AUGUST, 1943 No. 2

CHEMICAL INDUSTRIES

The Chemical Business Magazine


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he Business Magazine for
Makers & Users of Chemicals

Management, Research, Production, Marketing

CHEMICAL INDUSTRIES

Contents

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AUGUST, 1943

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BEST DRESSED MEN IN THE WORLD

YOU don't need any introduction to these men – they're your sons, your brothers, your neighbors' boys. Fighting for you – for America – with the finest equipment and materials America can give them. That includes both equipment you see and equipment you don't see.

Take their uniforms, for instance – and their blankets, tents and parachutes. Millions of units of sturdy textiles are needed to equip our armed forces. Thousands of tons of chlorine are used in bleaching these materials – that's where a big supply of Mathieson chlorine goes.

And their planes, tanks and munitions – the best that America can supply. Mathieson Chemicals fill many a vital need in their manufacture. Mathieson chlorine helps in the production of warplane cowlings, high octane gasoline, explosives, cooling agents for liquid-cooled engines, and certain types of synthetic rubber. Mathieson soda ash is required in the making of explosives, aluminum, iron, steel and war-essential glass. Other war needs consume large amounts of Mathieson caustic soda, ammonia and carbon dioxide.

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BETWEEN THE LINES

Alcohol Supply and Demand

Important decisions are under study in the Chemical Division of WPB regarding production of alcohol, some of which may be forced by developments in the near future. Problems include future production rate and utilization of present stockpile.

THE ALCOHOL stockpile is now at its peak. For one thing, production ran ahead of preliminary estimates. For another, the synthetic rubber program developed behind alcohol production, so that the stockpile accumulated faster than it might have, if synthetic rubber production had come in faster than was the case. Against an estimated total alcohol requirement figure of 435,000,000 gallons for 1943, an allowance of 145,000,000 gallons was finally considered adequate for the rubber program for the year.

The Chemical Division has maintained for some time, and expected to hold, a stockpile of 100,000,000 gallons or more. It has calculated that a desirable level would be 125,000,000 gallons, and its stocks may now be at that figure, as no recent public figure has been issued.

However, studies which have been made by interested agencies show that there has been an increasing demand on this stockpile for meeting war needs. In other words, in addition to current production as such needs have arisen, a substantial amount of the required alcohol has been drawn each month from the stockpile. Incidentally, this stockpile is separate from a reserve for absolute war-emergency, largely maintained at service arsenals.

In other terms, the minimum stockpile requirement has been figured at from 1½ to 2 months supply. It has been stated that if any foreseeable contingency should arise, this would give Washington time to expedite construction of new facilities which are now either in a dormant state or not being rushed along. If the current trend continues, the stockpile will be down to less than 1½ months' supply before production is augmented.

The capacity of synthetic rubber plants has proved to be about 50 per cent greater than was first expected. This means that the drain on the stockpile will be faster, and it means that any temporary excess in production will be balanced. Coupled with other factors, there may be a steady trend of requirements exceeding current production, and a consequent continued downward flow of the stockpile until early 1944.

At that time new facilities are scheduled to come into operation. These include a plant at Kansas City, scheduled for completion in November; another in Iowa scheduled for operation in October, and another in Nebraska, scheduled for completion in September.

Unforeseeable war developments could affect this outlook, obviously. One potential new use for alcohol, which is now on the secret list, but is described as *not* for Chemical Warfare, is expected to require a considerable amount. If German desperation results in a resort by that country to gas warfare, it would be reflected in an increased demand for alcohol on this side, incident to stepped up chemical activities of our own.

Rubber plants may be calling for larger amounts of alcohol in the coming months. The alcohol position is reviewed periodically, but overall estimates of production requirements were determined early in the summer, and at the time, it may be recalled, supplies for 1944 were reduced to 590,000,000 gallons from an earlier figure, 640,000,000 gallons, and requirements for 1944 were balanced at 590,000,000 gallons.

Since this program was laid out, there has occurred the stringency in corn, the possibility of large stocks of both corn and wheat being necessarily earmarked for distribution as food abroad and at home, and a growing pressure for a holiday on the part of some beverage alcohol distilleries which temporarily converted to industrial alcohol production. The possibility is now regarded as stronger that some grain may be withdrawn from alcohol production.

The position of Chemical Division on these matters is that it must meet essential alcohol requirements above any other demand. It has given assurances that such demands will be met, including promises to the Rubber Administration that synthetic rubber will get the alcohol it needs. The stockpile serves as a buffer in all the contingencies that are now kept in mind by Washington authorities.

Thus, even though the Rubber Administration or any other agency might expand its facilities, requiring larger quantities of alcohol beyond current estimates, it is figured that new alcohol plants could be built more rapidly than the consuming facilities. However, it is emphasized that this does not mean new alcohol consuming plants necessarily will be built.

It may help to clarify one phase of the alcohol situation to indicate that the Chemical Division has as its guide in planning production, the fluctuating demands from various users. Thus, what may appear as a wavering policy at times is simply explained as an effort to keep production facilities in line with known and reasonably sure future demands for the product.

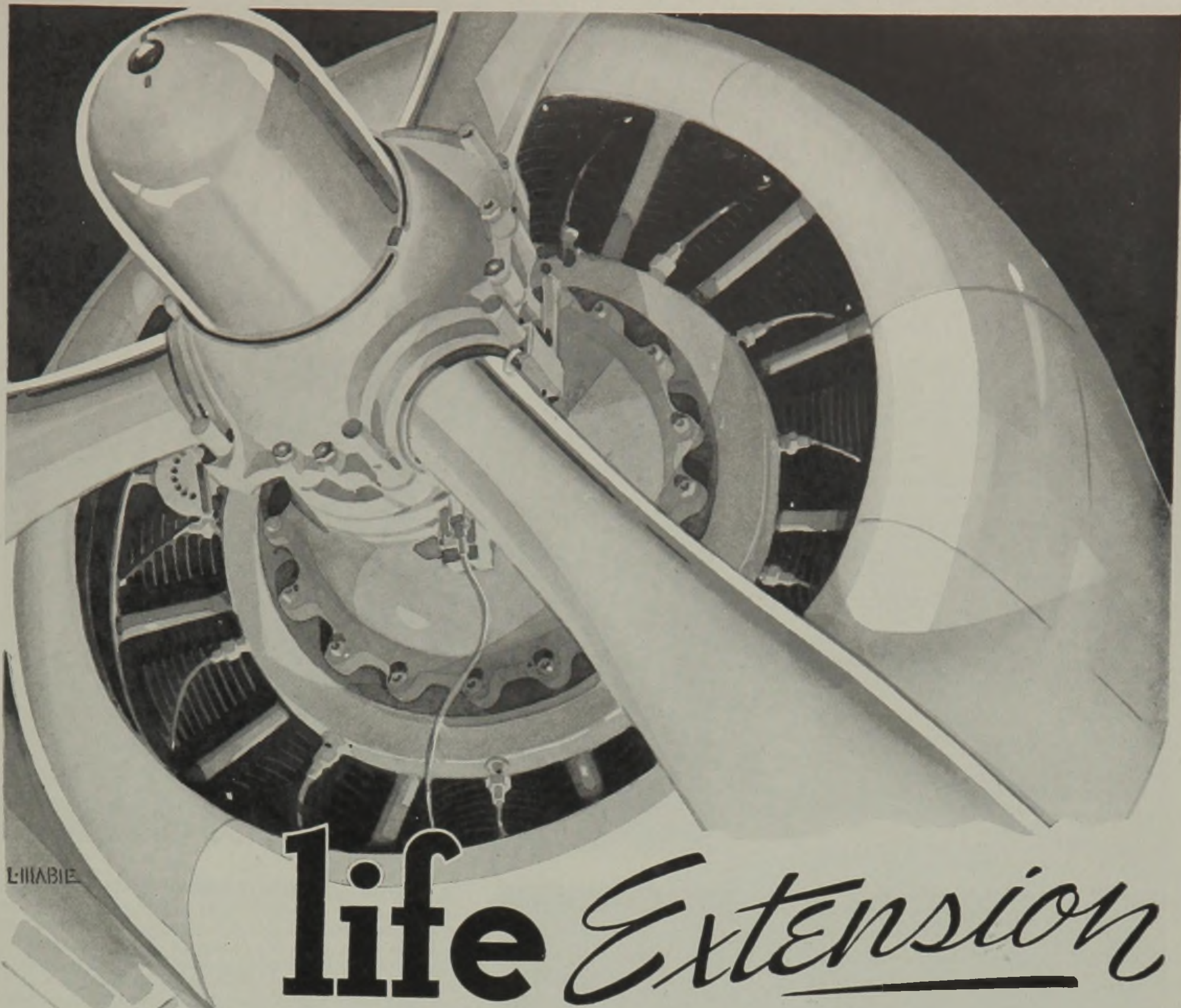
At the outset, in early 1942, the alcohol program was outlined as follows: early estimates, 175,000,000 gallons needed, raised to 275,000,000 gallons, and finally, for 1943, to 365,000,000 gallons, to be divided—smokeless powder, 80,000,000 gallons; Army-Navy requirements, 45,000,000; lend-lease, 25,000,000; chemical raw material, 115,000,000; antifreeze, 40,000,000; various others, 60,000,000.

It is a commentary that against this estimated need at the time, the best guess as to production available was a maximum of 270,000,000 gallons, of which 220,000,000 gallons was from molasses and 50,000,000 ethylene; furthermore, the molasses for the major figure was exhausted. Such was the early picture.

This was when synthetic rubber was in the planning stage, and it was before gasoline rationing made certain changes in requirements for anti-freeze. Since that time also, Army estimates have been reduced, from one cause or another, and the latter requirements have been a considerable element in originally large estimates of alcohol needs.

The Division now confronts the various possibilities which have been touched on here, and some others, that may be speculative but undoubtedly are on the desks of those most concerned: the possibility of increased automobile travel in the coming year, made likely by easing pressure on gasoline supplies, and possibly more tires available, which means renewed demand for antifreeze compounds; the possible resort to new fuel compounds of alcohol, especially for distribution in reconquered territory where autos and other apparatus are geared for such fuel use; and always, some new turn in the war.

While the Division and other agencies in Washington have been under fire almost constantly from one or another quarter, especially because of cancellation of new plant projects, it is advanced as one of the safeguards against unexpected developments that plant plans are ready, sites are known, and if required, new facilities could be launched. And finally, there is the great unknown: What if the war takes an entirely different turn from any now considered? What if a lot of production has to be cut down suddenly? This latter is considered to be still a future matter, however.



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Life ON THE

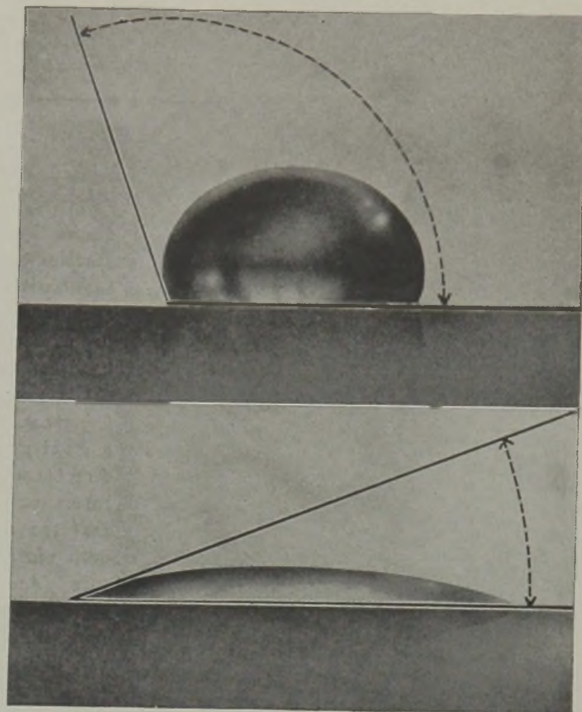
(Right) **INSECT AND PEST CONTROL** measures must be rapid but thorough for military structures which must be in almost continual use. Cyanamid's ZYKLON* DISCOIDS (hydrocyanic acid absorbed in cellulosic disks) are proving to be one of the most effective ways to combat infestation. In the pictures to the right are shown how barrack doors first are sealed against escape of the hydrocyanic acid gas. Likewise, each member of the fumigation crew wears his military gas mask, fitted with a special "HCN cannister," before opening one of the cans preparatory to spreading the DISCOIDS through the barracks.

(Below) **ACTION! CAMERA!** Multiple copies of everything from field maps to equipment are needed by the armed forces for field study and personnel training. Redsol Crystals* (Potassium Sodium Ferricyanide) developed and produced by Cyanamid to make us independent of foreign sources of supply, finds wide use as the essential ferricyanide for blueprint paper. Fine crystalline form, resulting in ease of solution, its uniform high purity and higher ferricyanide content per unit weight of product makes the use of Redsol Crystals particularly advantageous.

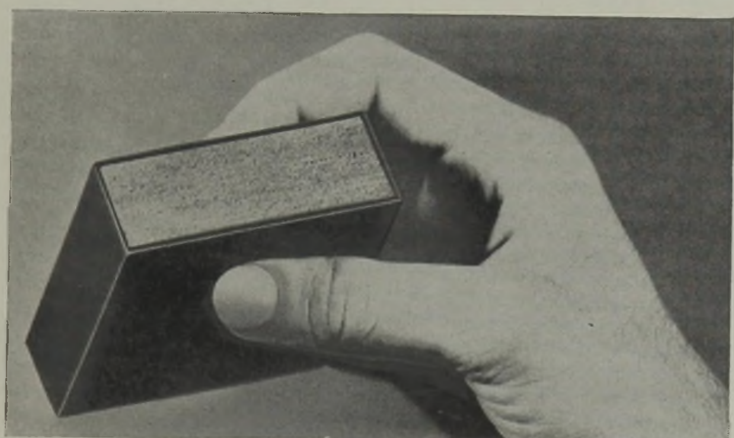
(Below) **FROM UNDERWEAR TO OVERCOATS,** buttons molded of MELMAC* and BEETLE* plastics provide smart appearance and durable service on garments for our fighting men and the Women's Auxiliary services. Resistance to repeated launderings and dry cleaning respectively feature these ideal plastic button materials produced by the Plastics Division of the American Cyanamid Company. Cyanamid plastic materials find other wide and diversified use, such as for container caps and closures, for safety lighting reflectors, and electrical appliance parts where these materials meet the exacting requirements of wartime fabricating and service conditions.

CHEMICAL NEWSFRONT

(Above) **SUPPLIES FOR THE FIGHTING FRONTS** must not only get through, but must reach their destinations intact and ready for use. This places a big responsibility on the containers in which food, medical supplies, clothing and munitions are shipped over the seven seas and the skyways of the world. The fact that more and more supplies are sent in paperboard containers can be credited to the application of Cyanamid's URAC* Resin Adhesives which "weather-proof" and strengthen solid fiber and corrugated cases, of the type shown here ready to be discharged on a South Pacific beach-head.



(Above) **ORDINARY WATER** in contact with a "waxy" surface forms into spherical droplets with limited spread and surface covering as shown in the upper picture. But when Cyanamid's VATSOL* Wetting Agent is added to the water the drops flatten out, spread to cover a much greater area and "wet" the surface more thoroughly, as shown in the lower picture. Leaf surfaces of plants, fruits and the bodies of insects are covered with waxy or oily materials. Thus it is easy to see why insecticides and fungicides containing VATSOL prove more effective.



(Left) **OIL-RESISTANT SYNTHETIC RUBBER** is made possible largely by the properties of acrylonitrile which provide exceptional resistance to grease, gasoline, light, heat and abrasion. Shown here is a synthetic rubber gasket developed by the B. F. Goodrich Company to withstand the destructive action of oils and greases. At Cyanamid, the development of a new chemical process made it possible to initiate the first commercial production of acrylonitrile in this country. Since then, Cyanamid's capacities have been constantly expanded to keep pace with the growing demand until today Cyanamid is the largest producer of acrylonitrile. The entire production of acrylo-type rubber is at present restricted to aircraft industry uses.

*Reg. U. S. Pat. Off.

American Cyanamid & Chemical Corporation

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WASHINGTON

By T. N. Sandifer

Chemical Warfare Demands Increasing

CONGRESSIONAL recess until September will further delay any action to modify renegotiation of contracts procedure, as recommended by spokesmen for the chemical and other industries recently.

Renegotiation has not been the factor in chemical warfare production that it has in the case of manufacturing contracts for other military and naval services. Officials of Chemical Warfare Service report that it has recovered about $3,000,000 in renegotiations of its own contracts, attributing this relatively small haul to the fact that this services' contracts are not as large as those for other service manufacture.

T. N. Sandifer

Compared with the billions being expended for other categories of war production, the amount of money actually put in circulation by CWS up to now does not leave much scope for heavy repayment claims. At the time CWS was seeking appropriations for the fiscal year 1944, the point was raised that the service had obligated only about half of the total of $1,748,099,832 made available to it since June, 1940, and some objections were offered in Congress to allotting any considerable additional funds at this time.

One explanation of this lag was that a substantial part of CWS' production is only now getting well started, and during the coming year will increase. Funds were finally allowed, despite the large carry-over from earlier appropriations, on the representation by service spokesmen that CWS must now make several times the former quantities of certain items required by the Army. Hence, with increasing expenditures now forecast, renegotiation may loom as a more important consideration, and pressure on Congress for modernizing the procedure under this head can be expected to be renewed.

Carry-overs are a touchy matter with Congress. In the case of CWS, however, a good impression was made, and an indirect compliment to chemical manufacturers voiced incidentally by a statement that the over-hang could be charged to both efficient procurement and manufacture. Another factor has been that foreign governments have not made as heavy requisitions for supplies and equipment in this field, as it was estimated they would. Still another has been adjustments made in Army requirements due to changes in war planning.

New war developments could change all this, CWS officials point out, and such changes could come very suddenly. CWS is the sole manufacturer of some items in current war demands, consequently this service must obtain or build plants for the necessary processes or manufacture. Under current procurement planning, provisions are being made for construction of pilot plants from which large-scale production can be launched when necessary.

Stockpile Shadows

Without intimating that Washington is becoming prematurely concerned with the end of the war, it is the fact that the size of the war plant is causing uneasiness both officially and in the industries affected. There is a growing disposition to trim out any obviously surplus plant or material accumulations, or at any rate, to put them to more urgent use in current war efforts.

The Office of War Mobilization has instructed procurement agencies to review their requirements constantly, discarding any that have been outpaced by the changing war, and balancing those retained in relation to the over-all needs of today. In the chemical field, in which government-subsidized plants have been a major factor in war production, some discussion is heard among members of Congress as well as others as to the best disposition of surplus facilities. It is very evident even at this stage, and with cut-backs in view, that considerable stocks of various chemicals will be left on hand at the end of the war, in addition to the vastly expanded production capacity for their manufacture.

Much of the surplus material, as well as the plants, is adaptable to conversion for commercial use. Suggestions are being advanced from various quarters here for a conversion program. Emphasis is placed, in the case of chemical plants, on conversion that will permit ready return to war production if needed, or on putting such plants into stand-by idleness. About 5 per cent of ordnance plants of all types have been closed to date, and among ten recently listed was a bag-loading plant. They are being kept in stand-by condition, however. The Army has emphasized that closing such plants now can only be regarded as tentative, with re-opening at any time a contingency requires.

Use of Chemical Engineers Questioned

Apart from CWS' production problems, Congress has recently raised the issue with that service that it might not be making the best use of chemical engineering graduates called up in the draft, or volunteering. CWS has been reminded that with the growing scarcity of technically trained personnel, it could not afford to waste the services of such men on non-vital activities after they don uniform.

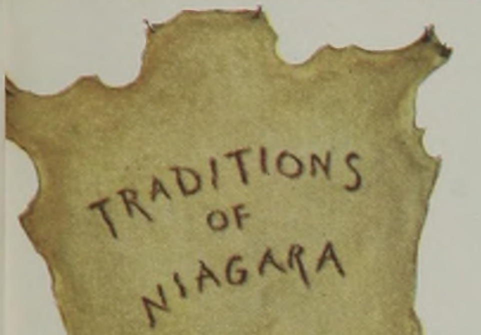
As to the chemical material supplies, allocations of chemicals for July, the latest report month, amounted to more than $100,000,000, a sharp increase over the preceding month, accounted for by issuance of new allocation orders, and inclusion of figures for several orders covering longer periods.

The chemical field has come to the rescue of several industries feeling the pinch in industrial corn supplies. Thus war production in many foundries continued despite the shortage of cereal core-binders such as starch, because chemical substitutes were available. These included dextrine, synthetic resins, soybean meal, rosin-base binders, and by-products of the sulfite paper process such as lignin.

Grain Situation

There is no actual shortage of corn for industrial use, if supplies can be brought to market. So far, government action has served merely to insure a bare minimum

(*Turn to page 255*)



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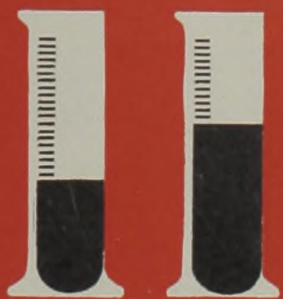

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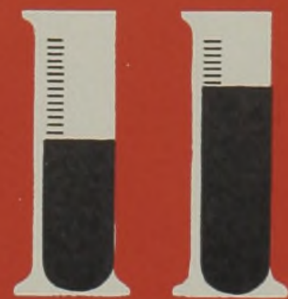

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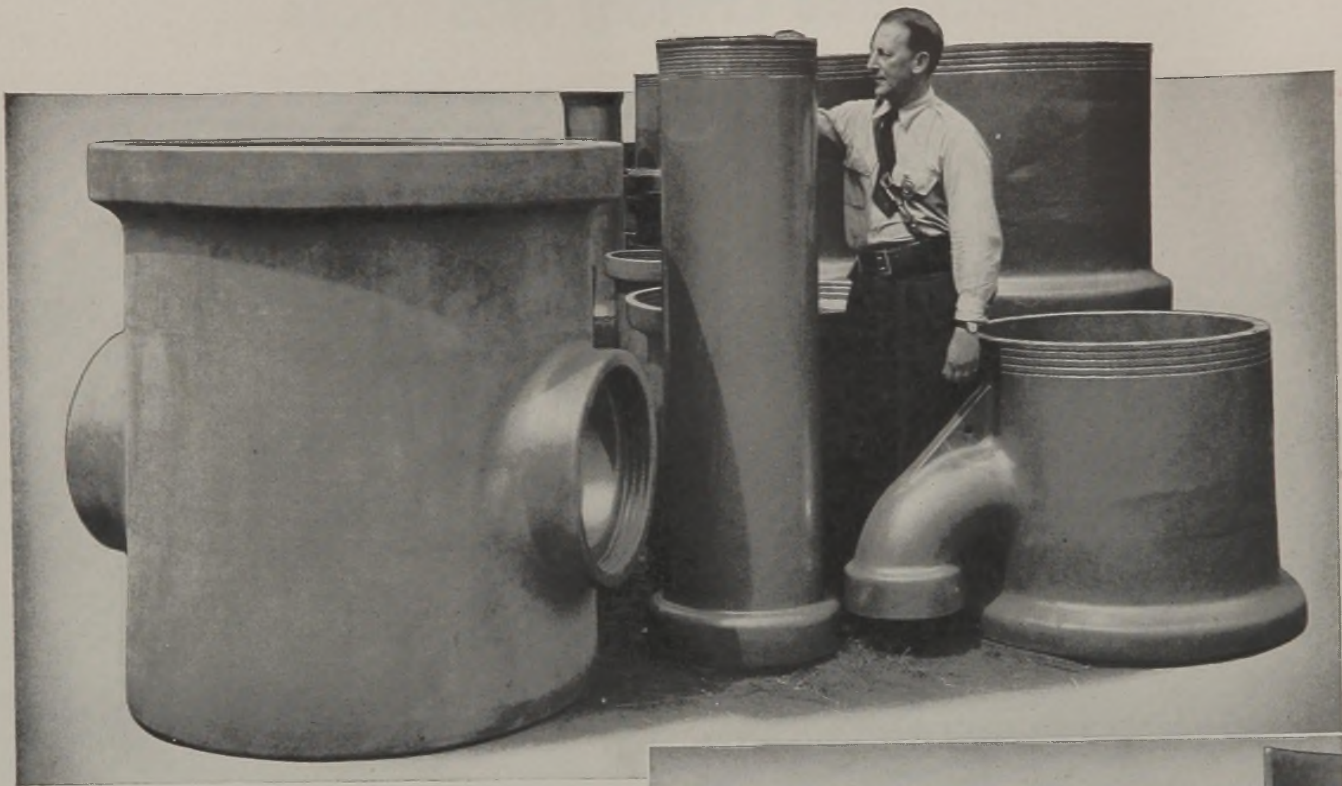

Illustrated here are a few of many types of acid-proof pipe regularly being made by Maurice Knight. Bore sizes range from one to sixty inches. Knight also furnishes standard fittings such as elbows, T's, Y's, sanitary T's, traps, etc.; also special fittings to meet unusual installation conditions.

