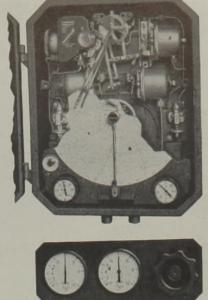
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"TRANSET" is a new Pneumatic Transmission System particularly adapted to applications involving long lead lines between transmitter and control panel and where compactness of control panel is a consideration for the control of temperature, pressure, rate of flow, and liquid level.

The "Transet" Controller is really a Fulscope Pneumatic-Set Recording Controller-Transmitter. Left hand control mechanism regulates control valve while other side transmits air pressure, proportional to pen movement, to indicating receiver remotely located on panel board.

Left gauge of receiver unit is calibrated in same units of measurement as controller chart and thus provides indication of controlled variable. Right gauge, connected in pneumatic-set line and calibrated in same units as controller chart, indicates set pointer position. Thus, when both pointers of the receiver unit coincide, the pen and set pointer of Transet will be together and process will be at desired control point. Here is what Transet gives you:



1. More Precise Control: Eliminates or greatly reduces time lag in the control circuit because Transet Controller can be at or near the point of measurement. 2. Pneumatic Control at Its Best: The simplicity and dependability of Taylor Fulscope air-operated con-

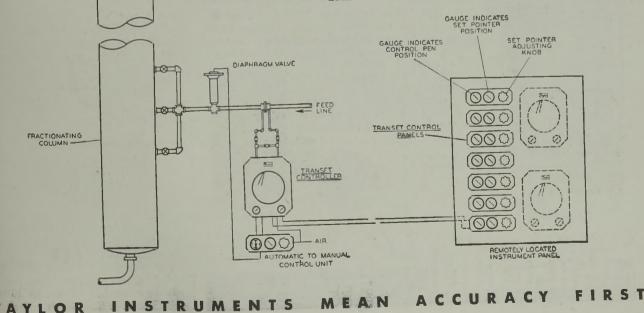
trollers extended to remote pneumatic transmission. 3. Field Tested and Time Proven: No experiment; simply new combinations of standard control features.

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in the manufacture of phenolayers for the preparation of compositions with thermoreactive properties by drying and thermal treatment of their mixtures with fillers. The compositions thus obtained are distinguished by the property of rapidly changing, on heating under pressure, to plastics which are not inferior in their nechanical and other properties to phenolayers obtained from phenol-aldehyde resins. The synthesis of mixtures of phenol alcohols from phenol and formalin makes it possible to considerably simplify the manufacture of many phenolayers and get various types of layered and other plastics without the application of ready made phenol aldehyde resins and organic solvents.

Digest from "Phenol Alcohols as Substitutes for the Thermoreactive Phenol-Aldehyde Resins in the Plastics Industry" by A. A. Vanscheidt and A. A. Vassiliev, Zhurnal Prikladnoi Khimmi XIX, No. 1, 7-22, 1946. (Published in Russia.)

POLYVINYL BUTYL ETHER

A SIMPLE and practical method developed recently by Favorsky and Shostakovsky for the preparation of vinyl ethers by the action of acetylene on alcohol in the presence of alkali, has made these ethers available for the synthesis of polymers. A study was therefore made on the polymerization of n-butyl vinyl ether with the following different catalysts: I2, SnCl2, SnCl4, AlCl₃, FeCl₂ and BF₃, both in the presence and in the absence of sulphur dioxide. Polymerization was carried out in the temperature range of 55 to 60 deg. The polymers of n-butyl vinyl alcohol are very viscous and sticky, poorly flowing liquids, soluble in ether and benzene, insoluble in alcohol and water, and of low molecular weight, approximately 5,000. Oxidation of the polymer yields butyric and oxalic acids, showing that the polymer is a derivative of 1,3-glycol. The butyl groups can be hydrolyzed and yield polyvinyl alcohol, and they can be substituted in part by acetyl groups with the formation of mixed etherester.

Digest from "Polyvinyl Derivatives. II Polyvinyl Butyl Ether" by V. V. Korshak and V. A. Zamyatin, Zhurnal Obshchei Khimii XV, No. 11-12, 947-951, 1945. (Published in Russia.)

DECOLORATION OF SUGAR SIRUPS

CERTAIN anions have a detrimental effect on the decoloration of sirups with bone black. To determine this effect, experiments were carried out with 300 g. of crystal sugar dissolved in 170 ml. of water. 10 ml. of a normal solution of the anion (such as chloride, acetate, lactate, succinate, etc.) and 10 g. of pulverized bone black were added to this solution. The mixture was maintained at 90 deg. for 15 min. and filtered. The pH was adjusted to SERVING PROGRESS IN AMERICAN AERONAUTICAL RESEARCH

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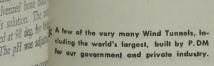
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7.0 and the readings made with a photoelectric colorimeter. These ex-periments showed that the anions adsorbed as a result of physical affinities, or by secondary chemical reactions, have considerable influence on the power of adsorption of charcoals for coloring matter in sirups which are of an electro-negative nature. A series of tests was also conducted to determine the degree of this influence by varying the quantity of anion (phosphate). It was found that even small quantities of the anion cause a considerable decrease in the decoloring power of the charcoal. The detrimental effect appears to exist only in the case of the anion attached to a monovalent cation, When the cation is polyvalent, the detrimental effect of the anion is compensated by the favorable effect of the cation. The intensity of the detrimental effect of anions therefore depends on the valence as well as the solubility of their calcium salt.

Digest from "Influence of Anions on the Decoloration of Sugar Sirups by Means of Bone Black" by Kurt Lowy, Anais da Associaca Quimica do Brasil V, No. 1 17-20, 1946. (Published in Brazil.)

FIRST CHILE CONVENTION OF ENGINEERING STUDENTS

THE CONVENTION held last July 9-14th coincided with the celebration of the 26th anniversary of the School of Chemical Engineering of the University of Concepcion, which organized the convention. Members of the School of Engineering of the University of Chile, the Catholic University of Chile and the State School of Engineering also participated. University faculty members and local industry and commerce offered their help in organizing the convention. Guillermo Weber was president, Sergio Droguett was secretary, and Jorge Rodriguez was treasurer of the Organization Committee. The first committee was in charge of papers on pure and applied sciences, including mathematics, physics, chemistry, industrial chemistry, metallurgy, electrical engineering, construction engineering and road engineering. The second committee presented papers on engineering in the industrialization of Chile. These covered engineering and industrial activities in the north zone (saltpeter, copper, manganese and sulphur), the central and south zones; engineering in future industries, including: plan for industrialization of Chile, heavy industry and siderurgy, fuels (coal, petroleum and schists) and chemical industries; and promotion of production. The third committee covered such general themes as engineer-ing vs. technique, etc.

Digest from "First Convention of the Engineering Students of Chile" Revista de Ingenieria Quimica, Universidad de Con-cepcion, V, No. 4-5, 107-123, 1945-46. (Published in Chile.)

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ILE CONVENTIONO RING STUDENTS

ONVENTION held h th anniversary of the cal Engineering of Concepcion, which ention. Member Engineering of the and the State School also participated. U members and local merce offered their he the convention. G vas president, Sergi D tary, and Jorge Rodin of the Organization Ci first committee wat. s on pure and applie's g mathematics, phys dustrial chemistr, 2 g and road engineer committee presental ring in the industria ial activities in the and ter, copper, mangmer the central and set ering in future induction an for industrialization industry and side petroleum and sch l industries; and proon. The third com general theme a chnique, etc.

rom "First Conressi Students of Chile be Students of Chile be No. 4-5, 107-111 n Chile.)



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CHEMICAL ENGINEER'S BOOKSHELF

Lester B. Pope, ASSISTANT EDITOR

GETTING THE OIL

PETROLEUM PRODUCTION ENGINEER-ING, OIL FIELDS DEVELOPMENT. Third Edition. By Lester C. Uren. McGraw-Hill Book Co., New York. 764 pages. \$7.

Reviewed by D. F. Othmer THIS book was first written "to provide a text or work of primary reference for petroleum engineering students in that part of their curriculum which pertains to the technology of oil field development and petroleum production." It has filled that purpose well during the previous two editions; and the present one rounds out the coverage of the field by describing the notable advances in techniques which have made possible much greater depths now possible wells, new and more efficient types d drilling equipment, new methods of installing and cementing casing in wells, new methods of logging, testing and completing wells, and the better definition of principles governing oil field development practice. The approach has been from the engineering standpoint, which has been increasingly important in this phase of the oil industry.

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INDUSTRIALIZATION OF LATIN AMER-ICA. Edited by Llovd Hughlett. Mc-Graw-Hill Book Co., New York. 193 pages. \$5.

THE RECENT war served the useful purpose of drawing the Americas much closer together. For the first time many of us in the United States became acquainted with our neighbors to the south. We called on them for rubber, bauxite, vegetable oils, and many other products. They in turn depended on us for many of their requirements. Latin America made a splendid record in supporting the war effort and has built credits, much greater than at any time in her history, for postwar use. This closer association makes a better understanding of conditions in the Latin American countries on the part of chemical management a must.

The editor of this volume has wisely chosen to add to his own first-hand knowledge of conditions that of 25 to

30 business-men contributors. Drawing upon their many years of experience in promoting, developing and fashioning the course of industrial expansion in Latin America, they are in an exceptional position to describe their respective fields. The symposium offers a valuable contribution to chemical management interested in developing trade with our southern neighbors. The studies cover at length the present development and future possibilities of the industry that can be supported by Latin American natural resources, labor and capital. Several of the chapters deal with individual chemical process industries, heavy chemicals, cement, food, leather, paint and varnish, petroleum refining, pharmaceutical, pulp and paper, and sugar refining. Several others are of equal importance, power, textiles, transportation and mining.

PSYCHOLOGY

PERSONAL ADJUSTMENT. By Knight Dunlap. McGraw-Hill Book Co., New York. 433 pages. \$4.

Reviewed by H. H. Bliss THIS book contains a collection of psychological facts of life drawn from the author's 40 years of teaching and counseling experience. He interprets persons and people who tend to react in unexpected and disadvantageous manners. He incorporates material around such topics as learning processes, mental disorders, features of neurotic maladjustments, readjustments, sex and marital adjustments, and various types of maladjusted persons. This book broadens the basis for

RECENT BOOKS RECEIVED

- Drying Oils, Thinners and Varnishes. By J. S. Remington. Leonard Hall, London. 12s, 6d. Inorganic Syntheses, Vol. II. Ed. by W. C. Fernelius. McGraw-Hill. \$4. Organic Syntheses. Ed. by Homer Adkins. Wiley. \$2.
- Pigments, Their Manufacture and Properties. By J. S. Remington. Leonard Hall, Lon-don. 12s.
- don. 12s.
 Qualitative Analysis by Spot Tests. 3rd ed.
 By Fritz Feigl. Elsevier. \$8.
 Rarer Metals. By J. De Ment & H. C. Dake. Chemical. \$7.50.
 Talbot's Quantitative Analysis. 9th ed. By L. F. Hamilton & S. G. Simpson. Mac-millan. \$4.

comprehending vagaries of human behaviour; it does not implement the engineer with special techniques for handling ticklish situations. The executive-minded engineer will benefit from reading to the extent that he recognizes the inadequacies of his own understanding and his need for improving the personnel relationships centering around him. Although he will miss his favorite concentration of demonstrable facts woven into a pattern of know-how, the engineer will find relief in following a psychologist's point of view divorced completely from psychoanalytical entanglements.

CORRAL

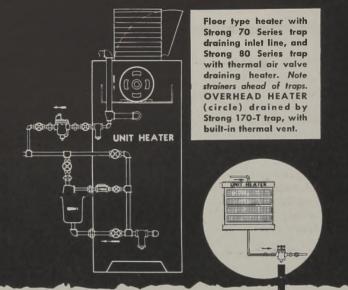
MODERN ORGANIC FINISHES. By Rollin H. Wampler. Chemical Publishing Co., Brooklyn. 452 pages. \$8.50.

Reviewed by Myron A. Coler DURING recent years the transition of surface technology from an empiric art to an engineering science has taken place with encouraging acceleration. However, much of the pertinent in-formation is still widely scattered in articles, trade notes, manufacturers' literature, specifications and miscellaneous files. This is particularly true in the field of organic finishes (primarily coatings of which the binder or filmogen is an organic compound—more familiarly known by such terms as paints, varnishes and lacquers). A book, like the present one, which tries to corral the diffusely scattered information performs a useful service.

The volume is divided somewhat unevenly into six nominal sections. The first seeks to characterize the principal finishing materials. The materials are classified partially by composition and partially by end use. Sec-tions II, III and IV deal respectively with application methods, drving and curing methods and product handling. The fifth section discusses finishing systems along three lines: the substrate to be finished, the field of use of the product, and auxiliary processes involved in finishing systems. Section VI is comprised of a chapter on good practice in the finishing department and a somewhat sketchy chapter on evaluation and test methods. The con-

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Completeness of the Strong line enables us to recommend exactly the right type and size of trap you need—open or inverted bucket, closed float, float-and-thermostatic (blast), etc.—semisteel, cast, forged and welded construction. Send your drainage problems to us for the *right* solution.

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cluding bibliography provides a number of important and helpful references.

Although the organizational pattern entails points of overlap, the book is weakened by the attempted breadth. It is not possible to cover evenly and adequately a descriptive subject ranging from recipes for the bright dipping of copper and its alloys to the testing and evaluating of organic finishes in a single volume of the present size. There are several statements which involve unorthodox terminology or require cautious interpretation, e.g., p. 18-"The finish on a modern automobile will last as long as the car it-self . . ."; p. 290—"The key to preventing corrosion is to stop the flow of the local electrical currents, called eddy currents . . ."; p. 334-"There are a thousand different shades of white . . .". The text is supplemented by a substantial number of pertinent photographs and drawings. Unfortunately, the choice of type is such that the captions on the figures may be confused with the body of the text in a few instances.

The book will be of particular interest to those concerned with the application and cure of organic finishes in general and those concerned more specifically with the finishing of wood products. The treatment of application methods is enhanced by the inclusion of information on the less frequently discussed techniques and auxiliaries such as centrifugal finishing, mechanical graining and the use of decals, masking pastes and striping tools, etc. Emphasis is placed on industrial and production line finishing rather than on structural, architectural and maintenance work. The producer of organic coating materials will find little information that he can employ directly in the formulation and manufacture of finishes; however, not only manufacturers but also experienced users will find many valuable suggestions on the practical application of organic finishes and the efficient routing of items through the coordinated steps of diverse finishing systems.

SYMPOSIUM

WHAT INDUSTRY OWES TO CHEMICAL SCIENCE. A symposium by 53 contributors. Chemical Publishing Co., Brooklyn. 372 pages. \$5.

Issued by authority of the Council of the Royal Institute of Chemistry, London, this book had its origin in a series of articles contributed to The Engineer, London, during the first World War. The authors of the present work are associates or fellows of the Royal Institute, and are expert in the subjects they cover. Deliberately written DRON

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DO YOU NEED 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. Cor-han 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

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 zitconia-bearing aluminous refractory, with density of approximately 205 lbs. per cu. ft. CORHART ZAC ELECTROCAST—a high-duty zitconia-bearing refractory, with density of ap-proximately 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-tempera-ture, hot-setting plastic refractory, designed for tamming 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 combina-tion of characteristics found in no other type of refractory. Data on properties will be sent on request. request.

POROSITY: Appatent porosity of Corhart Elec-trocast 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-balf times that of conventional fire clay bodies.

REFRACTORINESS: Many industrial furnaces continuously operated up to approximately 3000° F. are built of Corbart Electrocast.

CORROSION: Because of exceedingly low por-osity and inherent chemical compositions, Cor-hart Electrocast refractories are resistant to corrosive action of slag, ashes, glasses, and most non-ferrous metals as well as to disinte-grating 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, tuckstones, throats, forehearths, bushings, bowls, recuper-ators, 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 hottoms.

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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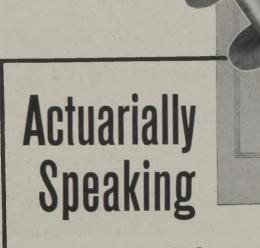
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This 11-foot, 6-inch conveyor screw runs in a 6% solution of sulphuric acid heated to 210° F. It is fabricated from Ampco 15 sheet and Ampco 15 extruded stock. Welding was done with Ampco-Trode 10 aluminum bronze electrodes, which have the same corrosion- and wearresistance, and the same physical properties as the parent metal.

Ordinary non-ferrous metals were used first for this application, but

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rapid disintegration made them costly and impractical. Ampco Metal, the modern aluminum bronze, came to the rescue, and all trouble stopped.

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P.15

in non-technical language, the articles will be of more value to the layman than to the technologist, although students of chemistry will get an insight into the wide and varied applications of chemistry in industry. Obviously only a brief outline of each application can be given in so small a scope. Following an introduction by Alexander Findlay, president of the Royal Institute of Chemistry, 18 chapters deal with as many kinds of industry in which chemistry and the chemist play an important part.

RECENT BOOKS

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PAMPHLETS

Ceramic Whitewares. By Rexford Newcomb, Jr. Published by Pitman Publishing Corp., 2 West 45th St., New York, N. Y. 313 pages. \$5. History, technology, applications—current data for both users and makers of ceramics.

Chemical Age Year Book, 1947. Published by Benn Brothers, Ltd., Fleet Street, London, E. C. 2. 25th year of this British publication.

A.S.T.M. Standards on Paper and Paper Products. Published by American Society for Testing Materials. 1916 Race St., Philadelphia 3, Pa. 232 pages. \$2. Third edition provides 57 specifications, test methods and related standards.

Engineering and Human Affairs. Published by Princeton University, Princeton, N. J. 32 pages. A summary of the Princeton Bicentennial Conference on "Engineering and Human Affairs" held last October.

Electrolytic Conductivity Curves. Published by Industrial Instruments, 17 Pollack Ave., Jersey City 5, N. J. \$1.50 per set. Charts of data giving concentration vs. specific conductance at various temperatures. Four sets are available: NaCH, NaOH, HCI, and CaCL. More sets will be available.

Aniline. Published by Division of Labor Standards, U. S. Department of Labor, Washington 25, D. C. 14 pages. Series No. 5 of "Controlling Chemical Hazards." Safety precautions for the industrial use of aniline.

Starch for Paper Coating. Tappi Monograph Series No. 3, edited by R. T. Bingham. Published by Technical Association of the Pulp and Paper Industry, 122 East 42nd St., New York, N. Y. 120 pages. Chemistry, application, production and other factors in the use of starches by the paper industry.

Machine Design. Fifth edition. By L. J. Bradford and P. B. Eaton. Published by John Wiley & Sons, 440 Fourth Ave., New York, N. Y. 283 pages. \$3.25. Textbook.

Industrial Peace and the Wagner Act. By T. R. Iserman. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 91 pages. \$1.50. How the Act works and what to do about it.

Sugar and Sugar By-Products in the Plastics Industry. By L. Long, Jr. Published by Sugar Research Foundation, 52 Wall St., New York 5, N. Y. 61 pages. A survey of the patent and periodical literature made in view of the potential importance of plastics to the sugar industry.

The Utilization of Sugar Cane Bagasse for Paper, Board, Plastics and Chemicals. Edited by C. J. West. Published by Sugar Research Foundation, 52 Wall St., New York 5, N. Y. 146 pages. An annotated bibliography.

Invertase. By C. Neuberg and I. S. Roberts. Published by Sugar Research Foundation, 52 Wall St., New York S, N. Y. 62 pages. A monograph about the biocatalyst (enzyme) which hydrolyzes sucrose into glucose and fructose.

Symposium on Materials for Gas Turbines. Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 199 pages. \$3. Eight papers reporting research on metals and alloys for this high temperature application.

Specifications and Tests for Electrodeposited Metallic Coatings. Published by American So-

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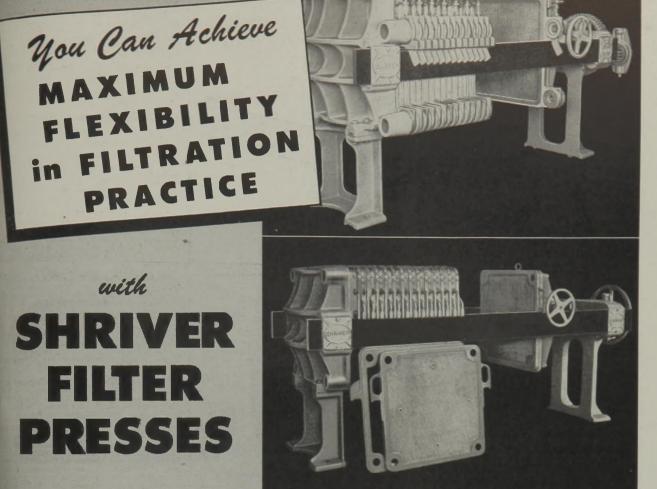
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Whether it's recovery of solids that must be thoroughly washed, extracted and even partially dried; clarification for maximum purity; bleaching; decolorizing or deodorizing; continuous thickening of slurry; leaching or catalytic contacting—no single filtration equipment can match the Shriver Filter Press for versatility of performance and easy suitability as to feed, delivery, portability or other plant conditions.

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ciety for Testing Materials, 1916 Race St., Philadelhphia 3, Pa. 46 pages. \$1.25. Eleven specifications, methods of testing and recommended practices sponsored jointly by ASTM and the American Electroplaters' Society.

British Chemicals and Their Manufacturers, 1946. Published by the Association of British Chemical Manufacturers, 166 Piccadilly, London, W.1. 121 pages. A classified list of chemical products giving the British manufacturer of each.

Reynolds Aluminum Alloys and Mill Products. Published by Reynolds Metals Co., Louisville 1, Ky. 245 pages. \$2. Technical information on aluminum alloys featuring 106 tables of technical data.

Pentaerythritol Uses—A Bibliography. Prepared by Burrell and Neidig, Inc., 115 Broadway, New York 6, N. Y. 440 pages. \$15. 354 annotated references to patents and articles.

Silicones: Food for Imagination. By R. R. McGregor. Available from Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh 13, Pa. 10 pages. Gratis. An address reprinted from the "Journal of the Franklin Institute."

Paraformaldehyde. Manual Sheet SD-6, published by Manufacturing Chemists' Association, 608 Woodward Bldg., Washington 5, D. C. 4 pages. 15 cents. Essential information for the safe handling and use of paraformaldehyde. Sixth in the MCA series of chemical plant safety manuals.

Production Comes From People. Published by Industrial Hygiene Foundation, 4400 Fifth Ave., Pittsburgh 13, Pa. 12 pages. Gratis. A description of the activities of the Foundation.

Five Years of Synthetic Rubber. Published by United States Rubber Co., Rockefeller Center, New York 20, N. Y. 50 pages. Gratis. Shows dramatic growth of the industry with authoritative appraisal of its importance today. Types of synthetic rubber are identified and described in detail.

Laboratory Manual in Metallography. By J. F. Eckel and R. J. Raudebaugh. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 344 pages. \$4.50. Looseleaf manual with 42 experiments.

Co-ordination of Motive, Men and Money in Industrial Research. Prepared by Darrell H. Voorhies. Published by Standard Oil Co. of Calif., 225 Bush St., San Francisco. 64 pages. Scope. types and motives of industrial research; general organization and coordination; management guides for executives and key staff pesonnel; and the provision of funds and their control. Included are extensive charts illustrating divisions of responsibility, executive functions, relationships and limits of authority.

Tenth Annual Wine Industry Statistical Survey, Part III. Published by the Wine Advisory Board of the Wine Institute, 717 Market St. San Francisco 3, Calif. 17 pages. Completes a series of three statistical bulletins on crush, production, consumption, inventorics and other wine industry activities in the United States during the 1945-46 crop period.

California Oil Fields. Published by California Department of Natural Resources, Division of Oil and Gas, Ferry Bldg., San Francisco 11, Calif. 159 pages. Thirty-first annual report. Contains a descriptive survey of the Coalinga oil field. a resume of statewide oil operations in 1945, production statistics, wildcat wells and a directory of California oil operators. Several maps of the Coalinga field are included.

Revised List of Publications. Published by California Department of Natural Resources, Division of Mines, Ferry Bldg., San Francisco 11, Calif. 33 pages. A list of publications dealing with mining activities and methods, minerals and mineral deposits, processing, maps and department investigations.

Commercial Fertilizers and Agricultural Minerals, 1945. Published by Bureau of Chemistry. California State Department of Agriculture, 243 Mull Bldg., 1125 10th St., Sacramento 14, Cait, 95 pages. Extensive charts showing the tonnage and analysis of all commercial fertilizers and agricultural minerals sold in California during 1945.

Economic Base for Power Markets in Skagit County, Washington. By Carol Colver. Pubhished by Bonneville Power Administration, Portland 8, Ore 79 pages. Appraises the proprotes for electric power consumption in this area. Reviews the physical base, people and their incomes, production, employment and pubcharts showing inter-industrial relations and costs, incomes, crop and industrial production and taxes are included.

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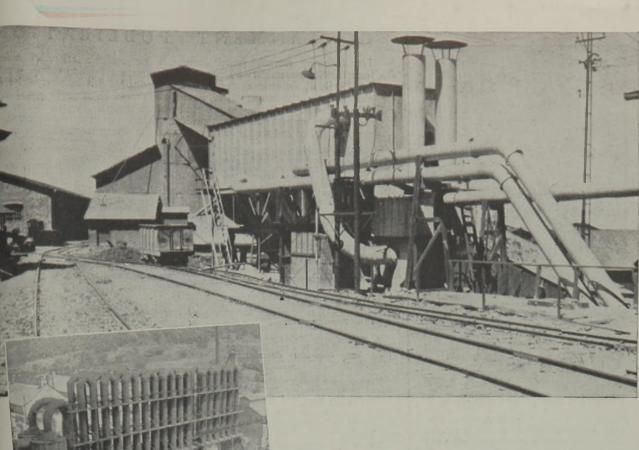
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GOVERNMENT PUBLICATIONS

The following recently issued documents are available at prices indicated from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. In ordering any publications noted in this list always give com-plete title and the issuing office. Remittance should be made by postal money order, coupons, or check. Do not send postage stamps. All publications are in paper cover unless otherwise specified. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue.

Foreign Commerce and Navigation of the United States for the Calendar Year 1943. Vol. 1, Import and Export Statistics, Section A. Price \$4. Vol. 1, Import and Export Statistics, Supplement. Price \$1.75. Vol. 2, Export Transport Statistics. Price \$2. Bureau of the Census. Cloth.

Statistical Abstract of the United States, 1946. Bureau of the Census. Price \$2.25. Cloth.

Painting Interior Walls and Trim. By E. F. Hickson and P. T. Howard. National Bureau of Standards, Letter Circular LC-837. Very elementary, but lists some other more technical material. Mimeographed.

Lime: Technical Publications by Members of the Staff of the National Bureau of Standards. National Bureau of Standards, Letter Circular LC-835. Mimeographed.

A Photoelectric Refractometer. By Enoch Karrer and Rollin S. Orr. Bureau of Agricul-tural and Industrial Chemistry, AIC-126. Mimeographed.

The Economic Report of the President, Trans-mitted to Congress January 8, 1947. House Document No. 49. Price 15 cents.

Government-Owned Pipe Lines. Report of the War Assets Administration to Congress December 18, 1946. Price 10 cents.

Report of the Secretary of the Interior on the Synthetic Liquid Fuels Act from January 1, 1946 to December 31, 1946. Available free from Office of Synthetic Liquid Fuels, Bureau of Mines, Washington 25, D. C. Mimeographed.

List of Publications of the U.S. Department of Agriculture from January 1941 to December

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TIMES

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1945, Inclusive. Department of Agriculture, Miscellaneous Publication No. 611. Available free from U. S. Department of Agriculture, Washington 25, D. C.

Washing Characteristics of the Pittsburgh Coal in a High-Sulfur Area in Greene County, Pa. By Thomas Fraser and William L. Crentz, Burcau of Mines, Technical Paper 689. Price cents

Carbonizing Properties of Velva Lignite from Ward County, N. Dak., and Monarch Coal from Sheridan County, Wyo. By D. A. Reynolds, et al. Bureau of Mines, Technical Paper 695. et al. Bureau Price 10 cents.

Exploration of the Crowell Fluorspar Mine, Nye County, Nevada. By Robert W. Geehan. Bureau of Mines, Report of Investigations R. I. 3954. Mimeographed.