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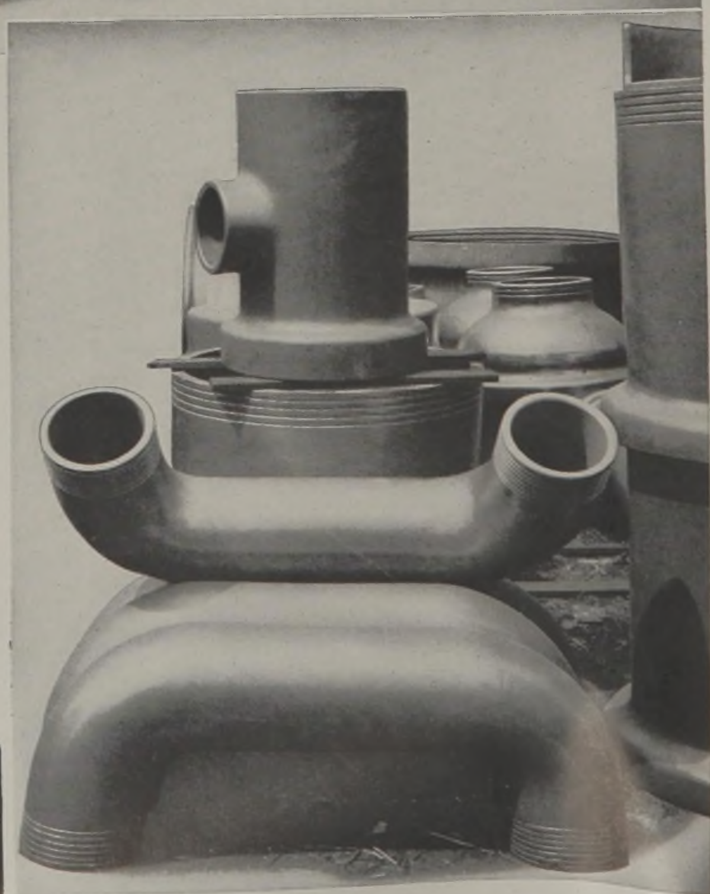

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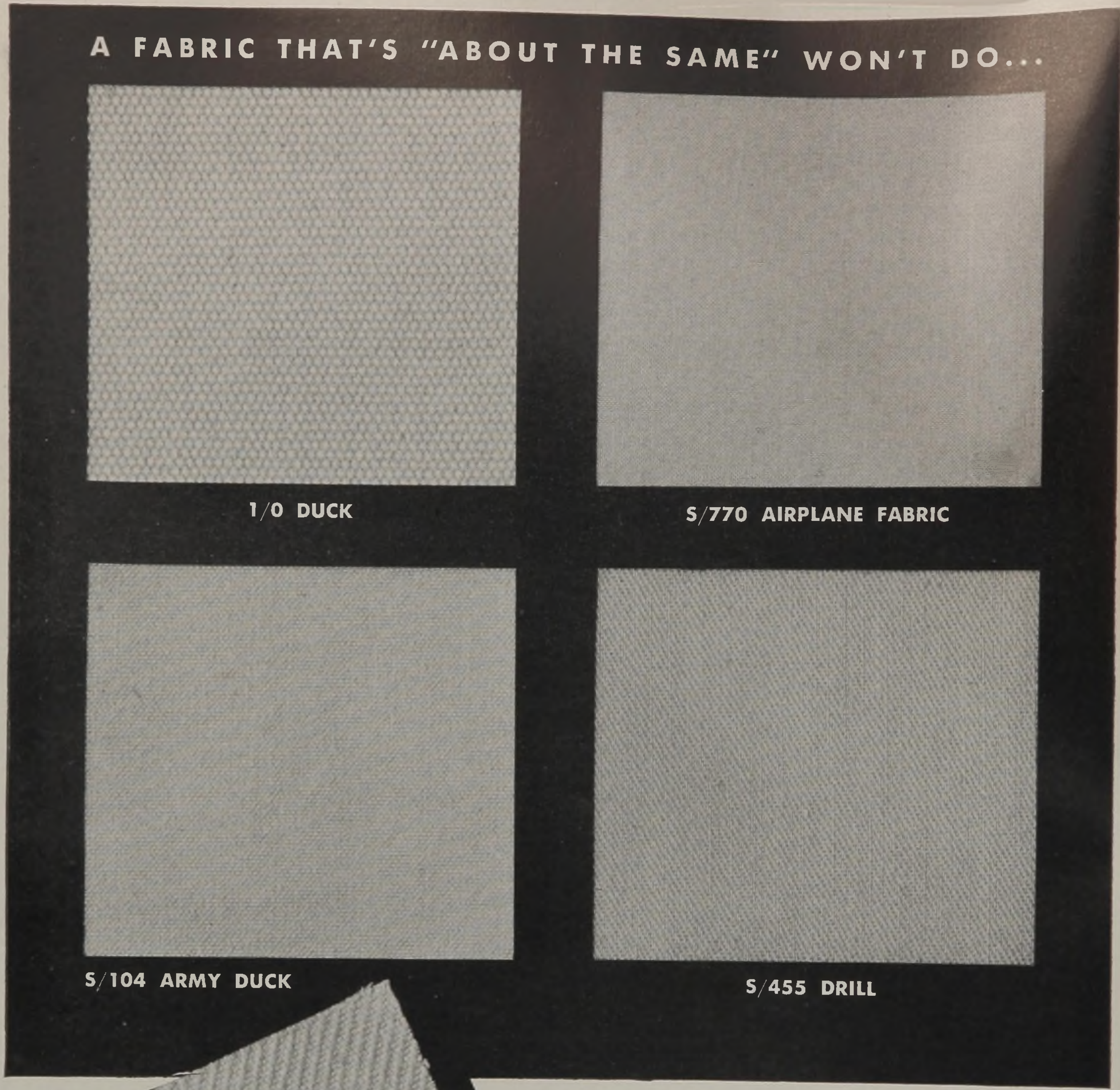
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S/104 ARMY DUCK
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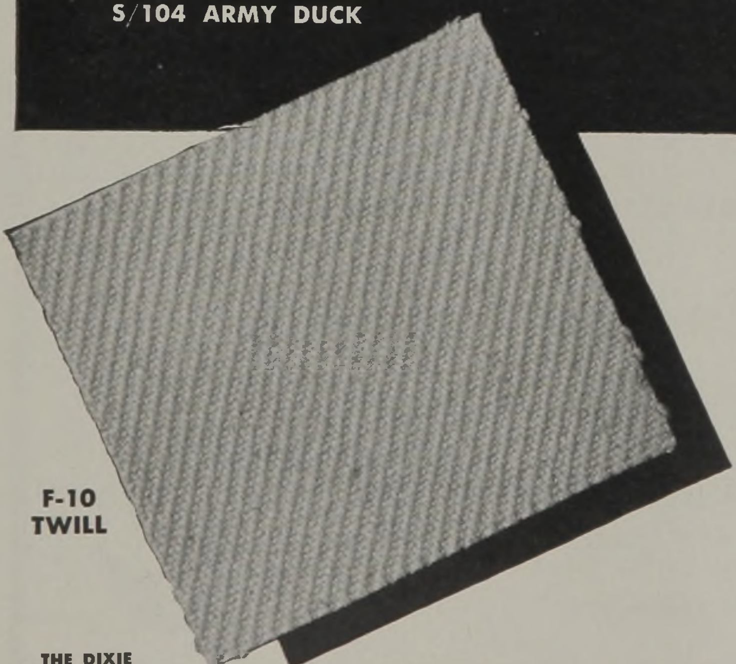

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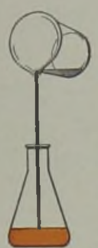

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SAVE 8 MEN IN PACKING AND LOADING OPERATION

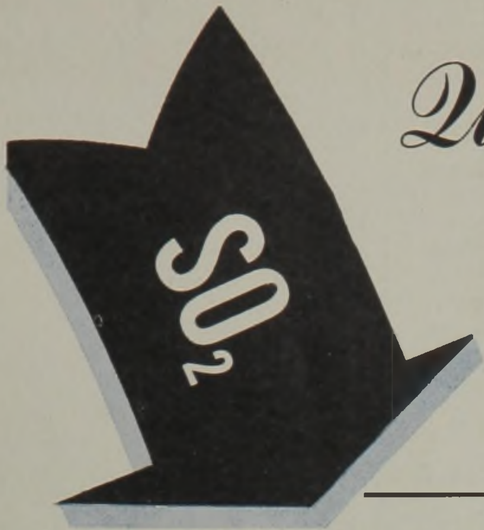
A plant shipping products in multiwall bags required 16 men to pack and load their output. A Bemis Multiwall expert recommended rearrangement of packing equipment and slight mechanical changes. Results: 8 men doing the work previously requiring 16!

BEMIS BRO. BAG CO.

Better Bags for 85 Years

Peoria, Ill. • East Pepperell, Mass. • Mobile, Ala.
San Francisco, Calif. • Wilmington, Calif. • St. Helens, Oregon

Baltimore • Boston • Brooklyn
Buffalo • Charlotte • Chicago
Denver • Detroit • Houston
Indianapolis • Kansas City
Los Angeles • Louisville
Memphis • Minneapolis
New Orleans • New York City
Norfolk • Oklahoma City
Omaha • St. Louis • Salina • Salt Lake City • Seattle • Wichita



Quality

SODIUM SULFITE

(and other sulfites)

by MALLINCKRODT

SULFITES

	Formula	Typical* Assays	Calculated SO_2 Equivalent	Form	Solubility in Water
AMMONIUM SULFITE	$(NH_4)_2SO_3+H_2O$	99% as $(NH_3)_2SO_3+H_2O$	47%	Small Granules	Freely Soluble
CALCIUM SULFITE	$CaSO_3+1\frac{1}{2}H_2O$	98% as $CaSO_3+1\frac{1}{2}H_2O$	44%	Crystalline Powder	Practically Insoluble
POTASSIUM SULFITE	K_2SO_3	98% as K_2SO_3	40%	Coarse Crystalline Powder	Freely Soluble
POTASSIUM META-BISULFITE	$K_2S_2O_5$	97% as $K_2S_2O_5$	56%	Granular or Powdered	Moderately Soluble
SODIUM SULFITE	Na_2SO_3	99% as Na_2SO_3	50%	Small Granular and Fine Powder	Freely Soluble
SODIUM META-BISULFITE	$Na_2S_2O_5$	90% as $Na_2S_2O_5$	61%	Granular or Powdered	Moderately Soluble

* *These figures are determined at the time of manufacture. Over long storage periods changes may be expected since some of these chemiccls have a strong affinity for oxygen.*

HEADQUARTERS FOR SULFITES

Used extensively by the photographic industry for which its high chemical quality and special physical form was originally developed, Mallinckrodt Sodium Sulfite, as well as other Mallinckrodt Sulfites, has become an important factor in all industries wherever high SO_2 content, uniformity, stability and general efficiency is needed.

Mallinckrodt also supplies — in small or large quantities— Magnesium Sulfite, Sodium Bisulfite and Acid Sulfurous 6%

Quality in Quantity

FINE CHEMICALS *Mallinckrodt* SINCE 1867

MALLINCKRODT CHEMICAL WORKS

76 Years of Service to Chemical Users

Mallinckrodt St., St. Louis 7, Mo. • 74 Gold St., New York 8, N. Y.
CHICAGO • PHILADELPHIA • LOS ANGELES • MONTREAL

Masterpieces OF POTTERY

18TH CENTURY FRENCH ceramics were known and cherished for their artistic daintiness and ornate decoration. In contrast to these characteristics, General Ceramics Chemical Stoneware is known and valued for its strength, durability and functional design. It is built for but a single purpose—to serve you, industrially, well and long. There is nothing pretty or dainty about a stoneware pump, for instance, yet, in the handling of strong chemicals and corrosive liquids, its stoneware lining assures long life to the pump itself and insures personnel and property against hazardous leakage. General Ceramics Chemical Stoneware is acid-proof throughout and is built to meet mechanical, thermal, and chemical requirements.

General Ceramics Chemical Stoneware products include acid-proof pipe, valves, fittings, kettles, jars, pots, pumps, exhausters, coolers, condensers, acid elevators, towers, filtering equipment and tourills.

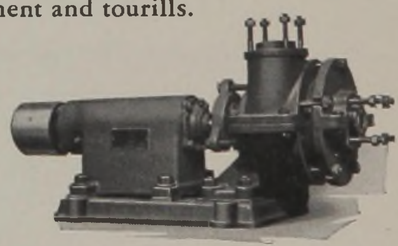


FIG. 420
ARMORED STONEWARE CENTRIFUGAL PUMP

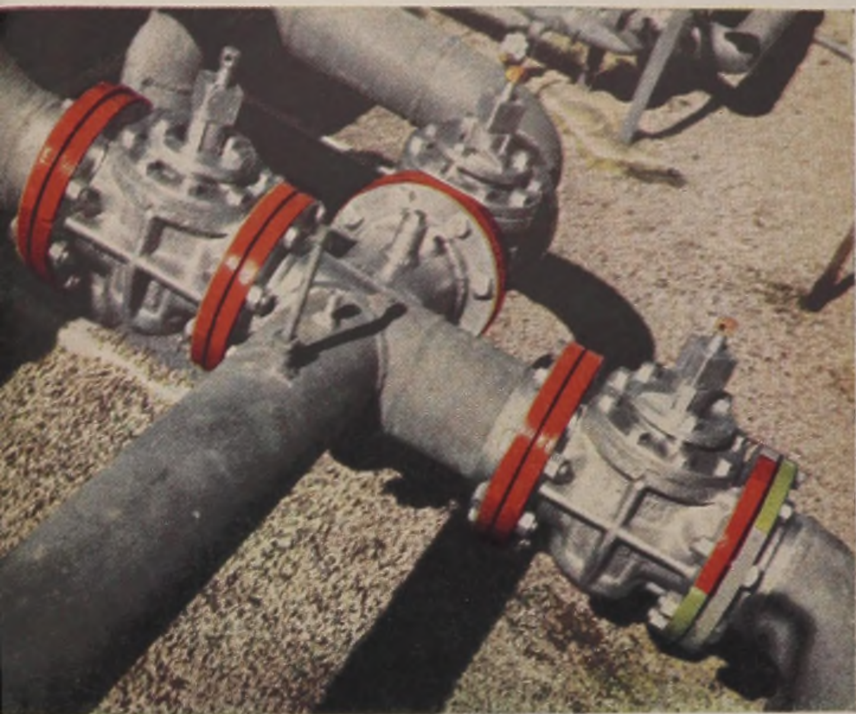
Other products include Steatite Insulators made by General Ceramics & Steatite Corp., Keasbey, N. J.

General Ceramics Co.

GENERAL CERAMICS COMPANY
CHEMICAL STONEWARE

CHEMICAL STONEWARE DIV.
KEASBEY • NEW JERSEY

3950



Nordstrom 8" Valves in a gas plant.

Nordstrom Valves in chlorine department of a magnesium plant.

Nordstrom 14" Steel Valves on recovery tower in a synthetic rubber plant.

Nordstrom Gear Operated Hypreseal Valves on dehydration lines.

Serving on the war front of production

The flow lines of industry are the life lines of production. Nordstrom Valves are the sentinels of control on the most vital lines. They are speeding production toward Victory.

•

KEEP UPKEEP DOWN

Nordstrom Valves in ion exchanger department of a Michigan sugar plant.

Nordstrom Bronze Valves in acid treating plant.

Nordstrom Valves on mud discharge manifolds and suction lines of a drilling rig.

Nordstrom

LUBRICATED — FOR ALL-PURPOSE SERVICE — VALVES

Sealdport Lubrication

MERCO NORDSTROM VALVE COMPANY — *A Subsidiary of Pittsburgh Equitable Meter Company*

WORLD'S LARGEST MANUFACTURERS OF LUBRICATED PLUG VALVES; GASOLINE, OIL & GREASE METERS

Main Offices: 400 Lexington Ave., Pittsburgh, Penna. • *Oakland (Calif.) Factory:* 2431 Peralta St.

BRANCHES: Buffalo, Chicago, Columbia, Des Moines, Houston, Kansas City, Los Angeles, Memphis, New York City, Oakland, San Francisco, Seattle, Tulsa

CANADIAN Licensees: Peacock Bros., Ltd., Montreal • *EUROPEAN Licensees:* Audley Engineering Co., Ltd., Newport, Shropshire, Eng.

SOUTH AMERICAN Representative: The Armco International Corporation. *Main Office:* Middletown, Ohio

PRODUCTS: Nordstrom Lubricated Valves; Air, Curb and Meter Cocks • Nordco Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators EMCO Regulators • Pittsburgh-National Meters for Gasoline, Grease, Oil, Water and other Liquids • Stupakoff Bottom Hole Gauges

Chemicals in GLASS

The greatly increased demand for glass and ceramics as a replacement for vital materials is being capably met by the expanded production of the glass and ceramic industry.

For many years preceding the present emergency, Stauffer has supplied the glass and ceramic industry with its chemical requirements. Now, more than ever before, glassmakers rely on the manufacturing responsibility and dependable service behind each Stauffer product.

STAUFFER PRODUCTS

Borax......................Boric Acid
Sulphur..................Caustic Soda

*Acids	Commercial Muriatic Acid	Silicon Tetrachloride	*Superphosphate
Aluminum Sulphate	Commercial Nitric Acid	Sodium Hydrosulphide	Tartar Emetic
Carbon Bisulphide	*Copperas	Stripper, Textile	Tartaric Acid
Carbon Tetrachloride	Cream of Tartar	Sulphuric Acid	Titanium Tetrachloride
Citric Acid	Liquid Chlorine	Sulphur Chloride	

(* Items marked with star are sold on West Coast only)

Stauffer CHEMICALS SINCE 1885

420 Lexington Avenue, New York, N. Y.
444 Lake Shore Drive, Chicago, Illinois
624 California Street, San Francisco, Cal.
550 South Flower Street, Los Angeles, Cal.
424 Ohio Bldg., Akron, O. — Apopka, Fla.
North Portland, Oregon — Houston, Texas

STAUFFER

ICAL COMPANY

Protection for America's vital crops

LETHANE 60

WHEN the war slashed imports of rotenone and pyrethrum, Rohm & Haas was ready with a synthetic organic insecticide made from domestically available materials—LETHANE 60.

Mixed with either rotenone or pyrethrum, LETHANE 60 is now doubling the supply of insecticidal dusts available for vegetables. Moreover, these combination dusts have proved to be better dusts.

Here is another example of one company's peacetime research serving our country at war.

Fly Sprays and Industrial Sprays

Household insecticides play an important role in the guarding of civilian health. Most of this country's fly sprays contain LETHANE 384 SPECIAL.

In live stock and dairy sprays, LETHANE *384 and* LETHANE *384* SPECIAL, *are widely used for their outstanding effectiveness.*

ARMY E NAVY

LETHANE *is a trade-mark, Reg. U. S. Pat. Off.*

ROHM & HAAS COMPANY

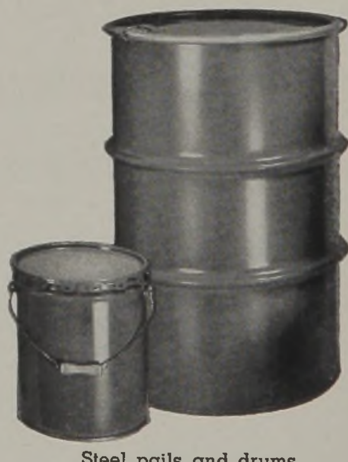
WASHINGTON SQUARE, PHILADELPHIA, PA.

Manufacturers of Chemicals including Plastics . . . Synthetic Insecticides . . . Fungicides . . . Enzymes . . . Chemicals for the Leather, Textile and other Industries

Landing gasoline in the tropics.
ACME PHOTO

STEEL CONTAINERS GIVE POSITIVE PROTECTION TO CONTENTS

Wartime shipping must be packed to withstand irregular handling—unavoidable delays in loading—inadequate facilities at unloading points. It is often necessary to store war materials such as foods, munitions and gasoline in the open where they are subject to attack by destructive elements. Steel containers provide positive protection of contents under all conditions.



Steel pails and drums
3 gal. to 55 gal. capacities.

INLAND STEEL CONTAINER CO.

Formerly WILSON & BENNETT MANUFACTURING COMPANY

6532 S. MENARD AVE. CHICAGO, ILLINOIS

Plants at Chicago—Jersey City—New Orleans—Richmond, Calif.

Sales offices in all principal cities

CONTAINER SPECIALISTS


PORCELAIN PROGRESS & PRODUCTION

Booby traps that look like varnish cans!

Remember when you used to walk into a store and buy a gallon of varnish? The man handed you a can with a screw top and a handle.

Who'd have thought that this very same can would some day become a booby trap—a deadly land mine? It has!

The soldier in the picture is planting this booby trap. It's an anti-tank mine containing explosives that cripple a tank by wrecking its treads. Two wires run from inside the can to hidden trip wires that set off the explosion.

Do you wonder now why you can get only certain cans for civilian use? Cans have gone to war! There are good reasons why the can, more than any other container, is needed for war.

Cans are tough customers. They're impervious to heat, cold, moisture. Dirt, insects, gas and light can't get into them. They don't break, chip, tear. Things get there—*safe*—in cans!

The cans that are away helping American boys fight will be back some day. They'll be even better cans. We're gaining new and useful knowledge as "Packaging Headquarters for America" at war.

CONTINENTAL CAN COMPANY

HELP *CAN* THE AXIS—BUY WAR BONDS

Presentation of Army-Navy "E" Production Award to the employees of Chas. Pfizer & Co., Inc., by Lt. Col. R. R. Patch, Sn. C.

WE ARE PROUD TO ANNOUNCE that the War Department has judged the results of the efforts of our Company and its employees as worthy of the Army-Navy "E" Production Award for Excellence in War Production.

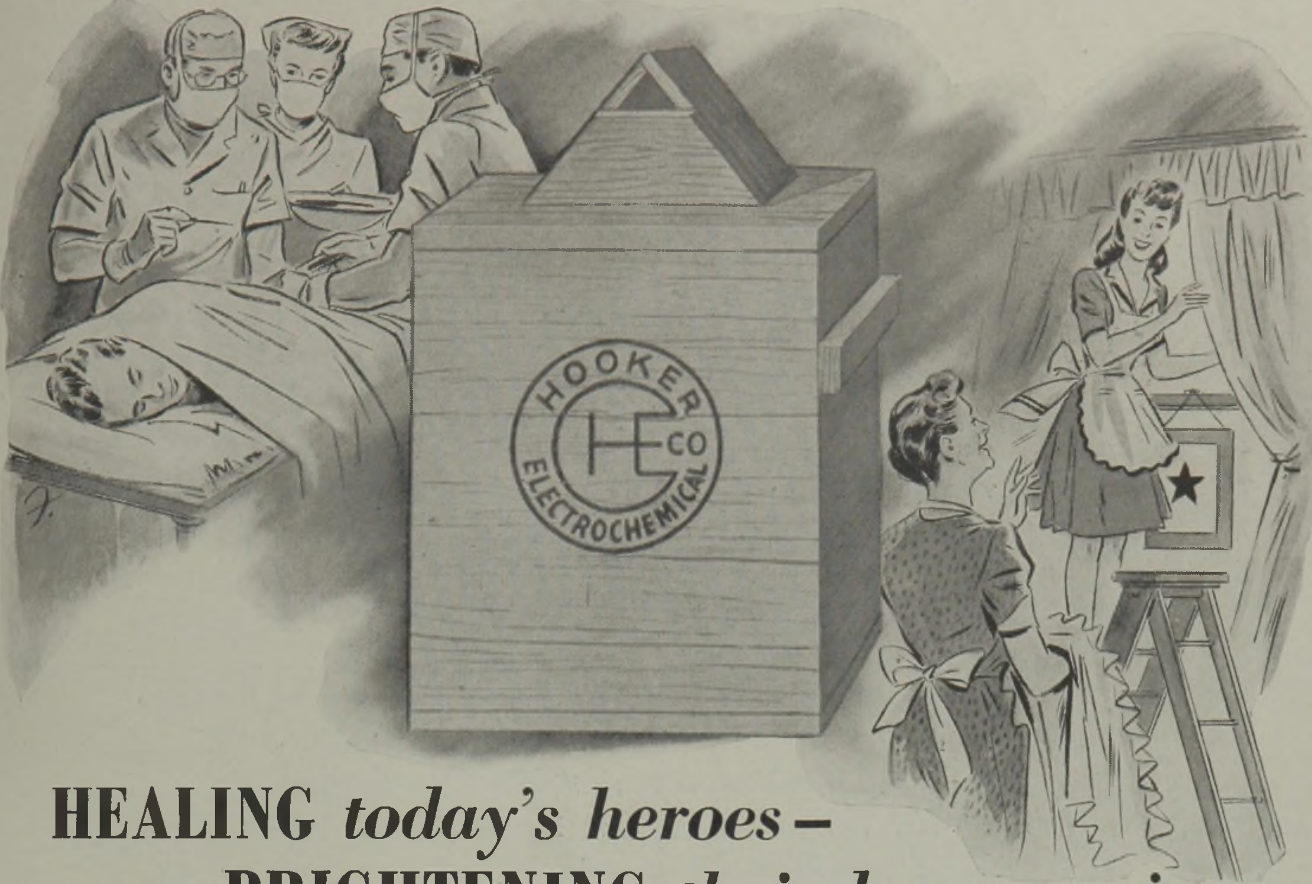
Realizing that this award is a trust, as well as an honor, we intend to bend every effort toward continuing to fill all requirements of our government for those of our products essential to the winning of the war.

MANUFACTURING CHEMISTS • ESTABLISHED 1849

Chas. Pfizer & Co., Inc.

81 MAIDEN LANE, NEW YORK • 444 W. GRAND AVE., CHICAGO, ILL.

Busy Chemicals for the War and After



HEALING *today's heroes* – BRIGHTENING *their homecoming*

The Hooker "Acid Chloride Group" is a versatile family of chemicals. Three of its members are helping make medicine urgently needed at far-away field hospitals. These are acetyl chloride, benzoyl chloride and para nitrobenzoyl chloride.

These same three and two others (phosgene and meta nitrobenzoyl chloride) are used in the making of synthetic dyes. After military needs have been met, they'll be ready to add brightness to the post-war picture when new, cheerful furnishings and draperies, for example, will welcome home returning soldiers.

Propionyl chloride rounds out this sextet of busy chemicals. It is used in the manufacture of propionamide, esters of propionic acid and other synthetic chemicals.

THE "ACID CHLORIDE GROUP" OF HOOKER CHEMICALS

comprises six of the more than a hundred products developed and commercially produced since the two original Hooker Chemicals. Some of the uses of each are given in tabulated form at right, graphic evidence of how busy these products are.

No table can chart *all* the possibilities the future holds for any chemical today. Research is constantly uncovering new jobs for Hooker products used directly or combined with others in organic synthesis. As new post-war conditions arise, many changes will have been anticipated by this "spadework".

	DYES	MEDICINALS	ORGANIC SYNTHESIS	PERFUMES	PHARMACEUTICALS	WAR & POLICE GASES
ACETYL CHLORIDE	X	X	X		X	
BENZOYL CHLORIDE	X	X	X	X	X	
META NITROBENZOYL CHLORIDE	X			X		
PARA NITROBENZOYL CHLORIDE	X	X				
PHOSGENE	X		X	X	X	X
PROPIONYL CHLORIDE			X			

Hooker chemists may be able to combine some of their post-war thinking with the research you have been doing towards filling long-deferred civilian needs as soon as they can be met. A consultation right now will be held confidential and may prove of practical help to you. Remember that "It's never too early to tackle tomorrow".

HOOKER ELECTROCHEMICAL CO.
NIAGARA FALLS, N. Y.
New York, N. Y. Tacoma, Wash. Wilmington, Calif.

HOOKER CHEMICALS

3684

Serving America's Laboratories

The Fisher Scientific Company is devoted exclusively to the design, manufacture and supply of modern laboratory appliances.

Large stocks of laboratory apparatus and reagent chemicals are on hand at Fisher Scientific Company in Pittsburgh and at Eimer and Amend in New York. Laboratory requirements can be obtained from either plant, whichever is more convenient.

Eimer and Amend's new plant, with its instrument shops, glassblowing shops and chemical manufacturing laboratories, is the modernized continuation of America's Pioneer Laboratory Supply House.

Manufacturers — Distributors

FISHER SCIENTIFIC CO. — **EIMER AND AMEND**

717 Forbes Street • Pittsburgh, Penna. — 635 Greenwich Street • New York, N. Y.

Headquarters for Laboratory Supplies

Natural BICHROMATES

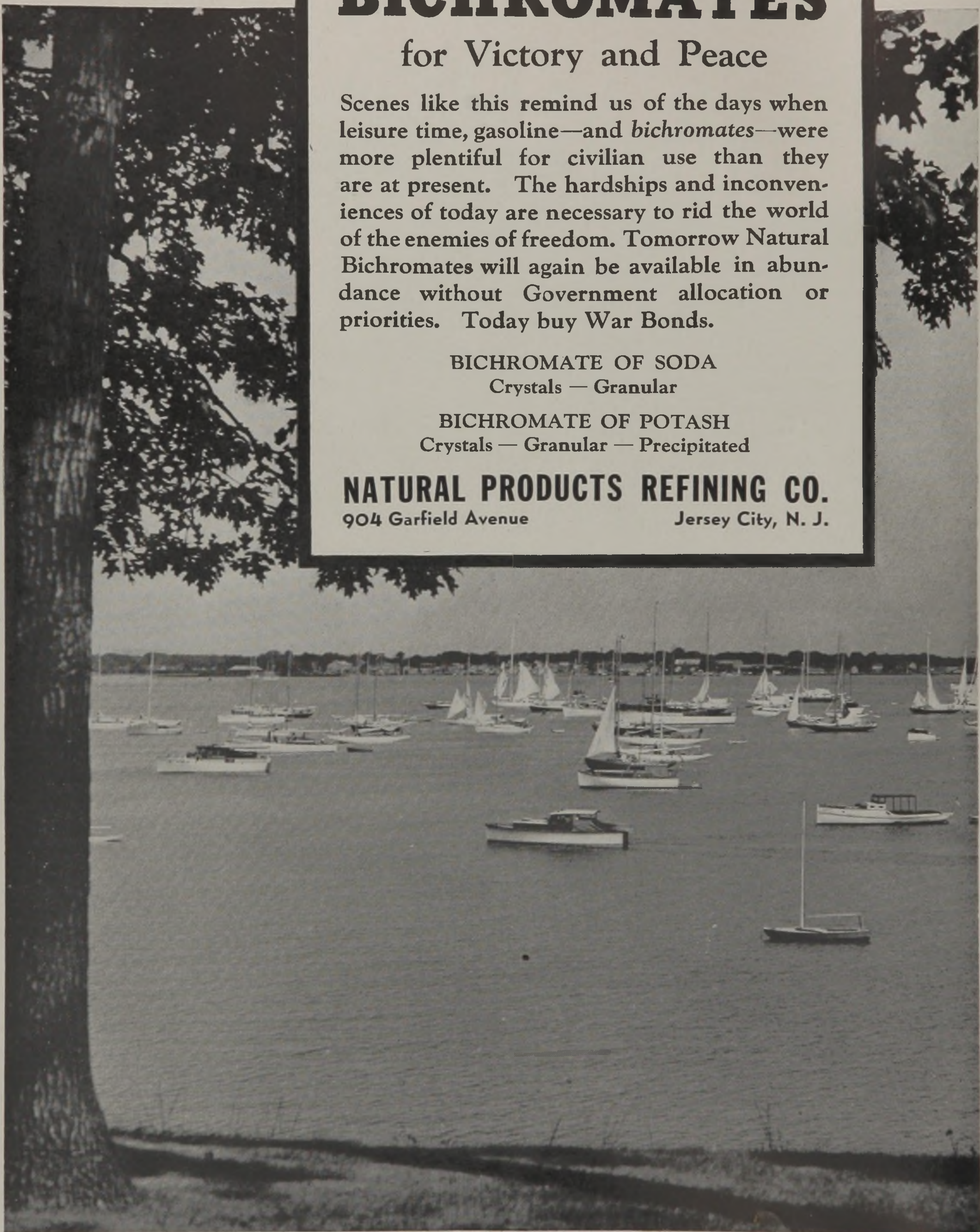
for Victory and Peace

Scenes like this remind us of the days when leisure time, gasoline—and *bichromates*—were more plentiful for civilian use than they are at present. The hardships and inconveniences of today are necessary to rid the world of the enemies of freedom. Tomorrow Natural Bichromates will again be available in abundance without Government allocation or priorities. Today buy War Bonds.

BICHROMATE OF SODA
Crystals — Granular

BICHROMATE OF POTASH
Crystals — Granular — Precipitated

NATURAL PRODUCTS REFINING CO.
904 Garfield Avenue Jersey City, N. J.



Full Measure Planning

EDITORIAL

Robert L. Taylor, Editor

If when the post-war programs of all chemical manufacturers are completed they could be laid out on a big table alongside each other, we venture to say that most of them would stress technological research and development as the key to progress and to the strengthening of competitive positions in post-war markets. In the years following the war, emphasis is certain to be placed as never before on new processes and products and on improvements in the old. And what could be healthier—for both the industry and the public? That industry which builds on the seeking of new knowledge and the application of such knowledge toward the better fulfillment of man's needs and desires, is likely to endure and prosper.

But technological research and high sounding maxims will not alone guarantee post-war success in the business of making and marketing chemicals. If emphasis is to be placed on products and processes, so must proper consideration be given to the economic and marketing aspects of these new things if they are to amount to more than mere monuments to scientific achievement. Any plan for post-war product research must embody in it a parallel plan for economic research if it is to be successful. It is the opinion of many in the industry that research into the marketing, distribution, consumption, and cost and pricing of chemicals has lagged considerably behind research in the making of chemicals. It is to be hoped that this situation will not long prevail. That progress toward its elimination was being made when the industry went over to war production in 1939 and 1940 was indicated by the announcement by several companies of increased market research activities and by the formation of a group within the industry to study market research problems and methods.

When peacetime operations are again resumed many chemical manufacturers will find themselves with markets completely new and different from those on which they depended before the war. Others will have large scale production facilities on hand for products yet untried in the domestic market. A few may find themselves victims of the success of wartime "substitutes."

In the post-war period more than ever before, chemical manufacturers will find need for accurate market data and market evaluation. Need and marketability of all chemicals will have to be reappraised in terms of a new peacetime economy, not the one left behind in 1940. When new products are contemplated an accurate appraisal of the competition, the cost of gaining acceptance in the market, the grade and quality to be manufactured, will need to be known. In order to lay their own plans, some chemical producers will find it necessary to consult their customers on trends and probable needs in consumer fields. There may have to be exchanges of market data and availability data.

In the case of old, established products there will be the need for investigating possibilities for expanding sales by reducing costs and prices; industrial as well as consumer products have their marginal users. Selling, promotion, and handling methods will have to be reviewed and overhauled to keep up with improved techniques, for the company that can perform these functions more efficiently than its competitors gains an advantage just as surely as when it develops a better or cheaper manufacturing process. There will be no place for costly and haphazard marketing in the chemical industry of the future. Management will call for periodic appraisals of the market possibilities for each product, and selling and advertising efforts will be concentrated on those products and markets which offer greatest possibilities.

Standardization of product grades and physical forms will offer possibilities for important economies in some lines. Progress toward standardization was being made in the case of aspirin and some other chemical products before the war, and the war itself has brought about the elimination of special grades of other products that were expensive to make because they were bought in small quantities by insistent customers. Also, simplification and standardization can enable selling and advertising expenditures to do a more effective job.

These are only some of the more general economic and marketing factors that must be given attention by chemical manufacturers as they formulate their plans for post-war development. Others will be suggested by specific circumstances. The longer the war lasts, the greater will be the task of rebuilding sales and marketing organizations. In all its phases, this major task offers the opportunity to apply the results of market research to the end that the new structure may emerge on the most efficient and economical basis.

"It's an Ill Wind . . ." One of the things chemical engineers and production men will have learned from this war is that it is still possible to build a chemical plant without gold-plated valves and streamlined equipment. One noteworthy case where this was done with surprisingly good results is described on the pages following this one.

This editorial is no recommendation that chemical plant construction go back to the wash boiler era. Far from it. We would be the last to deprecate the strides in plant and equipment that have made possible the great chemical production achievements of this war.

But we do wonder if perhaps chemical production men hadn't grown just a little soft on their rich pre-war diet of new equipment. If a particular piece of equipment didn't work or fit just right it was so easy to write out a requisition for a new one instead of making a few alterations. A perfectly good salvage item was more than once relegated to the junk heap. A high-priced piece of equipment was frequently ordered when a cheaper design would have given just as good service. And of course these things were always rationalized with the argument that they were actually economies in the long run because they assured more efficient operation, freedom from breakdown, and kept maintenance costs at a minimum.

Doubtless these reasons were valid many times—probably more times than not. But likewise how many times did they represent needless expenditures of money and materials that might have been saved or put to better use? Perhaps some of the lessons in ingenuity and resourcefulness that are being learned today will serve in good stead even in more plentiful years to come.

Microbepower: The commercial development of two new industrial microbiological processes—penicillin as derived from *Penicillium notatum*, and butylene glycol produced by fermentation from grain—is arousing new interest in biological processes as tools for chemical industry.

Alcohol, acetic acid, citric acid, fumaric acid, gluconic acid and acetone are some of the more common industrial chemicals that have been produced commercially by microbiological processes. Others have been carried out on a laboratory scale. As agricultural products assume a more important position as chemical raw materials, it is probable that microbiological methods will come in for even greater attention. Dr. R. D. Coghill of the U. S. Department of Agriculture's Regional Research Laboratory at Peoria has already assembled a collection of over 2400 varieties of living molds, yeasts and bacteria—believed to be the largest in the world—and the laboratory itself has been aggressive in its investigations and development of fermentation processes.

Biochemistry is an old science. As an industrial tool it has never quite come into its own, but if present interest continues, the opportunity may yet come. It may be that the age of power will yet have to make room for the lowly microbe.

Off-the-Job Accidents: The National Safety Council reports that while 18,500 workers lost their lives last year as a result of accidents on the job, no fewer than 26,500 were killed on the streets, in other public places, and at home.

Industry has demonstrated beyond doubt that the frequency of accidents on the job can be cut down and eliminated. Chemical industry has done an exceptionally good job of making its plants safe places in which to work.

But how about those accidents that strike down employees while they are off the job—away from work? Are they management's business?

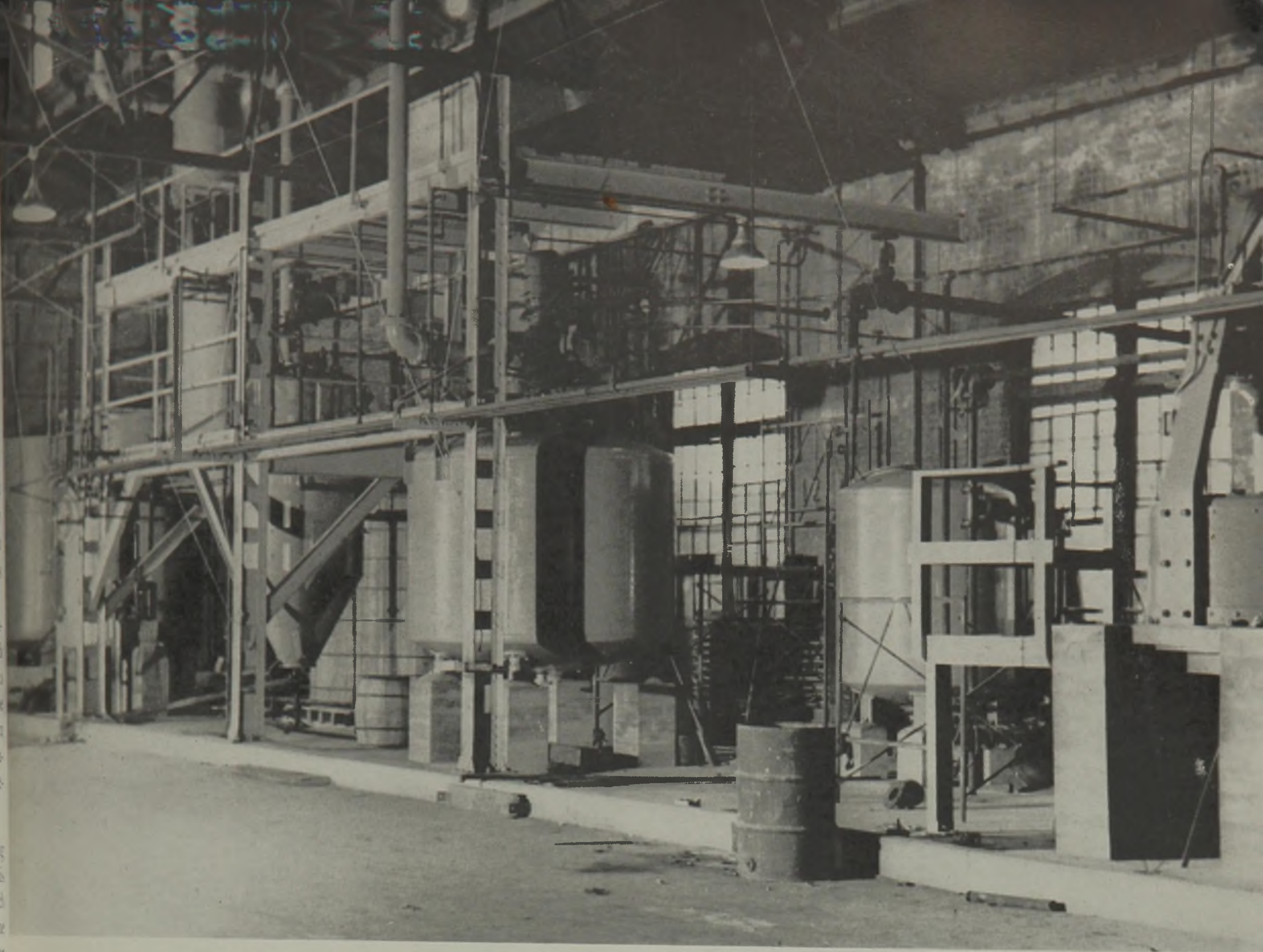
There is no doubt that an accident suffered off the job keeps a man away from his work just as effectively as an accident suffered on the job. In fact in the lost time scores of individual plants, the National Safety Council found that absenteeism caused by off-the-job accidents was five, seven, even ten times as great as absenteeism caused by on-the-job accidents.

What is the off-the-job accident score of your employees? How does it compare with the on-the-job score? Safety education can be used effectively to combat off-the-job accidents without meddling in the private lives of employees. If you have a problem in your plant, corrective steps should be taken. The National Safety Council has some suggestions and material that will be helpful.

Petroleum Investigation: Mr. Ickes is making good and sure that there will be no blame placed on his shoulders for a petroleum shortage if and when such a shortage does occur. Legislation sponsored by the Department of the Interior for the erection of pioneer plants for producing liquid fuels from coal is receiving solid backing from a stream of Ickes witnesses in the current hearings before the war minerals subcommittee of the Senate Committee on Public Lands and Surveys.

While it is well that attention be given to the problem of conservation of dwindling petroleum reserves, and to methods of synthesis as insurance against the future, the chances of a coal hydrogenation industry developing in this country in the near future would seem to be small. More likely, and more sensibly, our present petroleum reserves will be extended far beyond estimates based on current consumption by resort to such methods as prohibiting use of oil in furnaces, production of higher quality gasoline, and stepping up of imports of crude oil. One of the committee's witnesses from the petroleum industry recommended that shale and oil-bearing sands would be cheaper sources than coal when present reserves of crude are exhausted. Another recommended natural gas, and gave the opinion that it would be "well after the year 2000" before the country by force of necessity would have to turn to coal for lubricants and liquid fuel.

In all of the testimony there did seem to be one note of agreement, however. That was that the sands of Texas, Oklahoma and California are slowly but surely running out of oil. It would appear that the lush days of cheap and plentiful gasoline may be destined to be the favorite pre-war memory of the present generation.



A "non-priority" pilot plant constructed largely from salvaged materials.

PILOT PLANT CONSTRUCTION
Under Wartime Conditions

By William F. Waldeck, **Development Supervisor**
Wyandotte Chemicals Corporation

Chemical industry can't afford to let mere lack of priorities delay pilot plant development of new products and processes. There's more than one way of skinning the equipment cat.

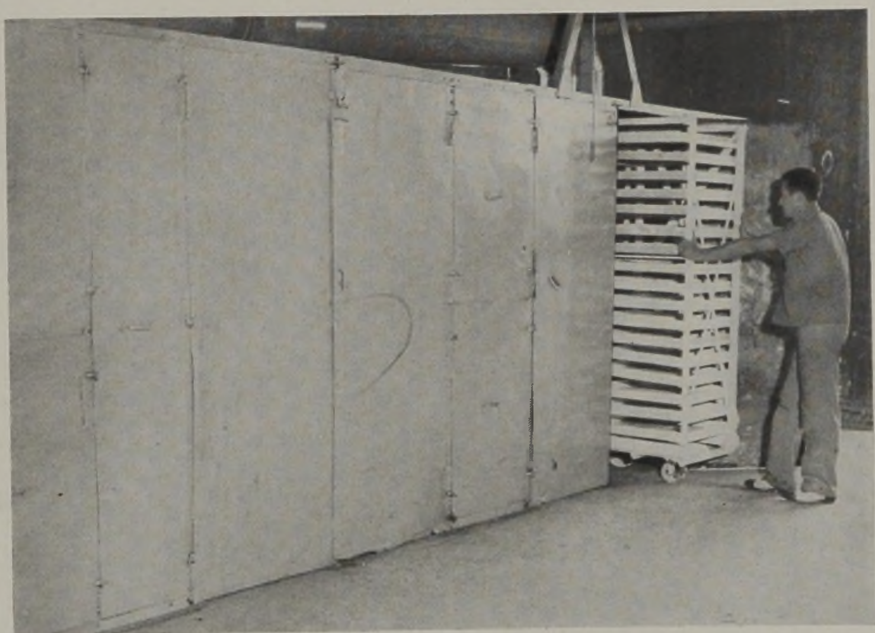
CHEMICAL pilot plant construction since the start of the war has been, broadly speaking, of two types: projects actively pushed by Washington and given high ratings, and projects given the blessing of Washington—but no rating.

Even with ratings, development projects can hardly be called normal these days. Designing to use the minimum of critical material, securing the approval of the various federal agencies involved and getting delivery on equipment, all present their individual problems. Construction projects with no rating, however, bring up procurement problems of a sort novel to the chemical industry that has been nourished on a rich diet of new equipment. This article discusses some of the recent projects that have been undertaken by Wyandotte Chemicals Corp. and points out some of the problems and how they were met.

One project required among other things a building, all services, a railroad siding, a number of steel tanks, reaction kettles, centrifuges, driers, filters and pumps.

In this particular case, an ancient pump house, being used for storage purposes, was found to be available and close enough to all the service facilities that only nominal extensions of lines were required to provide the facilities for the plant. Enough rails were found on little-

A piece of brewery equipment doubling as a chlorinator. Note at the manhole the synthetic finish which is all that stands between the aqueous solution containing chlorine and the steel wall. To avoid glass coolers in this installation, the heat of reaction is absorbed by excessive dilution with water.



This old lead arsenate dryer was reconditioned for service on a corrosive product which must meet low iron requirements. Enameled steel pans being unavailable, the original iron ones were protected with a synthetic finish.

used tracks on the plant property to provide the material for the spur track. Various steel vessels were located in the salvage department which could be converted to the necessary storage tanks, and a large percentage of the used structural steel for equipment support purposes was similarly located by means of an all-out scrap drive within the company. Beyond this, however, it was necessary to buy considerable other equipment from the second-hand market.

As anyone who has purchased used chemical process equipment quickly finds out, it is impossible to detail a plant or process and then expect to find used equipment exactly filling the detail. Therefore, in operating in this manner, no detailed drawings are made beyond a diagrammatic flow sheet indicating capacities, flows, materials of construction and the like. Armed only with these broad needs, we have been fairly successful in getting the necessary equipment by keeping in close touch with the used equipment dealers, the Plant Facilities Section of the Chemical Branch of W.P.B., and advertisements in the national trade journals and local newspapers. With few exceptions, all equipment is inspected before purchase. This has required much travel to points on the East coast and as far West as California, although some of the equipment has been purchased by telephone. Vapor-proof lighting equipment and fixtures were picked up from dismantled gasoline stations.

Problem of Design

The purchase of used equipment necessarily throws a considerable burden on an engineering department which is accustomed to designing new equipment from scratch to fit a specific purpose. Used equipment entails considerable field survey prior to shop layout work so that the engineering time spent on such a project is much greater than would be the case for the design of new equipment.

Because of the non-availability of equipment constructed of the materials that would ordinarily have been specified for the various operations involved, many compromises have been indicated. Rubber lining for a chlorinator was ruled out and in its place was used one of the newer synthetic finishes which tests had shown to be highly resistant to the action of aqueous solutions of chlorine and hypochlorite. Ordinarily, the volume of the chlorinated mass would have been kept small and the heat evolved during chlorination dissipated by circulation through coolers. To avoid the coolers, which could not be obtained second-hand, the volume of the chlorinated mass was increased by the addition of enough water so that the temperature during chlorination, even with no external cooling, would not exceed the critical point for the material. The introduction of this water, which approximately doubles the volume involved, necessarily places a greater load on the centrifuge which is used immediately following the chlorination to separate the product from the mother liquor. Instead of using a pump made of chlorine-resistant materials, the chlorinator is used as a blow tank and the materials forced by air pressure to the centrifuge through a rubber hose instead of the conventional chlorine-resistant pipe line materials.

Linings Can Be Changed

No rubber-covered bottom-discharge centrifuge could be located, so an old but unused German machine, with a copper-lined steel basket, was purchased. The copper lining was removed from the basket and a sheet tin coating from the shell, the two sand blasted and given the same protective finish used in the chlorinator.

A drier presented quite a problem until, with W.P.B.'s assistance, an old Proctor truck drier that had been used for drying lead arsenate was located in Colorado. Reconnaissance by telegraph indicated that the drier was at least nominally suited for our purpose but a visit was made to inspect it, as inspection of driers that had been offered to us before had been disappointing. Inspection showed this one to be in satisfactory operating condition and it was purchased.

Synthetics for Anti-Corrosion

The drier was fitted with sheet steel trays, lapped and riveted at the corners, which were in very bad shape due to corrosion. Ordinarily, the material involved would have been dried on enameled steel pans because of its corrosive nature. Under the circumstances these were not available to us, and we therefore sand-blasted the trays and coated them with one of the synthetic finishes that our tests have shown to be resistant to the corrosive effect present in the product.

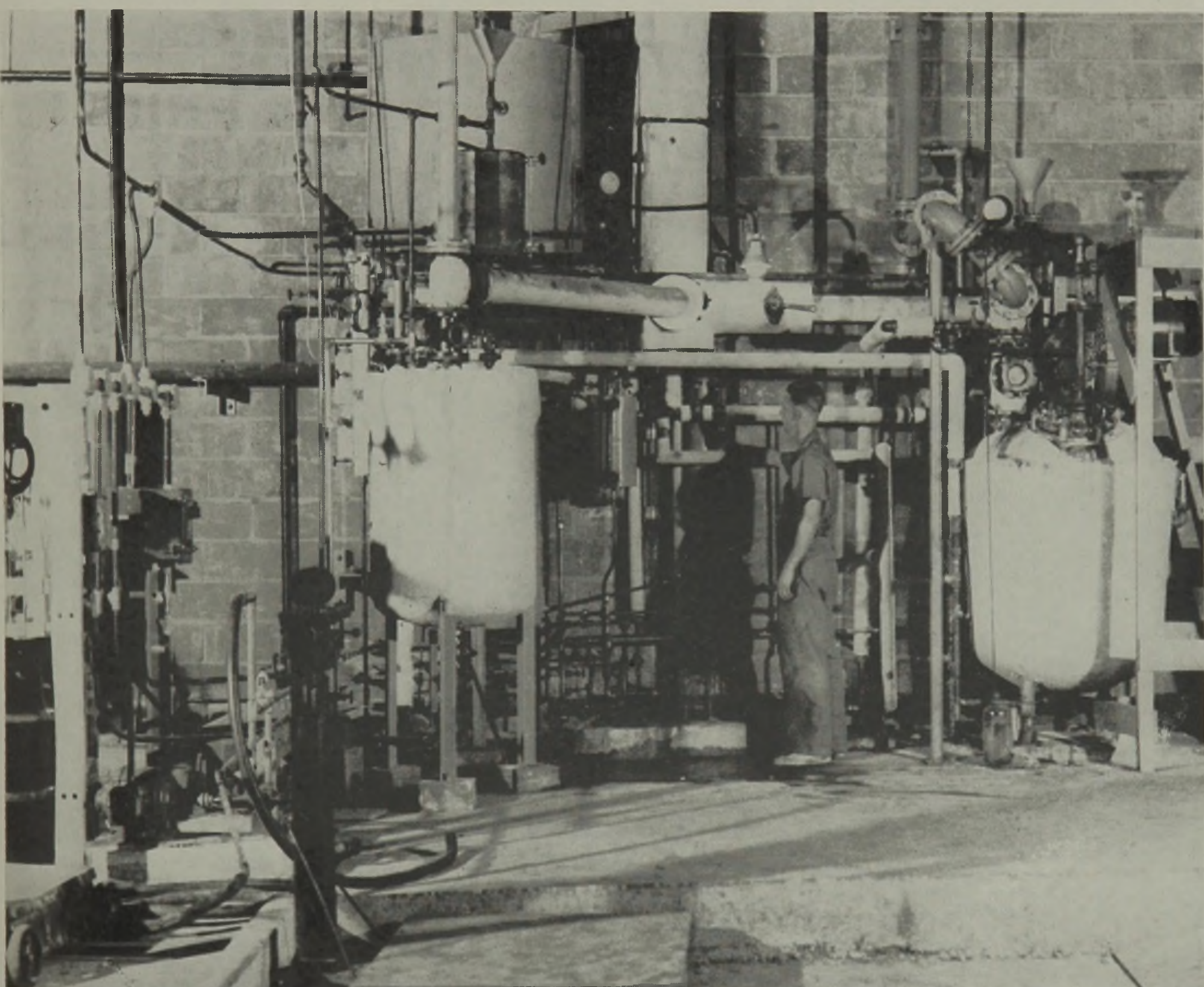
Whenever conventional materials of construction have not been available to us, we have always considered very carefully the wide and increasing range of synthetic lining materials that are on the market. In some cases where the solutions involved are not too corrosive to the metal under the lining, usually steel, these finishes, when properly fitted to the job, are highly satisfactory. In cases where the process solutions are very corrosive toward the underlying metal or material, a certain amount of penetration through pin holes must be expected and regular inspections and maintenance must be resorted to.

The Cost Angle

From the financial standpoint, used equipment is a mixed blessing. Certain items of equipment, notably larger tanks and agitators, have been purchased at substantial savings over new equipment. On the other hand, a considerable amount of work has to be done on all such equipment to fit it for the intended uses. In some cases used equipment represents a greater expense than would have been the case with new equipment. For instance, rather than request the new steel that would have been required for stamped steel trays, the old trays that came with the drier mentioned earlier were hammered into a reasonably tight condition and sand-blasted. The depth of scale and old rust on the pans necessitated an amount of sand-blasting (sometimes going right through the steel) that was more expensive than new trays would have been and the finished trays certainly are not nearly as satisfactory as stamped trays would have been.

Pilot plant and experimental operations present a big field for improvisation. In the first place, since the equipment is not to be used permanently, there always exists the possibility of borrowing lacking equipment. On one project a 12 inch bubble cap column was borrowed from an adjoining plant where it was not in service at the moment. Our efforts to locate equipment that could be borrowed have been met with a great deal of helpfulness and cooperative effort by the companies contacted, and we have in turn reciprocated in this regard wherever possible.

By using this "compromise design" unit for a sequence of operations, the construction of a pilot plant of approximately five times this size was avoided. Much critical material can be saved by making equipment do double duty.

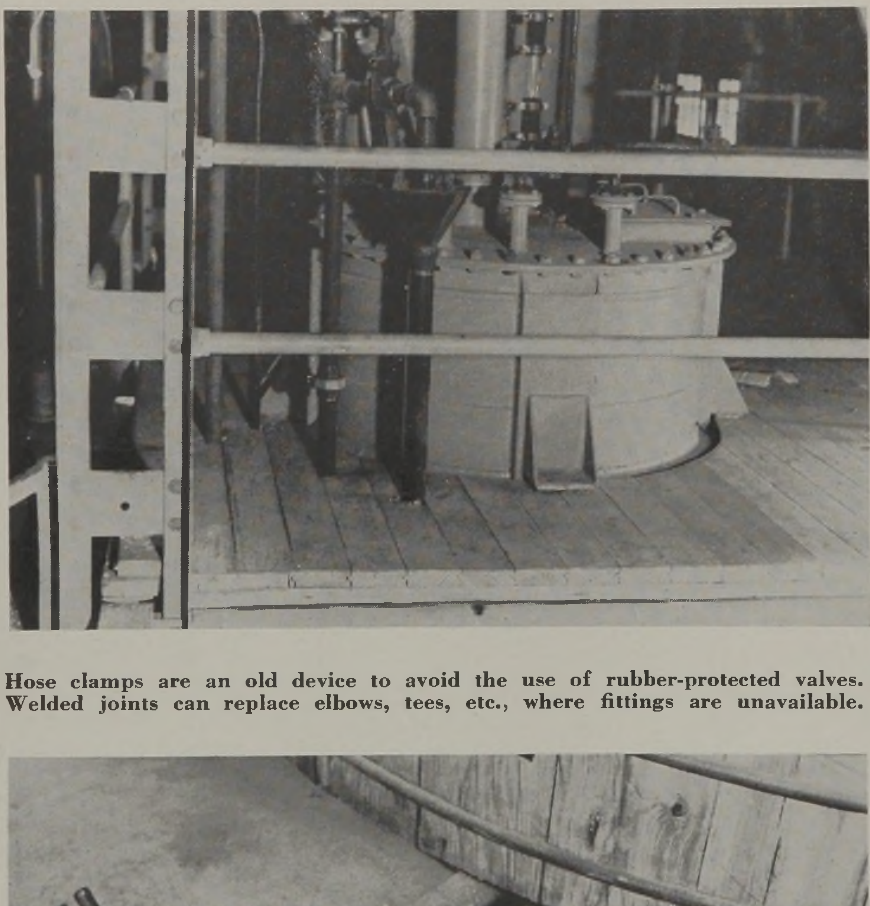


One important way of minimizing consumption of critical material for pilot plants is to make all equipment double for other purposes as much as possible. In other words, rather than build a pilot plant embracing all steps of the operation, it is often possible to set up a small unit in such a way that consecutive operations are performed in the same equipment. In one such project a single glass-lined kettle and fractionating column serves for five distinct operations, the products of each reaction being removed and recharged into the kettle for the next operation in sequence. This has its drawbacks, of course, as equipment must be designed as a compromise of the demands for the various operations to be performed. Also, it leads to complications in piping. However, since oftentimes experimental projects must stand or fall on the ability to get along with limited equipment, such shortcomings are most generally not too serious.