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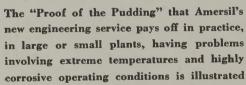
Metallic Titanium and Its Alloys. By R. S. Dean and B. Silkes. Bureau of Mines, Inform-ation Circular I. C. 7381. Mimeographed. Bi-Cop Flou

Exploration of Barite Deposits in Montgomery County, Ark. By Robert B. McElwaine Bureau of Mines, Report of Investigations R I. 3971. Mimeographed. Coloum Glue

Exploration of Alunite Deposits, Marysvale Piute County, Utah. By John H. Hild. Bur eau of Mines, Report of Investigations R. I 3972. Mimeographed.

Coal Preparation Practice in Western Ger many. By Thomas Fraser and M. G. Driessen Bureau of Mines, Information Circular I. C 7389. Mimeographed. Glaconic Acid Glacono Delta

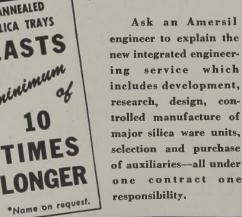
Exploration of the Cherokee Iron Deposits Cherokee County, North Carolina. By Almon



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List of Reports and Publications on the Use of Wood in Aircraft Construction. Forest Products Laboratory, Madison, Wis. No. R54. Mimeographed.

Curing of Resorcinol-Resin Glues at Temperatures from 40° to 80° F. By W. Z. Olson, et al. Forest Products Laboratory, Madison, Wis. No. R1629. Mimeographed.

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The Elastic Properties of Wood. Various pamphlets recently issued by Forest Products Moduli, Moduli of Rigidity, and Poisson's Ratios of Mahogany and Khaya. By D. V. Doyle and J. T. Drow. No. 1528-C. Young's Moduli and Poisson's Ratios of Douglas-Fir and Their Relations to Moisture Content. By R. S. McBurney and J. T. Drow. No 1528-D. The Moduli of Rigidity of Douglas Fir at About 11 Percent Moisture Content. By N. V. Doyle, et al. No. 1528-E. Young's Moduli, Poisson's Ratios, and Moduli of Rigidity of Sweetgum at Approximately 11 Percent Moisture Content. By R. S. McBurney, et al. No. 1528-F. Young's Moduli, Moduli of Rigidity, and Poisson's Ratios of Yellow Birch. By J. T. Drow and R. S. McBurney. No. 1528-H. Mimeographed.

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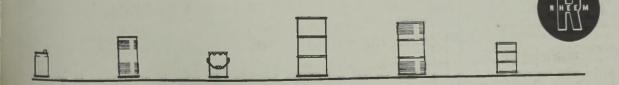
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Adhesives. Paisley Products, Inc., Chicago, III.—Bulletin No. 15 is a two-page flyer featur-ing the Cooler-Proof Glue for labeling bottles subject to wet storage. Description and proper-ties of the glue are given, and various applica-tions are described.

Blenders. Sprout, Waldron & Co., Muncie, Pa.—8-page booklet featuring this company's equipment for blending insecticides. The impor-tance of proper blending of insecticides is dis-cussed in some detail, and the equipment for accomplishing this blending is described and illustrated.

Building Materials. A. C. Horn Co., Inc., Long Island City, N. Y.—96-page handbook of construction data contains technical information on products made by this company, such as flooring materials, coatings, roofing materials, waterproofing, etc. A section is devoted to use-ful engineering tables, conversion factors, esti-mating tables, weights and strength of building materials, etc.

Chemicals. Armour & Co., Chicago, Ill.—4-page leaftet entitled "Armeen Salts" discusses the aliphatic amine salts and their use as pene-tration assistants and water repellants. Contains information on the characteristics of these com-pounds such as properties, composition, and other useful information.

Chemicals. Armour & Co., Chicago, Ill.-Four l-page charts giving the physical prop-erties, molecular weight, refractive index, density, flash point, boiling point, solubilities of *n*-aliphatic acids, amines, amides and nitriles.

Chemicals. Chemical Solvents, Inc., Newark, N. J.--64-page plastic bound booklet entitled "Solvents, Alcohols, Extenders." Contains specifications, properties and outstanding char-acteristics of the chemicals available from this company. Contains formulas and information on denatured alcohol, and includes excerpts from

Internal Revenue regulations on denatured alcohol.

Chemicals. Godfry L. Cabot, Inc., Boston, Mass.—An 11 x 14-in. colored plastic chart showing the application of this company's carbon black in various industrial products. Shows the type of carbon black for use in such applica-tions as ink, rubber, enamels, plastics, etc.

8 Chemicals. Griffin Chemical Co., San Fran-cisco, Calif.—Booklet entitled "Light Hydro-carbon Properties." Presents in tabular form, hydrocarbon and light petroleum liquid and gas properties, with thermal data and data on com-bustion.

Chemicals. Oronite Chemical Co., San Fran-cisco, Calif.—4-page folder giving the proper-ties and applications of Oronite synthetic de-tergent, a compounding material for industrial washing and cleaning operations.

0

Chimney Construction. The Weber Chimney Co., Chicago, Ill.—6-page folder showing the effect of the atomic bomb on chimneys built by this company.

11

Chlorinated Rubber. Hercules Powder Co., Wilmington, Del.—32-page booklet giving the properties and uses of Parlon, this company's chlorinated rubber. Contains detailed informa-tion on the chemistry of this type of compound, as well as its physical properties. Includes in-formation on the application in alkyd enamels, paints, varnishes, and various types of finishes, as well as inks, adhesives and coatings.

12

Crushers. American Pulverizer Co., St. Louis, Mo.—8-page booklet featuring the stone crush-ers made by this company. Advantages, rat-ings, dimensions for this company's line of hammer and rolling ring stone crushing mills are included.

13

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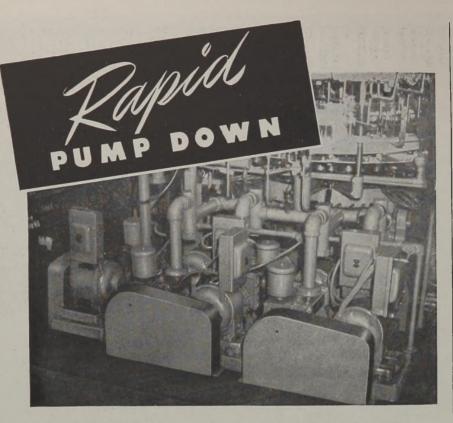
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Ohio—Bulletin No. 794. 8-page illustrated booklet featuring the double-roll crushers manu-factured by this company. Contains information on various types of applications. The equip-ment itself is illustrated by cutaway views and drawings. Contains tables of speeds, shipping weights, dimensions, etc. drawings. Contains tabl weights, dimensions, etc.

14

14 Dust Collectors. Peters-Dalton, Inc., Detroit, Mich.-Bulletin 101, entitled "Hydro Whiri Dust Collector," illustrates and describes the industrial dust collecting equipment made by this company. Principles of operation are de-scribed and illustrated with sketches and the various types of equipment are depicted both in photographs and drawings. Method of planning and laying out a dust collecting system is de-scribed and illustrated. Contains a table of air velocities for conveying various type osf dust material. Bulletin 201 features this company's wet type spray booth.

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15 Dust Collectors. The Thermix Corp., Green-wich, Conn.—Catalog 101 is a 12-page illus-trated booklet featuring the Aerotec industrial Devises collectors available from this company. Details of design and performance are given, and diagrammatic sketches illustrate the cor-struction details. Dimensions and capacities of the various sizes are tabulated. Catalog 200 ontains 20 pages featuring the Prat-Daniel stress. Various types of equipment, such as fans, various described. Catalog 10 is a 12-page ulletin giving the features and advantages of Heacon dampers for controlling flow, available the company. <u>16</u> stion be ingineer, is their tess and for an eff mond Rt. Hammo

W THROL Electric Equipment. Rex Rheostat Co., Bald-win, N. Y. Catalog 3. 8-page illustrated book-let describing the various types of rheostats made by this company. ONDTANK induced he i course the

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Electric Motors. Elliott Co., Jeannette, Pa. --4-page leaflet announcing the new steel fab-ricated motor manufactured by this company. adepend up

Fans. Sprout, Waldron & Co., Muncie, Pa. -4-page leaflet illustrating and describing this company's industrial fans. Features of con-struction are illustrated and described, and a table designating the direction of rotation and discharge of fans is included. Dimensions of the various types of units are tabulated, ca-pacity tables are shown. Bulletin F, 946.

Filters. Oliver United Filters, Inc., New York, N. Y.—Bulletin 123-R. 4-page leaflet describing and illustrating the pressure filter for filtering or polishing liquid chemicals, dyes, fruit juices, syrups, and similar materials re-quiring clarification. Includes information on filter elements, operation, precoating, capaci-ties and sizes ties and sizes.

20

Filters. Proportioneers, Inc., Providence, R. I. Bulletin 1550. 12-page booklet illustrat-ing and describing the Pur-o-cel pressure filter which uses diatomaccous earth for filtering and polishing water, solvents, cutting oils, wines, food oils, etc. The principle of operation is dis-cussed in some detail and the equipment is il-lustrated with photographs and diagrammatic sketches. sketches.

21

Fire Protection. Randolph Laboratories, Inc., Chicago, Ill.—Slide rule type, fire extinguisher data-guide, which gives important facts about the suitability, maintenance and performance of various types of fire extinguishers.

22

Fractionating Distillation Equipment. Glass Engineering Laboratories, San Carlos, Calif.--6-page illustrated booklet describing the Older-shaw perforated plate fractionating column for laboratory use. Includes physical and operating data on the 26-mm. plate columns, automatic liquid dividing still head and automatic vapor dividing still head.

23

Heat Enclosures. Geo. P. Reintjes Co., Kansas City, Mo.—Catalog C-46. 34-page book-let featuring the furnace wall construction avail-able from this company. Various types of con-struction are illustrated and described and a number of examples of this company's work are featured.

24

Heat Treating. Ajax Electric Co., Inc., Philadelphia, Pa.—Reprint entitled "Liquid Car-burizing" discusses all phases of liquid car-burizing, both technical and the economic as compared with other types of carburizing.

25 Heat Treating. Surface Combustion Corp.,

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Toledo, Ohio-4-page leaflet illustrating and describing the tempering furnaces made by this company. 26

Industrial Clothing. Archer Rubber Co., Mil-ford, Mass.—8-page catalog of the industrial work clothing manufactured by this company.

Industrial Clothing. Hydro-Tex Corp., Chi-cago, Ill.—4-page leaflet illustrating and de-scribing the plastic industrial aprons equipped with permanently fused all-plastic eyelets made by this company. 28

Industrial Flooring. Walter Maguire Co., Inc., New York, N. Y. Bulletin No. 603 fea-tures the use of Emeri-Crete Fooring for use in various industrial plants.

29

Instruments. Bell Telephone Laboratories, New York, N. Y.-Monograph B-1376 is a four page reprint entitled "A Simple Refracto-scope for Liquids." 30

Instruments. Fuller Co., Catasauqua, Pa.— Bulletin 1-3 entitled "Fuller Material-Level In-dicator for Storage Bins and Silos" contains six pages which illustrate and describe this piece of equipment. 31

31 Instruments. Leslie Co., Lyndhurst, N. J.— Bulletin 464, 22-page booklet illustrating and de-scribing the temperature regulators and con-trollers made by this company. Includes data on the self-contained temperature regulators and the external pilot-operated temperature con-trollers made by this company. Contains in-formation on size and capacity tables, as well as instruction for installation, operation, Mainte-nance, etc.

32

Insulated Cable. Hazard Insulated Wire Works, Wilkes-Barre, Pa.—Bulletin H-407 con-tains six pages describing this company's alumi-num building wire. Bulletin 302-AL contains list prices as of Jan. 1, 1947.

33

Insulation. Monsanto Chemical Co., St. Louis, Mo.-4-page leaflet featuring Santocel, this company's insulation material for refrigera-tion equipment. 34

Kettle Heating System. Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh, Pa.—Bulletin 2083. 8-page booklet illustrating and describing the electrovapor heating system which combines the advantages of electrical and Dowtherm heating for use in the chemical and process industries. A number of applications are suggested. Di-agrammatic flowsheet shows application to a resin kettle installation.

35

Lighting. Lustra Corporation of America, New York, N. Y.--Bulletin No. 103 is a four-page leaflet describing four types of light bulbs especially designed for heavy-duty service where ordinary light bulbs fail to stand up.

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Materials Handling. Elwell-Parker Electric Co., Cleveland, Ohio-New illustrated catalog describes the various types of power industrial trucks and cranes manufactrued by this com-pany. Principal specifications are given.

37

Materials Handling. Lift Trucks, Inc.. Cin-cinnati, Ohio-6-page illustrated leaflet describ-ing the Hydro-Lectric lift ruck available from this company. Details of construction are shown by sketches and photographs.

38

Materials Handling. Lyon-Raymond Corp., Greene, N. Y.—Bulletin No. 220 is a 4-page booklet illustrating and describing the hydraulic pallet lift truck manufactured by this company. Construction and operation is shown by photo-graphs and sketches. 39

59 Petroleum Products. Phillips Petroleum Co., Bartlesville, Okla.—8 x 24-in. chart entitled "Vapor Pressures of Twelve Four-Carbon-Atom Hydrocarbons." Vapor pressures 0.30 to 800 lb. per sq. in. absolute are shown over a temperature range of —110 to +320 deg. F. Includes such hydrocarbons as isobutane, iso-butylene 1, 3-butadiene, vinyl acetylene, etc.

40

Petroleum Products. Sun Oil Co., Philadel-phia, Pa.-4-page folder listing and describing the various oils, greases and other industrial products manufactured by this company.

41

Plastic Dip Tanks. Aeroil Products Co., West New York, N. Y.-Two-page flyer illus-

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- Unusually fast action (up to 3500 rpm working speed) permits the use of standard Wilson accessories.
- Any economically practicable scavenging agent can be used. In some cases they have been used successfully with *no* scavenging agent.
- Can be used even on sagged tubes. Hollow shafting has sufficient "give" to follow contour of sag without damaging tube walls.
- 5 Provide operator with instantaneous, finger-tip control of speed and power.
- Minimum operator fatigue—light weight, extra power, higher speed means less time on job.

all small tubes "come clean" for this handy Wilson team

Remember, too, that the Wilson Trigger Power tube cleaner is the only tube cleaner with which it is economically practical to remove deposits from completely plugged tubes without damage to the tube walls—that the Wilson Pistol Grip weighs only 3 lbs. (no more than a 12" Stillson wrench) providing the operator with one hand control for cleaning small, straight tubes of $\frac{1}{4}$ " to 1" I.D. in sterilizers, hot water heating units, lube oil heaters, oil preheaters, and heat exchangers.

When you are cleaning small bore tubular apparatus, you'll find that your tubes will "come clean" more economically with this Wilson team! They are available from stock. For additional information on how the Pistol Grip or Trigger Power can help solve your problem, please address Dept. A.

THOMAS C. WILSON, INC.

21-11 44th Avenue, Long Island City 1, N.Y.

TW-723



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Is Handling. Elvel-Frie u eland, Ohio-New Illismi i the various types of pore and d cranes manufactured b ins rincipal specifications or pre-37

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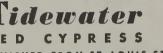
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In Tanks, Aerol Page Pork, N. Y.-Two page lei CHEMICAL ENGINE



... Its Superior Qualities Make It Ideal for a Wide Range of Industrial Uses

The Indians knew it, the Spaniards knew it, the French knew it, and those of English descent of the Southeastern regions have known for 150 years the superior qualities of Tidewater Red Cypress and its resistance to decay. Along the Atlantic Coastal Plain where lie buried cypress trees that grew over 100,000 years ago in the Pleistocene Age, many of which have since been dug up, give mute evidence of the lasting qualities of cypress never equalled for its decay resistance. In more recent years industry has also learned that it licks the difficulties of odor, taste and acid. Tidewater Red Cypress has ALL the qualities you demand for many specific industrial demands.





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Vibrators on bins and hoppers keep the materials free-flowing, The vibratory feeders automatically filling scale hoppers to exact weight, and discharging onto secondary vibratory feeders, smoothly emptying each accurately weighed batch into mixers, blenders, belt conveyors, etc.

Any one, or a combination of any number of materials may be batched, accurately and automatically at the same time.

-save you money and time. Write us about your problem.

SYNTRON CO.

610 Lexington

Homer City, Pa.

trating and describing various models of dip tanks for application of plastic coatings to vari-ous types of objects. Discusses temperature control.

42

42 Rubber-Lined Piping. The B. F. Goodrich Co., Akron, Ohio-Catalog Section 9780. 8-page folder featuring Vulcalock rubber lined pipe and fittings made by this company. The various types of fittings are illustrated, and the different linings available are listed. In-cludes information on how to apply gaskets to these fittings and describes rubber expansion joints for pipe lines. 43

Safety Equipment. American Optical Co., Southbridge, Mass.—Now available from this company is a body safety guide which classifies occupational hazards by industries and recom-mends the proper safety clothing and equip-ment for maximum protection. Classifies 21 hazardous types of work found in 18 industries.

44

Safety Equipment. Mines Safety Appliances Co., Pittsburgh, Pa.—4-page illustrated leaflet featuring the carbon monoxide alarm designed for efficient protection against dangerous con-centrations of carbon monoxide in the air. Principle of operation is described and a wiring diagram and cutaway view of the instrument is shown. Bulletin DR 3.

45

Steam Specialties, Jerguson Gage & Valve Co., Somerville, Mass.—General catalog illus-trating and describing the liquid level gages, valves and engineering specialties available from this company.

46

40 Synthetic Rubber Insulation. Simplex Wire & Cable Co., Cambridge, Mass.—12-page book-let on Simplex synthetic rubber insulation. Discusses natural and synthetic rubber insulation materials, principal synthetic compounds, and describes the various types of synethic rubber insulation made by this company. Properties of the different classes of insulation are given in tabular form. 47

4/ Tank Roof. Graver Tank & Mfg. Co., Inc., East Chicago, Ind.—8-page illustrated booklet describing the expansion roof and the improved floating roof of double-deck construction which prevents vapor losses in the storage of petro-leum products. Cross-sectional views illustrate the principles involved. Includes data on con-struction features, design features, accessories. Applications are discussed and the advantages outlined.

48

Temperature Indicator. Tempil Corp., New York, N. Y.—6-page illustrated folder describ-ing the fusible temperature indicator manufac-tured by this company. Covering a range of 125 to 1,700 deg. F., these indicators are avail-able in liquid, crayon or pellet form. and have a sharp and rapid melting action at the specified temperatures. 49

49 Valves. Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.—4-page folder featuring various types of control valves made by this company. Includes information on water pressure reducing valves, single-acting standard altitude valves, integral pilot type cold water float valves, water strainers, etc. Valves are illustrated by cutaway views and applications are shown in diagrammatic sketches.

50

50 Water Treating. Liquid Conditioning Corp., New York, N. Y.—Catalog G. 56-page book-let illustrating and describing the various types of water-conditioning processes and explains the applications, advantages and limitations of each types. Included are tables listing the various kinds of gaseous and solid impurities, showing the effects, limits of tolerance for various purposes, methods of removal, and re-sidual amount of each impurity after treatment. Also Bulletin 2 of four pages featuring the deaerating heaters and vacuum deaerators manu-factured by this company.

51

Welding. Ampco Metals, Inc., Milwaukee, Wis.—Bulletin D-2383. 19-page mimeographed loose leaf compilation entitled "Weldability and Composition of 313 Copper-Based Alloys." Gives trade names, manufacturers, and chemical composition of the established copper-based alloys, together with welding information such as degree of weldability, preheat, type of elec-trodes or rods recommended together with the preferred welding process.

52

Welding. Arcos Corp., Philadelphia, Pa-4-page leaflet illustrating and describing the Oxyarc process for cutting various types of metals with the combination of an electric arc and a stream of oxygen.

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for the Right Tubing.

Section of petroleum cracking unit made of B&W Croloy 25-20 Stainless Steel Tubing

for Any Process Requirement

AT B&W your tube requirements are considered in the light of exceptionally broad experience with seamless and welded tubing for services requiring resistance to corrosion, oxidation, creep and other adverse conditions in high and low temperatures. From its exceptionally wide range of steels—from simple low carbons to high alloys, including stainless and other corrosion-resistant steels, carbon-molybdenum steels, and the many special B&W Croloys developed expressly for chemical process services, B&W can supply the analyses best suited for your particular service conditions . . . that will give the most satisfactory and economical service.

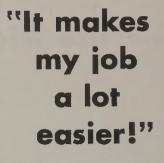
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Other B&W Products THE BABCOCK & WILCOX CO. 85 LIBERTY STREET • NEW YORK 6, N. Y.

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





Yes, modern Fairbanks-Morse Scales win the approval of labor as well as of management... do their part to help keep workers contented.

How? By weighing with less human effort-saving men's energy.

By reading themselves at the touch of a button, and by printing accurate, alwayslegible weight records automatically.

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It is quite possible that you, too, might benefit from these and the many other advantages of modern scales. A Fairbanks-Morse engineer will gladly help you investigate the possibilities.

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CHEMICAL ECONOMICS

H. M. Ballers, MARKET EDITOR

ACTIVITIES IN MOST LARGE MANUFACTURING LINES WERE SPEEDED UP SHARPLY IN JANUARY

S turing plants continued to rise in December with the value of delivered products reported at \$12.7 billion or a gain of about 2 percent over the total for the preceding month. That a much higher level was reached in January is indicated by reports that many of the more important manufacturing lines operated at a much higher rate in that month. Steel mills operated at about the same level as in last October which was the peak month for that industry in 1946. Automotive outputs were up appreciably, paper mills moved up rates of activities, oil refineries were less active in the first half of the month but became more active in the closing weeks and while total runs to stills were under the December figure, they were about 5 percent above those reached in January 1946. These are typical of the preliminary reports obtained from other manufacturing lines and apparently manufacturing outputs in general, as well as consumption of raw materials, went through the opening month of the year in a gratifying way. While data for all segments of the chemical industry are not yet at hand, it is probable that the general movement in January was along lines reported for all manufacturing. In most branches production was said to be at capacity but the use of that term is relative since much of present-day equipment is far from 100 percent efficient and current capacities frequently are not large enough to fill requirements. Because of the publicity given in recent months to the shortage of soda ash, the position of that chemical will illustrate the wide influence such a scarcity has upon production totals.

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neats.

In the first place, while production has fallen from the wartime peak, it still is far ahead of prewar volume. Hence, growth in consuming demand is the reason underlying the shortage. The shortage itself is cutting down production on many chemicals, it is restricting operations in many consuming industries, such as glass, soap, textiles,

alumina, and water softeners. What is true of soda ash applies in varying degrees to caustic soda, phenol, solvents, and many other basic chemicals. The importance of this lies in the fact that productive activities can expand only so far as availability of raw materials makes it possible. That relatively high levels were reached in January is encouraging but many production schedules and plans for nearby plant expansions must now give more than usual consideration to the problem of covering raw material requirements.

All production as measured by the index of the Federal Reserve Board, dropped rather sharply in the closing weeks of last year. The index for No-vember stood at 182 with 176 representing activities in December. For production of industrial chemicals the

Chemical Engineering Index

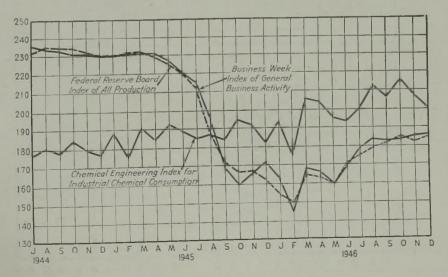
Industrial Consumption of Chemicals

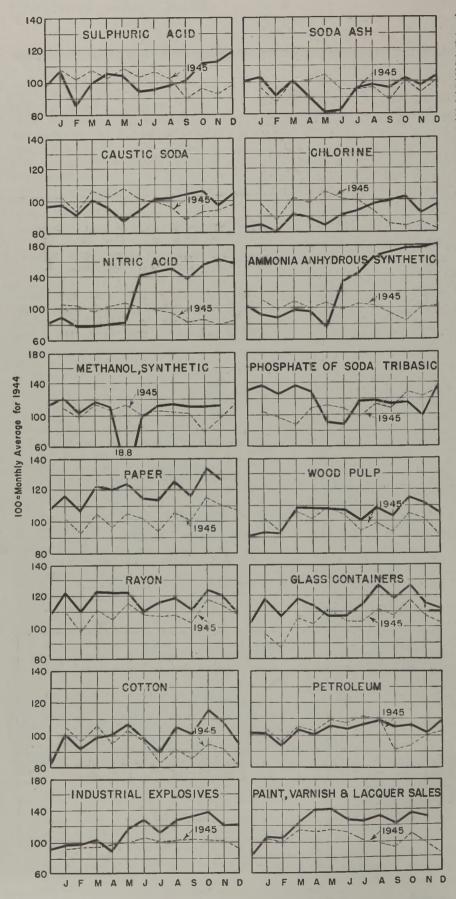
	Nov.	
	Revised	Dec
Fertilizers	46.53	47.30
Pulp and paper	22.33	20.77
Petroleum refining	18.32	19.53
Glass	21.88	20.40
Paint and varnish	21.72	20.60
Iron and steel	11.81	10.27
Rayon	20.39	18.37
Textiles	11.70	10.57
Coal products	8.85	7.70
Leather	4.45	4.50
Explosives	6.63	6.60
Rubber	6.45	6.60
Plastics	6.54	7.33

206.60 200.54

Board places the index at 411 in November and at 417 in December. The Chemical Engineering index for industrial consumption of chemicals followed the line of all production and dropped 200.54 in December with 206.60 as the revised figure for November. Seasonal influences had something to do with the drop in December but the coal strike in the latter part of November and early part of December had a direct effect on some producing plants and an almost equally direct effect on others by curtailing their raw material supplies. The strike at a southern alkali plant also was a factor in the decline in rayon output for the month. Production of glass containers and flat glass still is restricted because of the shortage in soda ash.

Plastics was among the divisions which made a favorable showing in December. Practically all types of plastics shared in the more active movement with cellulose acetate, phenolic, polystyrene, and vinyl recording the highest gains over the November totals. Shortage of some of the important materials, however, is still reported and this tended to delay plans for expansion of plants for molding and fabricating plastics. Refiners of petroleum also were more active in Dccember but production of vegetable oils fell off because the drop in crush of cottonseed more than offset the increase in consumption of copra, soybeans, and peanuts. Crushing of linseed also was lower in December.





PRICE CHANGES in the market for chemicals are predominantly on the up side. Very little softness is reported in current trading and while many important chemicals appear to be maintaining a steady and well established position, others in the last month have moved up to higher sales levels. Demand is running heavy and price advances in general are due either to the excess of demand over supply or to rising costs for raw materials. It had been anticipated that metal derivatives would fluctuate for some time in harmony with fluctuations in metals and this has proved to be the case for such items as lead, zinc, and copper salts, all of which have been subjected recently to upward price adjustments. There even is a possibility that sulphur will sell at higher figures. A bill has been introduced in the Texas Legislature, which, among other things, proposes that the present severance tax of \$1.27 a long ton on sulphur be raised to \$5 a ton. It is not probable that the proposal, at least as now drawn, will be adopted.

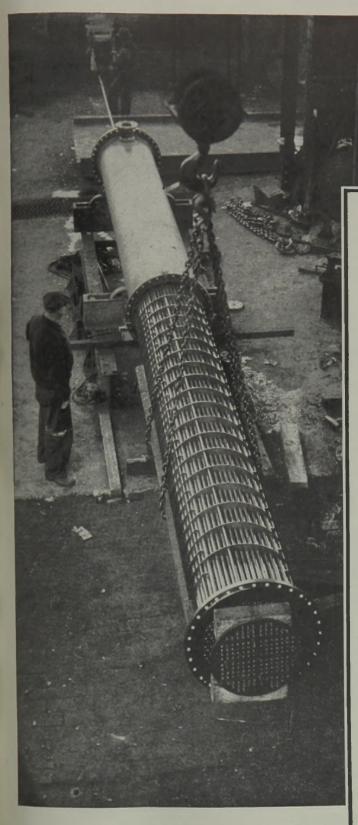
Around the middle of last month it was announced that export controls had been lifted on rosins. This had the immediate effect of stimulating interest on the part of exporters and also had a strengthening effect on prices. Some drop from the high points followed but the market can hardly be called stabilized.

In domestic trade, considerable variations are noted in the volume of rosin passing to the different consuming industries. Soap makers have cut their requirements partly because they no longer are obliged to use a specified percent of rosin in their finished product and partly because production of soap has been reduced because of short supplies of oils and fats. More rosin is going into linoleum but here again the shortage of oils is an unfavorable factor and it will be some time before lineoleum production can be raised to a point where it will take care of consuming needs. Paint and varnish makers have increased their demands but ester gums and synthetic resins are competing actively in this industry. For the first half of the current season paper makers held the ranking place as consumers of rosin and will consume more than 15,000 tons more in 1946-47 than they did in 1945-46. Manufacturers of chemicals and pharmaceuticals probably will increase their requirements by about an equal figure.