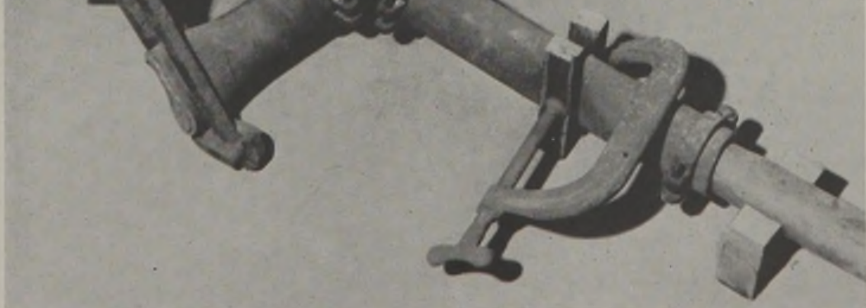
Break Down the Process

Another means of performing experimental operations is to break down the process into its units, disregard all those that represent relatively old procedures and carry on the remaining new steps as fragments separately wherever suitable equipment in the plant can be found. In one operation of this type we carried on crystallization experiments in a crystallizer isolated from a large bank of crystallizers in use in a plant process. The crystallized material was centrifuged through two different centrifuges, both of them borrowed. The obtaining of satisfactory data on the crystals and the mother liquor were carried out in an entirely different pilot plant layout, using compositions corresponding to the mother liquor and crystal and running both operations consecutively through the same equipment, parts of which were borrowed from our own plant and from neighbors. Operations of this type repair careful integration of data in order that no slips occur.

Operating level of reaction kettles in the "non--priority" pilot plant. Note how substantial I-beam columns have been built up from angle iron and strip.



Hose clamps are an old device to avoid the use of rubber-protected valves. Welded joints can replace elbows, tees, etc., where fittings are unavailable.



Build Own Equipment

The third method of overcoming equipment shortages, especially for pilot plant operations, is to build equipment that normally would not be built by anyone but specialists in the field. In the case of one of our projects, the process demanded a continuous centrifuge to perform a novel operation. The conditions were such that, to our knowledge, no centrifuge was in existence that could even remotely fill the bill. Ordinarily, we would have worked with a centrifuge manufacturer in the design of such new equipment but because of war conditions, the logical manufacturer did not have the plant facilities nor time to take on such work. We therefore undertook to build the centrifuge ourselves with suggestions from time to time from the manufacturer until we had worked out most of the operating difficulties. This procedure gave us our machine, yet at the same time the manufacturer is fully in touch with the problem involved and the methods of solution and will be in a position to build a commercial machine whenever materials again become available.

Piping Substitutes

Another small but important type of improvision has been helpful to us in instances where required pipe fittings were not available. In many cases welded joints can replace couplings, elbows, tees, etc., to good advantage. In other places where corrosion-resistant valves were needed and were not available, good use has been made of rubber hose and pinch tongs.

It is probable that many of the expedients discussed here will be dropped at the end of the war with a sigh of relief. The ingenuity and resourcefulness demanded by the war, however, will undoubtedly point the way to more efficient use of equipment and development of new materials long after the return of peace.

The Dow Chemical Company library at Midland, Michigan.

Building a Chemical Library

By *Maude W. Ellwood*, Librarian, The Dow Chemical Company

The technical literature is the foundation of chemical progress, and any research organization without access to a good technical library is severely handicapped. Because of the number of new chemical research groups that have sprung up in recent years, *Chemical Industries* has asked an industrial chemical librarian of sixteen years' experience to suggest a recommended procedure and nucleus collection of books for starting a good chemical library.

THE IMPORTANCE of recorded information as a tool for research and development work is being increasingly recognized as new plants and processes are put into operation. The company library is the means by which this recorded scientific knowledge can be put into action. In view of the need of research workers, patent attorneys, engineers and production men for having information at hand, the expense of maintaining a library can be fully justified. For example, both time and money are saved by a survey of the pertinent literature prior to filing a patent application. A study of the work of previous investigators before beginning a piece of research produces new ideas and saves time.

It is not only in surveying the field of past experience that dividends are produced. The advantage of having the very latest publications filed in one location where they can be obtained quickly and put to work answering questions in the hands of trained personnel is realized by those companies which have already established libraries.

Wherever a program of research or development is being inaugurated, there is need for a background of previously published knowledge. Wherever the answer to questions of operation and maintenance must be answered quickly there is need for a well organized library, no matter how small the technical staff may be. If the company or laboratory is located near some large library, it may not be necessary to purchase complete sets of older periodicals, but a collection of reference books, textbooks and current periodicals would pay for itself from the beginning. A small staff of twenty to thirty technical men would be large enough to justify the inauguration of a library.

Place in the Organization

As the first step in organizing and building a chemical library for a staff of chemists, the place which it is to occupy within the organization should be considered. A library committee may be formed of the heads of departments whose members will have the greatest use for the library. The chairman of such a committee should be an executive of the company who is well informed as to the research and development program to be undertaken and the literature needs in relation to it. If the company is primarily engaged in research, the library may function under the research director. Whoever assumes responsibility for the library should see that it is adequately supported and encouraged in its efforts.

The physical requirements of the library should be considered also. A room or rooms should be definitely set aside for it from the beginning. The location and arrangement should be chosen with a view to the type of work and processes which it is expected will be carried on there. It should not be housed in the corner of a laboratory or a hall-way or in some one else's office. Considerable room for expansion should be allowed from the outset. Proper furniture and lighting should be provided. While it is difficult at present to obtain some of the furniture and equipment formerly considered necessary, it is still possible to secure adequate wooden shelving, card files, tables and chairs.

Qualifications of a Librarian

Next a competent librarian should be engaged. This is the most important step of all. There is often a temptation on the part of the company starting a library collection for the first time to place it in charge of a secretary or some person who has outgrown his usefulness in some other capacity. However good may be the intentions of such a person they cannot make up for training in library technique and knowledge of the subject. The ideal person for a chemical librarian should have a fundamental knowledge of chemistry, at the very least, a minor in college chemistry, a major is better, of course, a reading knowledge of French and German, some knowledge of economics and a year of accredited library school training.

Personal characteristics are important in this type of work. The special librarian should be alert for new developments, persistent in tracking down information and able to see relationships between the material which is dealt with and the problems which arise. If the right person is chosen as librarian, the company officials and prospective library users may be assured that the operation of the library will be smooth and efficient.

Types of References

The materials of the technical library may be classified as follows: 1. Periodicals, 2. Books, 3. Government documents and pamphlets of various kinds, 4. Trade catalogs, 5. Photostats, microfilms and clippings, 6. Patents. By far the most important part of the collection in a chemical library is the periodical literature. In The Chemical Library of The Dow Chemical Company which now numbers about 20,000 bound volumes, two thirds of the collection are bound journals. It is to the periodicals that one turns for the latest developments which have not yet found their way into books and for the complete record of scientific discovery as it has developed in the past.

Books are important tools for putting information into action. A chemical library should contain all the standard reference books, not only in pure chemistry, but in the related fields of physics, metallurgy, mathematics and engineering. Books have a habit of becoming out of date very rapidly so the alert librarian should always be on the watch for new editions and for the very latest publications in the fields in which the company is operating.

Government documents contain a great deal of worthwhile material. They may be obtained at small cost and form an easy way of assembling a vast amount of information. Careful selection must be

Maude Ellwood, author of this article, has been Dow's librarian for 16 years.

made, however, or the problem of caring for the documents will become too great. A useful guide to U. S. Government documents is the book, "United States Government Publications" by Anne Boyd, 2nd ed., 1941. It is well to check the "Monthly Catalog of U. S. Public Documents" each month and also the "Weekly List of Selected U. S. Government Publications." The "Monthly Check-List of State Publications" compiled by the Library of Congress is of value for finding publications of the state experiment stations. At Dow we file our government documents in pamphlet boxes numerically under the name of the Bureau or Department of issue and the State publications under the State with the proper sub-heading. Some of the longer sets such as the "Journal of Research of the National Bureau of Standards" and the "Bulletins" and "Technical Papers" of the Bureau of Mines are bound and shelved with the journals.

Trade catalogs are another important type of library material. In our organization the Library concentrates on a file of the strictly chemical catalogs and trade literature and leaves the collection of machinery and equipment catalogs to the purchasing and engineering departments.

When an article is needed which is not in the library, it is often desirable to obtain a photostat of the pages containing the article from some other source. Many libraries are now equipped to furnish copies of their material on microfilm. This saves space and is also less expensive than photostating. But the library must possess a microfilm reader and people do not always care to take the time to run the film through the reader and prefer to have a photostat which can be checked out.

Clippings must also be mentioned as a form of library material. Sometimes a pertinent clipping of a newspaper paragraph or an article in a magazine which would otherwise be discarded will furnish much needed information and should be saved. Photostats and clippings are filed in vertical files usually under subject with the necessary cross-references.

Patents are another valuable source of information. In a small library copies of patents may be obtained and indexed under subject, patentee and filed numerically. However, many companies now have separate patent departments for handling this information.

Aids in Assembling Material

In assembling the collection certain aids and sources of information should be available. I have already mentioned some of the guides to public documents. "The United States Catalog" and "Cumulative Book Index" of the H. W. Wilson Co. starting with "Books in Print in 1928" and constituting a world list of books in the English language since then is indispensable, and access to it becomes necessary in building a collection. Complete information as to publisher and date is given and books are listed under author, subject and title. The Library of Congress card number is given for many books.

The book catalogs of the technical publishing houses, McGraw-Hill, Wiley, Reinhold, Van Nostrand and others, are useful, but in order to find dates of the various editions the "Cumulative Book Index" must be consulted. The "Chemical Engineering Catalog" gives a very comprehensive list of books for a chemical engineering library each year under subject as well as author and the list is kept up to date, but the publishers of the books are not given, so this information must be found by some other means. "The Technical Book Review Digest" of the Special Libraries Association is also a useful tool since it gives excerpts of reviews from scientific journals.

There are several sources for information about periodicals. The "List of Periodicals Abstracted by Chemical Abstracts" (1936) with a 1942 supplement gives the place of publication and the publisher. The 1936 list also gave the list of Libraries having the journal and the facilities for reproducing material possessed by them. The 1942 Supplement lists the periodicals added since the 1936 list was published but does not give location.

"The Union List of Serials in Libraries of the United States and Canada" 2nd ed. has just been published. In this work the actual holdings of periodicals in all the large libraries of the United States and Canada are given. It is invaluable in finding where a volume may be borrowed or a photostat secured.

The "Periodicals Directory" (1938) edited by Carolyn F. Ulrich, is a classified guide to a selected list of foreign and domestic periodicals. The 1943 "Inter American Edition" includes North and South American publications only. In our library we make extensive use of the "Standard Rate and Data Service" for information about periodicals. Our Advertising Department keeps the latest editions and turns the next to latest over to us. The lists of periodicals in the Industrial Arts Index and Engineering Index are also helpful.

A very useful article for help in selecting periodicals for a library is found in Science *66*, 385-89 (1927). While this was written with the college chemistry library in view, it is also applicable to the industrial library.

Bibliographies are another fruitful source of information. A few of the more important may be mentioned: "Bibliography of Bibliographies on Chemistry and Chemical Technology" (1900-1924), by C. J. West and D. D. Berolzheimer, Bulletin No. 50; (1924-28) Bulletin No. 71; and (1928-31) Bulletin No. 86, of the National Research Council, the "Bibliography of Pulp and Paper Making," by C. J. West (1900-1928 and 1929-1935) published by Lockwood Trade Journal Co., New York, "Bibliography of Journals, Books and Compilations (American and Foreign) which List and Abstract Patents," by Elsa von Hohenhoff, 1936, Baltimore Special Libraries Association, Baltimore, Md., "Selected Bibliography of Engineering Subjects," No. 1—Parts 1 and 2, American Institute of Chemical Engineers, 1939.

Functions of a Library

The services which a library should be prepared to render will differ with the size of the technical personnel, the size and accessibility of the library and the size of the library staff. A regular list of the new books should be issued, with annotations if possible. This list may be in the form of a bulletin giving important journals, articles and news items also. Weekly abstracting of articles appearing in the current journals is a service which the special library may offer, thus keeping the technical staff informed on articles pertaining to their work before the abstracts appear in the regular journals. In order to do this the librarian must keep abreast of the work in progress and in prospect, so that the person interested will receive material relating to this work.

The routing of periodicals is another unique service possible only in the special library. At the Dow Library we route our magazines very extensively. In order to do this it is necessary to subscribe to several copies of the same journal. One copy always remains on file in the library. We make up the list of people who have indicated their interest in a particular journal before we place our renewal orders for journals each fall. Then we have routing slips mimeographed with the titles of the journals, the names of the persons to whom the journal is to go in the most convenient order as to location of office or building and the date on which the journal is reviewed. When a person has finished with a magazine he crosses off his name, writes in the date and drops it into the mail for the next person. Sometimes we have 2 or 3 routing slips for the same journal in order not to have too long a list on any one slip. We send journals out in this way to our Bay City Division also.

In addition we charge out some periodicals for varying lengths of time where the interest in the journal is centered in one laboratory or office only. This checking and routing of journals takes practically the full time of one assistant.

Some of the other services which a library must be prepared to give are the answering of reference questions over the telephone, the assembling of additional material on a subject by inter-library borrowing, by sending for photostats or microfilms. The preparation of bibliographies is another service which is requested very frequently.

Often libraries have members of their

More than 450 current magazines in five languages are on the shelves of The Dow Chemical Company library.

staff who are able to prepare translations. If this is not the case the librarian should have a file of sources from which translations may be obtained.

Classification and cataloging of the books and periodicals and even the vertical file material in a chemical library should be worked out with great care in order to make it possible for the librarian and the users of the library to find the material with the minimum of effort. A good classification system brings the same subjects together in close proximity on the shelves, although it is difficult to accomplish this in all cases for subjects tend to overlap and widely separated subjects are often treated in the same text.

The two systems most generally used are the Dewey Decimal System and the Library of Congress Classification. The Dewey Decimal System is inadequate in some of the branches of science but the principle of expanding by decimals is an easy one to apply and it is a system where the main numbers are easily memorized. We use the Dewey Decimal System in the Dow Library, but we have had to work out our own classifications for Organic Chemistry, Chemical Technology and Metallurgy to suit the material which we had at hand.

The Library of Congress Classification permits of infinite expansion and I would recommend it for a collection which will grow rapidly or one which is likely to take in a wide variety of subjects.

The catalog is to the library what an index is to a book. Even a very small collection should be carefully catalogued for then it becomes doubly useful. With a small collection it is possible to include every single bit of information which the library contains. It is not necessary to go into elaborate bibliographical detail on the cards for a special library. The essential information should be put down, but careful description of the format of the book is unnecessary. The subject matter of the book should be brought out in great detail by the use of analytics for the various chapters, if necessary. ("Analytics" are card analyses of books by subjects.)

The Chemical Library at Dow uses Library of Congress printed cards for its catalog. These are ordered when the book is accessioned and a temporary card under author made until the permanent card arrives, usually within two weeks. When it is not possible to obtain Library of Congress cards, typewritten cards are made. Our catalog contains analytics for the "Research Papers" of the National Bureau of Standards, the "Bulletins" and "Technical Papers" of the U. S. Bureau of Mines, "Sammlung Chemischer u. chemisch technischer Vörtrage," Mellor's "Comprehensive Treatise" and Friend's "Inorganic Chemistry." Some librarians insert cards in their catalogs for books not in their library but in the libraries in the vicinity from which they may be borrowed; usually a different color is used if this practice prevails.

There should be as little delay as possible in bringing the book and users together. This applies to the charging system and circulation records also. This routine should be kept as simple as possible in order to allow time for more important work.

A Nucleus Collection

In working out a suggested minimum collection of books on which to build a chemical library the question of availability of the necessary reference books and periodicals must be considered. By watching advertisements and scanning the lists of dealers in second hand periodicals, it is still possible to purchase most of the common American and British publications. Often sets of German and French periodicals are offered for sale when a private library is broken up. Edwards Brothers, Inc. of Ann Arbor, Michigan, have photolithoprinted sets of Beilstein and Landolt - Bornstein "Physikalisch-chemische Tabellen" under license from the Alien Property Custodian and are reproducing other foreign books as they obtain a sufficient number of orders.

Before presenting my basic list of books for a library which is just being organized in the field of chemistry, I should like to mention two excellent recent guides to the literature of chemistry, namely, "Chemical Publications, Their Nature and Use" by M. G. Mellon, McGraw-Hill, 2nd ed., 1940 and "Library Guide for the Chemist" by Byron A. Soule, McGraw-Hill, 1938.

Starting with dictionaries, the two most used one-volume works are: "The Condensed Chemical Dictionary" 3rd ed. (1942) and Hackhs's "Chemical Dictionary" 2nd ed. (1937). Thorpe's "Dictionary of Applied Chemistry," a revised edition in 7 volumes with 3 supplementary volumes (1921-1936) is now appearing in a 4th ed. of which five volumes have already been published. Patterson's "German-English" and "French-English" dictionaries should be included.

In the field of handbooks the two most important are, of course, the Chemical Rubber Company's "Handbook of Chemistry and Physics" (1943-44) and Lange's "Handbook of Chemistry" 4th ed. (1941). Perry's "Chemical Engineers' Handbook" 2nd ed. (1941) is indispensable. The recently published "Chemical Engineers' Manual" by Keyes and Deems (1942) is useful, and one mechanical engineers' handbook should be included, either Marks' (1941) or Kent's 2 v. (1936-38).

The "International Critical Tables" in 7 v. (1926-33) are valuable in spite of faults and are basic material in building a chemical library. Since the Landolt-Börnstein, "Physikalisch-chemische Tabellen" (8 v. in all) are relatively inexpensive in the reprinted form, they should be purchased also. Seidell's "Solubilities of Inorganic and Organic Compounds" 2 v. (1940-1941) is a "must" title.

One way in which to assemble a collection of works on chemistry is to study the list of "American Chemical Society Monographs" and purchase the ones which relate to work being done by the company, or are of general chemical significance and add to this collection later. If the entire series can be purchased at the beginning, so much the better. A few books of a general nature should be included: Deming's "General Chemistry" 4th ed. (1935), Holmes' General Chemistry" (1930), Smith's "College Chemistry" (1935), and McPherson and Henderson's "Introduction to College Chemistry" (1942) are suggestions. Kendrick's "Introduction to Chemistry" (1933) offers a new approach.

In the field of inorganic chemistry, Mellor's "Comprehensive Treatise on Inorganic and Theoretical Chemistry" 16 v. (1922-1937) is necessary. Mellor's one volume work, "Modern Inorganic Chemistry" (1939) is a good textbook, as is Partington's "Textbook of Inorganic Chemistry" 4th ed. (1933). Ephraim's "Inorganic Chemistry" in its 3rd English ed. (1939) is valuable.

When we consider books on organic chemistry the field is so large that it is difficult to choose. Of course, Beilstein is the bible. The photolithoprinted copy is much cheaper than the original work, so it is possible for every chemical library to own this now. Some of the well known texts are: Bernthsen's "Text-book of Organic Chemistry" (1930) containing a very complete index of compounds. Conant's "Chemistry of Organic Compounds" (1933) and Schmidt's "Textbook of Organic Chemistry" (1936). Karrer's "Organic Chemistry" translated from the latest German edition (1938) is a very reliable work. Whitmore's "Organic Chemistry" (1937) and Gilman's "Organic Chemistry" 2 v. (1943) are more advanced texts. The work, "Organic Syntheses" should be mentioned and also "Organic Reactions" of which one volume has appeared. A valuable book for approaching the field of organic chemical research is Reid's "Introduction to Organic Research" (1924).

Physical chemistry might be represented by Taylor's "Treatise on Physical Chemistry," the third edition of which is now being published. Daniels' "Experimental Physical Chemistry" 3rd ed. (1941) and Getman and Daniels' "Outline of Theoretical Chemistry" 7th ed. (1943) are also suggestions. Books on thermodynamics and colloid chemistry should be included.

Checking and sorting technical magazines in Dow's library work room.

Lewis and Randall's "Thermodynamics and Free Energies of Chemical Substances" and Thomas' "Colloid Chemistry" (1934) may be mentioned.

In the field of analysis there is Scott's "Standard Methods of Chemical Analysis" 2 v. 5th ed. (1939) and Allen's "Commercial Organic Analysis" 5th ed., 10 v. (1923-33).

For the chemical engineers we should include Badger and McCabe's "Elements of Chemical Engineering" 2nd ed. (1936) and Walker, Lewis, McAdams and Gilliland's "Principles of Chemical Engineering" 3rd ed. (1937). Groggin's "Unit Processes in Organic Synthesis" 2nd ed. (1938) and Vilbrandt's "Chemical Engineering Plant Design" 2nd ed. (1942) are important as are McAdams' "Heat Transmission" 2nd ed. (1942) and Robinson's "Elements of Fractional Distillation" 3rd ed. (1939).

A chemical library should of course contain books on plastics and rubber. Two basic titles are: Ellis' "Chemistry of Synthetic Resins" 2 v. (1935) and Memmler's "Science of Rubber" (1934). In the field of petroleum there is a comprehensive 4 volume work by Dunstan entitled "Science in Petroleum" (1938) and Ellis' "Chemistry of Petroleum Derivatives" in 2 volumes (1934-37). Petroleum refining might be represented by Bell's "American Petroleum Refining" 2nd ed. (1930) or Nelson's "Petroleum Refinery Engineering," 2nd ed. (1941).

Every chemical library will find use for books on metallurgy. The "Metals Handbook of the American Society for Metals" (1939) and the work by Carpenter entitled "Metals" in 2 volumes (1939) may be mentioned as well as Hayward's "An Outline of Metallurgical Practice" 2nd ed. (1940). Speller's "Corrosion, Causes and Prevention" 2nd ed. (1935) is another "must" book.

As to periodicals, the first purchase should be a complete set of "Chemical Abstracts." "Industrial and Engineering Chemistry," all editions, should also be secured complete. "Chemical Industries" and "Chemical and Metallurgical Engineering" should be complete for the last fifteen or twenty years. It is desirable to have sets of the "Journal of the American Chemical Society," "Chemical Reviews" and the "Berichte der deutschen chemischen Gesellschaft." Then subscriptions should be placed for current numbers of the more important journals in the specific fields in which the company is interested.

The above suggestions are based on books and journals which are most used in our library and I believe they would constitute a good beginning to which other works might be added according to specific subject interests of the company. An estimate as to the cost of such a collection would be about $6,000.

After the library has been organized it will be seen that familiarity with the literature on the part of the technical staff has increased their service to the company. A bibliography of articles on the value, selection and operation of libraries on chemical and engineering subjects follows.

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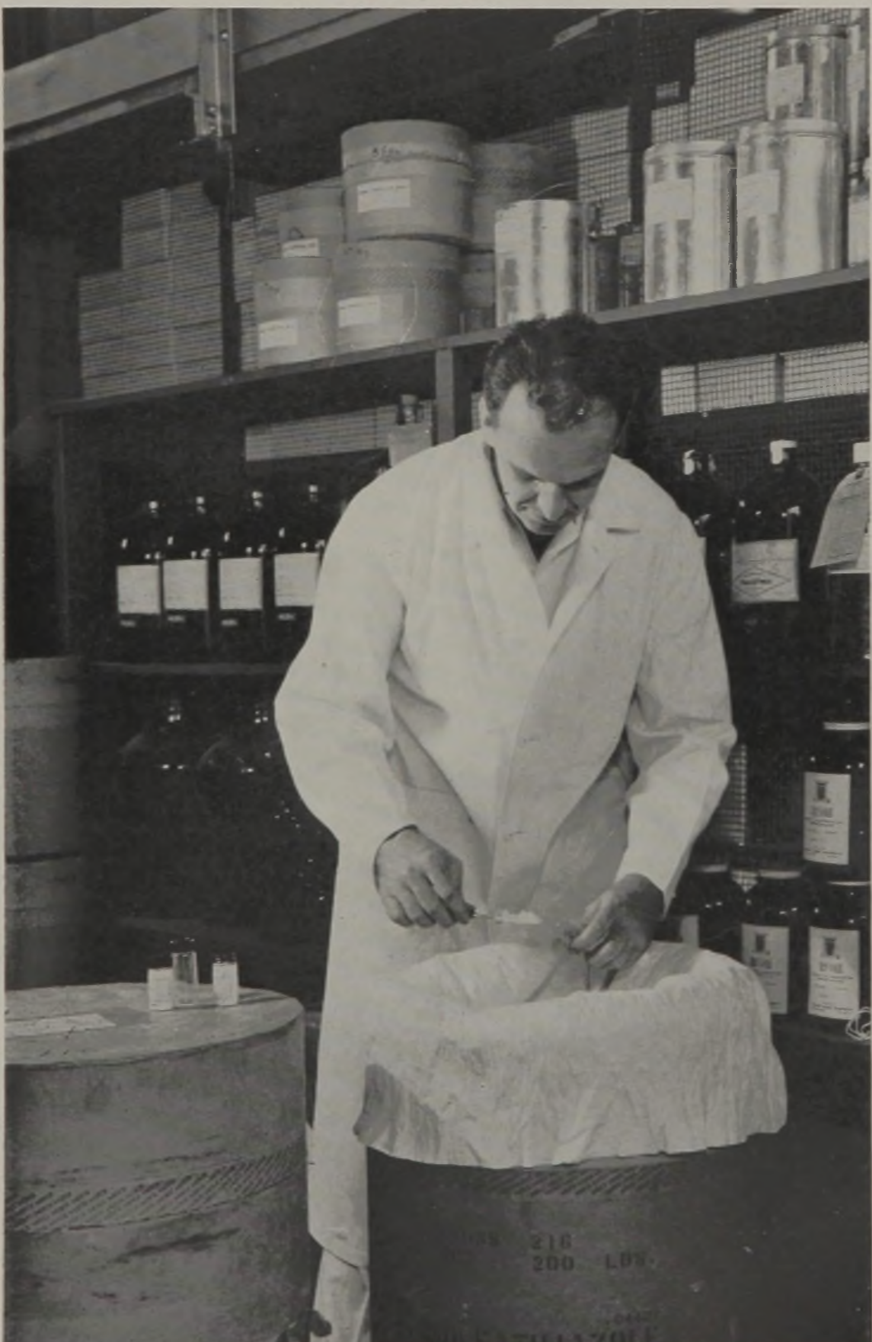
RAW MATERIALS CONTROL at The Wm. S. Merrell Company

By *F. J. Messmann*
Assistant Plant Superintendent, The Wm. S. Merrell Co.



IN THE pharmaceutical industry we are dealing with thousands of different chemicals, almost any one of which may quite possibly mean life or death to the ultimate user. With so many powerful materials at hand, utmost precaution must be taken to keep each one in its proper place and to insure that every tablet, every ointment, every fluid, contains tested ingredients in the proper proportions.

To those in other branches of the chemical industry, many of the precautions taken in the drug manufacturing business may seem unduly exacting or even unnecessary. Yet experience has proved that they are essential for absolute assurance that the proper grade of the specified chemical is used in the correct amount in the desired formula and in no other formula. Whether the same degree of control is justified in other branches of the industry is for persons in those branches to decide.

A good control system pays for itself in the avoidance of rejections of finished products. Faulty or imperfect raw materials are not only a loss in themselves but they can cause the loss of other valuable materials with which they are mixed. Considerable labor may also be lost.

You may sell Wm. S. Merrell Co. one of your products and we may have bought the same chemical from you hundreds of times, but we still put your product through our raw materials control system.

Control of every raw material begins when our purchase number is stamped on the container by the seller. Let's follow a shipment of six drums of Thiamine Hydrochloride, U.S.P. Powder (Vitamin B_1) from the time a truck delivers the ingredient into our Receiving Department until it is mixed with other ingredients in a batch of polyvitamin tablets.

As the truck driver removes the drums of Thiamine Hydrochloride U.S.P. Powder from the truck, a clerk checks the drums against the freight or express bill. The clerk then goes to the numerical file of purchase orders and withdraws Order No. 1001 which calls for "blank" quantity of Thiamine Hydrochloride U.S.P. Powder from the John Doe Company, St. Louis, Mo. Purchase Order No. 1001 is checked against the shipment of Thiamine Hydrochloride U.S.P. Powder as it is unpacked. The quantity received, with gross, tare and net weights, is recorded on the purchase order together with the name of the shipper and the amount of shipping charges. If all the containers show no evidence of having been damaged or tampered with and look satisfactory, the clerk prepares, in duplicate, a Warehouse Acceptance Slip (see Fig. 1).