302

[•] FEBRUARY 1947 • CHEMICAL ENGINEERING

BEFORE ordering condenser tubes



CONSULT REVERE

Users of condenser tubes naturally are interested in obtaining tubes that will last long, because that means economy. However, the life of a tube may depend only in part upon the alloy of which it is made. For that reason Revere is always glad to make a thorough study of all the conditions of use when tubes have to be replaced oftener than they reasonably should. This extra service offered by Revere often adds greatly to economy.

For example, there was the case of a refinery where tubes in a heat exchanger were failing within a year. A study of tem-peratures and other operating conditions showed that changing to Admiralty tubes would result in sufficiently longer life to more than pay for the slightly higher cost. During examination of the exchanger it was found that the tubes showed considerable pitting at the inlet side of the hot vapors. Use of a baffle plate at this point was sug-gested. The superintendent followed both recommendations, and when last checked, the equipment had given 20 months of completely satisfactory service and was still in operation.

Revere suggests you go over your records, and ask for collaboration on any cases of uneconomical performance of condenser tubes.

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801 230 Park Avenue, New York 17, New York Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y. -Sales Offices in Principal Cities, Distributors Everywhere. Listen to Exploring the Unknown on the Mutual Network every Sunday evening, 9 to 9:30 p.m., EST.

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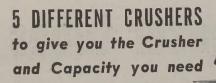
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"AC" Ringmill. Capacities up to 500 TPH.



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Hydrogen Perox		
(100 Volume Basis))	
July 1, 1944–June 30,	1945	
Use	1,000 lb.	Percent
Total allocations	29.440	100.00
Direct military	8,535	29.0
Export		0.8
Other uses		70.2
Textile processing		35.3
Chemical processing		9.3
Drugs and cosmetics		3.9
Fur treatment		1.8
Bleaching		0.9
Resale and small orders *		13.0
Miscellaneous t		6.0
		0.0
* Distributed to "Other uses."	t Includes	auantities
for foods, gelatin, lanolin, lecithin, and	soap proce	essing.

END USES FOR CHEMICALS

THE BUREAU of the Census has re-

leased further data showing end uses of

chemicals based on allocation records

of the War Production Board. The data with the periods covered are:

Precipitated Barium Carbonate July 1, 1944-June 30, 1945

Use	Tons	Percen
Total allocations.	21,261	100.0
Direct military	7,888	37.1
Export	86	0.4
Other uses	13,287	62.5
Ceramic brick and clay	4,184	19 7
Chemicals	2,187	10.3
Glass manufacturing	1,882	8.9
Metal heat treating.	2,053	9.6
Oil well drilling	2,015	9.8
Miscellaneous	966	4.8

Potassium Chlorate

January 1, 1944-June 30,	1945	
Use	1,000 lb.	Percen
Total allocations	35,478	100.0
Direct military.	4,626	13 0
Export.	3,746	10.6
Other uses	27,106	76.4
Matches	25,142	70.9
Chemical heat pads	742	2.1
Commercial explosives	504	1.4
Pharmaceuticals and medicinals.	99	0.3
Miscellaneous	619	1.7

Anhydrous Hydrofluoric Acid (100 Percent H2F2)

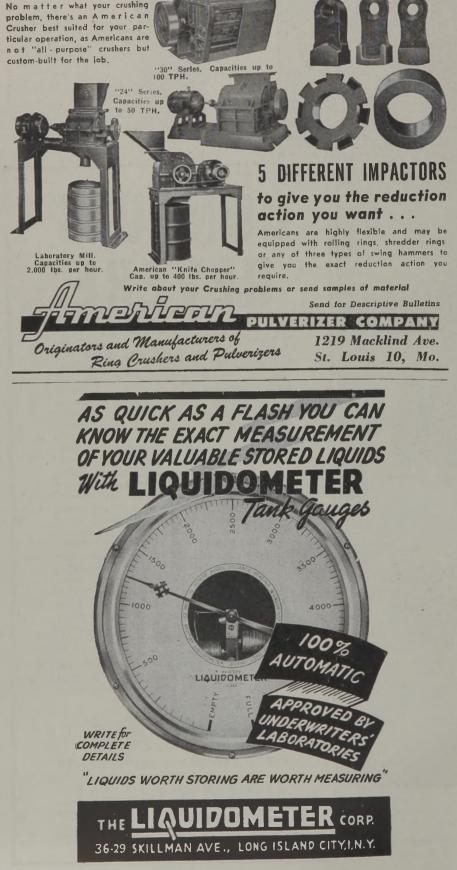
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JUV 1. 1944 June av. 174J		
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otal allocations 33	3,050 100.0	
Direct military	5,711 17.3	
ther uses	,339 82.7	
Aviation gasoline 19	083 39.6	
Chemical uses	2,086 6.3	
Miscellaneous. 12	2,170 36.8	

Lactic Acid		
October 1, 1944-March 31 Use	, 1945 1,000 lb.	P
	5.899	1
Total allocations		1
Direct military.	2,292	
Export.	179	
Other uses	3,428	
Food processing.	592	
	506	
Leather processing		
Beverages	413	
Plastics	153	
Textile processing	114	
Adhesives	93	
	79	
Sodium lactate		
Medicinals and pharmaceuticals.	22	
Miscellaneous.	1.456	

Sodium Bichromate	
January 1, 1944–June 30, 1945	
Use 1,000	
Total allocations * 192,9	
Export	
Other uses	52 98.2
Pigments 82,2	22 42.6
Pigments. 82,2 Chemical manufacture *	53 15.8
Tanning. 30.0	
Metallurgical uses	
Metal treatment. 13,8	
Corrosion prevention	
Textile processing. 11,	
Miscellaneous †	

the manufacture † Includes metal of other primary chromium chemicals. al'oys,



You Can Forget About Atmospheric Hazards

is covered a

d Barium Carlynne 1944 Jose M. 196

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s Hydroßwone Ad 00 Percent Edit 1944-Jane XI, 1945

Lactic Acid

CAL ENGINE

In this installation the

15 horsepower Century

motor is totally enclosed fan cooled because it operates in an

atmosphere charged with corrosive fumes

that would attack the

vital parts of the motor.



This 5 horsepower Century motor operates a conveyor in a grain elevator in an atmosphere charged with explosive dust.

Because this Century 200 horsepower motor operates a blower in the boiler house of a large generating plant it is protected from falling objects and dripping liquids.

hen You Have a CENTURY Protected Motor ...Properly Applied

WITH the correct Century motor driving your machine you can have complete confidence that it will provide a long life of satisfactory performance.

From the wide range of standard types and sizes there is a Century motor that will meet the electrical characteristics and atmospheric conditions of nearly every application.

The three examples shown here each require a different kind of motor frame because of the differences in surrounding conditions. In addition to the fact that all three are powered by Century motors — they have other things in common. They are quiet starting, and they run smoothly and quietly due to their unusual freedom from vibration. They have the correct electrical characteristics to give top performance.

Century builds a complete line of electric motors and generators, fractional and integral horsepower, in the popular sizes to meet the requirements of appliances, industrial production and commercial needs.

Specify Century for all your electric power applications.

CENTURY ELECTRIC COMPANY • 1806 Pine Street • St. Louis 3, Missouri Offices and Stock Points in Principal Cities

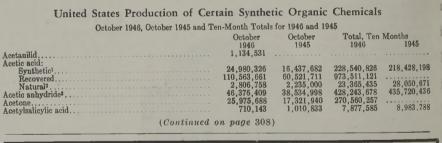
CHEMICAL ENGINEERING • FEBRUARY 1947 •

Century

SKINNER PURIFIERS INC.	
Announces a complete, new line of leaf and plate type FILTERS ranging in size from 1 sq. ft. to 485 sq. ft. • IMPROVED DESIGNING	
ADVANCED ENGINEERING NEW ECONOMY These new models are in addi-	
tion to the full standard line of disc and wound type filters for air, gasolene, kerosene, fuel oil, hydraulic and other fluids. A few valuable territorres available.	
SKINNER PURIFIERS, INC. 1500 Trombly, Detroit 11, Michigan	
• FILTER CLOTH • FILTER PRESS SACKS • FILTER All KINDS WOVEN GLASS AND "DURAKLAD" (ACID RESISTANT)	
• FILTER FABRICS	
Made into all sizes and construc- tions, filter cloths, tubes, discs, gravity bags, centrifuge liners, rotary filters, flotation blankets, etc.	
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tions, filter cloths, tubes, discs, gravity bags, centrifuge liners, rotary filters, flotation blankets, etc. GLASS CLOTH FOR HIGH TEMPERATURES is acid and alkali resistant, has a smooth, hard surface, free from lint, made in'o a wide variety of weaves and widths. Can be fabricated to meet your require-	

United States Production of C November 1946, November 1945 and Eleven-Mi			45	
		November		ven Months
Chemical (Tons unless otherwise noted)	November 1946	November 1945	1946	1945
Ammonia, synthetic, anbydrous ¹	80,380	45,298	643,414	503,198
Ammonium nitrate (100% NHANOa)	81,733	39,678	641,133	
Ammonum sulphate, synthetic, technical ⁹	26,021	16,015		
Calcium arsenate (100% Ca ₃ (AsO ₄) ₂) ⁸	1,330	1,403	34,603	25,644
Calcium carbide, commercial	55,312	44,610	518,308	628,707
Calcium phosphate:8				FR 870
Monobasic (100% CaH4(PO4)2)	7,109	6,793	68,099	57,550
Dibasic (100% CaHPO ₄)	5,624	7,518	63,880	50,931
Carbon diouide:8	15.437	16.412	201.144	196,986
Liquid and gas	46,611	42.856	603.827	624,536
Solid.	97,186	91.453	1,062,742	1,097,289
Chlorine	1,265	1,527	16,711	7,455
Chrome green (C.P.) ^a Chrome yellow and orange (C.P.) ^a	3,083	4.773	39,998	39,637
Hydrochloric acid (100% HCl)	30,150	30,037	310,912	378,561
Hydrogen ⁹	1.525,000	1,414,000	16,124,000	
Lead arsenate, acid and basic ⁸	2,865	4,253	52,943	65,943
Molybdate chrome orange (C.P.) ⁸	435	339	4,203	1,544
Nitric acid (100% HNOa)	63,277	31,352	511,357	414,049
Oxygen ⁹	1,005,544	875,350	9,838,259	13,035,460
Phosphoric acid (50% H ₃ PO ₄)	82,419	7 0,4 09	787,796	649,628
Soda ash:				
Ammonia-soda process:	220 200	355.039	3,898,862	3,995,231
Total wet and dry ²	$368,302 \\ 176,446$	177,737	1,993,288	2,088,044
Finished light ³	136,626	123,237	1,405,716	1.315.379
Finished dense.	15.357	15,283	191,790	167,146
Natural ⁴	15,580	15,692	182.946	158,135
Sodium bichromate and chromate	7,159	6,999	78,808	73,903
Sodium bydroxide;	.,			
eectrolytic process:				
Liquid	92,531	85,616	1,029,585	1,038,957
Solid	13,848	16,073	177,997	196,900
Lime-soda process:		00 510	677,943	671,891
Liquid ⁵	60,751	62,516 20,340	215,544	223,521
Solid.	20,374	20,010	210,011	220,021
Sodium phosphate:	986	1.307	10,771	13,603
Monobasic (100% Na ₂ HPO ₄) Dibasic (100% Na ₂ HPO ₄)	5,676	5,528	53,931	55,160
Tribasic (100% Na2PO4)	6,596	8.299	96,217	80,021
Meta (100% NaPO3)	2,012	2,749	24,937	25,396
Tetra $(100\% \text{ Na4}P_2\text{O}7)$.	4,428	4,104	62,658	39,179
Sodium silicate	34,442	28,843	379,645	381,455
Sodium sulphate:		0 700	100 100	75 000
Anhydrous	9,229	9,530	163,107	75,996
Glaubers salt4	15,242	13,712	162,258 425,438	182,449 512,890
Salt cake, crude, commercial	37,239	53,387	220,200	012,000
Sulphuric acid;7	526,858	402.363	5,103,680	5,099,970
Chamber. Contact, net ⁶ .	274.969	255,853	2,788,449	2,906,831
Zinc yellow.	203	200,000	13,296	13,316
Zine yenow				

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 materials. 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 processed to finished light and finished dense. ³ Not including quantities converted to finished light collected in cooperation with the Bureau of Mines. ⁶ Figures represent total production of liquid material, including quantities sporated 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 included. ⁶ Thousands of pounds. ⁹ Thousands of cubic feet.



MATERIALS of CONSTRUCTION for Chemical Engineering Equipment

— Editorial Department ———

330 West 42nd St., New York 18, N. Y. CHEMICAL ENGINEERING

• FEBRUARY 1947 • CHEMICAL ENGINEERING

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New York 18. 1

CAL ENGINE

1,017 0,711 5,528 0,021 8,299 0,021 2,749 0,021 4,104 0,02 8,943 77,56

diphenyl carbonate

(CARBONIC ACID, DIPHENYL ESTER)

by GENERAL CHEMICAL COMPANY

Fundamental research and product development in today's chemical process industries constantly require new chemical tools of varying properties. Perhaps your investigations indicate the need for a process material with the characteristics of General Chemical Company's Diphenyl Carbonate. If so, experimental quantities of this basic organic chemical are available on request to General Chemical Company, Research and Development Division, 40 Rector Street, New York 6, N. Y.

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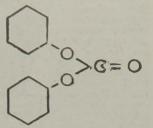
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In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

CHEMICAL ENGINEERING • FEBRUARY 1947 •

Structural Formula:



Physical Properties:

Appearance: white crystalline solid, white needles from alcohol.

Molecular Weight: 214. Melting Point: 78° C. Bailing Point: 302° C. Specific Gravity: Liquid 1.122 at 87° C. Solid 1.272 at 14° C.

Chemical Properties:

1. Can be halogenated and nitrated in characteristic manner.

2. Readily undergoes hydrolysis and ammonolysis when treated respectively with inorganic bases, ammonia and amines.

Solubilities:

Insoluble in water-

Quite soluble in acetone, hot alcohol, benzene, carbon tetrachloride, ether, glacial acetic acid, and many other organic solvents.



307

Now! important basic data on JET PROPULSION

theoretical bases experimental work

The translation of this monumental work enables aeronautical engineers and researchers to get, for the first time, at the wealth of investigation and detail it provides. The book not only presents the theoretical basis for explosion and combustion processes in gases, but describes the experiments in



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such detail that the reader may draw his own conclusions, independent of the theories of the author. The book includes an exhaustive analysis of the various phases of explosions—initial stages, spark ignition, propagation of explosions, explosions in closed chambers, and detonation—and of such elements of combustion as combustion of oxygen-hydrogen mixtures and carbon monoxide, of hydrocarbons, and combustion in Otto engines and Diesel engines.

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This examination of explosion and combustion processes in gases is so rigorous and complete that the aeronautical engineer will find it of immeasurable practical assistance in engine research and design work. The author provides a complete, objective inves-tigation of the field. Whenever data exists which seems to both prove and disprove theories that have been advanced, data representing the varying points of view are presented. Over 300 charts, graphs, diagrams and tables illuminate the text material.

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Position (For Canadian price, write Embassy Book 12 Richmond Street E., Toronto 1) Book Co.,

b-ethyl-b-phenylbarbituric acid and saits (Phenobar-			
bital)	29,683	29,747	321,561
Benzene:			
Motor grade:			
Tar distillers ⁴	810.345	376,890	7.787.673
Coke-oven operators ⁶	3,099,833	4,043,615	26.055.862
All other grades:	0,000,000	2,020,020	2010001000
Tar distillers ⁴	1,208,588	3,473,047	17,260,366
Coke-oven operators ⁶	11,208,111	7.083.220	86,225,897
	8,670,507	5,906,393	1286,491,753
Butyl alcohol, primary, normal		23,261,284	247,981,905
Carbon bisulphide	27,444,008		122,360,970
Carbon tetrachloride	16,527,880	11,136,450	
Chlorobenzene, mono	22,360,088	16,115,518	220,853,450
Creosote oil:			100 045 047
Tar distillers ⁴	12,202,721	10,391,451	108,245,347
Coke-oven operators ⁶	4,148,976	3,158,667	23,150,708
Cresols:7			
Meta-para	414,783	470,027	4,798,875
Ortho-meta-para	832,095	617,702	***********
Cresylic acid, refined ^{7,11}	2,455,799	2,132,956	19,549,191
Dibutyl phthalate	1,481,857		
Dichlorodiphenyltrichloroethane (DDT)	3,788,544	3,071,468	37,091,003
Ethyl acetate (85% by wt.)	8,744,934	7,329,352	75,992,991
Ethyl acetate (85% by wt.). Ethyl ether, technical and U.S.P.	3,003,670	2,963,871	30,372,197
Formaldehyde (37% by wt.)	41.863.814	31,934,286	12379,153,711
Methanol:			
Natural ⁸	1,464,220	1,487,360	13,182,445
Synthetic	43.776.937	31,445,934	404,123,256
	20,110,001	0111101000	
Naphthalene:	17,351,924	18,675,961	153,441,943
Tar distillers (less than 79°C.)	8,752,881	7.670.410	80,135,940
Tar distillers (79°C. and over)	8,425,254	5,631,640	57,257,632
Coke-oven operators (less than 79°C.)		791,636	1221,731,932
Penicillin ⁵	2,633,629	15.565.258	161,233,410
Phenol, synthetic and natural	18,369,252		87,113,767
Phthalic anhydride	9,275,629	8,065,675	310.577.842
Styrene (government owned plants only)	29,960,223	21,872,141	310,377,092
Toluene:		- 450 000	19 420 590
Coke-oven operators ⁶	1,466,888	1,450,263	13,439,520
All others ¹⁰	2,444,278		12,821,115
All data in pounds except benzene (gal.),	creosote oil	(gal.), tol	uene (gal.),
cillin (million Oxford units). Statistics coll	ected and co	mpiled by	U. S. Tarif
sion event where noted Absence of data	on producti	on indicat	es either th

Aniline. Barbituric acid derivatives:⁵ 5-ethyl-5-phenylbarbituric acid and salts (Phenobar-bital).

All data in pounds except benzene (gal.), creosote oil (gal.), toluene (gal.), and peni-cillin (million Oxford units). Statistics collected and compiled by U. S. Tariff Commis-sion 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. ⁸ All acetic anhydride including that from acetic acid by vapor-phase process. ⁴ Product of distillers who use purchased coal tar only or from oil-gas or water-gas produced or purchased by tar distillers. ⁶ Statistics are given in terms of bulk medicinals only. ⁹ Statistics col-lected by Bureau of Mines. ⁷ Total production including data reported both by coke-oven operators and by distillers of purchased coal tar. ⁹ Reported to U. S. Bureau of the Census. ⁹ Reported in gal. by Bureau of the Census but converted to bl. For com-parison with the production of synthetic methanol. ¹⁰ Includes toluene produced from petroleum by any process. ¹¹ Includes refined cresylic acid from petroleum. ¹² Revised.

U. S. Production of Synthetic Organic Chemicals (Cont. from page 306)

October 1946

8 924 437

October 1945

6.468.661

Another CASE HISTORY of a problem solved by the

PROBLEM: to clarify 65° Brixthick juice at 95° C. at a daily production rate equivalent to 150 tons of symp per 24 hours. Clarity of the 65° Brix-thick symp must be equivalent to the second filtration on the present presses prior to pan storage. One man must be able to handle all filtration opera-tions of a battery of 3 filters furnish-ing the complete plant production. SOLUTION: To meet these conditions

N.F.E *

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3087 Main St., Buffalo 14, N. Y.

tions of a battery of 3 filters furnishing the complete plant production.
SOLUTION: To meet these conditions, the N.F.E.* supplied a #440 Steel Steam Jacketed Niagara Filter with standard 24x10 stainless steel Style
"A" metal filter cloth leaves providing a maximum cake capacity of 27 cu, ft. and 440 sq. ft. of net filtration. This
#440 Niagara Filter was installed with a battery of 5 first thick juice filtration presses having 288 sq. ft. of filtration area each—a total aggregate area of 1440 sq. ft. These presses are augmented by 2 second thick juice filtration presses having to collectors.
RESULT: The N.F.E. installation solved all the problems—assuring complete plant production handling by 3 Niagara Filters under one man's supervision . . . and in addition, (1) Niagara's metal leaves eliminates the cost of thick price irreding and have aggregate and in addition.
(2) The Niagara Installation delivers the clarified thick juice irreding the supervision . . and in addition.
(3) The steam Jacketed #440 Niagara, with 60 ss. ft. of heating surface, makes possible the elimination of heating coils, blow-up liquor, and permits better heat control.

10 N



Total, Ten Months 1946 1945

73,197,358

1945

238.027

106,684,492 30,147,169

6.826.282 7,682,633 24,543,386

89,646,171 67,883,603

915,746,056 408,445,214

174,262,583 62,535,772 73,541,707

106.876.091

LEM TO THE N.F.E." Niagara provides a complete engineer-ing service—from laboratory analysis of the filtration characteristics of your product to final installation, giving the full production requirements of your plant at the lowest economical operating costs. An N.F.E.* will be glad to survey your filtration require-mendations.

glad to survey your initiation recom-ments as a preliminary to his recom-mendations. "N.F.E. = a Niagara Filtration Engi-neer... a trained graduate engineer with years of actual field experiences in the chemical, food, fermentation and processing industries.

Write for Your Free Copy of Bulletin G-345—The Story of Niagara Filter.

Worm-Halin to show b

HESE machines

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• FEBRUARY 1947 • CHEMICAL ENGINEERING

Niagara Filter Corp., Canada, Ltd.

Represented by Ex-perienced Filtration

Engineers in Principal Cities.

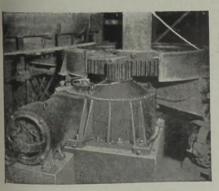
CAL ENGI



WORM-HELICAL SPEED REDUCERS -for Vertical Shaft Drived

THESE machines fill a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, ore roasters, bending rolls, etc., requiring a vertical shaft drive. Built in standard ratios in various types of assemblies ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings.

Jones Bulletin No. 75 covers complete details on these Worm-Helical Speed Reducers, with rating tables, dimension diagrams, torque charts and other application information. We shall be pleased to send you a copy.



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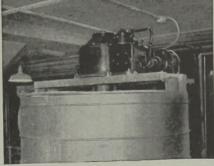
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r Corp., Cassia

CAL ENGINEER

• Jones Worm-Helical Speed Reducer on ore roaster with section of dust guard removed to show final gear reduction.



 Jones Worm-Helical Speed Reducer driving a lacquer agitator. A simple design prevents leakage of oil along the vertical low speed shaft.



• Jones Worm-Helical Speed Reducer on a paper mill agitator drive.

W. A. JONES FOUNDRY & MACHINE CO., 4415 Roosevelt Road, Chicago 24, Illinois

CHEMICAL ENGINEERING • FEBRUARY 1947 •

The sign of a GOOD PACKING

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Here are 6 typical Johns-Manville Packings designed to meet a wide range of service conditions in the chemical industry.

designed for high-speed centrifugal

pump service in many types to resist

acid, oil, gasoline and other corro-

E. J-M Metallic Packings. For severe

service against high pressure and

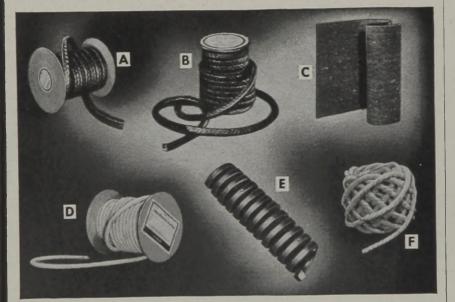
temperature conditions on all types

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sive liquids.

plungers.

Johns-Manville PACKINGS & GASKETS

HEMICAL EN leighted Index CHEMICAL ENGINEERING Weighted Index of Prices for OILS & F. **CHEMICALS** Base = 100 Ior Base = 100 for 1937 Last month.... February, 1946 February, 1945 121.63 109.13 108.84 hars, 100 lb. inbasic, baga, INDUSTRIAL CHEMICALS the last b ine, inig ton

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CURRENT PRICES

This month

The accompanying prices refer to round lots. Where it is trade custom to sell f.o.b. works, quota-tions are so designated. Prices are corrected to February 12.

Acetone, tank, lb Acid, acetic, 29% bbl., 100 lb Boric, bbl., ton Citric, drums, lb	\$0	.07			11.4.8
Acid, acetic, 29% bbl., 100 lb	3	.78	- \$4	.03	A BR. DU
Boric, bbl., ton	119	.00	-123	00.1	- HI
Citric, drums, lb.	_	.224	_	.23	100 20.0
Fornic, chys., lb. Hydrofluoric, 30%, drums, lb. Lactic, 44% tech., light, bbl., lb. Muriatic, 18°, tanks, 100 lb Nitric, 736°, carboys, lb. Oleum, 'tanks, wks., ton. Oxalic, lcrystals, bbl., lb. Phoephoric tech., tanks, lb.		12	-	.12}	
Hydrofluoric, 30%, drums, lb.		.08	_	.085	
Lactic, 44% tech., light, bbl., lb.		.073	_	.075	2020
Muriatic, 18°, tanks, 100 lb	1	.05			
Nitric 136°, carboya lb	_	05		.05	i del
Oleum tonks whe ton	18	50	- 20	1.00	in the second
Ovelie Corvetele bbl lb	-0	13		.14	135.0
Phoenhoric tech tenks lb	0	465	_	. 1.2	
Sulphuria 60° tentre ton	12	100	_···		OILS
Sulphuric, 60°, tanks, ton Tartaric, powd., bbl., lb Alcohol, gamyl from pentane,	10	541		.56	55.1m
Alashal Warmy from portang	+	.023		.00	in the
Alconol, a amy i from pentane,	Lab	151			1 Paint
Alashel butul tembra lb		141	- · · ·	105	C. and
Alcohol othyl depetured No. 1		1.1.43		.20	Do an
lb Alcohol, butyl, tanks, lb Alcohol, ethyl, denatured, No. 1 special, tanks, gal. Alum, ammonia, lump, lb		001			5.4
Alum annu anis lump lb		.043			All the
Aluminum sulphate, com. bags,		,047			131.00
too b	' 1	15		1.25	130.00.
100 lb Ammonia, anhydrous, cyl., lb	-	14		1.20	B.L.
	50	100	- 6	i.50	12
tanks, ton.	. 09	.00	- 0.	1.00	IL T
Ammonium carbonate, powd. casks, lb	•	003		10	mit
Casks, ID.,	20	.09		.10	1 EL PO
Surphate, wks., ton		.00		• • • • •	
Amyl acetate, tech. from pentane	5	01			25.12
tanks, ID.	•	.41	<u> </u>	02	m1
tanks, lb Aqua ammonia, 26°, drums, lb	0.0	.02		.03	
Amonia mhito new 1 hhl lh	00	.00		041	
tanks, ton Arsenic, white powd., bbl., lb Barium carbonate, bbl., ton	0.7	.00	_ 7	.03 .06 5.00 0.00	53.00E
Chlorida har tan	. 01		- 6	0.00	
Nitrate early lb	. οι	.00	1 0	11	00.0
INITIATE, CASKS, ID	. 05	.09	- 7	.11	
Bartum carbonate, bol., ton Chloride, bags, ton Nitrate, casks, lb Blanc fixe, dry, bags, ton Bleaching powder, f.o.b., wks. drums, 100 lb Borax, gran., bags, ton Calcium acetate, bags 100 lb Arsenate, dr., lb. Carbide, drums, ton.	, 07	.00		4.00	
desching powder, 1.0.0., wks.	° .	75	_	3.00	Reconce
Derums, 100 ID		2.75		0.00	1.5122
Colorum contexts here' 100 lb		8.50			16. XL,
Calcium acetate, bags 100 lb	. e	00.1		.10	ALL LER
Coshide days to	. 50	.09	_		10.00
Carbide, drums, ton Chloride, flake, bags, del., ton. Carbon bisulphide, drums, lb		50	- '2	8.00	U.S.
Chioride, nake, bags, del., ton.	. 41		- 0	.05	Th
Carbon bisuipnide, drums, ib	-	.05	-		
Tetrachloride, drums, lb Chlorine, liquid, tanks, wks., 10		.00	_	.06	
Uniorine, liquid, tanks, wks., 10	U,	0.00	_	2.30	24.3
Copper a rebonate, bl., lb., Sulphate, bags, 100 lb., Sulphate, bags, 100 lb., Cream of tartar, bbl., lb., Diethylene glycol, dr., lb., Epsom salt, dom., tech., bbl., 10 lb.	·	2.00	- 1	8.00	3.2,1
Copperas, bgs., 1.0.0., wks., ton.		.00	- 1	.24	14,2
Sulphoto home 100 lb	۰.,	.23	_	7.25	BR.C.
Croom of toston bbl lb	•	.45	-	.50	Mild.
Disthulana alucal dr. lb	•	.14		.15	1
Encoment dem took bbl 10	ò	.12	_	.10	50,0
Lepson sait, dom., occi., DDI., 10	υ,	2.05	_	2.25	同
Etheleostoto tople lb	•	.09		.19	1
lb. Ethyl acetate, tanks, lb. Formaldehyde, 30%, tanks, lb	•	.05	3		
who	••	03	2		10.5
wks. Furfural, tanks, lb. Glaubers salt, bags, 100 lb.		.09	ł		125
Glaubers salt, bags, 100 lb		1.25	- 1	1.50	- 22
Glycerine, c. p., drums, extra, lb.		.55	-	.60	14L
Lead:					
	V.				10
caska lb		.14	J		12
white, obsaic carbonate, ary casks, lb		.15	i	19	34
Lead acetate, white crva, bbl, lb).	.17			100
Arsenate, powd., bags, lb		.20) – (
Lithopone, bags, lb		.05	- H	.06	1
Magnesium, carb., tech., hags, lb).).	.07	1	.08	6.0
Methanol, 95%, tanks, gal		.60) – .		
Synthetic, tanks, gal		.24	Ŀ	.25	1.1
Phosphorus, vellow, cases, lb,		.22	2 -	.25	;
Methanol, 95%, tanks, gal Synthetio, tanks, gal Phosphorus, yellow, cases, lb Potassium bichromate, bags, lb.		.10		.10	
Chlorate, nowd., lb		.11	2 -	.11	1 14
Chlorate, powd., lb	t.,				
lb		.0	7-	.09	1
Muriate, 60%, bags, unit.				.53	1 B.L.
Nitrate, ref., bbl., lb Permanganate, drums, lb		,01	3+-	.21	
Permanganate, drums, lb		.20	1-10	.21	1 hrs
Prussiate, yellow, casks, lb. Sal ammoniac, white, casks, 10		.1	9 -	,20	100
Sal ammoniac, white, casks, 10	10	4	0	5.00	
lb.		4.5	0 -	5.00	
lb. Salsoda, bbl., 100 lb Salt cake bulk top	• •	1.1	0	1.4	6
Salt cake, bulk, ton	2	0.0	J		. 1
Soda ash, light, 58%, bags con tract, 100 lb Dense, bags, 100 lb Soda, caustic, 76% solid, drum	0+	1 0	0		
Dapas have 100 lb	• •	1.2	o – .		100
Soda constin 7607 politi deserved		1.2	o		1.0
100 lb	18,	2 5	0 -		. 1
100 lb.		2.5	0 5 }-	.00	
100 lb Acetate, del., lb Bicarbonate, bags, 100 lb Bichromate, bags, lb. Bisulphate, bulk, ton Bisulphite, bbl., lb.		2.2	52		
Bichromate bags 100 10	• •	0	8 -	.0	31
Bisulphate bulk top	• • •	0. 0. 09	ñ -	24.0	5
Bisulphite, bbl lb	••• *	0.0 0,	3 -	.0	
	-		-		

CHEMICAL ENGINEERING Weighted Index of Prices for **OILS & FATS**

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Prices for

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CHEMICALS

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Base = 100 for 1937

This month																				317.7
Last month																				303 8
February, 1946	•	٠	٠	٠	•	*	•	٠	•	•	•		•	•	•					145.6
February, 1945	•	•	٠	٩	•	٠	٠	٠	*	•	•		٠	*	٠	•	٠	•	•	145.6

Chlorate, kegs, lb. Cyanide, cases, dom., lb. Fluoride, bbl., lb. Hyposulphite, bags, 100 lb. Mitrate, bulk, ton. Nitrate, bulk, ton. Nitrite, casks, lb. Phosphate, tribasio, bags, 100 lb. Silicate, 40°, dr., wks., 100 lb. Sulphite, orys., bbl., lb. Sulphite, orys., bbl., lb. Dioxide, cyl., lb. Dioxide, cyl., lb. Tin erystala, bbl., lb. Oxide, Egran, bags, lb. Sulphate, bags, cwt. $0.06\frac{1}{2}$ $0.06\frac{1}{2}$ $14\frac{1}{2}$ 1507 - 082.25 - 2.503.40 - 4.0032.00 - 38.50 $06\frac{1}{2}$ 07.063-.07 nom. .05 -.09 -.09 -4.15 -- .08 - .09 - .09 - .09 - 7.00

OILS AND FATS

Castor oil, No. 3 dr., lb...... Chinawood, oil, tanks, lb..... Coconut oil, Ceylon, N. Y., lb... Corn oil crude, tanks (f.o.b. mill) Corn oil crude, tanks (r.o.b. mill) b. Cottonseed oil crude (f.o.b. mill) tanks, b. Linseed oil raw, oar lots, dr., lb. Panut oil, crude, tanks (mill), bl Rapessed oil, refined, bbl., lb. Soybean, tanks, lb. Menhaden, light, pressed, dr., lb. Crude, tanks (f.o.b. factory), bl Grease, yellow, loose, lb. Oleo oil, No. 1 lb. Red oil, distilled, bbl., lb. Tallow, extra, loose, lb.

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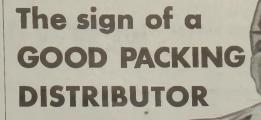
COAL TAR PRODUC	rs	
pha-naphthol, crude, bbl., lb	0.58 -	\$0.60
pha-naphthylamine, bbl., lb	.35 -	.36
iline oil, drums, lb	.12 -	.12
iline salts, bbl., lb	.22 -	.24
mzaldehyde, tech., dr., lb	.45 -	.50
nzidine base, bbl., lb	.70 -	.75
nzoic acid, USP, kegs, lb	.54 -	.56
anzol, 90%, tanks, works, gal	.17 -	
anzyl chloride, tech., dr., lb	.20 -	.21
eta naphthol, tech., drums, lb	.23 -	.24
resol, USP, dr., lb	.131-	
resylic acid, dr., wks., gal	1.00 -	1.05
iphenyl, bbl., lb	.16 -	
iethylaniline, dr., lb	.48 -	.50
initrotoluol, bbl., lb	.18 -	.19
initrophenyl, bbl., lb	.22 -	.23
ip oil, 15%, dr., gal	.23 -	.25
iphenylamine, dr., f.o.b. wks.,	~ ~	
lb		
acid, bbl., 1b	.50 -	
lydroquinone, bbl., lb	.90 -	
aphthalene, flake, bbl., lb	.091	
litrobenzene, dr., lb	.08 -	
ara-cresol, bbl. lb	.41 -	
ara-nitroaniline, bbl., lb	.101-	
henol, USP, tanks, lb	.30 -	
icric, acid, bbl., lb	1.55 -	
vridine, dr., gal	.68 -	
lesorcinol, tech., kegs, lb.	.26 -	
alicylic acid, tech., bbl., lb.		
olvent naphtha, w.w., tanks, gal.	1.00 -	
Coluidin, bbl., lb.		
foluol, drums, works, gal.		
gion com, tanks, gar		

MISCELLANEOUS

asein, tech, bbl., lb	nom.	
Dry colors:		
Carbon gas, black (wks.), lb	\$.04 -	\$.07
Prussian blue, bbl., lb	.42 -	.43
Ultramarine blue, bbl., lb	.13 -	.24
Chrome green, bbl., lb	.25 -	.40
Caroline green, DDL, ID.	5.50 -	6.00
Carmine red, tins, lb	.80	.95
Para Toner, lb	2.60 -	2.70
Vermilion, English, bbl., lb.		2.10
Chrome yellow, C.P., bbl., lb	.24 -	.20
Gum copal, Congo, bags, lb	.09 -	
Manila, bags, lb	.09 -	.15
Damar, Batavia, cases, lb	.10 -	
Kauri, cases, lb	.18 -	
Magnesite, calc., ton	58.75 -	
Pumice stone, lump, bbl., lb	.05 -	.07
Rosin, H., 100 lb.	11.50 -	
Shallan	.72 -	
Shellac, orange, fine, bags, lb.		
Bleached, bonedry, bags, lb		
T. N. bags, lb	1 45 -	

Turpentine, gal

CHEMICAL	ENGINEERING		FEBRUARY	1947
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Johns-Manville Packings

Authorised Distributor

CONSERVING POWER FOR INDUSTRY

WHEN you need a packing-you'll find, as thousands of others have, that the sign, Authorized Distributor -Johns-Manville Packings-means the right packing for your job . . . and a man who is ready and able to help solve your particular packing problem.

Your J-M Distributor is one of 400 Industrial Distributors who are located in important cities throughout the country and who stock Johns-Manville Packing in many forms and styles. Besides being a convenient supply

depot for packing, he is also headquarters for many other industrial supplies. Wherever there's a need for an essential part or tool or material, you can count on him for prompt, efficient service at all times.

Packings For Every Service are avail-able through your J-M Distributor. See him about your Packing needs.



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Your Johns-Manville PACKING DISTRIBUTOR

NEW CONSTRUCTION

Proposed Work

- Pa., Roaring Springs, D. W. Bare Paper Co., Roaring Springs, plans to construct a 2 and 3 story factory and warehouse. Estimated cost \$750,000.
- Tex., Texas City—Carbon & Carbide Chem-icals Corp., subsidiary of Union Carbide & Carbon Corp., New York, N. Y., plans to enlarge its plant here for the manufacture of plastics. Ford, Bacon & Davis, Texas City, Eng. Estimated cost \$10,000,000.

Contracts Awarded

- Ark., Clarksville-Eureka Brick & Tile Co., c/o E. K. Johnson, Clarksville, plans to con-struct a brick producing plant. Work will be done by owner. Estimated cost \$200,000.
- Calif., Los Angeles-Oro Chemical Co., 1018 South Santa Fe Ave., has awarded the con-tract for the construction of a factory to Fred Aldous, 8467 West Third St. Estimated cost \$60,000.
- Calif., Oakland-Pacific Rubber Co., 4901 East 12th St., has awarded the contract for a storage and shipping facilities building to Barrett & Hilp, 918 Harrison St., San Francisco. Estimated cost \$165,000.
- Fla., Jacksonville-General Chemical Co., 40 Rector St., New York, N. Y., will construct a sulphate plant with own forces. Estimated cost \$260,000.
- Ga., Augusta—Lily Cup Manufacturing Co., c/o Augusta Chamber of Commerce, has awarded the contract for a paper manufactur-ing plant to P. Kretzer & Sons, 32-15 Law-rence St., Flushing, N. Y. Estimated cost \$1,500,000.
- Md., Baltimore-Standard Oil Development Co., 500 North Broad St., Elizabeth, N. J., has awarded the contract for alterations and additions to its refinery to Consolidated En-gineering Co., 20 East Franklin St., Baltimore. Estimated cost \$150,000
- Minn., Hastings-Minnesota Mining & Manu facturing Co., 900 Fauquier Ave., St. Paul, has awarded the contract for a resin plant to W. Murphy & Son, 428 New York Bldg., St. Paul. Estimated cost \$150,000.
- N. J., Lyndhurst—Economics Laboratory, Inc., 914 Guardian Bldg., St. Paul, Minn., has awarded the contract for design and construction of a plant for the manufacture of a soapless cleaner, to Walter Kidde Construc-tors, Inc., 140 Cedar St., New York City. Estimated cost \$65,000.
- J., Trenton-Columbian Carbon Co., 601 Cass St., will construct a factory. Work will be done by separate contracts. Estimated cost \$275,000.
- O., Cleveland—Sherwin-Williams Co., Mid-land Bldg., has awarded the contract for a 3 story, 259x264 ft. and 2 story, 259x264 ft. warehouse to Albert M. Higley Co., 2936 East 22nd St. Estimated cost \$450,000.
- ... Youngstown-Republic Rubber Div. of Lee Rubber & Tire Corp., Albert St., has

	C. DOLALING A	1.1.1.1.1.0
	Proposed	
	Work	Contracts
New England		\$55,000
Middle Atlantic		708,000
South		2,164,000
Middle West		705,000
West of Mis-issippi	11,009,000	23,332,000
		478.000
Canada		
- Total	\$10,750,000	\$27,442,000

awarded the contract for a plant addition to George J. Murphy Construction Co., 519 Belmont Ave. Estimated cost \$100,000.

- Okla., Tulsa-Carter Oil Co., 1133 North Lewis St., has awarded the contract for an addition to its research laboratory to Marshall-Kerr Construction Co., 728 West 7th St. Estimated cost \$225,000.
- Ore., North Portland-Western Waxed Paper Co., Swift Blvd., North Portland, has awarded the contract for a 1 story, 66x85 ft. addition to its plant to Reimers & Jolivette, Railen Enders Plant Railway Exchange Bldg., Portland. Estimated cost \$\$1,000.
- Ore., Portland—Lloyd A. Fry Roofing Co., 5818 Archer Rd., Summit, Ill., has awarded the contract for a 1 story factory here to Camp-bell, Lowrie, Lautermilch Corp., 400 West Madison St., Chicago, Ill. Estimated cost \$172,000.
- Pa., Chester-Scott Paper Co., foot of Market St., will construct a boiler house at its plant. Work will be done by separate contracts un-der supervision of Stone & Webster Engineer-ing Corp., 49 Federal St., Boston, Mass. Estimated cost \$1,500,000.
- Connellsville-Anchor Hocking Glass Pa., a, Connensvinc—Anchor Hocking Glass Corp., Lancaster, has awarded the contract for a 1 story, 80x85 ft. addition to O. C. Cluss Lumber Co., Penna Ave., Uniontown. Estimated cost \$55,000.
- Pa., Natrona-Pennsylvania Salt Manufacturing Co., Natrona, has awarded the contract for a salt storage building to Unkefer Bros., Professional Bldg., Pittsburgh. Estimated cost \$60.000.
- Pa., Neville Island-Watson Standard Co., 225 Galveston Ave., Pittsburgh, Pa., has awarded the contract for a paint and varnish manu-facturing plant to Landau Bros. Building Co., 128 First Avc., Pittsburgh. Estimated cost \$60,000.
- Pa., Philadelphia-Barrett Div. of Allied Chem-ical & Dye Corp., Margaret and Bernuda Sts., has awarded the contract for repairing its plant to Frank V. Warren, Inc., Lewis Tower Bldg. Estimated cost \$98,000.
- R. Providence-National Glass Co., Inc., 1645 Westminster St., has awarded the con-tract for a 1 story addition to its factory to Dimeo Construcion Co., 75 Westminster St. Estimated cost \$55,000.
- Tex., Bishop-Celanese Corporation of America, Bishop, has awarded the contract for expanding chemical plant and constructing rail-

way spur tracks to Tellepson Construction Co., 3900 Clay St., Houston. Estimated cost \$65,000 and \$72,000 respectively.

-Cumulative 1947---

Contracts

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- Tex., Brownsville—Carthage Hydrocol, Inc., G. C. Gabrielson, Pres., Brownsville, has awarded the contract for the construction of a gasoline manufacturing plant to Arthur G McKee Co., 2300 Chester St., Cleveland, O. Hydrocarbon Research, Inc., 115 Broadway, New York, N. Y., Engr. Estimated cost \$15,000,000.
- Houston-Gulf Portland Cement Co., Tex., Shell Bldg., has awarded the contract for enlarging its plant to Stearns-Rogers Manufac-turing Co., Union National Bank Bldg. Estimated cost \$1,000,000.
- Houston-Rohm & Haas Co., Ship Tex. Channel, has awarded the contract for chemical plant and warehouses to Foster-Wheeler Corp., 2501 Crawford St.. Estimated cost \$1,200,000 and \$200,000 respectively.
- Tex., Houston-Rohm & Haas, 222 West Washington St., Philadelphia, Pa., has awarded a contract for additional plant construction for manufacturing chemicals, plas-tics, etc., to Foster-Wheeler Corp., 2501 Crawford St. Estimated cost \$3,250,000.
- Tex., Liberty-Texas Gulf Sulphur Co., Second National Bank Bldg., Houston, has awarded the contract for the construction of a sulphur plant to Consolidated Steel Corp., Oreange. Estimated cost \$2,000,000.
- Moss Hill (near Hardin)-Texas Gulf Tex. Sulphur Co., Second Natl. Bank Bldg., Houston, will construct two mining plant buildings and two plant additions. Work will be done by owner. Estimated cost \$150,000.
- a., Fredericksburg—Svlvania Division of American Viscose Corp., Fredericksburg, has awarded the contract for an acid recovery building and river pump house to Hughes Foulkrod Co., 1505 Race St., Philadelphia, Pa. Estimated cost \$55,000 and \$98,668 Va. respectively.
- Vis., Brown Deer (Milwaukee P. O.)—Lake-side Laboratories, Inc., 1707 East North Ave., Milwaukee 2, has awarded the con-tract for a 1 story, 90x22 ft. and 40x40 ft. synthetic chemical laboratory to Peters Con-struction Co., 2640 North Humboldt Ave., Milwaukee. Estimated cost \$100,000. Wis.,
- Wis Rhinelander-Rhinelander Paper Co., Rhinelander, has awarded the contract for a 1 story, 156x365 ft. finishing room building and 1 storv, 52x60 ft. filter building to C. R. Meyer & Sons Co., 50 State St.,, Oshkosh.

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Thomas "A METAL" Flex Couplings do depend on spi gears, rubbe grids to drive power is transm by direct pun. fect balance all conditions o alignment ... Lubrication i

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Hexible SPECIFIED WHERE 100°% DEPENDABILITY IS DEMANDED

Engineered to stand up on even the toughest jobs, Thomas Flexible **Couplings can be supplied in special** corrosion resisting materials for the chemical industries.

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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lexible COUPLINGS provide for Angular and Parallel Misalignment[°]as well as Free End Float ... BACKLASH, FRICTION, WEAR and CROSS-PULL ARE ELIMINATED NO LUBRICATION IS REQUIRED!

TYPE AM

The Standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special Flexible Couplings.



TYPE DBZ

TYPE CM

TYPE SS

Remember!

The longer life of Thomas Flexible Couplings, without costly interruptions and replacements, adds much to your operating profits.

COMPANY FLEXIBLE COUPLING THOMAS PENNSYLVANIA WARREN,

CHEMICAL ENGINEERING . FEBRUARY 1947 .





"THAT'S FOR ME ///

That's just exactly what the man said.

You've probably said it, too—as you leafed through the advertising pages of a current issue of THIS magazine.

It happens all the time-to every man who is on top of his job.

Why? Because he keeps a weather eye out for the things that promise a better, faster, more economical way of doing something.

He knows that America's 'eading manufacturers take the newest and best of their products and services to market in the advertising pages of the business and industrial magazines that help him keep on top of his job. And if *it's for him* he wants to know what makes it tick.

To keep in touch with the parade-----READ THE ADS.

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Available fo ssaying 101tous technics, in metallic im, i selection pro d Calcium Nin turch adhesive protechnics; i roting incande porsses.

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Calcium Nitrate REAGENT . PURIFIED . TECHNICAL

Available forms range from the four-water crystal reagent grade product assaying 101-104% Ca(NO3)2.4H2O, (35% H2O) to the essentially anhydrous technical grade assaying 98% min. Ca(NO3)2, (2% H2O). All are low in metallic impurities, particularly copper, nickel, iron and manganese. Such a selection provides a product suitable for any of the industrial applications of Calcium Nitrate, some of which are: in the production of rubber goods; starch adhesives; radio tubes and electric light bulbs; explosives, matches and pyrotechnics; in the preparation of heat transfer salts and compositions for For Your Fine Chemical Needs* treating incandescent mantles; as well as a number of patented processes.

Potassium Nitrite TECHNICAL AND CRYSTAL REAGENT

Production of technical grade Potassium Nitrite in commercial quantities was pioneered by Baker & Adamson Research to meet vital wartime needs. Now this Fine Chemical is available to Industry exclusively from B&A for a host of wide-ranging uses, including: regeneration of heat transfer salts; removal of scale from tungsten rods; manufacture of diazo dyes; as a rust inhibitor, etc. Rely on General Chemical's The fused lump technical grade

assays 90% min. KNO₂.

Zinc Formate

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Another example of a laboratory chemical brought into commercial production by B&A to meet customer requirements. The purified grade offered is in white, free-flowing granular form, assaying 99.5% Zn(CHO3)2.2H2O, and low in metallic impurities. New as an industrial chemical, Zinc Formate holds promise in many fields. Suggested uses include: as a catalyst in manufacture of Baker & Adamson Division methyl alcohol; production of pure zinc oxide; agent for waterproofing cellulosic materials and weighting silk, etc.

★ This is the second in a series of advertisements reviewing the B&A Fine Chemicals commercially available to American Indus-

try today from the Baker & Adamson Divi-

sion of General Chemical Company. Scores

of such purity products await your investigation. To learn more about these or other B&A Fine Chemicals that meet your requirements, write or phone nearest B&A Sales and Technical Service Office.



CHEMICAL ENGINEERING • FEBRUARY 1947 •

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TROUBLE CAN'T HIDE BEHIND GLASS

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The flexibility obtainable with "Pyrex" brand glass pipe is illustrated in this installation at Lakeside Laboratories, Milwaukee, Wisconsn. The use of elbows. tees and reducers almost any processing requirement can be met. Note the use of a glass centrifugal pump at the left.

Ro

TREX

REX brand GLASS pipe is used in our plant for oth transfer and hear exchanger work. One appliration has been the alternate transfer of an alkuline organic solvent and muriotic acid, unusually severe service. The pipe shows no sign of deterioration." LAKESIDE LABORATORIES, MILWAUKEE, WIS

Tough going . . . but PYREX brand GLASS pipe, in service for five years at Lakeside Laboratories, has outlasted all others tried for the same service . . . and has done it without a hint of corrosion or contamination . . . in both heat exchanger and transfer work. In no case has there been a failure, even though operating temperatures are often as high as 200°C.

Here is the experience of a typical user of PYREX brand GLASS pipe. Typical, too, is this company's satisfaction with its performance. Mile upon mile of PYREX pipelines in daily use in chemical and food plants throughout the country prove that when it comes to performance, to sturdiness and serviceability, glass pipelines hold their own. Try a test piece of PYREX pipe in the toughest spot in *your* plant.



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ees and reducen nilugal pump at

Specify PYREX brand GLASS pipe for ...

1. Corrosion resistance . . . it won't pinhole . . . nothing wears off or becomes loose to clog lines.

2. Product purity . . . PRYEX brand glass remains inert in the presence of all acids (except HF) and moderate alkalies. Product purity is assured.

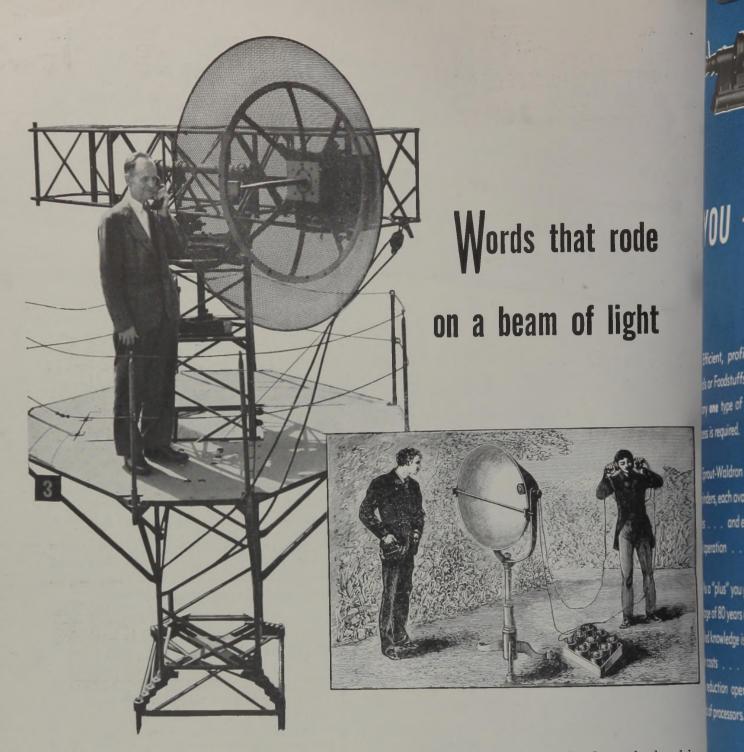
3. High visibility . . . the transparency of PYREX pipe keeps you posted on all transfer operations every minute. Trouble can't hide behind glass.

4. Low cost . . . from the standpoint of initial outlay and overall maintenance, records prove that PYREX is low in cost. Maintenance men find that glass pipe goes up faster than most materials.

5. Proved performance ... for over 15 years PYREX pipe has proved safe and practical in hundreds of plants. Try a test installation now.

Range of pipe sizes and fittings PYREX pipe is available in 1'', $1'_2''$, 2'', 3'' and 4" I.D. Adapter connections are available for all sizes of standard fittings of other material. Glass fittings include ells, tees, return bends, laterals and reducers in same sizes as pipe. CORNING GLASS WORKS TECHNICAL PRODUCTS DIVISION CORNING, NEW YORK SIGNALWARE LIGHTINGWARE GAUGE GLASSES GLASS PIPE OPTICAL GLASS GLASS COMPONENTS LABORATORY GLASSWARE CORNING GLASS WORKS, DEPT. CE2, CORNING, N. Y. Please send me Bulletin IA-3 describing PYREX brand Pipe. NAME_____TITLE_____ COMPANY

PYREX" IS A REGISTERED TRADE-MARK AND INDICATES MANUFACTURE BY CORNING GLASS WORKS, CORNING, N.Y.



IF Alexander Graham Bell could look at the microwave antenna in the illustration, how quickly his mind would go back to his own experiments, 67 years ago!

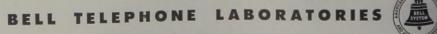
For in 1880 the inventor of the telephone had another new idea. Speech could be carried by electric wires, as Bell had demonstrated to the world. Could it be carried also by a light beam?

He got together apparatus—a telephone transmitter, a parabolic reflector, a selenium cell connected to handphones—and "threw" a voice across several hundred yards by waves of visible light, electromagnetic waves of high frequency.

Bell's early experiment with the parabolic antenna and the use of light beams as carriers was for many years only a scientific novelty. His idea was far ahead of its time.

Sixty years later communication by means of a beam of radiation was achieved in a new form-beamed microwave radio. It was developed by Bell Telephone Laboratories for military communication and found important use in the European theater. In the Bell System it is giving service between places on the mainland and nearby islands and soon such beams will be put to work in the radio relay.

In retrospect, Bell's experiment illustrates once again the inquiring spirit of the Bell System.



EXPLORING AND INVENTING, DEVISING AND PERFECTING FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE

• FEBRUARY 1947 • CHEMICAL ENGINEERING

YOU + = PROFIT

Efficient, profitable size reduction of materials or Foodstuffs cannot be accomplished best by any **one** type of machine. Often a complete process is required.

Sprout-Waldron offers you six different types of grinders, each available in a number of sizes and styles . . . and each one proved . . . in actual operation . . . the best of its kind.

As a "plus" you get at Sprout-Waldron the advantage of 80 years of processing know-how. This applied knowledge is responsible for outstandingly lower costs . . . and higher profits . . . in size reduction operations now benefiting thousands of processors.

SPROUT-WALDRON & COMPANY

Manufacturing Engineers

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KOVEN WAS MAKING INDIVIDUALIZED

CHEMICAL EQUIPMENT

When a top performer comes on the scene it's news. Back in 1881 KOVEN bowed in and showed the chemical industry what soundly built, individualized chemical equipment could do. On every assignment, regardless of size or specifications, KOVEN turned in an economical performance marked by outstanding efficiency. We build to meet your needs, incorporating in each job our diversified experience gleaned through years of delivering superior individualized chemical equipment. Consult with a KOVEN trained representative who assures you of up-to-the-minute counsel. Call or write KOVEN today.

KOVEN equipment, in all commercial metals and alloys, includes: pressure vessels, extractors, mixers, stills, condensers, kettles, tanks, chutes, containers, stacks, coils.

KOVEN FOR INDIVIDUALIZED CHEMICAL EQUIPMENT SIN 1881

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PLANTS: Jersey City, N. J.

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JERSEY CITY 7, N. J.

Easy-Mounting, Fast-Locking Sheave

TEXROPE ... Greatest Name in **V-Belt Drives**



"Super 7" V-BELTS Five Types - Sizes to suit every power transmission job.