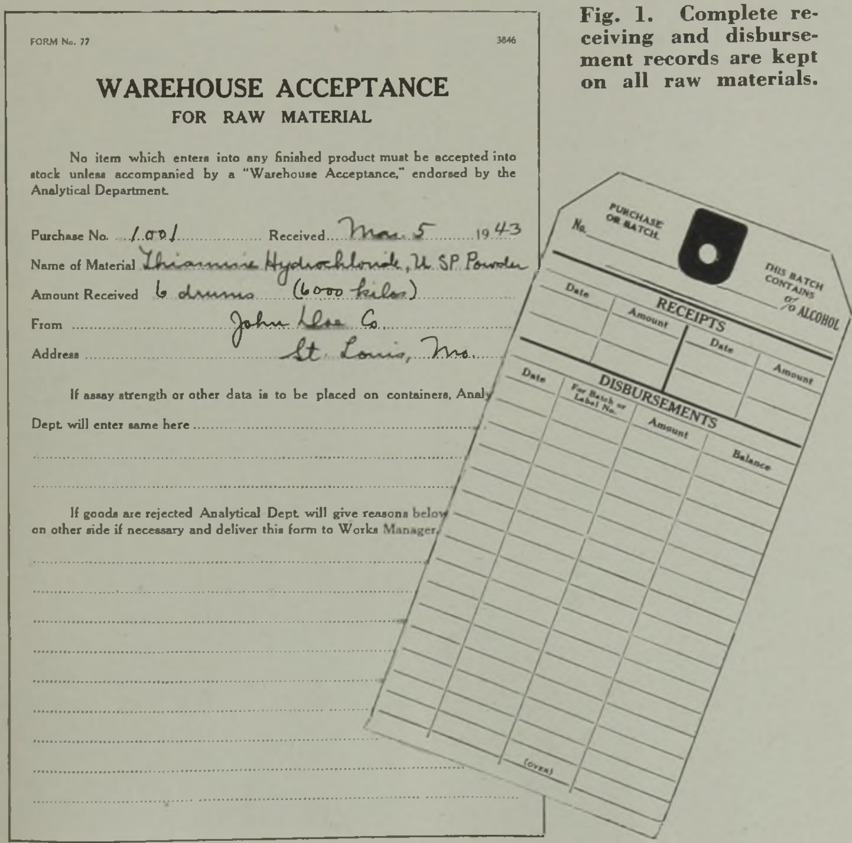
The clerk enters in the spaces provided, Order No. 1001, March 5, 1943, Thiamine Hydrochloride U.S.P. Powder, 6 drums, total 6000 kilograms, from John Doe Company. A space is also provided for entering the per cent strength determined after the ingredient has been assayed. Below these are several lines on which the Analytical Laboratory stamps "OK" or "Rejected," as the case may be, with space provided for entering information as to why a lot is rejected, if it should be.

Along with the Warehouse Acceptance Slip, the clerk prepares a Disbursement Tag for each container. A Disbursement Tag (Fig. 1) includes the listing of the name of ingredient, the lot number, the date, and the initial net quantity. Below this are spaces for recording the "OK" of the Analytical Department, the date of disbursement, the batch number for which the material is disbursed, the quantity disbursed, and the amount remaining. On the reverse side, additional spaces are provided for the notation of further disbursements as well as a space for the tare weight of the container.

The Analytical Laboratory tests incoming materials for identity and purity.

For this shipment of Thiamine Hydrochloride U.S.P. Powder, the clerk prepares six tags, one for each drum, and enters on each tag the following: Thiamine Hydrochloride U.S.P. Powder, Lot No. 1001, 3-5-43, 2.2 lbs. On the reverse side, he enters the tare weight, 0.5 lb.

The duplicate purchase order, the original Warehouse Acceptance Slip and the Disbursement Tags are placed together in a file for the chemist from the Analytical Department. The duplicate Warehouse Acceptance Slip is sent to the office.



FORM No. 77 3846

WAREHOUSE ACCEPTANCE
FOR RAW MATERIAL

No item which enters into any finished product must be accepted into stock unless accompanied by a "Warehouse Acceptance," endorsed by the Analytical Department.

Purchase No. 1001 Received Mar. 5 1943
Name of Material Thiamine Hydrochloride, U.S.P. Powder
Amount Received 6 drums (6000 kilos)
From John Doe Co.
Address St. Louis, Mo.

If assay strength or other data is to be placed on containers, Analy...
Dept. will enter same here

If goods are rejected Analytical Dept. will give reasons below on other side if necessary and deliver this form to Works Manager.

Fig. 1. Complete receiving and disbursement records are kept on all raw materials.

Several times a day, a chemist from the Analytical Laboratory visits the Receiving Department to take samples of incoming materials. He examines Warehouse Acceptance Slips and Disbursement Tags and compares them with the purchase orders for accuracy. If correct, the chemist proceeds to take a representative sample from each container. He examines the products for evidence of having been tampered with or adulteration and at this time a sample is taken. Uniform vials are used for samples so that they can be conveniently filed for future reference.

The sample of Thiamine Hydrochloride U.S.P. Powder is taken by the chemist to the Analytical Laboratory and tested for identity and purity. A standard manual is at the disposal of the analytical chemists since it is often desirable to supplement the various official tests with more particular tests which may be required to determine the suitability of the chemical or drug for our specific use.

If the Thiamine Hydrochloride U.S.P. Powder, or other ingredient, meets all the specifications, the chemist stamps his "OK" on the Warehouse Acceptance Slip and on each of the Disbursement Tags. If the material is one that may be stand-

A qualified compounder makes a final check on all ingredients for a batch.

ardized at other than 100% strength, the percentage strength is indicated on each tag and on the Warehouse Acceptance Slip so that the quantities required for any particular formula may be adjusted according to the percentage strength.

In the Analytical Laboratory, a file is maintained for each incoming substance showing the lot number, source, quantity received and the assay results. This file provides a permanent record which is quickly available whenever it is needed. In addition, a sample from each lot of incoming material is filed in the Analytical Laboratory for check assay and future reference in case any difficulty should be experienced with any product in which the particular ingredient is used.

A note is made on the control record if a lot of incoming material does not pass all tests. The Warehouse Acceptance Slip and the Disbursement Tags are marked "rejected" and the reasons for the rejection are noted on the Warehouse Acceptance Slip.

The chemist returns the Disbursement Tags and the Warehouse Acceptance Slip to the Receiving Department if the lot has been OK'd. If the lot is rejected, the plant superintendent receives the rejected Warehouse Acceptance Slip and arranges for disposition of the rejected material. It is the chemist's duty to see that the proper tags are attached to the containers of Thiamine Hydrochloride U.S.P. Powder, or whatever the product may be. Only after an OK'd Disbursement Tag is attached to a container may it be sent from the Receiving Department to the warehouse. This procedure insures that the stock in the warehouse has been tested and approved.

The Thiamine Hydrochloride U.S.P. Powder is sent to an enclosed storage space so that disbursements can be made only by an authorized stock clerk.

When a batch of polyvitamin tablets is to be made, a requisition and formula calling for the required materials are prepared and checked. When a check of the perpetual inventory shows that all ingredients are in stock, the material requisition is sent to the raw materials storage clerk. He proceeds to measure out each ingredient and to label it. On our batch of polyvitamin tablets, the label for the ingredient, Thiamine Hydrochloride U.S.P. Powder would read:

Polyvitamin Tablet
#101030
Thiamine Hydrochloride,
U.S.P. Powder
6.0 lbs.
in 3 cartons

This label is prepared by hand, not printed, to reduce the possibility of using the wrong label since the clerk, while writing a label, must think of what he is doing. The label indicates in how many containers the material is placed so that a check may be made quickly. This eliminates the possibility of a small container being overlooked if the bulk of the material is in a large drum or barrel.

On the Disbursement Tag for the Thiamine Hydrochloride U.S.P. Powder, he records: 3-5-43, #101030, 6.0 lbs., balance, 7.2 lbs. On the material requisition, he enters the lot number of the Thiamine Hydrochloride U.S.P. Powder.

The material requisition is returned to the perpetual inventory clerk for deduction of the materials disbursed. The purchase or lot numbers on the material requisition are transferred to the formula.

The formula and material requisition are sent to the Analytical Laboratory where each item is checked against the incoming materials file to be sure that the lots of Thiamine Hydrochloride U.S.P. Powder, and other ingredients are satisfactory for the product in which they are to be used. For instance, several mesh sizes of one chemical may be required for different products. Unless a check is made of Lot numbers, a lot of finely powdered material might be disbursed in place of a coarse powder. When the control chemist is satisfied that all the ingredients have been disbursed in the correct amounts from approved lots of the proper chemicals, he stamps the formula "OK for Production" and sends the formula and material requisition to the proper production department.

When a formula is compounded, the foreman of the Department sends the material requisition to the raw materials stock clerk who sends to the Department all the ingredients required for the particular formula. A qualified compounder then checks and measures the quantity of each substance. Then he places his initials on the formula opposite each ingredient, thus indicating that he has checked both the presence of each ingredient and its quantity. The person who actually adds the various ingredients to the mixer or kettle also places his initials on the formula alongside each ingredient as it is added.

This completes the system of check and counter-check that is applied to each and every lot of raw material that enters the Wm. S. Merrell plant from the time the lot number is stamped on the shipping container until the ingredient has finally become part of a mixture or compound. A complete history of the quality and use of each ingredient is kept permanently.

Outside Storage of Coal

Wartime conditions are requiring that more plants resort to outdoor storage of coal to assure adequate reserves. For maximum safety and efficiency, outdoor storage must be carried out properly, and here is a recommended procedure based on British experience.

By Thomas Herdman

JUST dump it any place in the yard, is, more often than not, the casual instruction the coal delivery man receives when the fuel bins inside a plant are already filled to capacity.

Open air storage of coal should not be a haphazard procedure. There are definite rules to be observed. As an outgrowth of British experience in wartime fuel conservation, the Fuel Research Station of the British Ministry of Fuel and Power has developed a recommended procedure for, outdoor storage of coal.

The first and foremost consideration is that no coal storage pile should exceed 200 tons. A lesser amount in any one pile is safer. Neither should the pile rise higher than ten feet from the ground. Even safer is a maximum of eight feet. The reason for these precautions is that coal must have scope to breathe. Coal deteriorates faster when stifled for air. Spontaneous combustion is a strong possibility when the storage tonnage is in excess of 200, or the pile towers above ten feet. Rarely does spontaneous combustion occur when these safety limitations are observed.

The ideal location is a piece of cleared ground, free from rubbish or weeds, and not altogether shut in by buildings or blank walls or fences, all of which retard ventilation. The best ground surfaces, in the order named, are stone, cold ashes (well-rolled), hard clay, chalk, peat (if first packed several inches deep with cold ashes or ballast).

On the other hand, the worst possible depository is that near a source or outlet of artificial heating—a boiler house wall, or steam pipes, or any covered carrier of a warm fluid such as organic waste.

Each kind of coal should be stored in a separate stack, as climatic reactions vary with the size of coal. Generally speaking, smaller coals disintegrate faster and to a greater extent than larger coals. Since coal is purchased in a size suitable for a specific industrial or commercial use, any change in that size as the aftermath of outdoor storage will reduce heating efficiency.

Anthracite (hard and dull) is safer to store in large quantities than bituminous (soft and shiny). The British Fuel Efficiency Board lists their deterioration ratio, from highest to lowest, in this order: Lignitic, sub-bituminous, bituminous, semi-bituminous, anthracite.

A noticeable change is that a bright coal like bituminous turns dull or rusty. It acquires such inorganic constituents as pyrites and ankerite. However, the fuel is just as good as before it was stored, although the changed condition is susceptible to disintegration.

The softer and larger the coal, the easier for climatic exposure to break it into smaller pieces.

The harder and larger the coal, the slower it deteriorates.

While a coal never crumbles to dust, it tends to become brittle after outdoor storage, so that each handling produces increased breakage. A sound rule to follow is never disturb a storage pile unless you have immediate need of the fuel.

Digging into the coal reserve pile during the first three months is inadvisable except in an emergency. To leave it untouched for six months or longer is preferable. Deterioration is more extensive during the first three months of outdoor storage. It then slows down considerably.

The advantage of starting a coal storage pile in the favorable weather months is that disintegration is lower than in winter.

Instead of drawing upon the stored pile for immediate fuel needs, use the supply of coal just delivered. One advantage is the labor saved in not having to handle the fuel twice. The other advantage is that immediate use of the new coal avoids the *high* deterioration of the first six months of outdoor storage.

Normal losses from stored coal average between one-half per cent and one per cent yearly.

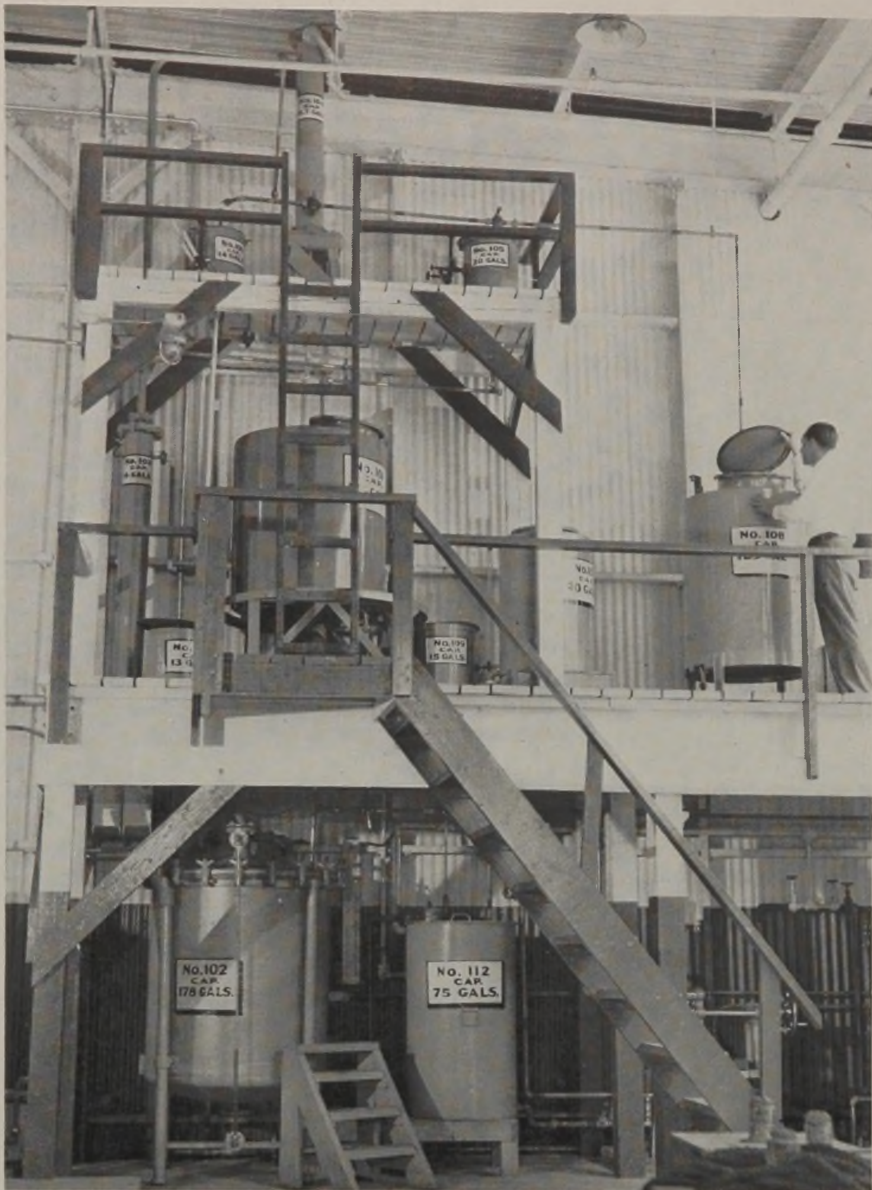
How much coal can be stored if space is limited in the plant yard? A British ton of 2,240 lbs. requires from 40 to 50 cubic ft. If kept to the ten feet high maximum, 1,000 British tons require a base 80 ft. square. At the top, with the sides sloping at 45 degrees, it will be 60 ft. square.

How is the steam-rising power of stored coal affected? The external difference in the moisture content may mistakenly reflect a decreased caloric value. There will also be the crop of disintegrated small coals slipping through the grate. As a matter of fact, neither condition materially reduces the steam-rising power.

To guard against a fire occurring by spontaneous combustion, the coal storage location should be one where there is access to an adequate supply of water. It takes more than a fine spray from a hose to put out such a fire. Not only is lots of water needed, but it is also essential to attack the seat of the fire by holing, trenching and cutting. Another tactic is to spread the pile so that the hot coal gets a chance to cool.

An approved method of outside storage of coal. After being loaded from a railroad car by clam bucket, the coal is smoothed and pressed down by a bulldozer in layers about 18 inches thick. This type of pile will shed rain water.

Photo by U. S. Army Signal Corps.



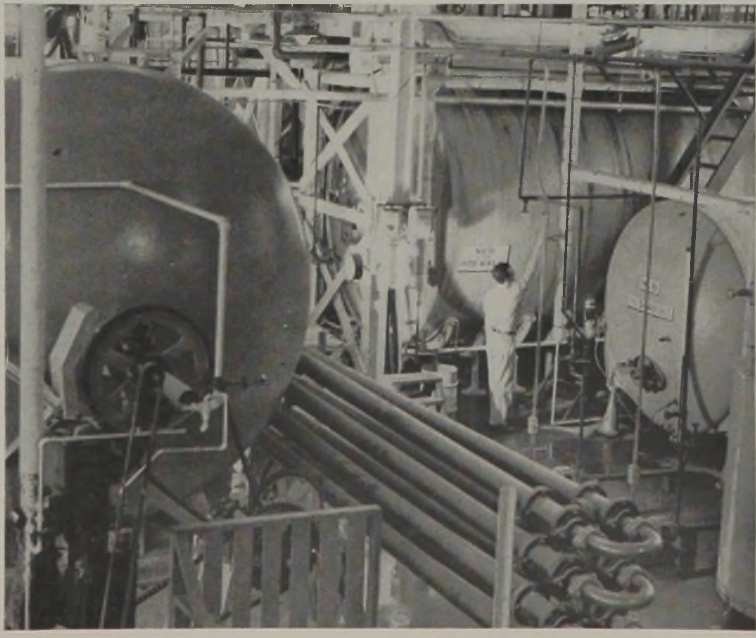
Butadiene

In

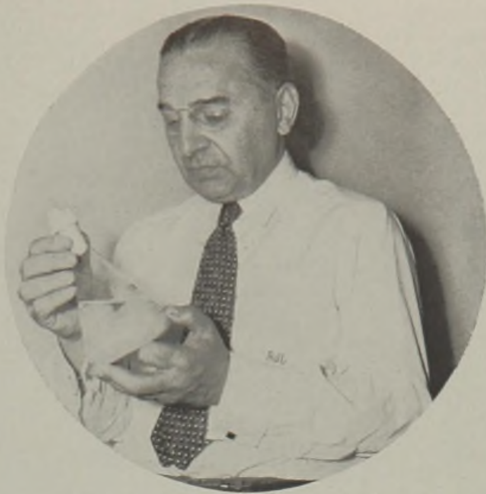
PRODUCTION of butadiene from grain by the short-cut process through butylene glycol instead of alcohol is being carried out in a new large-size pilot plant by Schenley Distillers Corp. at Lawrenceburg, Ind. The plant was demonstrated publicly for the first time last month.

The process, which involves fermentation of corn or wheat to butylene glycol followed by acetylation and pyrolysis to give butadiene, was first announced last fall by the Northern Regional Research Laboratory at Peoria, Illinois, following developmental work which had carried up to semi-pilot plant stage the original investigations made at Iowa State College several years earlier. The process was surveyed last year by the Baruch rubber committee which recommended it for further investigation.

Above—A corner in Schenley Distillers Corporation's pilot plant at Lawrenceburg, Ind., showing apparatus for acetylating butylene glycol to butane diacetate, an intermediate step in converting grain to butadiene. Below left—Grain cooker in the Schenley pilot plant. Below right—Transferring bacteria to the culture tank before adding to the grain mash.



from Grain
Pilot Plant Stage



Dr. A. J. Liebmann, head of Schenley Research Institute.

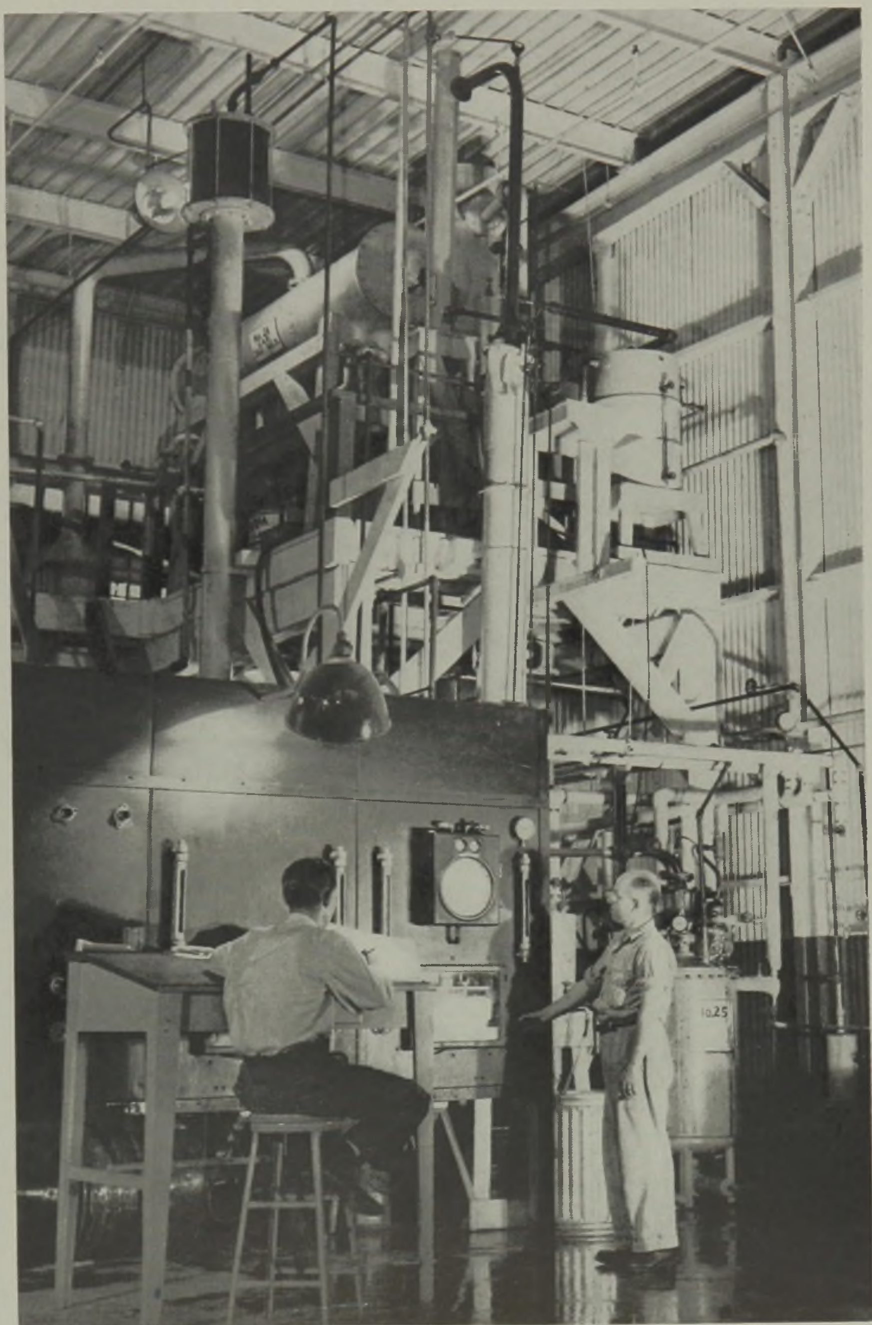
Operations at the Schenley pilot plant are under the direction of Dr. A. J. Liebmann, who has been working in cooperation with the Peoria laboratory. The plant has a mashing capacity of 450 bushels of grain, an amount sufficient to produce 4,050 pounds of butylene glycol in a 3-day period. This amount of butylene can produce about 2,430 pounds of butadiene.

The grain is fed into mash tubs in meal form where it is mixed with water and then sent to steam cookers. From there it goes into a fermenter where a specially prepared bacteria culture is added to give conversion to butylene glycol.

After fermentation, the resulting "distiller's beer" is allowed to settle, the clear liquid filtered off and pumped to an evaporator for concentration. Butylene glycol is removed from this concentrate by countercurrent extraction with butanol and the two components are separated by distillation.

To obtain butadiene, the butylene glycol is esterified with acetic acid to form butanediacetate, which in turn is cracked to butadiene by heating to 1,100 deg. F. in a molten lead bath. The butadiene is produced as a gas and is liquefied by compression and cooling. The acetic acid is recovered by condensation.

The process holds great promise as a cheaper method of making butadiene from grain in the opinion of qualified WPB officials, but it is stated that there are still some "bugs" to be worked out before a commercial plant can be attempted. If this should be in the near future, the problem of obtaining construction materials promises to be a hindrance.



Apparatus for recovering butylene glycol from the "distiller's beer."

Anhydrous ammonia storage system showing compressor house and storage tank with vertically-hanging flexible hose. Vaporizers between buildings are used in winter to heat the ammonia to sufficient pressure for utilization. Ordinarily it is preferable to enclose and heat the storage tank and not employ separate vaporizers.

All photos courtesy Blaw-Knox.

Storage and Handling of Anhydrous Ammonia in Tank Car Quantities

By *L. H. Brandt*, National Ammonia Division, E. I. du Pont de Nemours & Co.

It is obviously more economical to purchase ammonia in tank cars rather than cylinders when large quantities are used, and for this reason there has been a gradual increase in shipments in tank cars over recent years. However, the handling of tank car quantities of ammonia requires special equipment and safety precautions that are still not too well understood by many. Old and new users alike will find some valuable tips in this article by Mr. Brandt.

THE HANDLING of anhydrous ammonia in small quantities is well understood because of widespread use in the refrigerating industry. The handling of anhydrous ammonia in tank car quantities is not so well understood. This article is prepared for the information of engineers who are for the first time confronted with problems incident to the safe handling and storage of tank car anhydrous ammonia.

Properties of Ammonia

Anhydrous ammonia is a pungent smelling, colorless gas with a gravity of 0.5971 as compared to air. For commercial transportation, anhydrous ammonia is compressed and liquefied into steel cylinders and tank cars. The U. S. Bureau of Standards gives data on pressure-temperature relationships as shown in Table I.

Table I—Pressure-Temperature Relationships for Ammonia[1]

Temperature °F.	Gage Pressure lbs./sq. in.	Liquid Density lbs./cu. ft.	Vapor Density lbs./cu. ft.	Latent Heat of Vaporization BTU/lb.
—28	0	42.58	0.0555	589.3
0	15.7	41.34	0.1097	568.9
30	45.0	39.96	0.2073	544.8
50	74.5	39.00	0.3036	527.3
70	114.1	38.00	0.4325	508.6
90	165.9	36.95	0.6019	488.5
110	232.3	35.84	0.8219	466.7

Toxicity: The physiologic response to various concentrations of ammonia in air is tabulated by Henderson and Haggard[2] as:

Least detectable odor	0.0053%
Least amount causing immediate irritation to eye	0.0698%
Least amount causing coughing	0.1720%
Maximum concentration allowable for prolonged exposure	0.010%
Maximum concentration allowable for short exposure (½–1 hr.)	**0.03–0.05%**
Dangerous for even short exposure (½ hr.)	0.25–0.45%
Rapidly fatal for short exposure	0.5 –1.0%

From the practical angle, the pungent and unbearable odor of ammonia provides sufficient warning to prevent anyone from remaining in an area containing dangerously high ammonia concentration. The only hazard would develop where a means of exit is cut off. Toxicity is not cumulative. Because of low gravity, ammonia fumes will rise rapidly and be dissipated if natural ventilation is provided.

If liquid ammonia or concentrated ammonia gas comes in contact with the body, it will cause a chemical burn.

Flammability: Scientific data covering the flammability of anhydrous ammonia is conflicting. Probably the most authoritative conclusions have been written by the Underwriters Laboratories.[3]

A stream of pure ammonia gas, at atmospheric temperature, will not support its own flame in air. If air containing between 16 and 25% by volume of ammonia is exposed to an already existing flame, the combination will induce ignition of the ammonia-air mixture. This ignition is not with explosive violence and can best be described as a "puff."

Experience indicates that where this unusual condition has been met, the temperature developed by a momentarily existing ammonia flame "cap" will be sufficient to set off sprinkler heads but will not be sufficient to scorch wood.

Hydrostatic Pressure: Reference to Table I shows that ammonia is liquid at —28° F. at atmospheric pressure. If liquid ammonia is held in a closed tank, the pressure in the tank rises rapidly with increasing temperature, as shown in the first two columns The liquid ammonia expands very rapidly as can be seen by comparing the weights given in Column 3 for various temperatures. When liquid ammonia increases in temperature from 50 to 110° F., there is a 9% volume expansion as compared to only 0.6% for water. So long as the liquid does not completely fill the container, the pressures will not exceed the pressures in Column 2. However, as soon as the free space is filled with liquid, any further rise in temperature results in a pressure corresponding to that accompanying liquid compression unless the excess liquid be discharged through a safety vent. This applies to any section of pipe line, where liquid can be trapped between two valves.

Because of the relatively small volume of pipe lines, it is sometimes practical to install a cushion gas space in the form of an inverted surge chamber. For long lines of considerable volume, a ½" ammonia relief valve, set for 220 pounds per square inch, is preferable. It is desirable to install a minimum number of valves on liquid lines. In order to avoid loss of liquid from the storage tank safety vents, the amount of ammonia charged into the tank should not exceed 35.6 lbs. of liquid ammonia per cubic foot of tank volume. When it is necessary to determine filling of a storage tank by volume observations instead of weight, the following table may be used:

Temperature of Liquid Ammonia in Tank—°F.	Maximum Volume Filled with Liquid.
30	86%
40	87.5%
50	88.5%
60	89.6%
70	90.6%
80	92.0%
90	93.2%
100	94.5%

Permissible Ammonia Storage Layout

The drawing on the next page shows a layout that has the approval of one of the large manufacturers and distributors of ammonia for the storage of tank car quantities of liquid anhydrous ammonia. Many years of customer use have proved this layout to be both safe and satisfactory.

Liquid anhydrous ammonia is shipped in cork insulated tank cars of 10,000 gallon capacity, containing 52,000 pounds net. Cars are provided with spring loaded relief valves to open at 225 pounds gage. Under winter conditions or if refrigerated before filling, the tank car will arrive at destination with insufficient pressure for ammonia to flow into the storage tank without assistance. For this reason, it is customary to provide facilities as shown on the next page whereby ammonia gas may be pumped from the storage tank and compressed over the liquid in the car. The difference in pressure so created (about 50 pounds) blows liquid out of the car through a "dipper pipe" into the storage tank. Due to the low boiling point of anhydrous ammonia, it is not practical to pump the liquid as equipment would become gas bound.

In most cases, ammonia is finally utilized in the gaseous phase. Approximately 550 BTU's are required to vaporize each pound of liquid. When consumption is steady and under 200,000 pounds per year, sufficient heat for vaporization may be absorbed from the atmosphere surrounding the tank. In this case, ammonia will normally be drawn from the top of the tank and after pressure reduction (J) piped directly to the point of application. The reduction in pressure in the storage building is not because of safety considerations but rather to guard against possible recondensation where the pipe line is colder than the storage tank.

A 13,000 gallon bare tank half full of liquid ammonia will pick up sufficient heat from the surrounding atmosphere to discharge about two pounds of ammonia gas per hour for each degree F. that the contents are lower in temperature than the surrounding atmosphere. By reference to Table I, it is possible to evaluate the rate of evaporation for any ammonia vapor delivery pressure required.

For example:—

Rate of evaporation required, 40 pounds per hour (equivalent to 350,000 pounds of ammonia per year).

Vapor delivery pressure required, 45 pounds per square inch gage. From table on Page 1, the temperature of ammonia evaporating at 45 pounds per square inch gage, is indicated as 30°F.

To obtain a flow of 40 pounds of ammonia per hour, a temperature difference of (40 pounds per hour ÷ 2 pounds per hour per °F. temperature difference) 20° F. will be required. Therefore, a temperature of (30° + 20°) 50° F. will be required on the outside of the tank when it is half full.

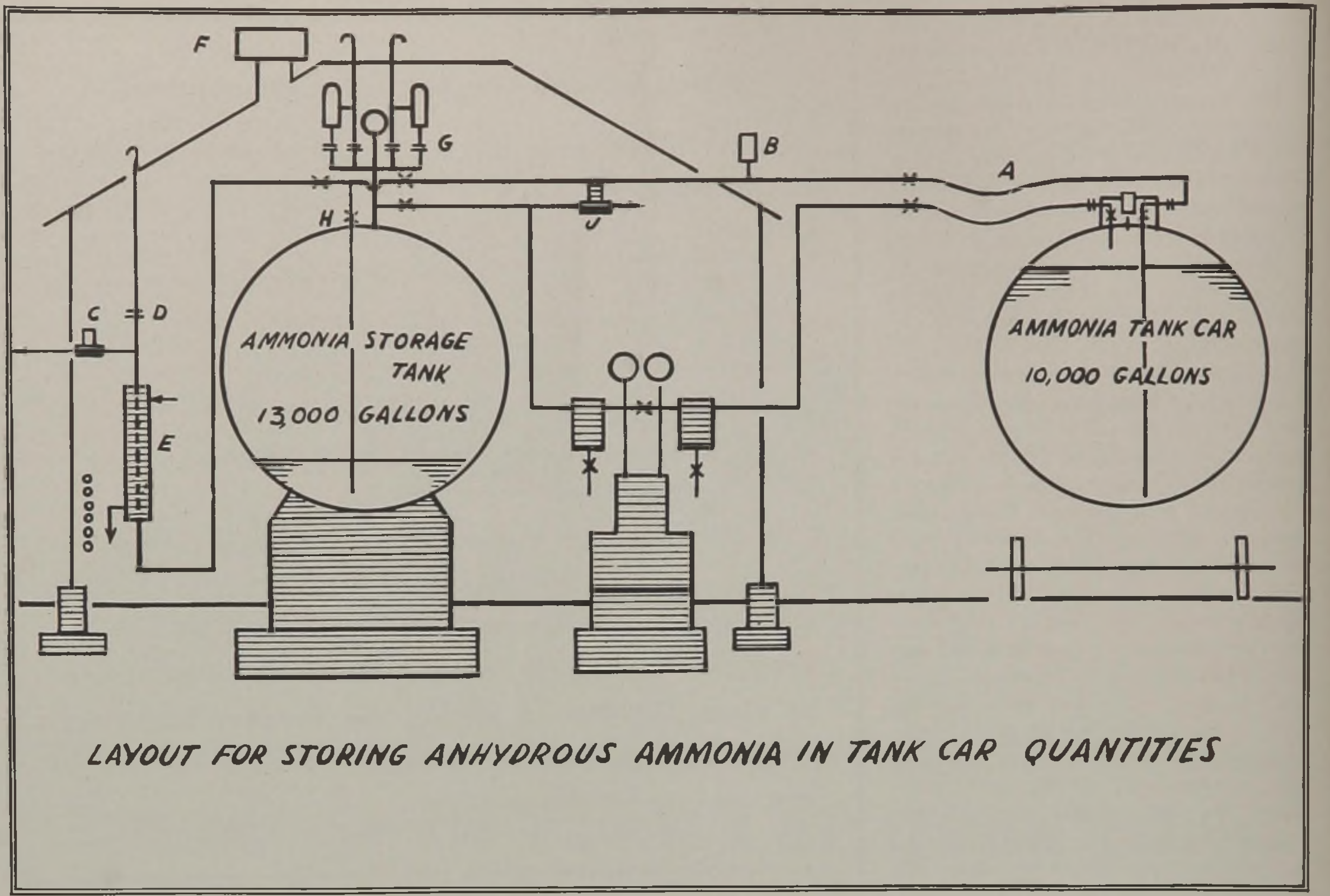
As the level drops, the rate of heat transfer will decrease in direct proportion to the decreased area of tank wetted on the inside by ammonia. In other words, the example above covers a case where 50% of the tank area transfers heat. If the liquid level drops so that only 25% of the tank is wetted by the liquid, the rate of heat transfer and, therefore, the rate of ammonia discharge would be cut in half.

When is Tank Car Ammonia Economical?

THE AVERAGE price of cylinder anhydrous ammonia in the northeastern section of the country is 16c a pound delivered.

This product is identical with refrigerating grade ammonia sold in tank cars at 5c a pound f.o.b. works, and for applications that can use a product of lower quality there is commercial grade ammonia in tank cars at 4.5c a pound. Freight to most destinations in northeastern United States will come to about 0.5c a pound.

Thus it is obvious that substantial savings can be realized by large users of ammonia through purchases in tank car quantities. On purchases of 100,000 pounds of refrigerating grade a year, for example, the saving would amount to about $10,500. A storage and handling installation similar to the one described on these pages is reported to cost not over $20,000.—*Editors.*



LAYOUT FOR STORING ANHYDROUS AMMONIA IN TANK CAR QUANTITIES

Where ammonia consumption for an appreciable period exceeds the rate of 200,000 pounds annually, it is better to draw ammonia from the storage tank as a liquid and effect vaporization in a suitable length of steam jacketed pipe (E) protected by a rupture disc (D).[4] No float valves are necessary to maintain a proper level in the vaporizer as back pressures automatically developed will prevent flooding as long as steam is supplied to the jacket. Ammonia gas leaving the vaporizer is reduced in pressure (C) and piped to the point of ultimate application.

In very unusual cases, ammonia must be utilized as a liquid and it is, therefore, necessary to pipe the liquid from the storage tank to the point of utilization. The same care should be exercised in laying such an ammonia line as would be exercised in the laying of any high-pressure pipe line where a leak would be a source of considerable hazard. Such lines should not run indoors and should be protected against damage by keeping them well overhead or enclosing them in a concrete or metal subway. Under no condition should a liquid ammonia line be buried, as soil corrosion could readily induce leakage.

Equipment Specifications

Storage Tank: The storage tank is normally of 13,000 gallon capacity, conforming to A.S.M.E. Code, paragraph U 69 covering unfired pressure vessels. The tank should be tested at 440 pounds gage and designed for a working pressure of 220 pounds gage. Ammonia may be withdrawn as either a liquid or a gas. The tank is provided with a manway at one end and gage glasses at the other end to indicate internal liquid level.

A ball-check valve should be located at each end of the gage glass to cut off ammonia flow in the event of rupture. An added precaution is the installation of a second valve between the ball-check and the tank which can be closed to permit repairs on the ball-check valve.

Even though gage glasses are normally protected against mechanical injury by the enclosing building and sometimes added guards, it is considered good practice to keep glasses empty except when taking inventory or filling the tank. The recommended procedure for emptying the glass is to close the top valve and allow atmospheric heat to vaporize liquid, thus forcing the liquid level down and out of the lower terminal of the glass. This emptying will not take more than a few minutes under normal conditions—bubbles form immediately on closing the upper valve. As soon as the glass is completely empty, close the bottom valve. Due to the rapid expansion of liquid ammonia and the fact that the sun's rays can sometimes strike a gage glass, care should be taken not to trap liquid in the glass. For this reason, steam boiler practice of using interconnected pairs of weighted quarter-turn cocks is not recommended.

On the liquid line directly above the tank, there should be located an emergency valve (H) which is locked open at all times except when repairs have to be made on the liquid line it controls.

Relief Valves: Experience indicates that large spring loaded valves are not overly satisfactory in holding anhydrous ammonia. Ammonia frequently leaks through these valves and after each opening, the valve must be removed for seat regrinding. For this reason, rupture discs ahead of safety valves are preferred. The safety valve merely prevents the continued loss of ammonia after the pressure has been reduced to normal. The rupture disc and safety valve are both set to operate at about 220 pounds gage.

In order to guard against the unlikely failure of such a disc-valve combination to function properly, a second disc set for a higher pressure (250 pounds per square inch) is installed in parallel.

In order to permit repairs or replacement of blown discs, a duplicate system is installed with a suitable special three-way valve which permits only one set of discs to be shut off at a time.

To protect lines between valves (such as between the shut-off valves at the tank car and the storage tank) a ½" pressure relief valve should be installed (B) to open at 220 pounds per square inch. All vents from rupture discs and safety valves should be piped out of doors and terminate in return bends (to prevent moisture from finding its way back and freezing), which are at least ten feet above the top floor of any tenanted building within a 150 ft. radius.

When installing rupture discs, great care should be taken not to scratch them as the metal is exceedingly thin. The disc should be so placed that the concave side is against the pressure and the convex side to the air. The tab showing rupture pressure should be placed in an accessible position. A supply of extra discs should be available.

In the handling of certain highly flammable gases, it is customary to install flow limiting devices to shut off the flow in the event of an over-rapid discharge. The specific hazard being guarded against is the possible breakage of a line.

Engineers differ in their opinions about the value of such devices. They have never been used to any extent in ammonia handling.

It is obvious that such flow limiting devices should never be installed under pressure relief equipment. These flow limiting devices sometimes snap shut at pressure drops below their intended setting. Where ammonia is used as a heat-treating atmosphere, any unexpected interruption of flow, (such as caused by the premature closing of a flow limiting device) might permit air to find its way into the equipment and not only spoil the work being treated but introduce a serious fire hazard. The only recommended application for a flow limiting valve is on a liquid ammonia line going through a plant. In the unlikely event such a line is ruptured, a flow limiting valve would serve a useful purpose. On ammonia gas lines, the possible premature closing of a flow limiting valve introduces a more serious hazard than the escape of ammonia.

Valves: Valves should be designed for service with high-pressure ammonia, and permit repacking of the stem when under pressure.

Housing: The tank, vaporizer, compressor and oil traps are normally housed in a single building of rectangular design—the compressor is normally on a line with the axis of the tank rather than placed at the side as shown. The material of construction should be consistent with adjacent buildings—steel in heat-treating plants and wood in fertilizer plants. A single ventilator (F) should be installed above the compressor. The only normal ammonia leakage is through valve packing and from oil trap drain lines. The building should be tight except for out-swinging doors at each end, together with the overhead ventilator, which should provide sufficient ventilation. In winter, it is desirable to heat the building to 50° F. so as to maintain the proper ammonia pressure. Heating may be effected by a steam coil located along one wall of the building. Care should be taken never to place a steam line in contact with the storage tank.

Where desirable, the building may be a lean-to in which event the dividing wall should be unpierced except for ammonia, water and power-lines.

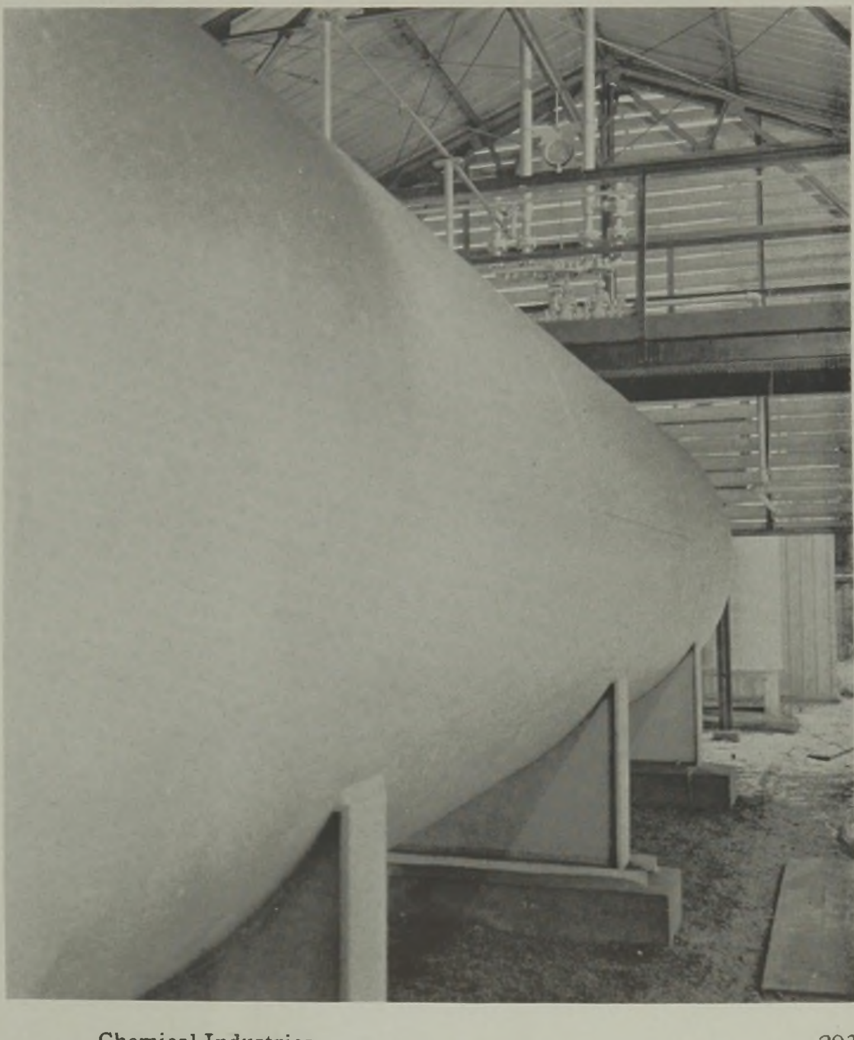
On account of the current shortage of steel, it is permissible to erect a wooden building (preferably of fire-proofed lumber) where steel might otherwise have been used. In such an event, the structure should be separated from adjoining buildings. If contingent risks make it desirable to make provision for later replacement with steel, this work may be facilitated by making minor design provisions in the frame structure.

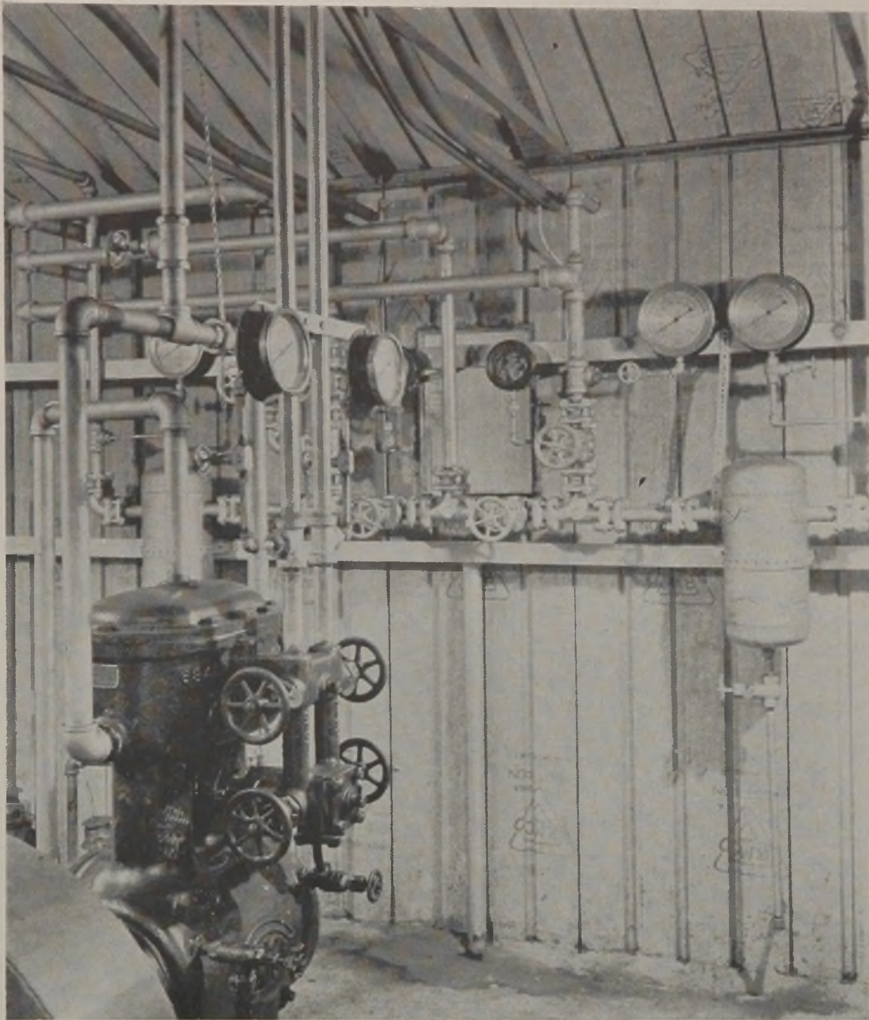
Compressor: A four-ton refrigerating capacity ammonia compressor is the recommended size. A 7½ horsepower motor —usually V-belt driven—is of sufficient size. For ease of operation, a compressor should be provided with a manifold system so that compression can be effected in either direction—toward the car when blowing out liquid and subsequently toward the storage tank. Suitably sized oil traps should be located as shown. The drains from these traps should terminate in an open funnel near the floor. Ammonia gages with 0-300 pound pressure ranges should be located on both sides of the compressor. A by-pass around the compressor should be placed above the unit as shown on the preceding page.

Piping: Extra heavy steel pipe and all steel ammonia fittings should be used throughout on high pressure lines. Piping should be welded where possible. Any screwed joints should be made up with freshly prepared litharge and glycerine pipe cement. A flexible "semi-metallic" ammonia hose is permissible for tank car connections (A). Unions connecting to the tank car should be screwed rather than flanged. Experience indicates operators can make a better joint with a screwed fitting, as a bolted flange is difficult to draw up evenly.

Pipe fittings at the storage tank end of the hose should point down so as to permit free vertical hanging of the hose when not in use. At such times, tank car fittings should be connected to the hose and the combination capped to exclude moisture. Lines carrying ammonia gas to the point of application should either be indoors or insulated to prevent cooling and recondensation. Where recondensation is anticipated, low spots in the line should be

13,000-gallon ammonia storage tank. Method of constructing saddles and connecting overhead relief valves are shown. Note overhead sprinkler system.





Unloading compressor, showing manifold arrangement whereby compression may be effected in either direction. Vertical tanks at rear and right are oil traps.

laid near a steam line to vaporize any liquid slugs. Low pressure ammonia lines need not be extra heavy—for 50 pound pressures, standard black iron is satisfactory.

Sprinklers: A horizontal sprinkler line should run the length of the ammonia storage tank. Heads to discharge 15 gallons of water per minute should be located at 4 foot centers. The function of such a sprinkler system would be to prevent overheating of the tank in the event of an adjacent fire. Summer temperatures are normally not sufficient to overheat ammonia, as the bulk of ammonia and steel which must be heated is so great that the pressure-temperature relations tend to stand at an average between day-night temperature conditions.

Safety Shower: A safety shower should be provided outside the storage building adjacent to the siding. This shower is for the purpose of employee protection in the event of exposure to liquid ammonia.

Gas Mask: A Bureau of Mines approved ammonia mask and a spare unused canister should be available in an unlocked weather-proof box outside the building housing the storage tank.

Testing for Leaks

As anhydrous ammonia gas is exceedingly difficult to hold, it is important that the system be carefully tested for leaks before being filled with liquid ammonia. This especially applies to the manway, rupture disc system (G) over the tank and the emergency liquid valve (H). There are two satisfactory methods and the choice between them is generally a matter of convenience. A 150-pound per square inch pressure can be built up with air (never use cylinder oxygen or carbon dioxide), or a mixture of air plus 10% ammonia can be employed at a lower pressure.

150-Pound Air Pressure: The volume of the tank is 13,000 gallons, which is roughly equivalent to 1700 cubic feet. The volume of piping is normally of little consequence. To build up 150 pounds pressure using the four-ton ammonia compressor, which is part of the system, will usually require several days. There is attendant hazard to the conversion of an ammonia compressor into compressed air service. The ammonia compressor is designed for refrigerating service where the suction gas is supercooled. Only the head is water jacketed. When drawing air at atmospheric temperature and discharging it against a 150-pound head, considerable overheating will result both because of the high compression ratio and excessive suction temperature. Refrigerating oil normally has a low pour point and, therefore, a low flash point. Excessive oil evaporation will take place when compressing air, and a mixture of oil plus superheated air constitutes an explosion hazard. To partially avoid this hazard, refrigerating grade oil should not be used in an ammonia compressor when the service is to unload tank cars. It is recommended that a high flash oil be used which will give better lubrication at temperatures met and minimize the fire hazard if the compressor is operated with air during testing.

The building-up of 150 pounds pressure can be greatly facilitated by the use of a portable high-speed air compressor.

When pressure is built up, all joints should be gone over carefully with soap and water.

There are four serious disadvantages to this system:

1. Excessive time required to build up pressure.
2. Explosion hazard if compressor runs hot.
3. Difficulty in finding small leaks especially in inaccessible locations.
4. Ammonia is harder to hold than air, and, therefore, a system which appears air-tight is not necessarily ammonia-tight.

Air-Ammonia: A method frequently employed to locate leaks in equipment subsequently to be subjected to high temperatures and pressures is based on applying a moderate ammonia-air pressure and determining the ammonia leaks with sulfur dioxide gas.[5]

Using any convenient compressor, force air into the system to about 50 pounds gage pressure. Connect a cylinder holding 50 pounds (weight not pressure) of liquid anhydrous ammonia to the flexible hose normally drawing liquid from the tank car. Place the cylinder so as to discharge liquid and allow the entire fifty pounds to flow into the system. This should take no more than five minutes. During this time, slowly bleed out air at the point of final application and at the tank car connection normally drawing gas until ammonia appears. When ammonia appears, the entire system may be assumed to hold air containing about 10% of ammonia.

Go over the system with either a burning sulfur taper (which may be obtained from ammonia manufacturers) or spray compressed cylinder sulfur dioxide on all joints. When using compressed sulfur dioxide, great caution should be observed on account of the highly toxic nature of sulfur dioxide. Any leaks will result in the formation of heavy white fumes.

If leaks are found which require welding, it is safer to purge out such portions of the system with compressed air to avoid any possibility of igniting the ammonia plus air. Theoretically, air containing 10% ammonia could not possibly ignite but the method followed in adding ammonia does not necessarily give perfect mixing.

Usually the manway on the storage tank is tightened by the fabricator and not removed during erection. Should the manway cover require tightening, great care must be exercised.

The gasket and seat should be carefully inspected (if the lid has been removed) to exclude all foreign matter. The proper placing of the lid should be checked—some lids fit in only one position and will be notched to show this. The bolts should be drawn up by carefully alternating sides. Bolts should not be drawn up in succession.

"Persuaders" should not be used in tightening the bolts as there is a distinct danger of tightening beyond their tensile strength. Equipment is available for automatically determining the tension on each bolt.

Tank Car Unloading Procedure

According to regulations of the Interstate Commerce Commission, all openings on an anhydrous ammonia tank car must be in an overhead dome. There are four such openings terminating in one inch angle valves. The two valves pointing lengthwise of the car terminate in dipper pipes extending to the bottom—they discharge liquid. The two valves pointing crosswise terminate just under the dome and discharge gas. The liquid line going to the storage tank should be connected to one of the liquid-discharging valves and the gas line should be attached to one of the gas valves.

First open the gas line and allow pressure to bleed through the compressor bypass to the tank and thence through the entire system. (When unloading the first car, the pressure generated will normally be around 40 pounds gage. It is a wise precaution to go over the system again with the sulfur tapers or compressed sulfur dioxide to check on the earlier test for leaks).