Texsteel, Texdrive, "Magic-Grip" - sheaves in a full range of sizes, grooves.



"Vari-Pitch" SHEAVES Exact variations in speed, stationery or motion control.



SPEED **CHANGERS** Speed variations up to 375% at the turn of a crank.



ENGINEERING Finest V-Belt engineering talent in the world-at your call.

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







"MAGIC-GRIP" sheaves offer time-saving, money-saving features!

E^{VEN} if you install the sheave only once, and never change it again — it pays to get a "Magic Grip" sheave! For frequent changes, naturally, your savings pyramid. • No filing or reaming. "Magic-Grip" bushing slides easily, even on oversize shafts. • No hammering or forcing to damage motor bearings.

• No wheel puller needed to get the sheave off

• No set screws to mar or score the shaft.

• No wobble or blacklash. "Magic-Grip"

sheaves lock to shaft with shrunk-on grip. HOW DOES IT WORK? Sheave and bushing come completely assembled. You just slip it on the shaft — align — and tighten three screws. That's all! And it comes off just as easily.

Standardize on time-saving, money-saving "Magic-Grip" sheaves. They're heavy duty, precision made and finely finished — the best sheaves you can buy... the best economy in the long run. Get them through your nearest A-C dealer or office.

Allis-Chalmers, Milwaukee 1, Wis. A 2166



CHEMICAL ENGINEERING . FEBRUARY 1947 .

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For accurate weighing and bagging economy . . .

New RICHARDSON automatic Bulk weighing scale—class 38

Gives you continuous accurate weights when handling borax, ores, clays, minerals, salts, soda ash, potash, alum, etc., — and you get the savings that go with Richardson accurate control due to the equal-arm lever principle—the most accurate method of weighing known.

With this totally enclosed scale — dustproof, and easy to operate — weighing chemicals to mixers, grinders, mills, storage bins, packers, driers, etc., your control of plant operations — by weight is complete. In addition, automatic counter provides continuous operation records for determining what each pound of chemical processed is costing you. Write for Bulletin No. 8946.



New RICHARDSON automatic Bagging scale model G-38

For weighing and bagging dry, ground, and granular chemicals and minerals, you can depend on this Richardson Scale for continuous accuracy and economy.

Among the many reasons why the new Richardson Model G-38 is finding favor with chemical industries are these construction features. Brushsealing, radial feed gate closes when weighed material is in true balance . . . Compensating poise for adjustment conveniently located . . . Automatic discharge from scale hopper to bag (or manual control, if desired). Scale is made in special alloy metals and modified design for corrosive or abrasive materials.

Get the whole story of the Model G-38 — its accuracy, economy and all'round dependability. Write for Bulletin No. 9646.

Both types of scale can be built to your requirements.

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TYPE OF GROUND, DRY OR GRANULAR MATERIALS

Alum • Ammonium Sulphate • Borax • Lime • Calcium Chloride • Graphite Carbon Black • Feldspar • Nitrates • Clays • Ores • Talc • Fullers' Earth Salt • Potash • Sludge • Soda Ash • Phosphates • Sulphur

Handled By RICHARDSON SCALES

• FEBRUARY 1947 • CHEMICAL ENGINEERING

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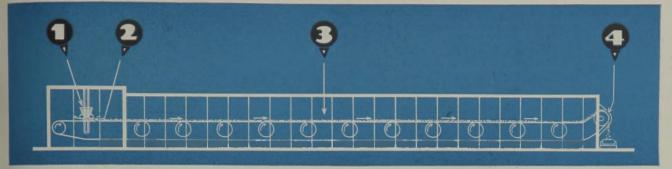
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CLAY DRIED TO UNIFORM

MOISTURE CONTENT OF 3.1% (B.D.W.B^{*})

AT RATE OF 2 TONS PER HOUR

*Bone Dry Weight Basis



in PROCTOR CONTINUOUS CONVEYOR SYSTEM

In one typical installation of a Proctor individually designed continuous conveyor drying system, for use in drying clay, here is what takes place. ① Wet clay, with a moisture content of 42.1% (B.D.W.B.) is delivered to the pre-forming feed of the dryer, from a continuous filter. Coming to the hopper of the Proctor rolling extruder feed. in this highly moist state, the material is forced through a perforated plate by rolls moving back and forth, and deposited onto the conveyor of the dryer in spaghetti-like extrusions. This particular Proctor preforming feed is ideally suited to the handling of clay, for the initial moisture content and the physical characteristics of this product are such that it will hold a definite shape after extrusion. E Loaded to a uniform depth on the moving conveyor, the clay is conveyed through the drying chambers, where heated air at 212° F. is circulated through the bed of material. By forming the clay into these small, uniform shapes, more rapid diffusion is possible, which accounts for rapid drying and the uniformity of the finished

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clay. After 42 minutes of drying time, the clay, uniformly dried to a moisture content of 3.1% (B.D.W.B.) is discharged from the dryer at the rate of 4,160 pounds—or more than two tons (C.D.W.†) per hour. Clay, thus dried, in the form of small particles, is uniformly dried all the way through to the center of each particle. This makes possible rapid and complete dispersability in water and, therefore, makes the clay ideally suited to subsequent use.

Proctor continuous conveyor drying systems, with pre-forming feeds, engineered to the individual product requirements, are in operation for a wide variety of wet-solids. It is safe to say that there are hardly two wet-solid drying problems exactly alike; that is why it pays to consult Proctor engineers early when you are considering drying equipment. On the basis of their experience they will be able to make laboratory tests on your product and then translate the results into a recommended system that will meet all of your requirements. TCommercial Dry Weight

This is a case history taken from this new Proctor booklet

A new 12-page booklet on "Proctor Continuous Drying for the Chemical Process Industries" is available upon request. It contains many case studies showing the application for Proctor individually designed systems. Write for your copy of this informative booklet today.



PROCTOR & SCHWARTZ, INC., Philadelphia 20, Pa.

323

QUICK WAYS TO CHECK MOISTURE CONTENT OF GASES

These G.E instruments give you quick and accurate analysis of moisture content in gases . . . whether your job requires a continuous record or just a spot check. One, the Dew-Point Indicator, is a portable device designed for spot checking. The other, the Dew-Point Recorder, is an automatic instrument which gives you a continuous record of the moisture content.

HOW CAN THESE INSTRUMENTS BE USED?

For measuring humidity of gases at compressor outlets, in storage systems, and at various points in plant piping systems.

For factory processes such as checking mechanical or chemical dryers furnace atmospheres, coolers, etc.

For analyzing moisture content of compressed gases.

For testing natural gases for humidity (to prevent freezing), partially burned city gases, and flue gases.

For experimental and process testing in research and testing laboratories.

DEW-POINT RECORDER

for Continuous Operation

This instrument is designed to give, automatically, a continuous record of the dew-point temperature which is converted to moisture content. Must be permanently installed.

How accurate is it? Photoelectric system eliminates possibility of human error. Measures dew-point temperature with accuracy of better than plus or minus 5 degrees F at minus 90 degrees F, and plus or minus two degrees F above minus 20 degrees F. Measurement is from ambient to minus 90 degrees F.

Operation of the Dew-Point Recorder is easy. After initial installation, only a minor adjustment or two is necessary before putting into continuous operation.

GENERAL (%) ELECTRIC

DEW-POINT INDICATOR

For Quick Spot Checking. Here's the quicktest instrument. Portable and compact. You can spot check gases in less than a minute. Versatile, too! Several gases can be measured in sequence with little purging time between measurements.

How accurate is it? Exclusive of observation error, plus or minus three degrees F over the entire range. Measurement range extends from plus 110 degrees F to minus 100 degrees F. Easy to use: you simply read the dew-point temperature and use the conversion table to determine moisture content.

The instrument is self-contained in a small, portable black metal case. Especially suitable for checking the moisture content of finished gases, or making checks where constant record of variations are not required.

FREE: Available now are publications on the Dew-Point Recorder and the Dew-Point Indicator and other gas analysis equipments. Check the ones you want and mail this coupon today for your free copies.

GEA-4613—Dew-Point Measuring Equipments
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General Electric Co., Section C800-31 Schenectady 5, N. Y.
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EMICAL ENGL

THE PIONEER CREED Always New, Always Better

Since the turn of the century Niagara has pioneered basic electro-chemical development in this country This experience is reflected not only in Niagara product quality but also in the efficiency of the service Niagara extends to customers seeking to blaze new trails to product improvement.

instinctive guidance...

SINCE EARLY TIMES, the raven has been celebrated in parable and legend by men of the sea for its remarkable instinctive faculty for flying directly toward the nearest land. Similarly, an instinct for direction often serves in the development of industrial enterprise, guiding with certainty and confidence toward the achievement of set goals. Pioneering in the development of the electro-chemical industry in America, Niagara products and services have been built upon a sure sense of the need by industry for basic electro-chemical products. Niagara Alkali Company has continued to advance the means and methods of producing these basic chemicals for industry to the highest quality standards. That is why Niagara can be relied upon to deliver consistently high-quality products at all times. Niagara Alkali Company, 60 East 42nd Street, New York 17, N.Y.

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Niagara Alkali Company

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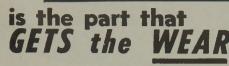
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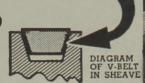
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You See at Once That the SIDE of a V-BELT





Naturally so, because the sides of a V-belt do all the gripping on the pulley. They get all the wear against the sheave groove wall.

and Now See How the

CONCAVE SID

It's the sides, too, that pick up all the power delivered by the driver pulley. The sides transmit that power to the belt as a whole. And then, once more, it's the sides--and the sides alone-that grip the driven pulley and deliver the power to it.

That is why you have always noticed that the sidewall of the ordinary V-Belt is the part that wears out first.

REDUCES Sidewall WEAR Greatly Lengthening Belt Life!

A GATES PATENT

Clearly, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the <u>middle</u> of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longen service than any straight-sided V-Belts can possibly give.

✓ MORE Important <u>NOW</u> Than ever Before!

Now that Gates <u>Specialized</u> Research has resulted in V-Belts having much stronger tension members -- tension members of Rayon Cords and Flexible Steel Cables, among others--the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the lifeprolonging Concave Side is more important today than ever before!

THE GATES RUBBER COMPANY, DENVER, U. S. A. World's Largest Makers of V-Belts Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley



You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

> Gates V-Belt with Patented Concave Sidewall



Showing' How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley



No Bulging against the sides of the sheave groove means that sidewall wear is <u>evenly distributed</u> over the <u>full width</u> of the sidewall—and that means much longer life for the belt!



CHEMICAL ENGINEERING . FEBRUARY 1947 .

SIMPLE but EFFECTIVE

MATIONAL SECTION



National Cooling and Condensing Sections are designed not only for simplicity and ease of assembly—but also for highly efficient heat transfer performance. These characteristics—plus long service life—make CAST IRON National Sections an ideal choice for your cooling and condensing services.

Here is a partial list of services for which CAST IRON National Cooling and Condensing Sections have been successfully used:

CHEMICALS Solvent Coolers Solvent Condensers Soda Solution Coolers Aqua Ammonia Coolers Mixed Acid Coolers CO₂ Coolers Sulphuric Acid Coolers COKE BY-PRODUCTS Wash Oil Coolers Ammonia Liquor Coolers Ammonia Dephlegmators Light Oil Condensers Pyridine Condensers Tar Vapor Condensers Gas Coolers PETROLEUM Gasoline Condensers Crude Still Condensers Pressure Distillate Condensers Sidestream Coolers Bottoms Coolers Lube Oil Coolers Natural Gas Coolers

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Write for descriptive catalog CP-16, and remember that National field engineers will consult with you at any time—and without obligation.



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UNITED INTERNATIONAL RESEARCH, Inc.

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-AS A CATALYST

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-FOR THE FORMATION OF ORGANIC BORATES

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> > UNITED INTERNATIONAL RESEARCH, INC. CHEMICALS DIVISION **P. O. BOX 36** NEWARK 1, N. J.

CHEMICAL ENGINEERING • FEBRUARY 1947 •

The Final Touch of Pump Precision

Built by Quimby Pump Co., Inc., this 6D Vertical gear-in-head Rotex Pump, arranged back to back, is direct-connected by a flexible coupling to a 40 h.p., 432/720 r.p.m. vertical ball bearing motor.

Rotex pumps are a close clearance type of unit. They depend on SCF Bearings to maintain the few thousandths of an inch clearance both axially and radially throughout the life of the pump. Good pumps and good bearings are always found together.

部法序 INDUSTRIES, INC. Front St. and Erie Ave., Phila. 32, Pa.

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BALL AND ROLLER BEARINGS

HEREGENERATION

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COOLING

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THE PRODUCT HAS AN AFFINITY FOR WATER VAPOR

SULPHUROUS PURGING GASES ENCOURAGE CORROSION

CARBONIC ACID MIGHT VITIATE THE PRODUCT

EN KEMP inert gases can be modified to match

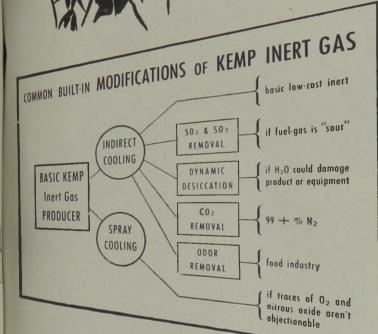
The so-called "inert gases" aren't always inert. The raw products of combustion which comprise the basis of most "inerts," contain water vapor and carbon dioxide—and, often, sulphur dioxide, odorous aldehydes and nitrous oxides —all in addition to the nitrogen you're after. And each of these can be most active in contact with certain materials at certain temperatures and pressures.

That's why the modifications of basic "inerts" (to remove selected components) are important.

KEMP is an old hand at gas modifications. It was one of the very first to make dynamic desiccation (continuous adsorption in gel beds) available to the chemical industries. Its equipment has been favored in sour-gas territories for years, because of its attention to SO_2 and SO_3 troubles. And lately it has set up to build amine scrubbers (for CO_2 absorption) —as well as odor-removal towers . . . into its units.

KEMP modifies the gas to match your job. Use the coupon for more particulars.

> JML Co.—K-B1cm The C. M. Kemp Mfg. Co., Inc. 405 E. Oliver St., Baltimore 2, Md. Send me your literature on the KEMP inertgas family. NAME POSITION COMPANY PLACE I use inert gas for purging Danketing preventing oxidation agitation fire protection displacement



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ADAPTED COMBUSTION FOR INDUSTRY'S HEAT USING PROCESSES

ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS FOR PROCESS CONTROL AND PROTECTION CHEMICAL ENGINEERING • FEBRUARY 1947 •

you should know more about

K&M "Century" **ASBESTOS CORRUGATED**

If you are planning repairs, remodelling, or new construction, the choice of building ing, or new construction, the enoice of bunding materials is all-important to you. Here are six inductrials is all-important to you. Here are six compelling reasons why K&M "Century", Asbestos Corrugated has proved to be the ideal inductrial sidior and reafore materials aspessos corrugated has proved to be industrial siding and roofing material: 1. Corrosion-proof . . . "Century" Corrugated resists the effects of rust, corrosion, smoke,

gated resists the enects of rust, corrosion, smore, soot, moisture, oil, other conditions so destructive 2. Weather-proof . . . withstands the worst to ordinary building products.

3. Fire-resistant . . . it cannot burn, and it helps prevent spread of fire. the elements can bring.

4. Speedily installed . . . large easy-to-work unit sizes speed construction, hold labor costs **5.** Extremely strong ... corrugations build extra structural strength into rugged asbestos-rement commonition. It actually grows tougher to rock-bottom.

ected structural strength into rugged aspestos-cement composition. It actually grows tougher 6. Maintenance-free ... first cost is last cost. Never needs painting, will not warp, with age.

It will pay you to send for full descriptive matter on "Century" Asbestos Corrugated and Flat Lumber. Just write us, we'll put it in the mail at once rot, or decay.

at once. KEASBEY

This tall mining headhouse will withstand a lifetime of beatings ation has complete from wind, weather and other tough conditions. It's completely units. The Indus sheathed with "Century" Asbestos Corrugated.



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TUROS. GEAR DENT H, 4545 S. P How long will it be before exploration of stellar spaces becomes practical? Ten years fifty years—a hundred years? It is not wise to predict, particularly when we consider the advances that the past few years have brought.

· planning on building a rocket ship ?"

But if you are developing a rocket ship, you will undoubtedly call on Foote Bros.—just as in the past manufacturers of other marvels of transportation have.

Today, Foote Bros. is producing precision gears of Aircraft Quality for many purposes where light weight, extremely high speeds, maximum efficiency, compactness and low noise level are important. Foote Bros. Power Units and Actuators provide absolute control from a remote point. These units assure accurate mounting so essential if the full benefit of "A-Q" Gears is to be realized.

Regardless of what your requirements in power transmission may be, Foote Bros.' two large plants are ready to serve you. The Precision Gear Division has complete facilities for producing "A-Q" Gears and Power Units in quantities. The Industrial Gear Division is equipped to turn out giant gears up to 20 feet in diameter or production runs of smaller gears. This division also manufactures speed reducers in sizes and ratios to meet almost every industrial need

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A recent bullstin on Power Units gives complete engineering data on "packages of power," Senton request. Also available, a bullatin on Aircraft Quality Gears. Mail coupon-

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Making GABLOCK 7021 Compressed Asbestos Sheet Packing at the Garlock factory.

Just the Right Mixture

In the manufacture of Garlock 7021 High Pressure Sheet Packing, long fibre asbestos is mixed with rubber binder according to a Garlock formula and to exacting Garlock standards. The mix is fed into sheeters and is compressed under heat into this superior gasketing material.

Expert workmanship and quality control result in a compressed asbestos sheet of great strength and uniformity. For satisfactory service use Garlock 7021 on pipe lines and other equipment handling gasoline, oil, gas or steam at high temperatures and extreme pressures.



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60th Anniversary 1887-1947

GARLOCK 7021

Thicknesses from ¼" to ¼." Sheets 40"x 40" and larger.

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COMPRESSED **ASBESTOS** SHEET PACKING



select centrifugals for sulfur dioxide and propane compression

CENTRIFUGAL compressors have taken on two of the toughest jobs in the refinery field. Three major refiners recently chose Carrier centrifugals over reciprocating machines for compressing sulfur dioxide and propane.

Standard Oil of California is using 700-hp. Carrier centrifugals—the largest ever built for this type of service—to compress sulfur dioxide in its oilpurification process. Humble Oil and

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Atlantic Refining compress propane with centrifugals in dewaxing processes.

Long-life Carrier centrifugals offer the same important advantages here as in other gas-compression jobs. They have no valves, pistons, wrist pins or rod bearings to wear. They are easily applied to direct steam turbine drive, cutting operating cost. They operate efficiently under partial load, and permit precise temperature control. Bearings, located outside gas passage, prevent contamination of refrigerant gases.

Centrifugals by Carrier are the product of a quarter-century's pioneering experience with this efficient, low-cost type of compressor. They are designed and built with the same skill that produced the world's first centrifugal refrigerating machine. The Carrier name assures years of trouble-free service. Carrier Corporation, Syracuse, N. Y.



AIR CONDITIONING REFRIGERATION INDUSTRIAL HEATING

Handcuff dust at its source

CUTT SENS

UST on the loose breeds trouble. Workmen, machinery, plant and product-all are handicapped where process dust is not controlled.

The Roto-Clone system of dust control picks up dust-laden air at its source, separates the dust, delivers the collected material to storage hopper or disposal point and expels the clean air all in a single operation - with one moving part. It's compact, requiring minimum space - costs less to install because location at or near source of dust eliminates long pipe lines and expensive outdoor dust collectors.

Roto-Clones are available in a size and type to handle dust separation efficiently over a wide range of particle sizes and specific gravities. There's an experienced American Air Filter representa-



tive in your area. He has seen many dust problems that were "different"-and solved them with Roto-Clones. Write today for complete information.

American Air Filter Company, Inc. 189 CENTRAL Louisville 8, Kentucky

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ROTO-CLONE

DUST CONTROL

HOW CUTTER LABORATORIES GUARD SENSITIVE PENICILLIN AGAINST METALLIC CONTAMINATION

ONE OF THE 5,000 GALLON penicillin fermentation tanks of Lukens Inconel-Clad Steel at Cutter Laboratories, Berkeley, Calif. Hazard of contamination by alien bacteria is great, so tanks, coils and agitating equipment are thoroughly cleaned and checked after each harvest of penicillin.

ľ

Sterility can be maintained throughout penicillin production, but . . .

That won't necessarily insure product purity.

Inorganic contamination has spoiled entire batches.

Discover a SAFE metal

As a means of protecting the sensitive drug, Cutter Laboratories, Berkeley, Calif., use Lukens Inconel-Clad Steel for their 5,000-gallon fermentation tanks. And solid Inconel* agitators and aerators. For they've found Inconel safe for use in contact with penicillin.

Here's a statement from their report: "Engineers at Cutter Laboratories find Inconel* the best material for tank linings, temperature control coils and accessory equipment. By test, Inconel is the least soluble of all metals tested."

PIRTY

Extremely low corrosion rate

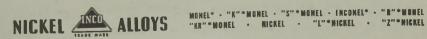
The tests mentioned took place in Cutter Laboratories over a 42-day period. The corrosion rate of Inconel in a corn steep water medium (standard culture medium for penicillin) under operational temperature of 75° F., and rising to periodic sterilization heats, was 0.00002 ipy.

Inconel forms no harmful contaminating corrosion products, and causes no dangerous chemical reactions with sensitive penicillin solutions. Its use, therefore, meets one of the chief problems of penicillin production - the extreme susceptibility of the drug to contamination during almost every stage of manufacture.

Which proves once more that it's a good idea to consider Inconel (and other INCO NICKEL ALLOYS such as Nickel and Monel*) whenever you need corrosionresistant equipment that will help you maintain or improve product purity. Nickel Alloys have solved many problems. Chances are, they can solve yours, too.

"Reg. U. S. Pat. Off.

PROTECTS THE INTERNATIONAL NICKEL COMPANY, INC. NEW YORK 5, N.Y. **67 WALL STREET**



CHEMICAL ENGINEERING . FEBRUARY 1947 .

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INCONEL PRODUCT

A PROTECTIVE COATING THAT OUTLASTS ALL ORDINARY MAINTENANCE PAINTS

CORROSION IS COSTLY—for replacing corroded equipment takes big bites out of your profits. So does frequent protective-maintenance—though it's the lesser of two costs. But with Ucilon, you save *both* ways—by stopping corrosion losses, by reducing maintenance expense. For Ucilon is a finish for concrete, metal or wood that outlasts all ordinary protective coatings!

Let's take a really tough application, for examplea large, sewage disposal plant:

Protective coatings of Ucilon were applied to sedimentation tanks, chlorination equipment, gas receivers, equipment embedded in wet sewage, and all metal work. Results? Ucilon outlasted any other coating that was ever tried! Even on outdoor steel manhole and tunnel covers, used as walks, Ucilon coatings were still in perfect shape after 7 hard months.

In another typical case, a drug manufacturer coated panels in his bleaching room with Ucilon. They were totally unaffected by the caustic soda fumes—not even a sign of discoloration after 6 months of this severe test!



We invite you to try Ucilon on your toughest jobs. See if you don't agree that it outlasts any other protective coating you've ever tried. Write your nearest Unichrome office for details—and a copy of the descriptive bulletin shown here.

WHAT IS UCILON*?

UCILON is a surface coating material formulated from new and improved inert synthetic resins. It is air drying and can be applied to any metal, wood, or concrete surface by brushing, spraying or dipping. Upon evaporation of the solvent, a hard, durable "plastic" coating is formed.

UCILON is remarkably resistant to acids, alkalies, salts, alcohols, oils, water, cleaning compounds, and industrial oxidants. It has excellent flexibility, toughness, adhesion—and no taste or odor when dry. It is non-toxic, fungus-inhibiting, has good electrical resistance, and gives an attractive glossy finish.

*Ucilon is a trademark registered in the U. S. Patent Office, by United Chromium, Incorporated, for a synthetic resinous coating material.



UNITED CHROMIUM, INCORPORATED

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PROCESSES AND MATERIALS

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Chicago 4, III.

FOR SURFACES THAT SURVIVE

Chromium Plating • Paraus Chromium • Unichrome* Copper Unichrome Lacquers • Ucilon* Protective Coatings Unichrome Stop-Off Lacquers and Compounds • Unichrome Dips Unichrome Rack Coatings • Anozinc* Compounds • Unichrome Strip *Trade Mark Reg. U. S. Pat. Off.

Dayton 2, Ohio



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ICAL ENGINER

Los Angeles 11, Cal.

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EVAPORATIVE COOLER

These coolers are designed to 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

CHEMICAL ENGINEERING . FEBRUARY 1947 .



BIG INTEGRAL PRESSURE FORGINGS

Pressure vessels like these are made by Midvale in an integrated plant having complete control over raw materials, forging, heat treatment and machining. This is a distinct advantage, which, together with Midvale's engineering experience, assures long and satisfactory performance in the finished forging. High pressure vessels by Midvale are promptly delivered according to schedule. Inquiries about pressure vessels of all sizes for all chemical and refining operations are invited, and information gladly given.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA offices: New York • Chicago • Pittsburgh washington • Cleveland • San Francisco



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... first step toward petroleum-chemical profits

As a low-cost source material, petroleum offers excellent opportunities for profits from the production of ethylene, solvents, styrene, butadiene, phenol, alcohols, ketones, esters, resins, and other intermediates. Already large, the markets for these chemicals are still expanding rapidly.

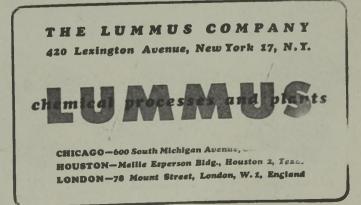
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HCAL ADDAN

With wide experience in designing and building all types of petroleum and chemical plants, Lummus is well prepared to help chemical producers and petroleum refiners to capitalize the demand for chemicals which can be produced cheaply from petroleum.

Throughout the world are hundreds of HEMICAL ENGINEERING • FEBRUARY 1947 • Lummus-built plants. Lummus engineers will welcome an opportunity to present the performance records of those which are of significant interest to you—and to discuss the design and construction of facilities for the production of chemicals from petroleum.



Speaking of HEAT EXCHANGERS You'll find ROSS first in so many uses

It's well known that over 81% of the Diesel engine builders use Ross lube oil and jacket water coolers...that an overwhelming percentage of hydraulic press builders use Ross oil coolers...that the U.S. Navy is a mammoth consumer of Ross oil and water coolers and heaters...and on and on it goes in the chemical, food, petroleum, machinery, paper mill and other fields!

But, why? First of all, industries like standardized lines. They mean mass production—faster, more economical output. Ross is a leader in standardization of coolers, heaters, heat exchangers, condensers. Secondly, industries like the possibility of tailor-made features in Ross standard equipment—individually assembling STANDARD parts to meet individual requirements. They mean meeting your operating conditions and performance needs *exactly* without paying a premium for specially engineered units.

Just as soon as your next heat exchange problem comes up, call in a Ross engineer. He'll show you how Ross standardized lines can be tailored to your needs. In the meantime, send a request on your company letterhead for whatever Ross bulletins you'd like for your files.

ROSS HEATER & MFG. CO., INC. Division of <u>American</u> Radiator & Standard Sanitary CORPORATION 1411 WEST AVE. BUFFALO 13, N. Y.

Ross equipment is manufactured and sold in Canada by Horton Steel Works, Ltd., Fort Erie, Ontario



BULLETIN 5322 Type "CP"-larger'oil and water coolers



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BULLETIN 4922 Type "BCF"-amaller oil and water coolers.



BULLETIN 3623-A Type "IS" - instantancous heaters for water, oils, chemicals.



BULLETIN 3624-A ype "O"-oil preheaters ype "TS"-tank suction eaters for heavy fluids. BULLETIN 5222 Type "BCP" - oil and water coolers, marine design.