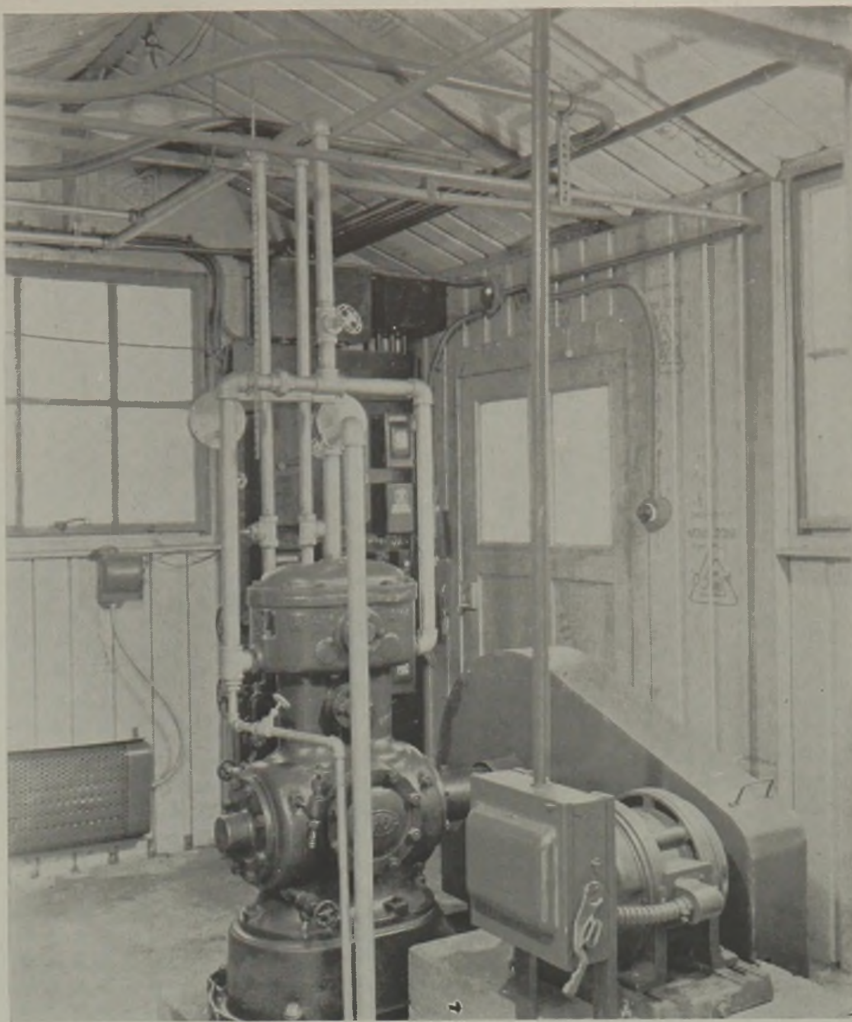
Open valves on the liquid line. Valves on the tank car will likely require the use of a "persuader." If the valves leak, tighten the stuffing box cap which is provided with a right hand thread. Valves seat when completely open. Start the compressor, watching gage above it. Be especially careful that valves on the discharge side of the compressor are open as indicated by the discharge gage. The difference in pressure between the storage tank and the tank car will blow out the liquid in about two hours time. During unloading, there will be about a 50-pound difference between the low and the high side of the compressor. Ammonia boiling in the tank will cause sweating on that part of the tank wetted on the inside by liquid.

While filling the tank, check on the proper operation of the gage glasses.

When all liquid has been blown from the car (average time required is two hours), the difference in pressure between the high and low sides of the compressor will drop to five or ten pounds—the pressure required to circulate gas through the system. When this drop takes place, close the liquid line valve at the storage tank end and shut down the compressor. Reverse valves on the compressor manifold to draw gas from the car and restart the compressor, drawing off as much gas from the tank car as is economical. Under average conditions, the car will be at about 100 pounds gage pressure when the liquid is out. About 500 pounds of ammonia gas (by weight) will remain in the car. At 5.5c per pound, this ammonia has a value of under $30.00. Depending on the cost of pumping, it may or may not be economical to remove part of this gas remnant.

When unloading the first car, it may be preferable not to pump the ammonia-air mixture from the car into the storage system as the air introduced may be objectionable. There is also the possibility of creating sufficient pressure in the tank to blow the relief valves. During the summer, care should be taken on subsequent cars that ammonia gas pumped from the car does not create excessive pressures in the storage tank. Pressure in the storage tank should not be allowed to rise above 200 pounds gage.

When sufficient gas has been removed, stop the compressor and close the gas valve at the storage tank and the gas and liquid valves on and adjoining the car. Carefully loosen unions at the car. When the pressure has bled from flexible connections (M), completely break unions at the car. Remove fittings from car valves, cap these fittings and reconnect unions. Hose and attached fittings should then be allowed to hang vertically.



Rear view of compressor, showing drive. A 4-ton refrigerating capacity ammonia compressor is the recommended size for this type of installation and duty.

During compression, oil traps on the compressor should be bled occasionally to make certain they do not flood. The presence of these traps prevents oil from contaminating ammonia in the storage tank and the ammonia car.

During the winter, the cooling jacket on the head of the compressor should be drained after each unloading to prevent freezing.

Care must be taken not to flood the ammonia storage tank as liquid may then be drawn into the compressor with the possibility of breaking the head.

Purging Air Remaining over Liquid Ammonia

Irrespective of the method of testing for leaks, a new tank after inspection will contain relatively pure air. Pressure should obviously be bled off prior to unloading the first car. After liquid ammonia has been forced from the car into the storage tank, the original 13,000 gallons of air will be distributed between the 3,000 gallon space overlying the liquid in the tank and the 10,000 gallon space in the car. Assuming a total pressure in the system of about 10 atmospheres, the gas overlying the liquid will be 90% ammonia, 2% oxygen and 8% nitrogen (10% air).

The nitrogen is inert and normally need not be purged out. Depending on the purpose to which the ammonia is put, the 2% oxygen may or may not be undesirable. It frequently happens that most of the overlying oxygen will be purged out when starting up ammonia-consuming operations where the equipment is already full of air and a little more air makes no difference.

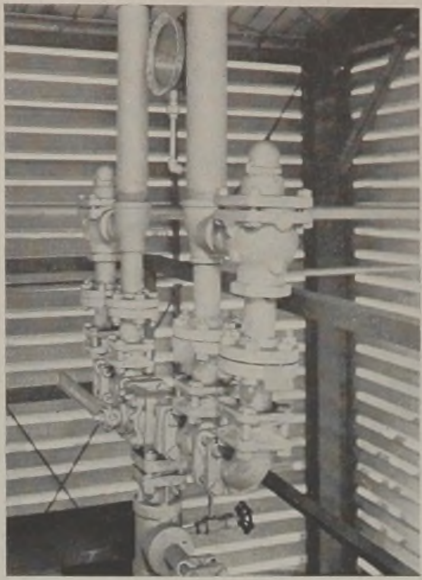
If this 2% of oxygen is undesirable, most of it can be removed either by pumping down the storage system before adding ammonia or by purging out the ammonia-air mixture after the system is filled.

Where time permits, the preferable method would be to pump down the system before originally filling with ammonia. It is obviously impractical to try to pump out all the air but half is not an unreasonable limit.

Purging of gas after the tank is full of ammonia can readily be effected except the fumes may be objectionable. The method is costly inasmuch as a minimum of 45 volumes of ammonia must be wasted to purge out a single volume of oxygen. Gas vented from the tank can be discharged into a barrel of running water until air bubbles cease to appear—pure ammonia gas will be absorbed and show no bubbles.

Reinspection

Anhydrous ammonia has no chemical or mechanical action on steel. The only wearing parts are the compressor and valves. For this reason, state boiler inspectors and boiler insurance companies very seldom insist on internal reinspection or retesting. In the event of reinspection, it is necessary to transfer the liquid to an empty anhydrous ammonia tank car or allow the storage tank to run dry. Great care must be taken to flush out all pipe lines and the tank before entry is made. The safest procedure as far as pipe lines are concerned is to flush them with compressed air using the ammonia compressor. When removing the manway, nuts should be eased off all the way around and the lid carefully loosened while all nuts are in position. This is to prevent the lid from flying off and being damaged in the event any pressure remains.



Relief valve assembly showing 3-way valve, four rupture discs, spring loaded relief valves and overhead vents.

The tank should be flushed with a blower prior to entry.

Anhydrous ammonia in the presence of steel builds up a protective coating of what is probably ferrous hydroxide. If this skin is exposed to moist air in the absence of ammonia fumes, it immediately oxidizes, yielding a finely divided brown rust. Unless the internal examination is made very quickly, this rust is likely to coat the inside of a tank and be a source of more or less subsequent annoyance. As soon as the inspection is terminated and even before the manhole is fully tightened, at least 100 pounds of anhydrous ammonia (from a cylinder) should be fed into the system and flushed through all pipe lines to prevent further rusting.

Care of Tank Car Equipment

An anhydrous ammonia tank car is of 10,000 gallon capacity. In the dome, there are two connections drawing gas (one inch valves pointing crosswise of the car) and two drawing liquid (one inch valves pointing lengthwise). Packing nuts on all four valves have right hand threads. In transit, these four valves are loosely plugged.

A spring loaded relief valve set for 225 pounds gage is located at the center of the dome. In the unlikely event excessive pressure is applied to the car (caused by lengthy exposure to summer temperatures), the spring loaded relief valve will open. The valve should reseat itself when excessive pressure has been relieved.

Cars are normally filled with cold ammonia which means the valve stem will shrink during filling. The stem is closed tightly while cold. The normal tendency is for the stem to lengthen on account of warming during transit and therefore cars invariably arrive with frozen valves. It is recommended that every user of tank car ammonia provide himself with a "persuader" that will fit the hand wheel. Valves are built so that the pipe wrenches cannot grasp the stem between the packing nut and the hand wheel. The recommended "persuader" should be in the form of an elongated "F." Valve stems carry a right hand thread and therefore open with a counter-clockwise motion.

When cars are spotted on a horizontal track, very little liquid ammonia remains behind after the liquid seal is broken at the bottom. Care should be taken to avoid a slanted track as a puddle of liquid will remain at the low end. It is almost impossible to boil out this liquid because of the insulation around the car.

A car containing more than two thousand pounds of liquid ammonia should never be returned to the railroad. Cars are not baffled and, therefore, the liquid may shift sufficiently in transit to tear the tank from its trucks.

When cars are empty, plugs should be replaced in the car valve outlets, the dome lid closed and sealed, and the car returned to its point of origin.

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3. Underwriters Laboratory Report on Miscellaneous Hazard No. 2375, November 13, 1933, "The Comparative Life, Fire and Explosion Hazards of Common Refrigerants."

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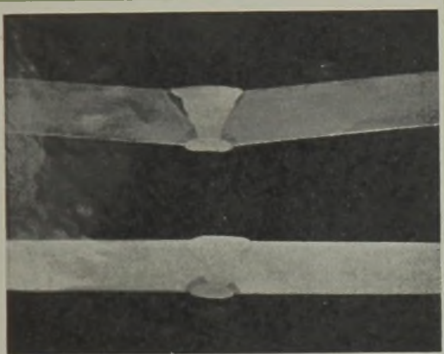
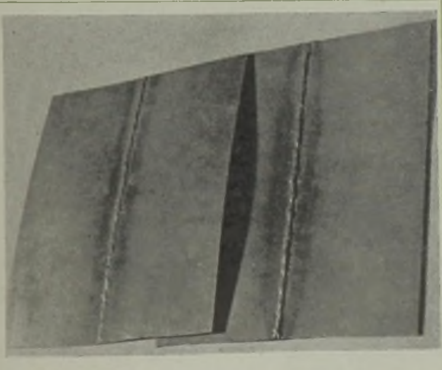
5. L. H. Brandt, "Anhydrous Ammonia Useful in Testing Tightness of Equipment," *Chemical & Metallurgical Engineering*, Vol. 44, No. 3, March, 1937.

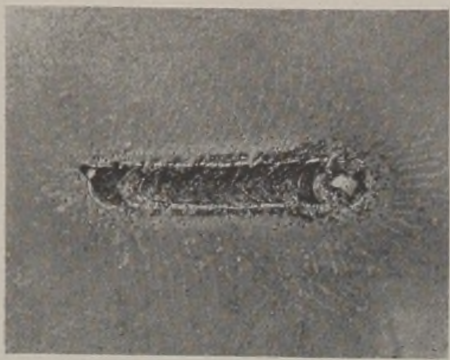
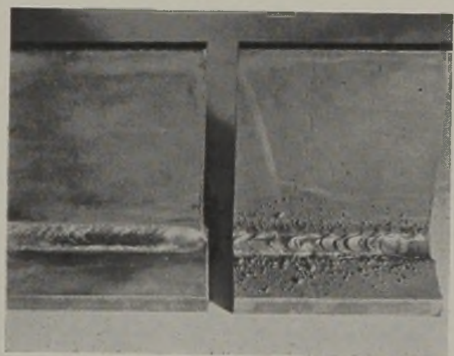
CAUSES AND CURES OF 14 COMMON WELDING TROUBLES

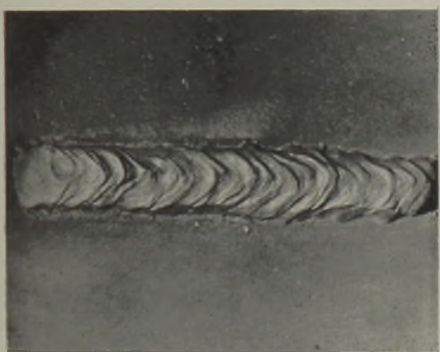
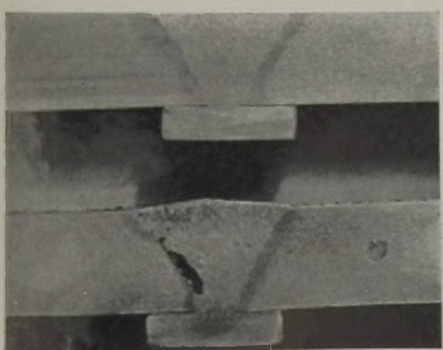
By *C. H. Jennings.* Welding Engineer, Westinghouse Electric and Manufacturing Company

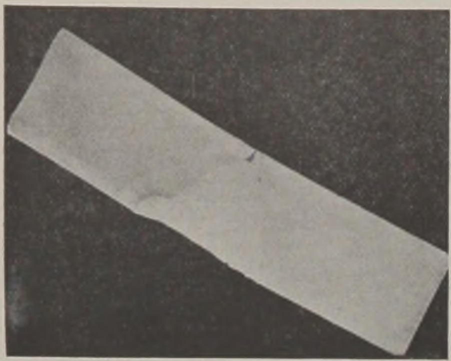
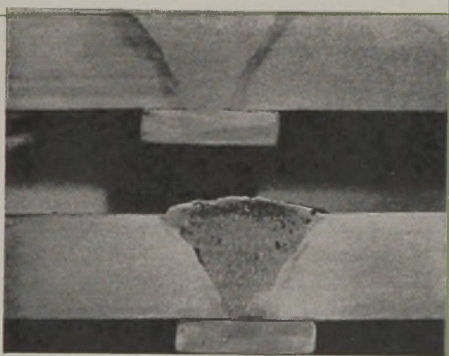
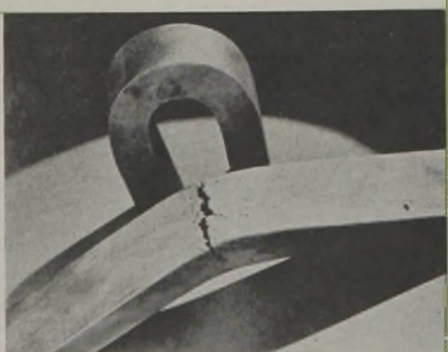
There are many fabricating difficulties encountered in the arc welding of any structure. Some of these difficulties seriously affect the strength and serviceability of the ultimate structure while others are less important and only influence the cost or appearance.

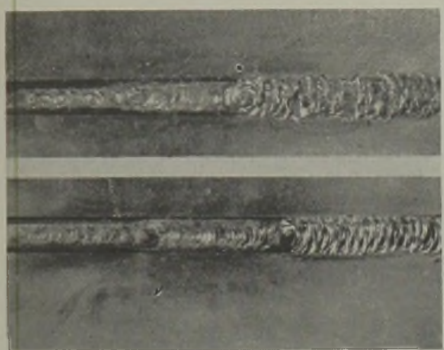
The correction of these troubles is generally not difficult providing the welding operator or engineer has a knowledge of the conditions causing them. In order to assist in detecting and correcting these undesirable factors, 14 of the more common troubles are illustrated by photographs and discussed from the standpoint of causes and methods of correction.

Trouble	Cause	Cure
 Figure 1—(top) Angular distortion obtained with single vee butt joint not properly prepared or clamped. (bottom) Single vee butt joint free from angular distortion, accomplished by proper clamping.	**A** Shrinkage of deposited metal pulls parts together and changes relative positions. **B** Non-uniform heating of parts during welding causes them to distort before welding is finished. Final welding of parts in distorted position prevents the maintenance of proper dimensions. **C** Improper welding sequence.	**A** Properly clamp or tack parts to resist shrinkage. **B** Pre-form parts sufficient to compensate for shrinkage of welds. **C** Distribute welding to prevent excessive local heating. Preheating desirable on some heavy structures. **D** Removal of rolling or forming strains before welding is sometimes helpful. **E** Study structure and develop a definite sequence of welding.
 Figure 2—(overlapping) Warped thin plate, improper tacking and welding procedure. (underneath) This plate free from warping, properly tacked and clamped, welded by skip and slipback method.	**A** Shrinkage of deposited weld metal. **B** Excessive local heating at the joint. **C** Improper preparation of joint. **D** Improper clamping of parts.	**A** Select electrode with high welding speed and moderate penetrating properties. **B** Weld rapidly to prevent excessive local heating of the plates adjacent to the weld. **C** Do not have excessive spaces between the parts to be welded. **D** Properly clamp parts adjacent to the joint. Use back up to cool parts rapidly. **E** Use special welding sequence; step back or skip procedure, **F** Peen joint edges slightly before welding. This elongates edges and the weld shrinkage causes them to pull back to the original shape.

Trouble	Cause	Cure
 Figure 3—Lines radiating from the weld are located where the mill scale has cracked off of the plate because the residual stresses produced by the weld shrinkage has exceeded the yield point of the material.	**A** Joints too rigid. **B** Improper welding sequence. **C** Inherent in all welds, especially in heavy parts.	**A** Slight movement of parts during welding will reduce welding stresses. **B** Make weld in as few passes as practical. **C** Peen each deposit of weld metal. **D** Anneal finished product at 1100-1200° F. for one hour per inch of thickness. **E** Develop welding procedure that permits all parts to be free to move as long as possible.
 Figure 4—(left) Weld made with proper current and arc length, note absence of adhering splatter. (right) Weld made with excessive current and arc lengths, note excessive splatter and poor appearance.	**A** Inherent property of some electrodes. **B** Excessive welding current for the type or diameter of electrode used. **C** Excessively long arc. **D** Arc blow.	**A** Select proper type of electrode. **B** Do not use excessive welding current. **C** Hold proper arc length. **D** Reduce arc blow. **E** Paint parts adjacent to weld with white wash. This prevents spalls from welding to parts and makes removal easy.
 Figure 5—(left) Undercut on fillet weld. (right) Good fillet weld, complete penetration, flat face and no undercut.	**A** Excessive welding current. **B** Improper manipulation of electrode. **C** Attempting to weld in a position for which the electrode is not designed.	**A** Use a moderate welding current and do not try to travel too rapidly. **B** Do not use too large an electrode. If the puddle of molten metal becomes too large, undercut may result. **C** Excessive weaving will cause undercut, consequently it should not be used. **D** A uniform weave will aid greatly in preventing undercut in butt welds. **E** If an electrode is held too near the vertical plane when making a horizontal fillet weld, undercut may be obtained on the vertical plate.

Trouble	Cause	Cure
 Figure 6—Cracked weld caused by rigid joint.	**A** Joint too rigid. **B** Welds too small for size of parts joined. **C** Poor welds. **D** Improper preparation of joints. **E** Improper electrode.	**A** Design the structure and develop a welding procedure to eliminate rigid joints. **B** Do not use too small a weld between heavy plates. Increase the size of welds. **C** Do not make welds in string beads. Make weld full size in short section 8″ to 10″ long. **D** Welding sequence should be such as to leave ends free to move as long as possible. **E** Insure that welds are sound and the fusion is good. **F** Preheating parts to be welded sometimes helpful. **G** Prepare joints with a uniform and proper free space. In some cases a free space is essential. In other cases a shrink or press fit may be required.
 Figure 7—Weld with poor surface appearance caused by excessive welding current and improper weave.	**A** Improper current and arc voltage. **B** Overheated work. **C** Poor electrode manipulation. **D** Inherent characteristic of electrode used.	**A** Insure the use of the proper welding technique for the electrode used. **B** Do not use excessive welding currents. **C** Use a uniform weave or rate of travel at all times. **D** Prevent overheating of work.
 Figure 8—(top) Good butt weld complete fusion and penetration. (bottom) Butt weld with poor fusing and slag inclusions on side, improper weaving procedure and low welding current.	**A** Improper diameter of electrode. **B** Improper welding current. **C** Improper preparation of joint. **D** Improper welding speed.	**A** When welding in narrow vees use an electrode small enough to reach the bottom. **B** Use sufficient welding current to deposit the metal and penetrate into the plates. Heavier plates require higher current for a given electrode than light plates. **C** Be sure the weave is wide enough to melt thoroughly the sides of a joint. **D** The deposited metal should tend to sweat onto the plates and not curl away from it.

Trouble	Cause	Cure
 Figure 9—Incomplete penetration on vee-butt joint.	**A** Improper preparation of joint. **B** Use of too large an electrode. **C** Insufficient welding current. **D** Too fast a welding speed.	**A** Be sure to allow the proper free space at the bottom of a weld. **B** Do not expect excessive penetration from an electrode. **C** Use small diameter electrodes in a narrow welding groove. **D** Use sufficient welding current to obtain proper penetration. Do not weld too rapidly.
 Figure 10—(top) Sound butt weld. (bottom) Porous butt weld caused by short arc and insufficient puddling.	**A** Inherent property of some electrodes. **B** Not sufficient puddling time to allow intrapped gas to escape. **C** Poor base metal. **D** Too short an arc length.	**A** Some electrodes inherently produce sounder welds than others. Be sure the proper electrodes are used. **B** Puddling keeps the weld metal molten longer and often insures sounder welds. **C** A weld made of a series of strung beads is apt to contain minute pinholes. Weaving will often eliminate this trouble. **D** Do not use excessive welding currents. **E** In some cases the base metal may be at fault. Check this for segregations and impurities. **F** Do not hold too short an arc.
 Figure 11—Ductile and brittle joints.	**A** Air hardening base metal. **B** Improper preheating. **C** Unsatisfactory electrode.	**A** When welding on medium carbon steel or certain alloy steels the heat affected zone may become hard as a result of rapid cooling. Preheating at 300–500° F. should be resorted to before welding. **B** Multiple layer welds will tend to anneal hard zones. **C** Annealing at 1100-1200° F. after welding will generally soften hard areas formed during welding. **D** The use of austenitic electrodes is sometimes desirable on steels which harden readily. The increase weld ductility compensates for the brittle heat affected area in the base metal.

Trouble	Cause	Cure
 Figure 12—(left) Corrosion of welded joint (HNO_3). Note weld is almost comparable to parent metal. (right) Improper electrode causes poor corrosion resistance of weld (HNO_3).	**A** Type of electrode used. **B** Improper weld deposit for corrosive media. **C** Metallurgical effect of welding. **D** Improper cleaning of weld.	**A** Bare type electrodes produce welds that are less resistant to corrosion than the parent metal. **B** Shielded arc type electrodes produce welds that are more resistant to corrosion than the parent metal. **C** Do not expect more from the weld than you do from the parent metal. On stainless steels use electrodes that are equal or better than the base metal. **D** When welding 18–8 austenitic stainless steel be sure the analysis of the steel and welding procedure is correct so that welding does not cause carbide precipitations. This condition can be corrected by annealing at 1900–2100° F. **E** Certain materials such as aluminum require careful cleaning of all slag to prevent corrosion.
 Figure 13—(top) Poor vertical weld—improper electrodes, welding technique. (bottom) Good vertical weld—proper electrode, current and electrode manufacture.	**A** Improper electrode manipulation. **B** Excessive welding current. **C** Welding in improper position for which electrode is designed. **D** Improper joint design.	**A** Use a uniform weave or rate of travel at all times. **B** Do not use excessive welding currents. **C** Use an electrode designed for the type of weld and the position in which the weld is to be made. **D** Prepare all joints properly.
 Figure 14—Arc blow at end of joint.	**A** Magnetic fields cause the arc to blow away from the point at which it is directed. Magnetic blow is particularly noticeable with d-c at ends of joints and in corners.	**A** Proper location of the ground on the work. Placing the ground in the direction the arc blows from the point of welding is often helpful. **B** Separating the ground in two or more parts is helpful. **C** Weld toward the direction the arc blows. **D** Hold a short arc. **E** Change magnetic path around arc by using steel blocks. **F** Use a-c welding.

Employment and Wage Trends In the Chemical Industry

SOME OF the effects of the war on chemical industry as compared with all industry are revealed in a special report issued last month by the Manufacturing Chemists' Association.

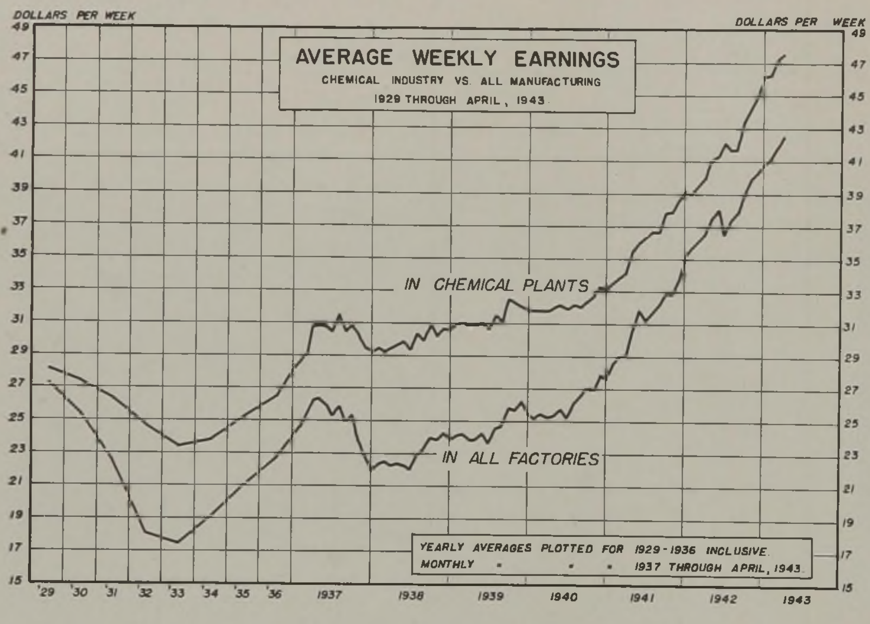
Designed to supplement "Chemical Facts and Figures", published by the Association in December, 1940, the report has been compiled from official government statistics and indicates current trends in wages, hours, employment, production and prices in the industry.

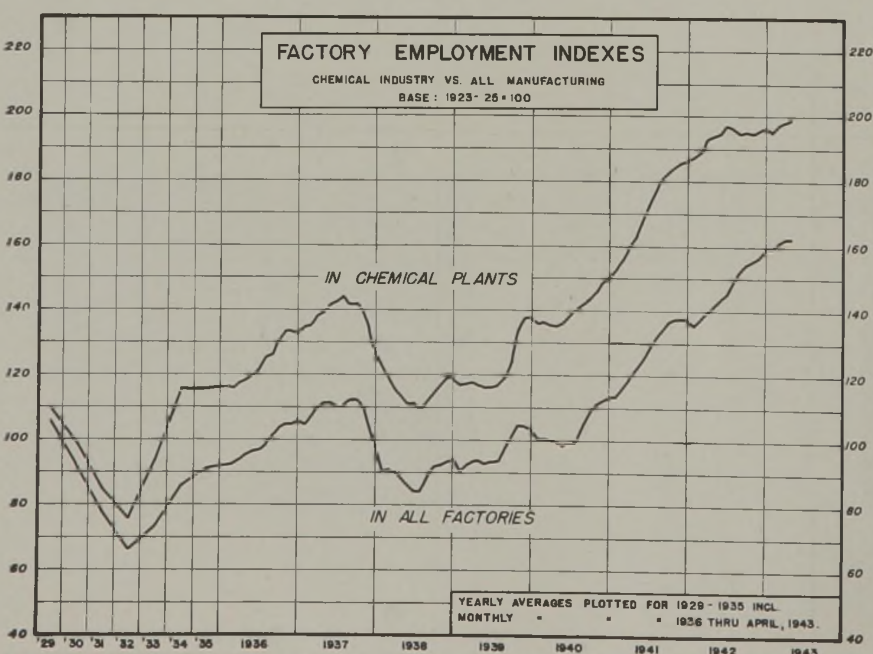
Of the data presented, especially interesting is the fact that although the percentage increase in number of wage earners in the chemical industry since 1939 has been much smaller than the increase in employment in industry as a whole, nevertheless production of chemicals has gone up relatively almost half again as much as production by all industry over the same period. This undoubtedly reflects the more efficient use of personnel made possible by capacity operation of chemical equipment and by new plants involving larger-scale units. It is a unique characteristic of chemical manufacturing operations that they usually require little more attention when built and operated on a large scale than on a small scale, a fact apparently borne out here by statistics.