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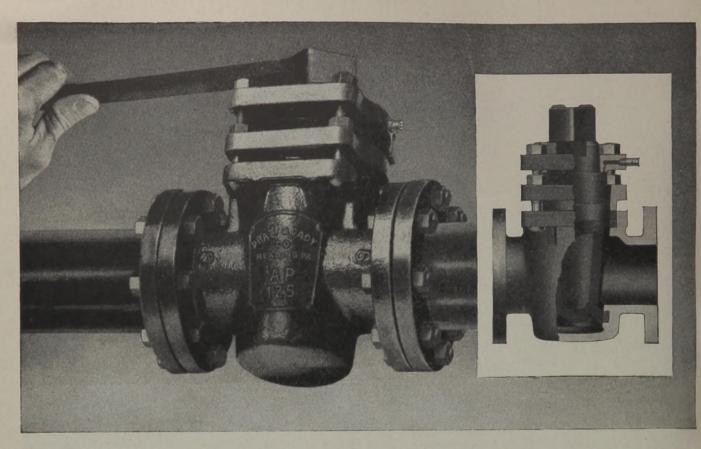
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EASIER WORKING, LONGER LASTING READING-PRATT & CADY A. P. COCKS

Asbestos-Packed Cocks serve best as a shut-off on lines that carry solids in suspension, viscous fluids, oils, etc.,—in short, where Globe, Angle or Gate valves fail or where conventional ground plug cocks prove unsatisfactory. R-P&C A.P. Cocks are made in cast iron, bronze and cast steel.

READING, PA. — U-shaped grooves in the body of this cock are packed solidly with asbestos, which is then vulcanized. This provides a bearing surface which absorbs expansion and results in easier operation by avoiding the friction of metalto-metal contact.

Double Gland Feature

This feature shown in the illustration, results in easier operation and longer life than the Single Gland Asbestos Packed Cock. With it the plug is not jammed down unnecessarily by putting appropriate pressure on the top packing.

Other R-P & C Products

Reading-Pratt & Cady offers you a single responsible source for bronze, iron and steel globe, angle and check valves—Lubrotite gate valves—Bar Stock valves—cast steel fittings.

R-P & C distributors are located in principal cities.

Reading, Pa. • Atlanta • Baltimore • Boston • Chicago • Denver • Detroit • Houston • Los Angeles • New York • Phriadelphia • Pittsburgh • Portland, Ore, • San Francisco • Bridgeport, Conn.

READING-PRATT & CADY DIVISION AMERICAN CHAIN & CABLE

Does Winter "Break" Your Emulsion?

Atlas Emulsifiers are helping solve this problem

Freezing in storage means "death" to many types of emulsions. They often "break" when frozen and thawed . . . their oil and water components separate. Sometimes their usefulness is destroyed entirely, or they are rejected on appearance even though effectiveness may be unharmed.

To avoid such cold weather ravage, emulsion-builders are turning to Atlas non-ionic emulsifiers such as the Spans or Tweens or combinations of them, to produce emulsions which are stable to freezing. Many types of emulsions made with Atlas non-ionic emulsifiers may be frozen again and again without harm to usefulness or appearance.

But winter safety is only one of the advantages of using Atlas Spans and Tweens. These non-ionic emulsifiers are also stable in the presence of electrolytes . . . the emulsion builder can use either hard water or soft. Such fields as food products, pharmaceuticals, cosmetics, textile processing, cutting oils, cleaning fluids, agricultural and sanitary sprays and water-thinned paints are finding the answer in Atlas Spans and Tweens.



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.

SPAN, TWEEN-Reg. U. S. Pat. Off.





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

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-cast steel fittings.

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often owe their "oomph" to PENNSALT **POTASSIUM CHLORATE**

Whether you manufacture mining explosives or matches, pyrotechnics or paper ... your product is no better than the ingredients of which it is made. You can always count on uniform high quality when you use Pennsalt Potassium Chlorate. Pennsalt guards every step of Potassium Chlorate manufacture with rigid quality control, thus producing Potassium Chlorate that is rapidly and completely reactive.

Write us for further information about Pennsalt Potassium Chlorate.



SALT PENNSYLVANIA PHILADELPHIA 7, PA.

MANUFACTURING COMPANY TACOMA, WASHINGTON

• FEBRUARY 1947 • CHEMICAL ENGINEERING LENG

197E 150 lb. 5.P

BRONZE "RENEWO" VALVES REGULAR TYPE , 73...200 lb. S.P. 16...300 lb. S.P. PLUG TYPE , 73.P..200 lb. S.P. 16.P..300 lb. S.P.

IRON BODY

VALVES

REGULAR TYPE

PLUG TYPE ig. 1021-P.150 Ib. S.P.

FERRENEWO"

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COMPANY WASHINGTON

Here's all you need... to convert a regular type into a plug type valve...

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SEATS AND DISCS INTERCHANGEABLE *

Just insert a plug type seat and disc in place of the regular type, and you change an entire Bronze "Renewo" Valve from regular to plug type — providing all the extra advantages of this type, including its ability to

stand up under unusually hard service. No other change is necessary. The plug type seatand-disc combination is made to fit per-

fectly into a regular type valve of corresponding size and pattern. And you have this same interchangeability in Iron Body "Ferrenewo" Valves. You don't have to buy an entire new valve . . . you don't even have to take the valve out of the line.

*Lunkenheimer interchangeability goes still farther. All parts of 200 lb. "Renewo" and 150 lb. "Ferrenewo" Valves (except bodies and bonnet rings) are quickly, easily, perfectly interchangeable. Fewer parts are needed; ordering and handling are simplified; repairs are facilitated. You save

time, labor, money. Write for a copy of Circular 567—

LET YOUR LUNKENHEIMER DISTRIBUTOR DEMONSTRATE .

Your nearby Lunkenheimer Distributor will welcome the opportunity to show you actual samples and demonstrate the interchangeability of parts in "RENEWO" and "FERRENEWO"

Valves. You'll find it a big factor in increasing efficiency, lowering costs.

CINCINNATI 14, OHIO, U.S.A. NEW YORK 13, CHICAGO 6, BOSTON 10, PHILADELPHIA 7. EXPORT DEPARTMENT: 319-322 HUDSON ST., NEW YORK 13, N.Y.

HEMICAL ENGINEERING • FEBRUARY 1947 •

CANDO

ow to speed up dehydration of a macerated material without expanding bis drying facilities was a problem that perplexed a food processor.

AGAIN... the answer is centrifuging

This case study is just one of the many applications in which centrifugal force as developed by AT&M Centrifugals has saved time, space and costs in the process industries. Now — while you're exploring new ways to lower unit production costs investigate what centrifuging can do for you. A confidential study and recommendation by AT&M's experienced engineering service costs you nothing and does not obligate you in any way. The coupon will bring you evidence that AT&M Centrifugals can improve products at lower cost. AMERICAN TOOL & MACHINE COMPANY, 1415 Hyde Park Ave., Boston 36, Mass., 30A Church St., New York 7, N. Y.

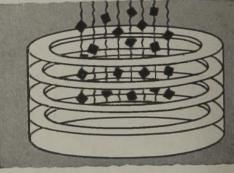
SAVE TIME, SPACE AND COSTS WITH



AMERICAN TOOL & MACHINE COMPANY, 1415 Hyde Park Ave., Boston 36, Mass.

Please send information on centrifuging applied to the following processes:

Extraction	E Filtration	Dehydration	Coating			
Precipitation		entation	Impregnation			
Write here any other process						
Name						
Company						



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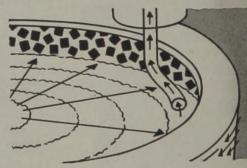
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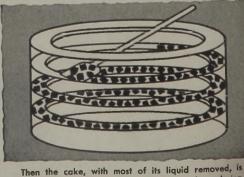
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ing

AT&M specified a centrifugal with an imperforate basket and a built-in skimmer.



Centrifugal force, developed by high-speed rotation, builds up the solids on the baffled sides of the basket while the liquor is decanted over the top by the skimmer.



Then the cake, with most of its liquid removed, is plowed out and conveyed to the drier where drying time is greatly reduced.

N.E.C. METHANOL SYNTHESIS op debydration vitbout expandin H H xed a food process. H H 0 C H 0 WATER H R H PRIMARY CONDENSER CONVERTER COLD EXCHANGER CHEMICAL CONSTRUCTION CORPORATION FILTER NEW YORK

SYNTHETIC METHANOL is best made by the **N.E.C. High-Pressure Process**

The modern way to produce METHANOL is by high-pressure synthesis from hydrogen and carbon monoxide.

CHEMICO offers the N.E.C. High-Pressure METHANOL Synthesis Process, generally similar to the well-known and successful N.E.C. Synthetic Ammonia Process.

Preliminary recommendations for new plants or for altering existing synthetic ammonia plants for METHANOL manufacture are offered without charge or obligation.



CHEMICAL CONSTRUCTION CORPORATION Empire State Bldg., 350 Fifth Ave., New York 1, N. Y. European Technical Repr.: Cyanamid Products, Ltd. Brettenham House, Lancaster Place, London W.C.2, England Cables: Chemiconst, New York

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HEMICAL ENGINEERING . FEBRUARY 1947 .

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For Never-Failing



in Services Involving Extreme Temperatures, Pressures and Corrosive Fluids

use HOMESTEAD

LEVER-SEALD VALVES

For more than 15 years HOMESTEAD LEVER-SEALD VALVES have solved the operating difficulties of hundreds of manufacturers in services where temperature extremes, pressure and the corrosive action of line fluids would cause ordinary valves to stick or "seize." HOMESTEAD LEVER-SEALD VALVES never stick. For built into

STICK-PRO

each valve is a powerful lever and screw device which relieves seating pressure between plug and body just enough to overcome friction and permit easy turning at all times and under all conditions.

They operate faster too ... 16 to 28 times faster than screw-stemtype valves, because a QUARTER-TURN fully opens or closes them. The QUARTER-TURN principle also makes them ideal for installation in restricted areas, next to walls, floors, ceilings, congested piping and other obstructions where many other types of valves could not be operated.

HOMESTEAD LEVER-SEALD VALVES are available in combinations of metals and alloys to meet your service requirements. Sizes range from 11/2" to 10" for pressures from vacuum to 1500 pounds. For complete details write for Valve Reference Book No. 38. No obligation.



CHECK

OUTSTANDING FEATURES

- A QUARTER-TURN fully opens or closes valve.
- INSTANT STICKPROOF OPERATION. Plug turns freely after seating pressure is relloved by screw lever.
- LEAK PROOF. Deep stuffing box and gland prevent leakage.
- POSITIVE LEAKLESS SEAL WITHOUT USE OF
- LUBRICANT is obtained by reapplying full
- seating pressure with screw lever after opening or closing.
- STRAIGHT-LINE FLUID FLOW. No obstruetions to cause pressure drop.
- SEATING SURFACES ALWAYS PROTECTED In both open and closed positions. Fluid or
- grit cannot damage valve seat.
- SEALED BOTTOM prevents fluid loss and reduces hazards.

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HOMESTEAD VALVE MANUFACTURING COMPANY CORAOPOLIS, PA.

P. O. BOX 13

• FEBRUARY 1947 • CHEMICAL ENGINEERING

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VALVES



THESE TSTANDING FEATUR TER-TURN fully open at

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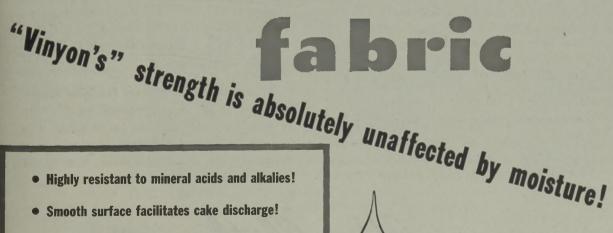
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NT-LINE FLUID FLOW. No old o cuiuse pre isurn drop. G SURFACES ALWAYS MOTICEN sen and closed pesitions, filds not damage valve sest.

BOTTOM prevents Build his m hazards.



CHEMICAL ENGINES



- Does not support fungi or bacteria growths!
- Long life, high efficiency!

Registered tredemark - C. C. C. C. 11

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WELLINGTON SEARS CO. . In Its Second Century of Textile Progress! . Sales Agents . 65 Worth Street, New York 13, N.Y. CHEMICAL ENGINEERING • FEBRUARY 1947 • 351

filter

2" OPENING, 32" ROD (LOCK MESH)

4" 0PENING, .135" (#10) WIRE

🔓 3/8" OPENING, .080" (#14) WIRE

34" OPENING, .192" (#6) WIRE 📭

🛑 2" OPENING, ¾" ROD (LOCK MESH)

A New, Improved, Longer-lasting Wire Screen

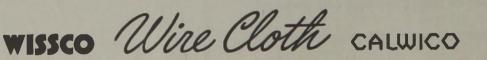
TOUGHER WIRE! Wissco SUPER-TEMPERED Precision Screens are fabricated from super-tempered steel—an outstanding Wickwire Spencer research development. Actual operating tests show that no other steel so combines resistance to abrasion and resistance to fatigue. It weaves up into the longest wearing, lowest cost steel wire cloth made.

TIGHTER CLOTH! To weave this tougher wire, Wickwire has installed new, modern hydraulic power looms. Designed exclusively for us, these powerful looms weave a $\frac{3}{4}$ " rod like a #10 wire. This combination of super-tempered steel and weaving know-how results in a tight, accurate cloth that will not wear loose in service. Even under excessive vibration, abrasive material cannot work its way between the rods and set up abrading action.

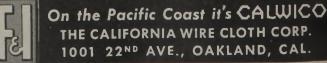
Wissco SUPER-TEMPERED Precision Screens are made in any length required for vibrating screen or trommel and can be furnished with welded, hooked or reinforced edge to fit any type of vibrator. For further details write to our nearest office.

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that 14 gauge, I stainless steel. I contains stain offes and deflec whe powder without and without inten, All inten reground smoot whary requirem



East of the Rockies it's **WIJJCO** WICKWIRE SPENCER STEEL STERLING ST., CLINTON, MASS.



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FOR A PILOT PLANT OR A PRODUCTION INSTALLATION

CISION SCRU

INCLONE COLLECTOR

FOR A POWDERED

MILK INSTALLATION

It is built of 14 gauge, type No. 304 stainless steel. The interior contains stainless

steel baffles and deflectors

to entrap the powder which

is collected and withdrawn

at the bottom. All interior welds are ground smooth to meet sanitary requirements.

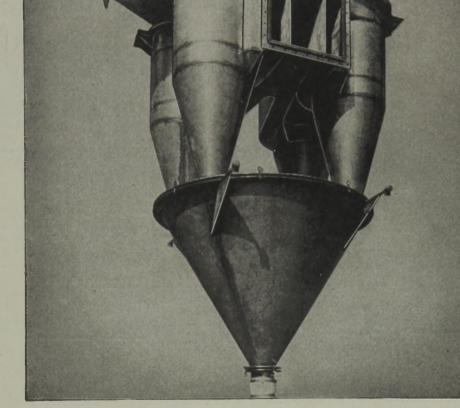
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ED Precision Screens equired for vibraing in be furnished with need edge to fit any it details write to our



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An example of intricate and painstaking fabrication. This unit is now in use in a West Coast Milk Processing plant.



CHEMICAL ENGINEERING . FEBRUARY 1947 .

★ Increase Output, Cut Costs

★ 4-Way Mixing Action Assures Thorough Blends

★ Open-Door Accessibility Permits Fast, Easy Cleaning

New Sturtevant Dry-Batch Mixers

The new, improved Sturtevant dry-batch mixers thoroughly and efficiently mix two or more substances into a homogenous and inseparable whole, every part of which has the same analysis. The 4-way mixing action does a more rapid mixing job than other machines. The single receiving and discharging opening permits tight sealing during the mixing process. Open-door accessibility permits thorough cleaning.

The mixer is simple and easy to operate . . . hand lever controls both receiving and discharging. These efficient Sturtevant drybatch mixers are available in five sizes with mixing capacities from $7\frac{1}{2}$ tons to 75 tons per hour. Write for bulletin and complete information today.



Designers & Manufacturers of GRINDERS • SEPARATORS • CONVEYORS • Receiving — The ingredients to be mixed enter the mixing chamber of the drum through a chute. Note scoops which carry up and dump the ingredients as the drum rotates.



Discharging — By simply throwing a lever, the inlet is closed and the mixer is in discharging position. The completely mixed materials drop off the lifting scoops and discharge through chute without segregation of ingredients.

MECHANICAL DENS and EXCAVATORS . ELEVATORS

354

CRUSHERS

• FEBRUARY 1947 • CHEMICAL ENGINEERIAL ENGINEE

SULPR

Large stocks carried at all times,

permitting prompt shipments

Uniformly high purity of 991/2% or better

Free of arsenic, selenium and tellurium

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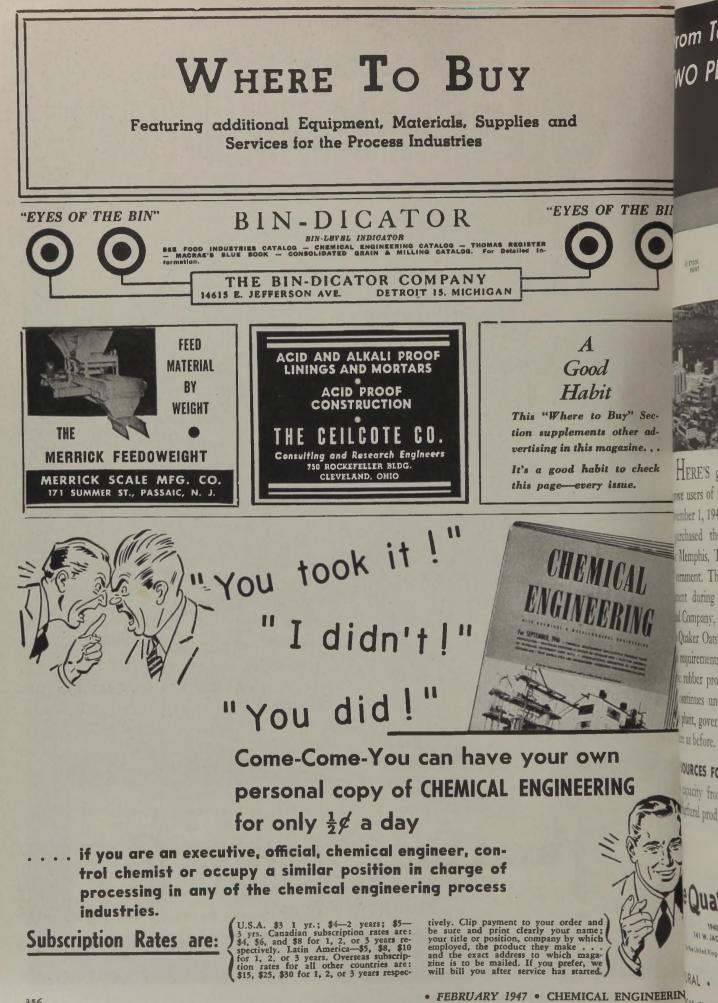
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BEVATORS CHEMICAL ENGL O. Inc.



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From Tennessee and Iowa TWO PLANTS NOW SUPPLYING

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STOCK POINT

A Good Habit This "Where to Be tion supplements de

vertising in this maren It's a good habit to in this page-every int.



e your own ENGINEERING

· CHEMICAL ENGLY

HERE'S good news for users and prospective users of furfural and its derivatives. On November 1, 1946, The Quaker Oats Company purchased the furfural manufacturing plant at Memphis, Tenn., formerly owned by he government. This plant, operated for the government during the war by The Q. O. Chemical Company, a wholly owned subsidiary of The Quaker Oats Company, supplied all the urfural requirements for the government's vast synthetic rubber program. Now, this same personnel continues under the new ownership to run this plant, government needs being supplied from here as before.

WO SOURCES FOR INDUSTRIAL USERS Excess capacity from the Memphis plant, the argest furfural producer in the world, as well as the entire facilities at the Cedar Rapids plant, are now available to industrial users of furfural and its derivatives. With these two sources, widely separated geographically, users of furfural are further assured of an uninterrupted flow of furfural in ample volume to meet their needs.

CEDA

Aurfural

STOCK

FURFURAL'S VERSATILITY WARRANTS YOUR INVESTIGATION

This versatile aldehyde, the cheapest pure aldehyde available today, is rapidly growing in importance in a wide variety of applications. If you are not entirely familiar with its current uses and reactions, we suggest you write on your letterhead for literature we have available.

he Quaker Oats Compan 1040 BOARD OF TRADE BLDG.

141 W. JACKSON BLVD., CHICAGO 4, ILLINOIS In Europe, Quaker Oats-Graanproducten, N. V., Rotterdam, The Netherlands In the United Kingdom, Quaker Oats Ltd., Southall, Middlesex, England In Australia, Swift & Company, Pty. Ltd., Sydney

FUROIC ACID • TETRAHYDROFURFURYL ALCOHOL FURFURYL ALCOHOL . FURFURAL .

HEMICAL ENGINEERING • FEBRUARY 1947 •

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TO TURN A COST CURVI

DOWN

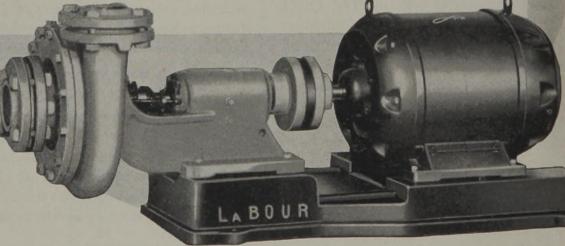
Lower cost per gallon of liquid handled is shown in one case history after another on the LaBour Type Q centrifugal pump. The reason is twofold.

Because the Type Q has an open impeller operating with generous clearances, this pump is slow to wear, and its high initial efficiency is hardly impaired at all over long periods of severe use.

Because of the famed simplicity of LaBour construction, mechanical difficulties are almost completely eliminated—''down time'' and maintenance costs are at a minimum with the LaBour Type Q.

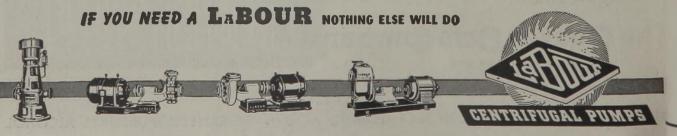
Although the Type Q is not ordinarily sold as a self-priming pump, its ability to handle up to 20% air or vapor without binding gives it a wide range of applications. If you're interested in giving your pumping cost curve a downward turn, by all means get complete information on what the LaBour Type Q can do for you. There is no obligation.

THE LABOUR COMPANY, INC. Elkhart Indiana, U.S.A.



HESE ore just why Walwort lves give "top my difficult serv III Walworth ives employ sp is which protect inst contact wi watting erosion he lapped surf "ssure sealed" m the open of ing the lubric med under hi coving system tes the ports as m of the plug elubricant se

DIS



ALWORTH LUBRICATED PLUG VALVES

offer these advantages

... Direct port opening

. . . Quarter turn opens or closes valve

... Dead tight shut-off

vacuum requirements

for pressures from 175 to 5,000 psi., and for

... Freedom from attack by fluids being handled

. . Pressure sealed ... Made in a complete line. Sizes from ½" to 24"

200 WOG WALWORTH

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AL PUNPS

AL ENGINE

THESE are just a few of the reasons why Walworth Lubricated Plug Valves give "top" performance on many difficult services.

All Walworth Lubricated Plug Valves employ special insoluble lubricants which protect the plug and body against contact with the line fluid, thus combatting erosion and corrosion.

The lapped surfaces of the valve are "pressure sealed" when the valve is in either the open or closed position. By turning the lubricant screw, lubricant is forced under high pressure through a grooving system that completely encircles the ports as well as the top and bottom of the plug.

The lubricant seals the valve against

leakage, and reduces friction between plug and body. This permits easy, quick, full-opening, or tight shut-off with only a quarter turn of the plug.

Number 1700 (illustrated) is a Steeliron valve, wrench operated, designed for a working pressure of 200 pounds WOG (water, oil, or gas). Valves are available in either screwed or flange types. Screwed type have API line pipe thread lengths. Flanged type (No. 1700F) is faced and drilled to American Standard for 125-pound cast iron flanges unless otherwise specified.

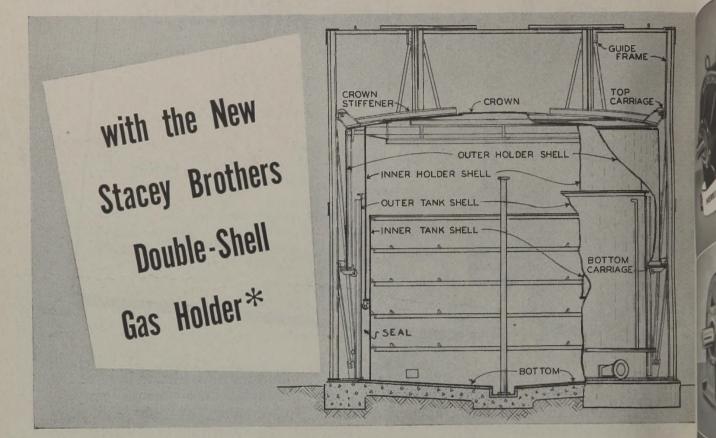
For further information about No. 1700 as well as the complete line of Walworth Lubricated Plug Valves, write for catalog.

WALWORTH valves and fittings 60 EAST 42nd STREET, NEW YORK 17, N. Y.

ISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

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ELIMINATE CONTAMINATION



Here's a single-lift gas holder that's an outstanding development for the storage of process gases. Regardless of the sealing fluid used, there's absolutely no chance of contamination by rain water —the design takes care of that.

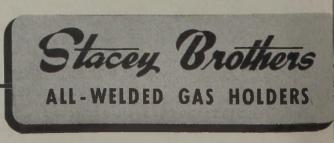
And because the volume of sealing fluid required is only a fraction of the water ordinarily used in conventional single-lift holders, you can select the fluid to suit the gas—it's that economical, that practical.

On one installation, for example, our customer is storing N_{o} , saturated with water-soluble organic

STACEY BROTHERS GAS CONSTRUCTION CO.One of the Dresser Industries5535 VINE STREET.CINCINNATI 16, OHIO

compounds—and using octyl alcohol as the sealing compound. The installation even provides for the recovery and re-use of the condensables.

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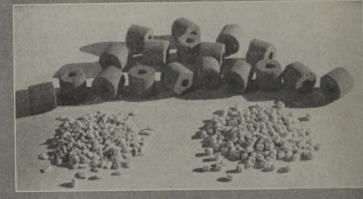
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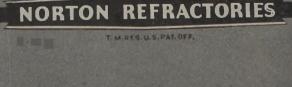




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Strength and light weight should be balanced. One should not be sacrificed for the other. In Hackney Cylinders you are assured of a lightweight cylinder, yet one of adequate strength. This is made possible by the Hackney Deep Drawing Process, which assures uniform sidewall thickness and eliminates all excess material. Then, too, the physical qualities of Hackney Cylinders are improved by special heat-treating after complete fabrication.

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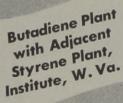
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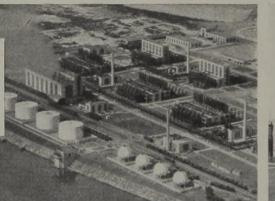
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PLANT: Plancor 1207 consists of land, buildings, machinery, and equipment for the manufacture of Butadiene from industrial alcohol. The following buildings, of permanent type construction and with a total floor area of approximately 156,000 sq. ft., house the functional units which comprise the three 20,000-ton units: Two Dowtherm furnace buildings, 3 distillation conversion buildings, 2 catalyst manufacturing buildings, together with other smaller service buildings.

UTILITIES: Process water is obtained from the Ohio River. Five centrifugal, motor-driven pumps, located in a pumping

PLANT: Plancor 229 consists of land, buildings, machinery, and equipment for the manufacture of Butadiene from ethyl alcohol. The production area comprises 4 units for conversion, each unit having rated capacity of 20,000 short tons per annum; 2 Dowtherm furnace buildings; a catalyst building; a water treating building; 2 water pump houses; 5 foam houses; a switch room; a machine shop; a stores building; totaling 270,000 sq. ft. floor area. All structures of permanent type.

UTILITIES: Water-cooling and fire protection water is pumped from the Kanawha River from two identical pump houses, each containing 6 electric-driven centrifugal pumps with total capacity of 66,000 g.p.m. and one steam turbinedriven, centrifugal pump with capacity of 11,000 g.p.m. A 2,000 g.p.m. treating plant provides treatment for boiler water.

PLANT: Plancor 483 consists of land, buildings, machinery, and equipment for the production of 80,000 short tons of Butadiene from alcohol feed stock annually. Production area includes 4 identical Butadiene productive units, each rated at 20,000 tons annual capacity; 2 Dowtherm units. Each Dowtherm building contains two Dowtherm Vaporizers (gas or oil-fired) rated at 24,000,000 b.t.u. per hour, surge tanks and two Methane gas compressors with auxiliary pumps.

The power plant building contains boiler bay, turbine bay, powerhouse annex, and there are 11 substations. The boiler bay contains 4 boilers, 350,000 lbs. steam per hour continuous rating each, at 800 lbs. per sq. in. Steam passes either through a 35,000 kw Westinghouse "Topping" turbogenerator unit, or through a battery of reducing stations which reduce the pressure from 750 p.s.i. to 165

station, are capable of delivering a total of 78,000 g.p.m: at approximately 50 lbs.

Domestic water is obtained from 2 driven wells, each equipped with electric-driven pumps.

Process steam is furnished by a high and low-pressure plant with a combined total rated capacity of 700,000 lbs. steam per hour.

Electricity and gas supplied by the Louisville Gas and Electric Company.

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Electricity and natural gas supplied by public utilities.

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PLANT: Plancor 1055 consists of land, buildings, machinery, and equipment for the manufacture of Styrene from ethylene secured from others by pipe line. The rated capacity is 25,000 short tons of Styrene per annum. The production area comprises 2 Styrene distillation units; Tetralin furnace building; one catalyst building; totaling approximately 40,000 sq. ft. floor area.

UTILITIES: Available from the adjacent Butadiene plant.

p.s.i. Designed capacity of turbogenerator is 43,750 kw at 80% power factor, 1/2 lb. hydrogen cooling pressure. Powerhouse annex receives coal by conveyer or chute from main boilerhouse and contains one Combustion Engineering, four drum, natural circulation boiler, 200,000 lbs. steam per hr. total capacity at 450 p.s.i. saturated temperature, with tubular air heater, combination forced and induced draft fan, Raymond fuel pulverizing equipment and 2 Allis-Chalmers boiler feed pumps.

UTILITIES: Water for industrial and fire protection purposes is pumped from the Ohio River. Drinking water is obtained from 2 deep wells.

Electric power and light is obtained from the generating station adjacent to the boilerhouse.

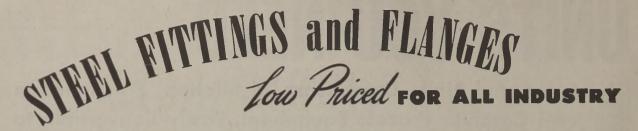
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METALLURGIST—ENGINEER Wanted by Philadelphia manufacturer of precious metal products. Applicant in early 30's preferred with creative imagination and experience in re-search, production and equipment design. Perma-nent position for man interested in challenging problems and capable of modernizing old processes.

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CHEMICAL ENGINEERS (7), under 31 years, for process development and sales engineer-ing. Send complete personal data-resumé of experience and recent photo. The Sharples Corporation, Philadelphia 40, Pa.

PRODUCTION MANAGER — expert chemist with thorough experience in manufacture of asphalt tiles, first class background, wanted to organize new department of outstanding Eu-ropean Rubber Company. General Manager in U.S.A. to discuss personally. Write details, salary requirements. P-976, Chemical Engi-neering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER—Wanted for design of corrosion resistant equipment and as-sistance to Sales Department. Sales experience desirable but not necessary. State age. educa-tion, length and nature of experience and salary expected, also enclose a recent snapshot or photo. P-977, Chemical Engineering. 330 W. 42nd St., New York 18, N. Y.

WANTED-TO employ on a consulting basis a chemist thoroughly experienced in producing dimethylamine or trimethylamine, or an ad-mixture of these amines. P-978, Chemical En-gineering, 520 N. Michigan Ave., Chicago 11, Ill.

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Chemical Pro-General Pro-fer as opport-a several year esertial. Salit with applican docation and aw-963, Chem-linet 42:0 St.

CHEMICAL ENGINEER: Five to ten years' experience for position in research and process engineering with large Midwestern chemical manufacturer. Salary commensurate with applicant's qualifications. Replies will be confidential. Moving expenses paid to man who meets requirements. Write, giving age, education, experience, and salary expectation. P-975, Chemical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

CHEMICAL AND Mechanical Engineers: For production shift foremen in chemical plant manufacturing anyhdrous ammonia, ammo-nium nitrate, nitric acid. related products. Re-quirements—3 to 4 years' operating experience in allied industries. Permanent position with aggressive Southwestern petroleum company. Good starting salary with excellent opportuni-ties for advancement. P-979, Chemical Engi-neering, 520 N. Michigan Ave., Chicago 11, Ill.

ENGINEER-RECENT graduate with experi-ence in design and layout of mechanical process equipment wanted for Engineering De-partment of chemical plant in upstate New York. Give full particulars of age, education, experience and salary desired. P-980, Chemical Engineering, 330 W. 42nd St., New York 18, N. Y.

PRODUCTION FOREMAN for shift operations, synthetic resing plant. Recent graduate or one with some experience. Supervise 6-12 men. Salary 50-55 plus overtime. Reputable firm. Location Metropolitan New York area. P-981, Chemical Engineering, 330 W. 42nd St., New York 18, N. Y.

EMPLOYMENT AGENCY

FOR CHEMISTS, chemical and metallurgical engineers, write Chemical Department, Posi-tion Securing Bureau (Agency), 45 John Street, New York. Telephone Cortlandt 7-9650.

EXECUTIVES—Industrial & Sales Engineers. Through our nationwide Service we negotiate for the better positions with well-established. aggressive companies. Your personal require-ments met by individual procedure. Strict confidence assured. Details on request. Jep-son Executive Personnel & Research Service (not an agency), 286 Porter Building, Kaneas City 2, Missouri.

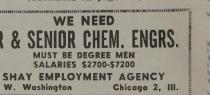
SALARIED POSITIONS \$2.500-\$25,000. This thoroughly organized confidential service of 37 years' recognized standing and reputation carries on preliminary negotiations for super-visory, technical and executive positions of the calibre indicated, through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position pro-tected. Send only name and address for de-tails. R. W. Bixby, Inc., 260 Dun Bldg., Buf-falo 2, N. Y.

POSITIONS WANTED

PLANT OR Production Manager, age 32, Chem-ical Engineer. Ten years experience in re-sponsible positions with major heavy chemical producers. Presently employed as Production Manager. Salary \$6,600. PW-974, Chemical Engineering, 330 W. 42nd St., New York 18. Engineering.

(Continued on page 373) WE NEED JR & SENIOR CHEM. ENGRS. MUST BE DEGREE MEN SALARIES \$2700-\$7200 SHAY EMPLOYMENT AGENCY 30 W. Washington Chicago 2, III.

GCAL ENG



AVAILARLE Soda Ash and Caustic Soda Expert on up to date production offers services in advisory or permanent capacity. Qualified to establish new plant or to improve existing processes.

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L ENGINEERING

NEED

PW-884, Chemical Engineering 520 North Michigan Ave., Chicago 11, 111.

POSITIONS WANTED (Continued from page 372)

CHEMICAL ENGINEER; Doctor's Degree. 1942. Age 30. Capable, conscientious man, executive ability, broad industrial experience meluding direction of research and pilot plant design, constructions, operation. Desires permanent, responsible position, good future, research, development, in progressive medium size company in chemical field. Western loca-tion preferred. PW-982, Chemical Engineer-ing, 520 N. Michigan Ave., Chicago 11, 111.

CHEMICAL ENGINEER, B. S., Ch. E., V.P.I. 27, married, 2 children. Six years experience includes technical control, development, per-connel training (operation various types of ma-chinery) and machine tool operation. Four years U. S., Navy Engineering (Lieutenant). Deelres position in development (process md/or equipment). Employer must favor pro-reasive ideas and position must offer a future. PW-983, Chemical Engineering, 336 W. 42nd Mt, New York 18, N.Y.

PRODUCTION MANAGER, Ch.E., 17 years ex-perience food packaging, cosmetics and allied ines. Plant moving, desire new connection, PW-984, Chemical Engineering, 330 W. 42nd St., New York 18, N.Y.

CHEMIST: B.A. 1937; special fields electroplat-ing; control analysis metals and alloys; fuels; desires responsible position; research; analy-uest control. PW-985, Chemical Engineering, 300 W. 42nd St., New York 18, N. Y.

EBRUARY GRADUATE in Chemistry, com-merce and general studies desires position re-wing technical and business training. Four eats industrial chemistry and engineering ex-petence. Age 25, Veteran. Want New York ara, PW-986, Chemical Engineering, 330 W. 402 St., New York 18, N. Y.

CHEMICAL ENGINEER: B. Ch.E., 1939, age 10, married. 7 years experience production, process control and design, plant lay-out and construction. Desires to locate in mid-west with small or medium sized company. PW-987, Chemical Engineering, 520 N. Michigan Ave., Chicago 11, 11).

PAPER & METAL Product Engineer, M.S. Metallurgical and Chemical engineering, Ex-perienced in manufacturing metal articles, tis-uie, croped, and coated paper products and general paper manufacturing. Desire super-vision, control and product development in Gilfornia with well established manufacturer. Age 41, Present salary over \$4,000. PW-988, Chemical Engineering, 520 N. Michigan Ave., Chieago 11, 111.

CHEMIST AND Superintendent, B. S., twenty years experience in tar, asphalt, petroleum and rubber plants, now chief chemist and usperintendent tar refinery wants position in muthern California or Florida. PW-989, Chem-ieal Engineering, 520 N. Michigan Ave., Chi-cago 11, III.

ENGINEER, B. S. in Mech., age 31, varied ex-perience, plant engineering on process culpment controls, instruments, piping, layout, specifications, construction. 7 years chemical process and 4 years steel industry. Now em-loyed. Prefer plant or sales engineering. Con-sider locating anywhere. PW-930, Chemical forgeneering, 330 W. 42nd St., New York 18.

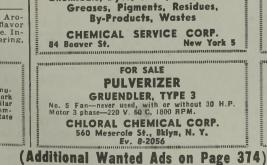
FOR SALE

PROVEN PLANT Processes for Synthetic Aro-matic Chemicals for perfume and flavor rades. Complete line of perfume formulae. In-furnes invited. FS-991, Chemical Engineering, 300 W. 42nd St., New York 18, N. Y.

WANTED

SALES ENGINEER
Established Chemical Process Equipment manu-
facturer offers an opportunity in its New York
Sales Office. Several years experience in similar
position is essential. Salary and commission com-
mensurate with applicant's qualifications. State
fully age, education and experience.
SW-993, Chemical Engineering

330 West 42nd St., New York 18, N. Y.



CHEMICAL ENGINEERING . FEBRUARY 1947 .

SALFS REPRESENTATIVES WANTED

Old, established firm with widest line of filter equipment wants successful, sales representative with filtration, chemical engineering or engineering background for sales to chemical and process industries and industrial plants. Valuable territories available. Our employees know of this ad.

SW-969, Chemical Engineering 520 North Michigan Ave., Chicago 11, Ill.

Notice to Manufacturers of Chemicals and Chemical Equipment: Recent news item tells of British commercial mis-sion to Austria to capture chemical trade perviously supplied by Germany. Are You Going to Let Them Get Away With 11? Chemical Engineer, '46, can offer jittle experience but plenty of knowledge of Austria and last rate ability to get you what you want. Veteran, young, single, with desire for travel and adventure. RA-972, Chemical Engineering 330 West 42nd St., New York 18, N.Y.





NEW COPPER DISTILLING UNIT

New all copper 48-inch diameter distilling unit. 20 plates to continuously distill alcohol or whiskey up to 170 proof from 2000 bushels grain per day. Complete with mash heater-dephlegmator, condenser-cooler, vent scrubber, mash pump, slops tester, steam regulator, gravity tester, te-conding thermometer, rotameter and inter-connecting copper piping. All new and unused and available for quick delivery.

PEBBLE SPRINGS DISTILLING CO. State and Water Streets, Peoria, III.

FOR SALE GENERATOR

1,000 k, w. Terry extraction turbine driven Allis-Chalmers generator, 250, p.s.l. inlet steam, 30 pound exhaust pressure. 440 volts, 3 phase, 60 cycle, complete with Westinghouse condenser, condensate pump, etc.

This machine is available for very early shipment and is in excellent operating condition.

For complete details contact, Mr. R. F. Toma, Purchasing Agent NATIONAL LEAD COMPANY TITANIUM DIVISION St. Louis 11, Mo. Lo 3980







Special LIQUIDATION of WAR ASSETS

PURCHASED NEW 1942-SOME UNUSED

AVAILABLE FOR IMMEDIATE SHIPMENT

- 12-Oliver Rotary Continuous VACUUM FILTERS, 11'6" dia. x 18' face, each 640 sq. ft. filtering area. Complete.
- 4-VACUUM PUMPS, Chicago Pneu-matic, duplex, 36" x 36" x 13", each with direct connected 250 HP 3/60/440, 225 RPM synchronous motor with exciter, starting equipment, etc. 6760 CFM at 22"
- 3—American Rotary Continuous VAC-UUM FILTERS, 12'6" dia. x 23' long, 10 discs, approx. 2000 sq. ft. filtering area each. Now equipped with steel leaves. Wood leaves can also be furnished.
- 3—Ingersoll-Rand Dry VACUUM PUMPS, 31" x 13" Type ES. 2830 CFM, with V-belt drives.
- 5-COAL PULVERIZERS type E-35, made by Babcock & Wilcox Co. Complete with exhausters and 100 HP 3/60/440 volt motors, full starting and control equipment.
- 2-#30-NF all steel HAMMER MILLS. made by Williams Crusher & Pul-verizer Co., St. Louis.

- 2-Goslin Birmingham EVAPORA-TORS. 6-effect. each evaporator having a total heating surface of 58,200 sq. ft. Electronite steel tubes; welded steel bodies. Each evaporator designed to evaporate 172,230 lbs. of water per hour from a feed of 586,000 lbs. per hour of soda-alumina solution. Complete with condensers, pumps, motors, controls, instruments, etc.
- 1-6' x 50' Louisville DIRECT HEAT **ROTARY DRYER** with combustion chamber, exhauster, Buffalo air washer for dust elimination.

DRYERS

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Copper 54" dia. 1 un 15-section REC IS, with copper Tub

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- 7-8' dia. x 46' ROTARY KILNS, DRY-ERS OR COOLERS, ½" shells, construction heavy enough for length-ening to 150 ft. Made by Traylor Eng. & Mig. Co.
- -Industrial UNIT HEATERS, each 645,000 BTU per hour. With motors, fans, etc.

WRITE-PHONE-WRITE FOR DETAILED SPECIFICATIONS AND PRICES.



PRODUCTION MORE LET'S GO! **MAKES LOWER PRICES** SAVE TIME AND MONEY — GET NEEDED

PRODUCTION MACHINERY QUICK-FROM

Consolictate

Send us your list of idle machinery today — Big demand — Convert "SURPLUS" into CASH!

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SOME UNUSED

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DEVER with comboster exhauster, Buttala at

5' BOTABY ETINS, DIV. DOLERS, 14" shella, cap eavy enough for length

50 ft. Made by Troyle

UNIT HEATERS, ecc

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ICAL ENGINEERING

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- 2-Buffalo 32" x 90" Atmospheric DOU-BLE DRUM DRYERS, M.D.
- -Buffalo 42" x 90" Atmospheric DOU-BLE DRUM DRYERS, M.D.
- -Buffalo 32" x 72" Atmospheric DOU-BLE DRUM DRYERS, M. D.
- 2-A. N. 4' dia. × 9' long atmospheric double drum dryers complete.
 1-B. & C. 28" dia. x 60" face Atmospheric DOUBLE DRUM DRYER complete.
 2-Direct heat ROTARY DRYERS; 5'x30', 6'x35'.
- 1-6'135' Louisville Direct Heat single shell Rotary Dryer. 1-4'120' Ruggles-Coles Indirect Heat Ro-tary Dryer.
- 4'x20' and 4'x26' ROTARY KILNS or ROTARY DRYERS, Ruggles-Coles, geared-head, motor drive.

RECTIFYING COLUMN

All Copper 54" dia. x 22'6" high, 30-plate, 16-section RECTIFYING COL-UMN, with copper Tube Dephlegmator & Condenser. Excellent condition; used on Methanol.

SPECIAL PURCHASE

26-Aluminum Jack. KETTLES, 30-gal. cap. 8—Stainless, Jack. KETTLES, 30-gal. cap.

CRYSTALLIZERS VACUUM PAN DRYERS

- -Buffovak 6' dia, Jacketed Pan Dryers or Crystalizes-300 gallon capacity-cast iron-jackets cast integral with shells. -Swenson Walker Continuous Steel Jacketed Crystallizers, Mizers or Dry-ers, each made up of four 24"x26"10' long sections with heavy spiral ribbon agitators. Each unit with worm gear speed reducer.

LABELING MACHINES

- l-World straightaway automatic LAB-ELER, M.D.
- Weeks McDonald straight line fully automatic LABELERS, motor driven.
 World and Ermold semi-automatic LABELING Machines.
- Burt auto. wrap around LABELLER, now set for 1 qt. cans, M.D.
 Knapp auto. LABELLERS, 1 ½ gal. and 1 1 gal. cans, M.D.
- CHEMICAL ENGINEERING . FEBRUARY 1947 .

HYDRAULIC PUMPS

Aldridge Pump Co. Vertical Triplex HY-DRAULIC PUMPS, 2%"x8", equipped with Herringbone Gears, 67.5 gpm. Maxi-num pressure for intermittent duty 2,200 lbs., for continuous duty 1,800 lbs. Pump and motor mounted on common bed plate. Motors are 75 HP, 3/60/220/440 volts, 1740 RPM. Complete with starting panel, consisting of G. E. motorstarter switch, push button control, square "D" Switch, and capacitor. and capacitor. Purchased new 3½ years ago. Excellent condition. Available for immediate de-livery.

MISCELLANEOUS

- 1--6'x6' OLIVER FILTER UNIT, com-plete. 1-Gedge Gray 600-lb. DRY POWDER SIFTER AND MIXER.
- J. H. Day, Size D. 600-lb. DRY POW-DER MIXERS, M.D.

- 3-J. H. Day, Size D. 600-lb. DRY POW-DER MIXERS, M.D.
 2-450 gal. copper steam jacketed KET-TLES.
 1-ROTEX SCREEN, 40"x84".
 1-W. P. MIXER, jacketed, 100-gal. sigma blades.
 1-York 500 GPM HOMOGENIZER, bronze fitted, with 15 H.P. A.C. motor.
 1-250 gal. Copper jack agit. closed Kettle or Vac. Still.
 10-Copper & Aluminum KETTLES to 500 gal. cap.
 2-Copper steam jacketed agitated KET-TLES, 1-54" dia. x 42" deep. 300 gals.; 1-36" dia. x 31" deep. 70 gals.
 1-J. H. Day auger POWDER FILLER. 2-Stokes No. 15.
 2-Colton No. 3 TOGGLE Globule PRESS-ES, for making capsules.
 4-250 gal. cosed GLASS LINED TAKS.
 1-Pneumatic Scale six head Capping Machine.
 Approximately 300 feet of STEEL BALL BEARING ROLLER CONVEYOR, from 17 to 32" widths.



FILTER PRESSES

- Johnson 24" x 24" cast iron FILTER PRESS, 24 chambers.
- -Brecht 24" x 24" cast iron recessed FILTER PRESS, 25 chambers. 1-

VIBRATING SCREENS

- 1-Robins "Gyrex" 3'x8'6", 2 decks, V-drive and 5 HP motor.
- Kennedy 3'x7', 2 decks, V-drive and 5 HP motor.
- 4—Tyler Hummer, 3'x5' No. 33, two 4'x5' No. 39, single.
- 2—Sturtevant 3'x6' Moto Vibo, single deck, all enclosed.
- 1-40"x84" Rotex, single deck. 5-UNUSED Robins, "Vibrex" 2'x8', single deck.

ALUMINUM

- VACUUM STILLS, KETTLES, TANKS
- -Steam Jack. KETTLES, 20, 25, 30, 50, 60 and 80 gal.
- 60 and 80 gal.
 24—Closed STORAGE TANKS, rectangular shaped, 78"x34"x60", 700 gal. capacity.
 24—Closed STORAGE TANKS, rectangular shaped, 56"x46"x72", 800 gal. capacity.
 2-Closed Jack. agitated Kettles with colls: 1-1,200 gal. 1-900 gal.
 1-1,200 gal. closed jack. Kettle or Vacuum Still
 3-Closed jack. agitated Kettles with collscience of the set of the

- -Closed jack. agitated Kettles or Vacuum Stills.
- vacuum Stills. 2—350 gal. closed jack. agit Kettle. 9—250 GAL. NEW CLOSED HORIZON-TAL STORAGE TANKS. OVAL SHAPED, APPROX. 46" AND 28" BY 61" LONG, 18" ROUND MANHOLE IN TOP, 3/4" PLATE.



DRYER

1-5'x30' Ruggles Cole double shell dryer, type A.

KILNS

2-8'6"x7'6"x125' long Vulcan Kilns. Shell _7/s" Plate.

PULVERIZERS

4-Raymond, 5-0, 4-0, 3-0.

CENTRIFUGAL PUMPS

- 2-500 GPM, 360' head, Ingersoll Rand Centrifugal Pump, 1800 RPM.
- 1-520 RPM, 50' head. DeLaval Centrifugal Pump, 2940 RPM, direct coupled to DeLaval Turbine, 200# pressure, 0-5# B.P.
- 1-4500 GPM, 135' head, LeCouriney Centrifugal Pump, 1800 RPM.
- 1—1800 GPM, 250' head, Ingersoll Rand Centrifugal Pump, 1800 RPM.
- I-2000 GPM, 188' head—Ingersoll Rand, direct coupled to 125 H.P. 3/60/2200, 1800 BPM motor.

WATER STORAGE TANK

1—100,000 gal. water tank mounted on 125 ft. structural steel frame, complete with stand pipe & ladders.

AIR COMPRESSORS

- 1-211 CFM Ingersoll-Rand Air Compressor, 100# Pressure at 325 RPM. Complete with Air Receiver. V-Belted to G. E. 30 H.P. motor type K-365 3-60-220/440 Volts, 1800 RPM with compensator.
- 1-211 CFM Chicago Pneumatic Air Compressor, 100# Pressure at 325 RPM. Complete with After Cooler and Air Receiver, V Belted to G. E. 30 H.P. motor type K-365, 3-60-220/440 Volts, 1800 RPM with starter.
- l-Gardner-Denver Air Compressor Vertical 7x53/4x5, 870 RPM, 200 CFM, 100# Pressure. Direct connected to G. E. 40 H.P. 3 phase 60 cycle 440 V 870 RPM moior.
- 2-Schramm gas driven air compressors, Displacement 315 and 210 CFM, at a working pressure of 100#. Portable mounted on pneumatic tires with a spare set of steel wheels complete and self-contained. Purchased in 1945.

ELECTRIC MOTOR DRIVEN WELDERS

300 AND 400 AMPERE GENERAL ELECTRIC - HORART -

LINCOLN - LATEST TYPE

IN EXCELLENT CONDITION

BUFFALO BLOWERS

30—Buffalo size 40 steel plate Blowers Type R. Flexibly coupled to West-inghouse motors 25 HP 3/10/220/440/ 1750 RPM. Explosion proof. Type CS 365.

TANKS

- 58—10'x32' horizontal storage tanks. ½" shell, 5%" dished heads. 20,000 gal. capacity.
- 8—9'6''x8' straight side, 4800 gal., certical warming tanks. Complete with 5 H.P. 3 ph. and 60 cy. 220/440 V. totally enclosed fan cooled motor, with Philadelphia gear reducer and agitator.
- 5—Ammonia or high pressure storage tanks 7'11"x39'5¼", 31/32" thick.
 Asbestos covered. 14,000 gal, capacity.
 3—24'x20' vertical riveted storage tanks.
- Dished roof, flat bottom. 70,000 gal. capacity.
- 26—8'x30' steel storage tanks. 12,000 gal. capacity.

GASOLINE DRIVEN POWER PLANT

1—35 KVA gasoline driven power plant, Hercules Motor Corp. engine, 41/4x43/4, Model WXLC-3, Serial No. 180572, with U. S. Motors Generator, Type M-7, 220 volt, 3 phase, 60 cycle, 1200 RPM, Serial No. 2981, complete self-contained with panelboard. Has a center tap, 110 volts, single phase.

1-300 KVA Skinner Uniflow Engine Generator Set 150 # LSP 0.5 # BP direct connected to Burke Alternator 3-60-480 V. 200 RPM with Exciter.

SKINNERS UNIFLOW SET









• FEBRUARY 1947 • CHEMICAL ENGINEERING CAL ENGINE

QUIPMENT Rittenhouse 6-8583

I" CL. P & F M" x M" Jaci

10 plates, frame trer Type 24" x 24 10 plates, frame Ther Presses, 12 mer 8'x 12', 10'x

ics Horizontal Seal

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ichrat 375 gal. Jack Jrize 5' x 4' Closed Jack Jackeled Steel Jacker Glass Lined Jan Jid. Lettles, 30 lipper Kettles, Jacks lipitors, 10 to 100 g kinless Steel Kettles II 101 aal. Ind Jacketed Kettles litclave, 50 gal. ag 1 ('Horiz. Cast Ir forak 3' and 6' dia ivesson Walker Crys Iw Skinless Sheel II. 100-gal. Indier, Alsop Gla 1, 500-gal. uzinem Tanka, 15 = closed. indler 1000 and 2

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GINEERING

PA.

- I-No. 10 Sweetland Filter.
 I-Kelly No. 150 Filter Press, 28" x 5'
 5-International and Kiefer Disc Filters
 5-Oliver 8' x 6' Rolary Dewaterers.
 I-Shriver 36" x 36" Rubber Covered Filter Press, 15 Plates
 2-32" x 32" C.I. Filter Presses, 36 Chamber Cover.

- 2-3" x 32" C.I. Filter Presses, 36 Chambers
 6-Wood Filter Presses, 18", 24", 30", 36"
 2-American 6' 2 Disc and 4' 4 Disc Rotary Continuous Filters
 4-Shriver 30" x 30" C.I. Recessed, 36 Chambers.
 2-C.I. 32" x 32" Recessed, 40 Chambers.
 4-40" x 40" C.I., P & F 44 Chambers.
 1-Shriver 24" x 24" Jacketed Filter Press with 30 plates, frames.
 5-Shiver Type 24" x 24" C.I. Filter Press with 20 plates, frames.
 5-C.I. Filter Presses, 12" x 12", 18" x 18", 56

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 Coliver 8' x 12', 10' x 18' Rotary Continuous Filters.
 2-Alsop Horizontal Sealed Disc Pressure Filters.

KETTLES—CRYSTALLIZERS—TANKS

- Bullovak 375 gal. Jacketed Kettles
 Devine 5' x 4' Closed Jacketed Kettles
 Closed Jacketed Steel Kettles, 6' x 5'
 Haudler Glass Lined Kettles, 200 gal.
 Alum, Jktd. Kettles, 30, 60, 80, 100 gal.
 Copper Kettles, Jacketed, some with Agitators, 10 to 100 gal.
 Stainless Steel Kettles, 60, 80, 100, 150, 200, 300 gal.
 Steel Jacketed Kettles, 200 to 6600 gal.
 Autoclave, 50 gal. agitated, 400 lb.
 Y a 4' Horiz. Cast Iron Autoclave
 Bullovak 3' and 6' dia. Crystallizers
 Swenson Walker Crystallizer 40'
 New Stainless Steel Tanks, 100, 200, 300, 500-gal.
 Haudler, Alsop Glass-Lined Tanks, 200, 500-gal.
 Muinum Tanks, 15 to 50-gal. open and closed.
 Gudler 1000 and 2500-gal. Glass-Lined Tanks.
 Stainless Steel Tanks, 1000 and 5000-Gals.

KILNS—**DRYERS**

- 2-Allis Chalmers, 6' x 60' Rotary Dryers
 1-Christie 6' x 40' Rotary Dryer
 1-I0' x 90' Rotary Dryer
 Traylor 71/2' x 51' Rotary Cooler
 1-Copper Shell Rotary Dryer, 6' x 17'
 4-Rotary Vacuum Dryers, 18'' x 31/2', 30'' x 8', 4' x 10', 5' x 33'
 3-Buticlo Vacuum Drum Dryers, 24'' x 20'', 48'' x 40'', 5' x 5'
 1-Rotary Steam Tube Dryer, 6' x 27'6''
 1-Steiner and Hudson Gas Fired Dryer
 1-Centry Kilns, 9' x 60', 6' x 125', 7'6'' x 125',

We Sell

GUARANTEED

RECONDITIONED

PROCESS PLANT

EQUIPMENT

1-41/2' x 40' Rotary Kiln or Dryer, jacketed

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1-2' dia. x 12' long Rotary Kiln. 1-Buflovak 4' x 9' Atmospheric Double Drum Drver.

GRINDERS— SCREENS

- -Abbe Ball Mill, 6' x 5'. -Bantam Mikro Pulverizers. -Schutz O'Neill 20'' Ball Bearing Mill. -Kent, Ross Double Cage Mills, 18'' -A.C. 36'' x 16'' Crushing Rolls -Lehmann, 5 Roll Retiners, 20'' x 48'' -Williams Inical Hammer Mill -Rubber Inical Pebble Mills, 3' x 3' -Krupp Beater Mill, with 40 HP motor Raymond Mills Nos. 0000, 000, 00, 1 -Robinson Gyro Sifters, 20'' x 48'' -Rotex Sifters, 40'' x 56'', 40'' x 84'' -Lehman 12'' x 33'', 4-Roll High Speed Roller Mill. -#5 Superior McCully Crusher -Tyler 4' x 5' Vibrating Screen -Mikro Model ISI Pulverizers, 5 HP

SPECIALS

- 14—Baker Perkins 100-gal. Type JNM Jacketed Mixers.
- 5—36" x 36" Plate and Frame Filter Presses.
- 2—Bird 40" Suspended Type Centrifugal, 40 HP, 1800 RPM, NEW.
- 1—Tolhurst 32" Centrifugal, monel basket, motor driven.
- -Fletcher 30" Centrifugal, steel solid basket, motor.
- 1—ATM 40" Centrifugal, 40 HP motor, 1200 RPM.
- 1-Raymond 3-Roll High Side Mill.
- -Oliver 8' x 12' Rotary Continuous Filters.
- 24—Stokes and Kux Tablet Machines, single or rotary punch, 1/2" to 4" dia.

MIXERS

- Readco 4 gal. Double Arm Stainless Steel Mixer
 Tank, with side agitator, 650 gal.
 Day 30 Gal. Double Arm Jktd.
 Readco, Baker Perkins 100 gal. Double Arm, Heavy Duty, Jacketed Mixers
 New 1000 lb., 2000 lb. Dry Powder Mixers, motor driven
 W. & P. Mixers, ½, 9 and 20 gal.
 1-15 Gal. Day Pony Mixer, Motor Driven.

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225 WEST 34th STREET, NEW YORK 1, N.Y.

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l—Robinson No. 11 Powder Mixer, 3'x 13' l2—Portable Electric Agitators, ¼ to 2 HP, 1750 and 440 RPM. l—Read 100-gal, Double Arm Mixer.

EVAPORATORS-PANS-STILLS

- 2-Copper Stills, 150, 400 gal.
 3-Rectifying Columns, 24", 30", 48"
 1-Scott Quad. Effect Evaporator, 8'3" dia. bodies, 2500 sq. ft. each effect
 1-Swenson Quad. Effect Evaporator, 1230 sq. ft. each effect Evaporator, 1230 sq. ft. each effect Evaporator, 1230 sq. ft. each effect Steate Lubes
 1-Zaremba Copper Single Effect Evaporator, 5' dia. 500 sq. ft.
 1-6' Double Effect Evaporator, 2500 sq. ft.
 1-6' Double Effect Evaporator, 2500 sq. ft.
 1-Swenson Single Effect Aluminum Evaporator, 100 gal. per hour.
 1-Bullovak Stainless Steel Single Effect Evaporator, 900 sq. ft., 7' dia.
 3-Cast Iron Vacuum Pans, 7', 8', 12' dia.
 1-Harris 7' Copper Vacuum Pan, jet condenser and pump.
 4-Automatic Water Stills, Barnstead, Stoks, ½, 1, 10 GPH.
 8-Badger Portable Distillation Units, 83 GPH.

CENTRIFUGALS

- Tolhurst, 32" Suspended Type, Motor Driven, Monel Basket.
 A.T.&M. 40" Suspended Type, 40 HP Motor, 1200 RPM.
 Bird 40" Brand New Suspended Cen-trifugal Solid Basket, 40 hp. motor.
 Tolhurst 32", 40", 48" Self-Balancing Centrifugals, steel and copper baskets, top and boltom discharge.
 I-2" to 30" Belt Under Driven Centrif-uacis
- 3—12 to 30 beit Onder Driven Centri-ugals
 2—Sharples No. 6 Presurtite Centrifuges
 2—Sharples No. 6 Super Centrifuges
 2—De Laval Nos. 600, 700 Clarifiers
 4—Sharples No. 16 Centrifuges, S.S. bowls.

MISCELLANEOUS

- 1—Williey 1½" Havege-Lined.
 10—12" Horizontal Bell Conveyors, from 10' to 80' centers, Screw Conveyors, 9", 12", 16" up to app. 1000'.
 1—Pneumatic Scale, 8 Spout Vacuum Filler with Automatic Single Head Capper.
 1—Anderson Super-Duo Oil Expeller.
 2—Kiefer 72 spout Rotary Bottle Washers 10—12" Belt Conveyors, built for any length, motor driven.
 4—Devine, Marsh Horizontal Piston Vacuum Pumps, from 50 to 200 cfm.
 4—Tubular Condensers, 25 to 260 sq. ft.
 10—Liquid, Paste and Powder Filling Machines

- Machines 6—Can and Bottle Labelers 25—Centrilugal, Piston and Rotary Pumps, 1" to 5" discharge 10—Boilers, 100 to 500 HP.

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Vacuum Pans with and without heavy duty agitators, sizes 20", 3', 4', 5', 6' **Glass-Lined Vacuums.**

- Pfaudler 150 gallon and 125 gallon Pan with heavy duty agitator.
- Mixers—F. J. Stokes, J. H. Day. New Era. Hottman, etc. From 2 gallons to 450 gallons, with and without jackets, single and double arm agitators.

SPECIAL:---3 Ton Spiral Mixer, 3 Ton Paddle Blade Pigment Mixers.

Grinders & Pulverizers-Three NEW Mikros. One SH. Two Mikros. 4TH. Schutz O'Neil. Prater. Mead-Gauge Mills or Disintegrators.

OVER 5.000

MODERN MACHINES

Rebuilt-Guaranteed

- Mullers & Sizers-4', 6' and 9' sizes. Roller Mills Day. Lehman 12"x30" Kent 9"x24". Soap Mills-N. E. Heavy Duty types.
- Sifters-Rotex 20"x18", Gayco 4' Air Separator and Sifter; Allis-Chalmers Low Head.
- Centrijuges Tolhurst 26", Crescent Morris 40" Basket Centrifuge.
- Jacketed Kettles With and without agitators. Cooper. Aluminum and Stainless Steel. Give full require-ments. Vertical Mixers, Hobart, Read, Century.

Write-or Wire Us Collect

- Filter Presses-Shriver, Oliver Sweet land. Johnson. 12", 24", 30" sizes. Write detailed requirements.
- Wrapping Machinery—Package Machinery. American Machine & Foundry. Hayssen. Gellman and others. Send samples with requirements.
- Ermold Semi-Automatic Labelers World Fully Automatic.
- Fillers-Karl Keifer Rotary Wisco-U. S. Bottlers-Acme C-10-N. E. High Speed Viscous and Semi-Viscous Fillers—Filler—Mch. Co. Stainless Steel Piston-Karl Keifer #10 Piston Filler.

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FOR SALL LEHMANN

Roller Finisher

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7. Chemini Browing and St. New Lot 11 1

OLOID MILLS TATES COLOD VILL COR Manufacturen

10" MERCURY Varia

Drives, 1150 REN. II O" MERCURY Varias Driver, 300 EM, 100 2" MERCURY Verson division operated by

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elphia and Dalter

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- **NOCLAVES** Byregnator, fumigator or pressure tunnel, 7' x 7' x 50' with rails, vacuum pump and accessories. Varical, 4' x 7'x6", forge welded steel, 600 liss, pressure. Varical, 42" x 24'x4", forge welded steel, 600 liss, pressure. Water and accessories. Water and the steel steel, 500 liss, pressure with agitator. Kated autoclaves, 3' x 12', 5's" shell, 100 psl. **LOID MILLS** Barlette, No. 3, stainless and monel, 3 HP motors. Burnbach, stainless, model "E", vertical, 1½ HP, AC motor. Burnbach, stainless, model "C", vertical, 5HP, 3 phase motor. Hew, stainless Chemi-Coiold, 30 HP and 50 HP motors. Barmer type "C", 5" rotor-stator, 3 HP motor. Barnbach, stainlese, No. 450 WH 10 HP, AC motor. S. Korizontal, each two motors, 3 HP and 15 HP. **MODENSERS**

NDENSERS

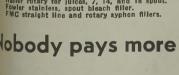
- **HUENDERS** Inviar condenser, copper, 4' x 22', having 288—1" tubes, 1440 sq. ft. Auminum condensers, tubular type, 24" x 60". Bihleham tubular condensers, 8483 sq. ft., 6' x 15', having 4500 tubes, $\frac{5}{2}$ " OD. Devine tubular vac., cast iron, surface cond., 8" x 5" with receiver, 18" x 28". Shutte Koerling, multi-jet, barometric condensers, varying capacities. Tokes tubular vac. cast iron, surface cond., 12" x 5' with 60 gallon receiver. EVERS
- IVERS Arron type single pass conveyor dryers, 18" x 23', motorized. Bouble drum, 30" x 90", complete with accessories. Buffai double drum, 30" x 160", double door, 20 shelves. Derine vacuum shelf dryer, 42" x 160", double door, 20 shelves. Derine vacuum shelf dryer, 42" x 42", with 17 shelves. Derine vacuum shelf dryer, 43" x 24". Future negineering rotary dryer, 3' x 24". Freetor and Schwartz, steam htd., tray dryer, 80 trays, 10" x 15", with access. Huhn rotary steam dryer, 3' x 13', continuous operation. Retary dryers, from 3' x 30' to 6' x 64'. Single drum dryers, or flakers, 4' x 9' and 4' x 12" with accessories. Althight flaking roll or drum dryer, 3' x 6' with accessories. Histore Steam Stea

- THORATORS Blaw Knox triple effect evaporator, horizontal type, 6' x 9', all steel. Buffalo triple effect evaporators, 600 to 1200 sq. ft. 10' copper vacuum pan, calandria type. Swenson single effect cast aluminum. Zeremba cast iron single effect, 10' diameter x 12' high, 200 gallon holding capacity, copper tubes, complete with vacuum pump and condenser. **BLIERS FOR DRY POWDERS** Stokes, Stokes and Smith, National Packaging, Triangle, Edtbauer, J. H. Day. Howes, Sprout-Waldron, etc.

XTRUDERS Allen 10" extruder-strainer.

V. DC Pung. Beaut LLERS RAYMOND LOENLE

LERS w FMC S.S. Vac. Fillers up to gallons. Kieler, piston type Visco filler. W & S. 6 piston fillers. Transle Eice-Tri-Pak, model N2C. Pneumatlo Scale tea bag fillers and sowers. Stokes tube filler, 79 80A, closer erimper. Buffalo and Voi-U-Meter can fillers. Haller rotary for julces, 7, 14, and 16 spout. Four stainless, spout bleach filler. FMC straight line and rotary syphon fillers. TOR COMPRESSION Driven, 860 EM 1





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EQUIPMENT



"EUREKA!" cried Archimedes leaping from the bathtub, in which he first discovered the principle of specific gravity, thereby determining the purity of the gold in King Hiero's crown.

FILTER PRESSES

- FILTER PRESSES
 4 Cast iron, 30", recessed presses.
 1 Filter press, cast iron, plate and frame, 60" x 48", having 40 plates and frames, open delivery.
 1 Shriver, 12" square plate and frame, 8 chamber, aluminum, 2 eye corner feed, closed delivery.
 1 Shriver, 36", rubber covered, 4 eyed closed delivery, 30 chamber.
 15 Sperry, 32", recessed presses.
 KETLES
 1 Full Jacketed, 4' x 3', agitated, 200 gallon.
 1 Lehigh, cast iron, coll heated, 2400 gallon.
 2 Steel Jacketed and agitated, 600 gallon.
 Copper, Steel, stainless, Jacketed isces, prompt shipments.
 LABELLERS
 4 Burt, Standard, Kann or Kyler all around labelers for any slow stainless

- 4 Burt, Standard-Kapp or Kyler all around labelers for cans, glass, etc. I Duplex New Jersey Labelria. 2 Straight line fully automatic labelers; Pneumatic and Weeks-MacDonald. 5 World and Ermold semi-automatic labelers for spot labeling. MILLS

- MILLS
 25 Fitzpatrick, stainless, model "D", comminuting machines.
 8 Raymond mills, Nos. "000", "0000", 45, 1, others.
 2 Jay Bee No. 12 mills.
 1 Lehman, 5 roll finisher or roller mill, 18" x 48".
 1 Lehman, 5 roll finisher or roller mill, 18" x 48".
 1 Mikro pulverizer, No. 2.
 2 Fuller mills, No. 33, 600 HP motor.
 6 Stedman, Gruendler, Williams hammermills.
 12 Ointment, drups, paste and color mills, Day, Hance, Ross, Waterville, etc.
 2 Aills Chaimers tube mills, 5' x 22".
 2 Rod mills, 5' x 10", 6' x 14".
 4 Hardinge mills, 5' x 5".
 1 Porter Jacketed mill, 5' x 5".
 1 Patteron, 5' x 5'. Inned pebble mill.
 3 Jar mills, single Jar, 16½ x 20; multiple, 3 (2 gallon).

 MXERS
- MIXERS Prompt shipment all sized ribbon type, horizental, all steel mixers. I Simpson Intensive mixer, 18" diameter, with double muller, I Day 30 gallon, stainless, imperial mixer. 2 Datterson horizontal double ribbon, 30" x 40" x 84". 2 Heavy duty, Jacksted, 9 gallon, double garn, double geare. I W & P. 100 gallon, double sigma arm, double geared. PACKAGING EQUIPMENT L Compate packaging software consisting of:
- - ICRAGING EQUIPMENT I Complete packaging set-up consisting of: Pnoumatic-Scale bottom sealer, Stokes & Smith auger filler, Pnoumatic top sealer for caricons ranging from 3" x 4" x 1½" to 6" x 9" x 2½", Hoepner-automatic, scale weigher, filler, bagger and stitcher for 5 and 10 lb. free flowing materials. Fillers for liguids, paste, powders. Labelers for all types of containers. Envelope and bag sealers. Wrappers, cartoners, conveying lines. FECEE
- PRESSES
- 2 Dunning & Boschert, 1200 ton, curb presses, 28" ram, 28" stroke, steam platen.
 2 Bunning & Boschert, 1200 ton, curb presses, 28" ram, 28" stroke, steam platen.
 2 Elmes hydraulic presses; 10" x 14", with pump and accumulator. Elmes compression moiding presses; 35 ton to 200 ton, 22 x 30 to 30 x 73.
 1 Farrel, 130 ton, heated platen, 20" x 20" and 1-150 ton, 26" x 26".
 2 Hardinge hydraulic presses, 24" x 28" platens, 14" ram, 9" stroke.
 1 Renneburg, 5 ton screw press and dryer, 50 HP motor.
 2 Southwark hydraulic presses, 80 ton, 20 x 20, and 100 ton, 36 x 36, with heated platen and accumulator.
 1 Stokes, 200 ton, semi-automatic compression moiding press.
 1 Thropp, 6 platen, 3' x 3', hydraulic, 12" ram.
 0 Other presses; 400 to 5000 ton Bethlehem, H.P.M., Southwark, Birdsboro, etc.

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Two practically new Ransome Machinery FOR SALE **Company Special Agitators or Mixers**

> with 9 ft. diameter 11 ft. 6 in. long drums on steel frames without power but complete with grear reduction unit, including V-belts and pulleys. Mixer equipped with special 8 in. pipe trough in axle and with trough baffles emptying into it.

dineri 15" x 3" Type Capacity 1" Material 3 fal 5 teta per bour. Biaka 13" x 3" Excent Man Strate Constant And Strate Strategy And Strategy States And Strategy All to States and Strategy DRYERS In & Snow, Varticul Stand J Up. Aplicture, Reducers, J

CONDENSERS

CONDENSERS Styr Condenser-Size Intelse, 2 pass, C.I. body maters 3' diameter x t stal body, t stal body, t Sarkart Iron Body Sarth 285 m, ft. Sartace-ig ar

" All Conter Condenses o IT. Sarface. IT. Cardinases with 154" Bo 180 m, ft. Surface. 18 ft. Stool Condenses of 18 ft. Stool

CRUSHERS

ELECTRIC TRUCKS wher Electric Lift True apartity, with Editors I ETTRACTORS

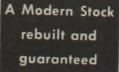


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- AUTOCLAVES I-42" dia. x 24'4" Vertical Forge Welded Steel 600 lbs. Pressure-1300 gals. I-4' x 6' Vertical fon Body Steel Jacketed 200 lbs. Pressure-600 gals. I-0' x 25' Vertical or Horizontal Forge Welded Steel Jacketed. 100 lbs. Pressure.
- BLENDERS I-3'6" x 5 ft. Cylindrical Blender with Stands and Drive.

- BOILERS 1-Cope 70 HP Vertical Steam Fire Tube Boiler 125 #. 1-26° D x 45' long stack for above. 1-Automatic Stoker for above boiler...-without motor. 1-Ginon Ton Works 44 HP Horizontal water tube boiler, 200# W.P.

- boiler, 200 # W.P. **CONDENSERS** -Alberger Condenser-Size No. H209-A, 240-5/4" eopper tubes, 2 pass., C.I. body. -#2 Condenser 3' diameter x 8' high, 125-11/4" tubes, steel body. -Condenser 3' diameter x 10' high, 125-11/4" tubes, steel body. -Elliott Enhart fron Body Surface Condensers-two pass 245 sq. ft. Surface-1/2" brass tubing & Tubes meet. -300 sq. ft. Surface. -Goubert Condenser with 11/4" Tubes-300 sq. ft. Surface. -Goubert Condenser with 11/4" Tubes-Body 330 sq. ft. Surface. -12" x 9 ft. Steel Condenser with 172 5/4" O.D. Copper Tubes, 250 sq. ft. surface.

- CRUSHERS I-Allis-Chaimers 15" x 9" Type "B" Blake Jaw Crusher. Capacity I" Material 3 tons per hour-2" Material 8 tons per hour-1-Ell W. Blake 15" x 9" Eccentric Jaw Crusher. Belt Driven. -Sturtevant 5" x 10" Jaw crusher capacity I to 1½ tons per hour-½" material. -Sturtevant 2" x 6" laboratory Jaw Crusher ca-pacity 700 to 800 lbs. per hour-½" material.
- DRYERS -Bartlett & Snow, Vertical Steel Jacketed 10' dia. x 4' high. Agitators, Reducers, 2 HP Motors.

- ELECTRIC TRUCKS 3-Elwell Parker Electric Lift Trucks, Model EG, 4000 lbs. capacity, with Edison Storage batteries.
- EXTRACTORS I-38" dla. King & Gerber with Bronze Basket and Iron Curb-Overdriven.

- -PARTIAL LISTING ONLY-
- $1-\!\!\!-40''$ diameter Tolhurst contrifugal (suspended) with steel frame, and $7'_2$ HP 900 RPM 220 volt 60 cycle 3 phase motor, solid basket (4 shelf design) bottom discharge.
- sign) bottom discharge. FILTER PRESSES I-12" dia. International Pressure Filter with Nickel Body and Cover-Single plate. I-Karl Kiefer Clarifying Filter on stand. I-24" Sporry Filter Press Chassis only. Two eye corner fed. I-24" x 24" Shriver I, LOD, Filter Press. Test of Cast Iron Plates & Frames for Shriver Filter Press-Size 18"-3 Eye Corner Feed. Open delivery.

- Filter Press—Size in delivery. Set of Cast Iron Plates & Frames for Sperry Filter Press—Size 36st—Top Side Feed—Open Delivery. TANKS

Tanks from 50 gallon to 1200 gallons in stock. Advise your requirements. FURNACES

FURNACES I—Lydon Glass Annealing Furnace with Temperature Controls, Motor, Fan, etc. I—Dispatch Electric Furnace Type C.F. 17-20 K.W. 220 volt—maximum temperature 1250 degrees F-with circulation fan and ¾ H.P. Motor and con-trols—18" x 13" hearth.



I-6 ft. Dia. x 6 ft. Long, Thropp Pebble Mill Burhstone Lining-Belt driven. IMPREGNATING UNITS

I—Imprognating Units, 800 gal. capacity. Quick opening doors, surface condensers, vacuum pumps, circulating tanks, pumps and motors.

i—No. 0000 Raymond Impact Pulverizer, me-chanical air separator, tubular dust col-lector, screw conveyor with 10.2 & I H.P. motors—220 volt—3 phase 60 cycle.

I—Sentry Electric Furnace—Size No. 3—Type HS, 33 K.W.—2 circults—220 volt—Temperature range 1200 degrees F. and 2500 degrees F.—12" x 18" Hearth.

- INSTRUMENTS I-Weston Model 44 Type C. Revolution Indicator 0-1200 RPM. 2-Brown Electric Pyrometer 1200 degrees to 2600 degrees F. I-Foxboro Recording Thermometer 0 to 100 de-grees F. I-Brital Recording Thermometer, 0 to 200 de-grees F.

- 1-
- grees F. -Tycos straight stem, glass front, separable socket thermometer. KETTLES

I-8' dia. x 10' deep, iron body with heating coil, agitator and drive, 3000 gal.

1-3'6" dia. x 5' deep, steel jacketed, with agitator 300 gals.
1-3'6" dia. x 5' deep, cast steel, jacketed, no drive or agitator. 350 gals.
1-4'6" dia. x 3' deep, steel jacketed, with agitator and drive, 350 gals.
1-8' dia. x 3'6" deep Vertical Pressure Kettle-Ruber lined.
1-00 Gal. Jacketed Copper with Bottom Outlet & Stands.
1-6"9" x 8'6" deep Iron body. Sulphonator, Propeller Auitator. Drive, Tight and Loose Pulley. Capacity 2000 gallons.
1-12" dia. x 3' deep, aluminum lined, Jacketed agi-tator, drive, tight and loose pulley.

- MILLS 1-6' x 6' Throop Pebble Mill-Silex lined. 1-6' diameter x 5' Pebble Mill-Porcelain lined T & L Pulley drive. 1-15'' Style 0 Schutz 0'Neil Pulverlzing Mill. 1-84'' Brown Ball Mill-Mushroom Type. 1-54'' Brown Ball Mill-Mushroom Type. 1-No. 21 Quarker City Hammer Mill. 1-No. 21 Quarker City Hammer Pulverlzer.

- 1-5' dia. 23'4/2" Forge Welded Steel 300 lbs. W.P. 3300 gais. suitable for storage of compressed gases.
 1-6'x8' dia. x 6' deep, steel, riveted 125 lbs. W.P. 1750 gais.
 1-3'6" x 10' high, steel riveted, 100 lbs. W.P. 750 gals.

- PUMPS I—American Well Works Centrifugal Pump 2 stage— Bronze Impeller—4" suction 3" discharge—com-plete with 30 H.P. G.E. Motor—Capacity 345 Gals.—200 ft. Head. I-Wilfley Model A.B. Centrifugal Pump 2" suc-tion—1½" discharge—complete with 7½ H.P. Drip proof motor—Capacity 80 G.P.M.—150 ft. head.

head. **REFRIGERATION UNIT** I-American Carbonic Model V5-2 Refrigeration Unit Type C02-capacity 5 ton. I-Cascade Deep Freeze Unit, complete with com-pressors, motors, control, etc. Minimum tempera-ture 130 degrees F.

STACKER I-Barrett Cravens Electric Lift Truck-Type NHB 204. Canacity 2000 lbs.-18" x 24" platform-lift 12', motor 2 H.P.-220/440 volt-3 phase-60 cycle-1600 r.p.m.

STILLS 1-No. 2 F. J. Stokes Automatic Water Still.

- VACUUM PUMPS
 4—Stokes Side Valve Type, size 6° x 6°, Pulley Drive.
 2—Devine Rotary Valve Type, Size 10° x 10° 52 cu. ft. Displacement. Pulley Drive.
 2—Devine Rotary Valve Type, Size 10° x 10°, 113 cu. ft. Displacement. Pulley Drive.

VIBRATING SCREENS raylor Type 4—Vibrating Conveyor

 VIBRATING SCREENS

 I—Jeffrey Traylor Type 4—Vibrating Conveyor Screen.

 I=Deister 3' x 6' Concentrator, Type C, Single Sur-face Leahy Heavy Duty Vibrating Screen with I h.p. motor—440 Volt—3 Phase—60 Cycle.



CHEMICAL ENGINEERING . FEBRUARY 1947 .

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UCAL ENGINEERN



10—Sperry 32" Sq. Iron Filter Presses.

1-Oliver Rotary Vac. Filter, 8' x 10' complete.

- 11-Sharples #5A Stainless Oil Purifiers 2 H. P., latest type.
- -Stokes RD 4, 1 3/16" Rotary Tablet Machines 75-18", 30" & 36" Sq. Iron Filter Press, Plates & Frames.
- 1-Chrystie 80" x 45' Rot. Dryer. 14-Tolhurst 40" Suspended Type Cen-trifugals, Bottom Discharge.
- 1-Stokes #149B High Vac. Pump. 1-Hardinge, 3' x 8" Conical Ball Mill.
- 3-Rotary Screens, 18" x 72". 2-Door 15' Bowl Classifiers.
- 4-Day Pot Ball Mills, 24" & 32" dia.
- Sturtevant 36" Rock Emery Mill.
- 4-Pfaudler Glass Lined Jack., Agitated Kettles, 350 & 400 gals.
- A. Stainless Steel Jack. Kettles, 40, 60 80 and 375 gals., 2 with agitators.
 5. New Stainless Steel Tanks, 100 to 1000 gals., open & Closed top.
- -Alum. Jack. Kettles, 60, 80 & 100 gals. New 40 gallon Pony Mixers.
- -W. & P. 9 gal. & 20 gal. double arm mixers, motor driven.
- 12—Filter Presses, Iron, Wood & Rubber, 7" to 42" sq.
- 1-Williams #3 "Regular" Type Ham-mer Mill.
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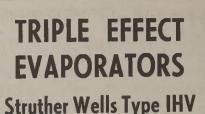
- 2-250 & 1500 gal. Lead Lined Kettles.
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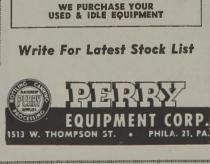
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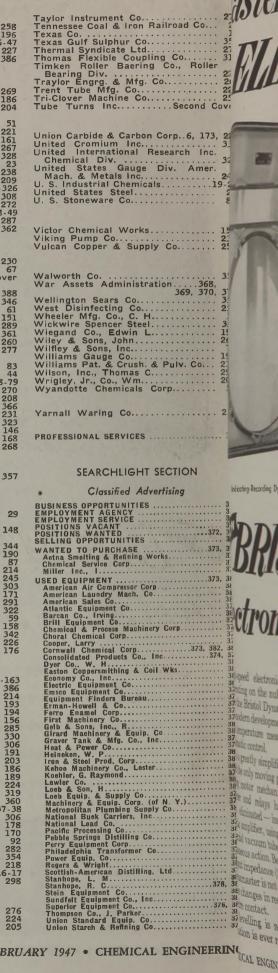
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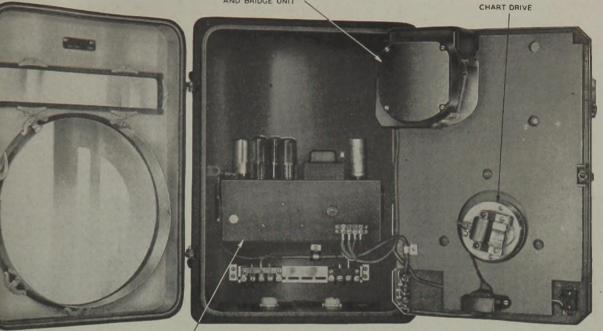
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A high-speed electronic instrument operating on the null balance principle, the Bristol Dynamaster is an ultra-modern development in the field of temperature measurement and automatic control.

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the Dynamaster is unaffected by vibration, corrosive atmospheres, ambient temperature changes or line voltage fluctuations. Built to give longer, more accurate service in general plant and process work under the severest operating conditions, Dynamasters are available as Recorders, Indicators and Automatic Controllers (air or electric). Standard temperature range: -150° F. to $+400^{\circ}$ F.; also furnished for other resistance measurements.

For complete data, write for Bulletin R900 to The Bristol Company, 109 Bristol Road, Waterbury 91, Conn. (The Bristol Company of Canada, Ltd., Toronto, Ontario. Bristol's Instrument Co., Ltd., London, N. W. 10, England.)

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CHEMICAL ENGINEERING . FEBRUARY 1947 .

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-AN ELLIOTT CENTRIFUGAL BLOWER

Below is shown an outdoor installation of an Elliott motor-driven blower, typical of many used in catalytic cracking service. Blower supplies 21,500 cfm of air at 2.5 psig. Driven by 350-hp, 3550-rpm motor.

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