Process refinements resulting in increased yields or easier operation also very likely contributed to the production achievement.

It would be expected to follow that chemical prices should have been less affected by the war than prices of other industrial goods, and this is indicated by the statistics. Prices of industrial chemicals increased 14 per cent from September 1940 to May 1943 as against 17 per cent for goods of all manufacturing industries.

Although weekly and hourly earnings in the chemical industry have not gone ahead as fast as the average for all industry over the past two years, chemical producers in 1940 were already considerably ahead of the wage parade, and actual wages are still higher than the all-industry average by 11 per cent on an hourly basis and 12 per cent on a weekly basis.





Average Hourly Earnings

	Chemicals	Drugs	All Mfg
1940 Sept.	$0.807	$0.615	$0.671
1941 Jan.	.822	.614	.689
Apr.	.839	.611	.708
July	.886	.636	.744
Oct.	.921	.639	.770
1942 Jan.	.949	.666	.801
Apr.	.974	.720	.819
July	1.004	.717	.850
Oct.	1.019	.742	.893
1943 Jan.	1.040	.743	.919
Apr.	1.051	.767	.944

The following comparisons between 1940 and 1943 are based on data contained in the M.C.A. report:

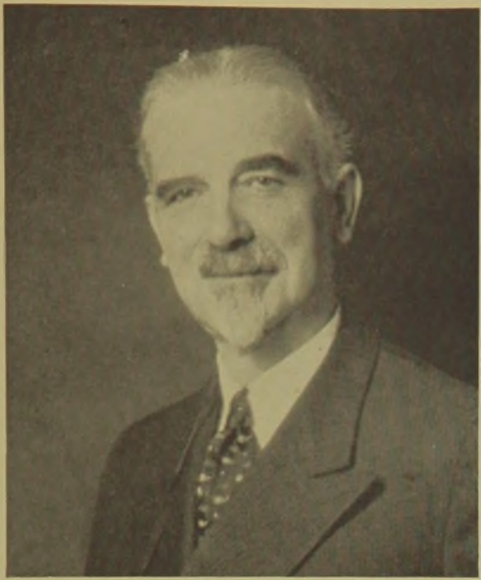
	Chemical Industry			All Ind.
	Jan. '40	May '43	% incr.	% incr.
No. wage earners	77,200	113,500	*47*	*60*
Production index	113	220	*95*	*66*
Payroll index	160	367	*129*	*193*
	Sept. '40	Apr. '43		
Av. weekly earn.	$31.80	$47.52	*49*	*60*
Av. hourly earn.	$ 0.81	$ 1.05	*30*	*40*
Av. hours per wk.	39.8	45.2	*14*	*16*
Wholesale prices	84.8	96.4	*14*	*17*

The two charts on this page are reproduced from the M.C.A. report with the permission of the Association. They are based on official figures of the Bureau of Labor Statistics, U. S. Department of Labor. In December, 1942, the Bureau issued a major revision of its employment payroll indexes, substituting a 1939 base period for the previously established 1923-25 base. In all of the M.C.A. charts these data have been recalculated to the 1923-25 base to permit comparison with pre-1939 years.

"Wage and Hour Standards in the Chemical Industry"

THIS ARTICLE which appeared in the July issue of CHEMICAL INDUSTRIES carried an unfortunate misnomer in the chart headed "What are Earnings in Industry?" The bar labeled "All Chemicals" should have been labeled "Chemicals and Allied Products". As indicated in the article on this page, current hourly earnings in the "chemical" industry are $1.051 instead of $0.94 as shown in July.

Headliners in the News



Wallace P. Cohoe of New York has been elected president of the Society of Chemical Industry, an international organization with headquarters in London. Mr. Cohoe, technical advisor to corporations, principally in the fields of textiles, synthetics, paper and cellulose, succeeds William Cullen, LL.D., chemical consultant of London, who for more than half a century was associated with the Nobel Explosives Company, Ltd., of Glasgow and South Africa.

E. L. Feininger has been appointed manager of the newly formed Resin and Insulation Materials Division of the Appliance & Merchandise Department of the General Electric Company. The new division will be responsible for the manufacture, engineering and sales of insulating varnish, glyptal, varnished cloth and mica products. Mr. Feininger, a native of Troy, has been with General Electric since he was graduated from Rensselaer Polytechnic Institute in 1912.

Thomas S. Nichols has joined the Harriman Mission to London. At the request of Mr. W. Averill Harriman, Chairman of the Mission, the War Production Board has informed the Department of State that it has loaned the services of Mr. Nichols to the Harriman Mission to London for an indefinite period. Mr. Nichols, who is Vice-President of Prior Chemical Corporation, New York, has been connected with the Chemicals Division of WPB for the past two years.

George W. Burpee was recently elected president of General Aniline & Film Corporation at a meeting of the board of directors, succeeding Robert E. McConnell, resigned.

Mr. Burpee has recently been executive vice-president of American Export Airlines and for many years was a member of the engineering firm of Coverdale & Colpitts where he was identified with a number of important industrial undertakings.

Salesmen's Association of the American Chemical Industry Have Golf Outing

The second golf outing of the summer was held at Bonnie Briar Country Club at Larchmont, New York on July 15. After a round of golf on the excellent course, the members and guests of the association enjoyed dinner and the awarding of prizes which were all in the form of war bonds and stamps. F. J. Reid, at the left, of New York Quinine and Chemical Works was chairman of the entertainment committee which arranged the outing.

Some of the golfers attending were: above, left to right; Russell Boland of Drug Topics, Charlie Alexander of L. Sonneborn & Son, Mathew L. Carroll, Fred Berggren of Oldbury Electro-Chemical Co., and J. P. Brinton of Tar Distilling Co.

At the right, top to bottom: H. S. Cottrell of Innis, Speiden; Foster Jones of National Oil Products Co. and M. E. Klein of Gunning & Gunning.

Below, left to right: R. H. McCahn, C. W. Benedict, W. J. Schappa and J. J. Cudahy, all of duPont and F. J. McHugh of New York Quinine and Chemical Works.

Picture News from Here and There In the Chemical Industry

Author Visits Monsanto: Hilary A. St. George Saunders (center), author of "Combined Operations—the official story of the Commandos," the June "Book-of-the-Month" selection, is pictured during his recent visit to the general offices of Monsanto Chemical Company, in St. Louis. He is shown conversing with two of the company's executives, Gaston DuBois (left), vice-president, and H. M. Hodges (right), director of the Foreign department.
Mr. Saunders, who is Assistant Librarian to the House of Commons as well as Official Recorder of Combined Operations, recounted many of the Commando's exciting experiences and dangerous missions.

New Plexiglas Plant: Officials of Rohm & Haas Co. and The Austin Company, engineers and builders of its new Knoxville plant, participated in ceremonies July 16 officially opening the new unit which has been producing plexiglas since March 1. S. C. Kelton, secretary of Rohm & Haas, is shown here in the center of the group which includes (left to right) J. K. Gannett, vice president of The Austin Company, New York; V. C. Henrich, manager of the Knoxville plant; (Mr. Kelton); G. A. Bryant, president of The Austin Company, Cleveland, and J. C. Childs, Austin manager at Philadelphia, who retired August 1 after 27 years with the company.
The plant was built largely from salvaged materials and utilized buildings which had previously served as an automotive body plant and tobacco warehouse.

Above: Workers dumping nitro-cellulose into a washing and purifying vat. Left: Packing cordite in a plant in Manitoba.

Canada's War Chemicals: Hon. C. D. Howe, Minister of Munitions and Supply recently reported to the House of Commons, on the great expansion of Canadian war chemicals. He said:

"Our present production of chemicals and explosives is running at a rate of 10,000 tons a week", he said. "The total quantity turned out to date is in excess of 800,000 tons."

The vast Canadian chemicals and explosives production is supervised by Allied War Supplies Limited. This Crown company has under its control 40 different projects, 34 of which have come into full operation. Of the 18 major projects on the list, three are mammoth ammunition-filling developments, three are making explosives, two are fuse-filling undertakings, and the others are chemicals producers. Total employment in these factories is in excess of 50,000 men and women.

Chemicals Division, War Production Board

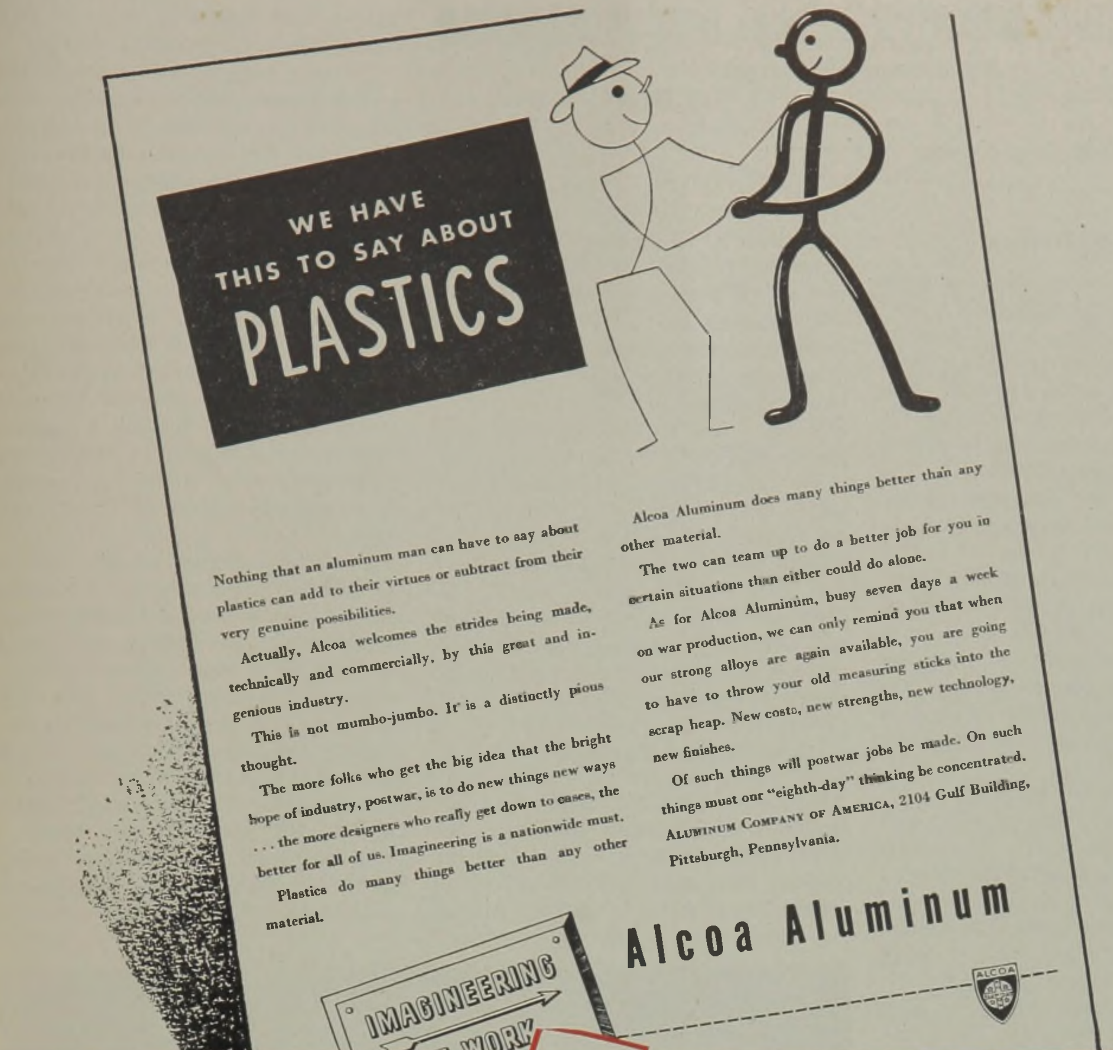
Left to right, first row: M. E. Clark, Chief, Program Section; Edward Casey, Chief, Coal Tar Unit, Aromatics and Intermediates Section; Eugene Gysbers, Sr. Industrial Specialist, Nitro-Ethyl Cellulose Unit, Protective Coatings Section; John Hostetter, Chief, Glass Unit, Inorganics Section; Joseph Houghton, Chief, Chemical Machinery Unit Facilities Section; John Rodda, Acting Chief, Insecticides and Fungicides Unit, Inorganics Section; James Lawson, Chief, Facilities Section; John Boyer, Chief, Alcohol & Solvents Section; Lt. Comdr. Colgate, Navy Representative; Lawrence Brown, Assistant Director; C. E. Wilson; Dr. D. P. Morgan, Director; Donald Nelson; Dr. Walter G. Whitman, Assistant Director; Lt. Col. W. F. Sterling, Army Representative; Fred J. Stock, Chief, Drugs and Cosmetics Section; William B. Foulke, Sr. Industrial Specialist, Chemical Projects Unit, Facilities Section; Vernon Bishop, Sr., Industrial Analyst, Chemicals Projects Unit, Facilities Section; Benton Wilcoxon, Chief, Chemicals Projects Unit, Facilities Section; Justin Lewis, Assistant Economist, Chemicals Projects Unit, Facilities Section; Joseph A. Mathews, Chief, Vitamis Unit, Drugs and Cosmetics Section; Roy S. Koch, Senior Economist, Drugs and Cosmetics Section; Thomas J. Starkie, Acting Chief, Pigments and Color Unit, Protective Coatings Section;

Left to right, second row: James B. Allen Acting Chief, CMP Policy and Procedure Unit, Distribution Section; John A. Cullin, Industrial Analyst, Chemicals Projects Unit, Facilities Section; Turner F. Currens, Chief Botanicals, Essential Oils and Imports, Drugs and Cosmetics Section; Andrew Ross, Industrial Specialist, Facilities Section; George Taylor, Chief, Statistics Unit, Program Section; R. C. Nuttmann, Industrial Specialist, Chemical Machinery Unit, Facilities Section; Rolland H. French, Chief, Grain Distilled Spirits Unit, Alcohol and Solvents Section; Frank E. Bennett, Chief, Industrial Alcohol Unit, Alcohol and Solvents Section; Donald Knapp, Chief, Packaging Unit, Resources Section; Frank Talbot, Deputy Chief, Program Section; Robert Ruark, Chief, Plasticizers and Glycols Unit, Aromatics and Intermediates Section; E. Kenneth Burger, Chief, Supply and Requirements Unit, Program Section; Wells Martin, Assistant Chief, Protective Coatings Section; Anthony Sedenka, Chief, Plant Facilities Unit, Facilities Section; Harry Mitnick, Asst. Industrial Analyst, Chemicals Projects Unit, Facilities Section; Hugh D. Hughes, Director, Commodities Bureau; Sheldon Clement, Sr., Industrial Specialist, Fertilizer Materials Unit, Inorganics Section; J. C. Leppart, Chief, Chlorine-Alkali Unit, Inorganics Section; George Sollenberger, Industrial Specialist, Thermoplastics Resins Unit, Plastics Section; E. Bennett Bradshaw, Chief, Solvents Unit, Alcohol and Solvents Section; Frank Carman, Chief, Plastics Section; Edward Kent, Industrial Analyst, Chemicals Projects Unit, Facilities Section; Richard Connolly, Assoc. Industrial Analyst, Chemicals Projects Unit, Facilities Section; Edgar Pearson, Chief, Cellulose Unit, Aromatics and Intermediates Section; J. N. Hall, Chief, Transportation Unit, Resources Section; Thomas J. Craig, Chief, Protective Coatings Section; B. M. Belcher, Chief, Paint, Varnish and Lacquer Unit, Protective Coatings Section; John Batson, Chief, Medicinal Chemicals and Biologicals Unit, Drugs and Cosmetics Section; William J. McManus, Chief, Plant Requirements Unit, Drugs and Cosmetics Section; Floyd K. Thayer, Consultant, Drugs and Cosmetics Section; Harry J. Schnell, Sr. Industrial Analyst, Compressed Gases Unit, Inorganic Section;

Left to right, third row: Harold Naisawald, Chief, Molasses Unit, Alcohol and Solvents Section; Paul Corbin, Chief, Coated Fabrics Unit, Protective Coatings Section; Lawrence C. Leonard, Chief, Distribution Section; W. G. Hughes, Industrial Analyst, Chemicals Projects Unit, Facilities Section; J. W. Wizeman, Chief, Inorganic Section; R. R. Hull, Consultant, Inorganic Section; John McDonnell, Chief, Research and Statistics Unit, Drugs and Cosmetics Section; R. P. Kenney, Industrial Analyst, Vinyl Resins Unit, Plastics Section;

Left to right, fourth row: Raymonds K. Webster, Consultant, Protective Coatings Section; Coleman Caryl, Chief, Associated Materials Unit, Protective Coatings Section; Charles A. Willard, Deputy Chief, Drugs and Cosmetics Section; Clinton Rector, Chief, Thermosetting Resins Unit, Plastics Section; Louis L. Newman, Chief, Maintenance and Repair Unit, Facilities Section; Lackland Beeding, Industrial Analyst, Chemicals Projects Unit, Facilities Section; Page Blakemore, Chief, Acids and Salts Units, Inorganics Section; E. M. Houts, Principal Industrial Specialist, Office of the Director; David L. Watson, Chief, Foreign Requirements Unit, Program Section; Charles M. Rice, Principal Industrial Specialist, Office of the Deputy Director; Herman Zouderer, Assoc. Industrial Analyst, Chemicals Projects Unit, Facilities Section; G. H. Peters, Nitro-Ethyl Cellulose Unit, Protective Coatings Section; William J. Canary, Chief, CMP Processing Unit, Distribution Section; Donald Vivian, Senior Economist, Statistics Unit, Program Section; Harry Howard, Chief, Aromatic Petroleum Solvents, Protective Coatings Section; Eugene Harwood, Assoc. Industrial Analyst, CMP Policy and Procedure Unit, Distribution Section; Arthur Wilkinson, Industrial Specialist, Chemicals Projects Unit, Facilities Section; L. W. Himmler, Industrial Specialist, Maintenance and Repair Unit, Facilities Section;

Left to right, fifth row: H. H. Custis, Sr. Industrial Specialist, Supply and Requirements Unit, Program Section; Nils Anderson, Chief, Adhesives Unit, Plastics Section.


WE HAVE THIS TO SAY ABOUT
PLASTICS

Nothing that an aluminum man can have to say about plastics can add to their virtues or subtract from their very genuine possibilities.

Actually, Alcoa welcomes the strides being made, technically and commercially, by this great and ingenious industry.

This is not mumbo-jumbo. It is a distinctly pious thought.

The more folks who get the big idea that the bright hope of industry, postwar, is to do new things new ways . . . the more designers who really get down to cases, the better for all of us. Imagineering is a nationwide must.

Plastics do many things better than any other material.

Alcoa Aluminum does many things better than any other material.

The two can team up to do a better job for you in certain situations than either could do alone.

As for Alcoa Aluminum, busy seven days a week on war production, we can only remind you that when our strong alloys are again available, you are going to have to throw your old measuring sticks into the scrap heap. New costs, new strengths, new technology, new finishes.

Of such things will postwar jobs be made. On such things must our "eighth-day" thinking be concentrated. ALUMINUM COMPANY OF AMERICA, 2104 Gulf Building, Pittsburgh, Pennsylvania.

Alcoa Aluminum

IMAGINEERING AT WORK

. . . and we have this to say about METALS

This advertisement by a leading light metals producer talks good, common sense.

OBVIOUSLY, plastics are not going to put metals out of business—as some Sunday feature writers would have you believe. Both groups of materials are cast for leading postwar roles in what we all hope will be a bright new world. Both have their own, unique advantages.

Plastics, for example, are marked by high resistance to chemical and atmospheric attack. They are light. They have excellent electrical insulating values and many desirable thermal properties. They offer a range of integral colors practically as wide as the spectrum, and many forms are transparent, translucent or opaque as the customer specifies. They can be molded into intricate shapes that require little, if any, finishing. They are warm and friendly materials to touch.

On the other hand, no molded plastics have yet been developed that equal metals for surface hardness, heat resistance, rigidity or structural strength per unit of area. Conventional molding methods require expensive molds and high heat and pressure limiting them to production of relatively small objects in relatively large quantities.

In short, there will be many a postwar job where metals will be a clear and obvious first choice.

There will be many other postwar jobs which logically call for plastics.

There will also be many occasions when plastics and metals will work together on the same job.

And there will be other times when a materials engineer will be hard put to make a choice.

Frankly, as one of the nation's largest producers of plastics, Monsanto would rather lose some of those close decisions than win a job which plastics could not handle. In the long run, one such misapplication can lose more business for plastics than losing a dozen close decisions. MONSANTO CHEMICAL COMPANY, Plastics Division, Springfield, Massachusetts.

☆ ☆ ☆

MONSANTO PLASTICS
SERVING INDUSTRY...WHICH SERVES MANKIND

THE FAMILY OF SIX MONSANTO PLASTICS

(Trade names designate Monsanto's exclusive formulations of these basic plastic materials)

LUSTRON (polystyrene) · SAFLEX (vinyl acetal) · NITRON (cellulose nitrate) · OPALON (cast phenolic resin) · FIBESTOS (cellulose acetate) RESINOX (phenolic compounds)

Sheets · Rods · Molding Compounds Tubes · Castings · Vuepak Rigid Transparent Packaging Materials

NEW PRODUCTS AND PROCESSES

By James M. Crowe

Bonding Process

A new bonding process which the manufacturer says unites metals with a bond stronger than riveting or spot welding, and that joins rubber, synthetic rubber, plastics, leather or wood, to metal, or to each other with a bond stronger than the materials themselves, has been announced by the U. S. Stoneware Company.

Already in use for vital war applications the new method, known as the Reanite Bonding Process, is expected to find literally thousands of peace-time uses. Engineers have long sought a method of uniting dissimilar materials in order to utilize to the full the physical properties of each—for example, to combine the lightness and insulating value of plywood with the permanence, strength and beauty of stainless steel.

Repeated laboratory and field tests indicate that it would require a direct pull in excess of 30,000 pounds to separate two six-inch square pieces of steel bonded with Reanite. On standard tensile testing machines it was found that Reanite develops a bond—metal to metal—ranging from 1000#s per square inch to as high as 3000#s per square inch. The bond developed between rubber and metal runs anywhere from 900#s to as high as 1500#s per square inch, compared with an average of 250-400#s for bonds obtained by other conventional methods. On repeated tests of bonds formed between natural rubber, synthetic rubber, plastics, leather and wood, the materials themselves gave way before the bond.

Application of the Reanite Process is simple. The surfaces to be joined are brushed, sprayed or dipped with Reanite. After drying, mild heat and pressure is applied.

The Reanite joint is unaffected by fresh or salt water, is non-corrosive to metals, possesses excellent corrosion-resistance in itself, and high dielectric strength.

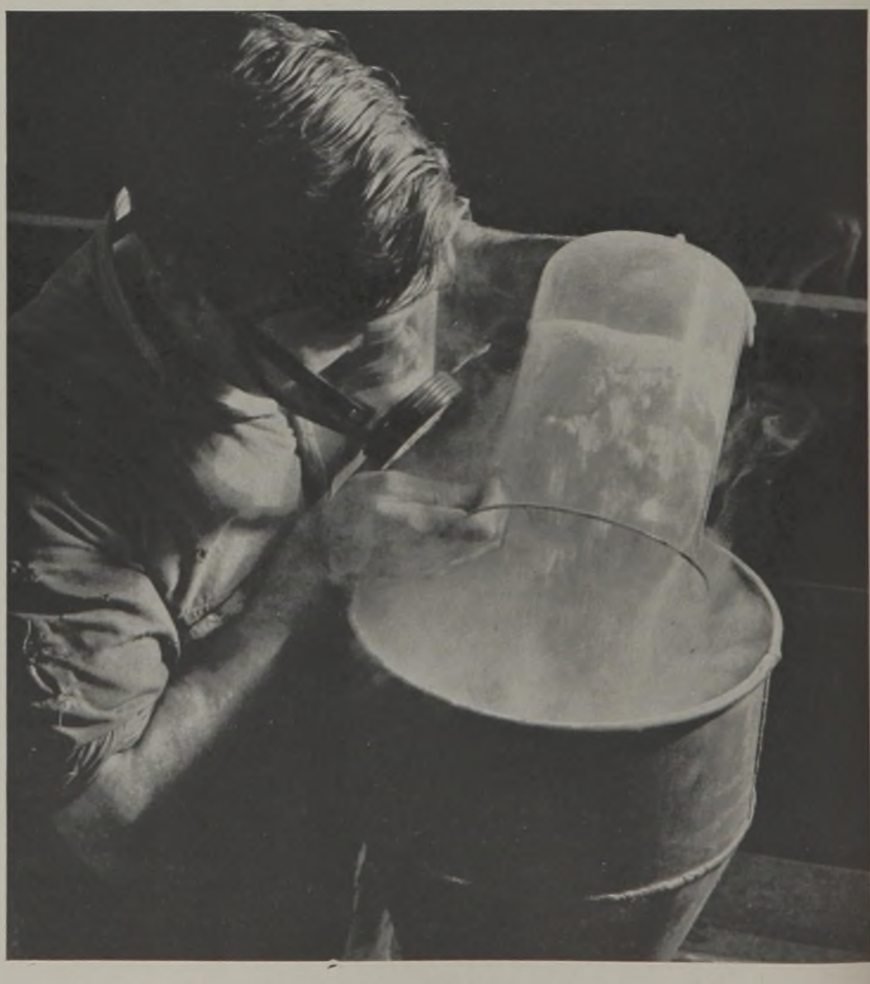
Present uses include fabrication of airplane sub-assemblies, motor mounts, sound and vibration dampener units, instrument mounts, bonding rubber or plastic insulation to wire or cable, and others.

Dust Layer

News comes from the Research and Development Laboratory of The Curran Corporation, that a new compound has been developed for laying airport dust. The newly developed composition is described as a stable homogeneous liquid of relatively low viscosity which may be diluted or extended with water in all proportions. The concentrate and its emulsions are said to be effective in wetting and penetrating over all types of soil, including moist earth. According to the company, the new compound may be actually applied to a soft, muddy surface immediately following a rain. Because of a new type of emulsifier used, the oil will wet only the top two inches of the soil since it becomes water insoluble on further penetration. Because of this valuable property, the composition is not dissolved and leached away into the soil by a following heavy rain. The compound is also stated to be safe and easy to handle; is non-corrosive to metal and spray equipment, and contains an effective weed killer.

Fluid Catalyst

In one of the first photographs made available on the subject the much discussed catalyst used in the fluid catalytic cracking process to produce high octane aviation fuel is shown below being poured into a small replica of the giant "Cat Crackers'" of the Standard Oil Co.



The fluid catalytic process represents a new chemical engineering technique which it is predicted will have many industrial applications not only in catalytic operations but also in non-catalytic processes.

In this process the catalyst, in the form of a fine powder, is carried along with the vapors undergoing cracking. After the reaction is complete, the catalyst is separated from the vapors in cyclone separators. The coke which forms as a result of the cracking is deposited on the catalyst powder. It is subsequently eliminated by passing the catalyst through a regenerating furnace in which the catalyst, in a similar manner, is carried by a stream of air which also burns off the deposited coke.

The important operating advantage of the fluid catalytic process is its complete freedom from mechanical means for moving the catalyst or changing the flow of the cracking or regenerating streams.

The finely divided catalyst is not, in reality, a "fluid". It is a powder maintained in a fluid, turbulent state, by passing through it at all times a certain minimum percentage of some vapor which may be either air, inert gas, steam, or petroleum vapor. The consistency of the catalyst thus handled might be compared to the sand just at the water's edge at the seashore which flows readily when supported in part by the water.

It is a remarkable fact that a properly pulverized solid properly mixed with even a small amount of such vapors attains an extraordinary degree of fluidity and can be handled exactly as if it were in fact a fluid. Thus in the fluid catalyst cracking plants the catalyst is circulated in a manner analogous to an airlift used to pump water out of a well, and the means used for this circulation is the petroleum vapor being cracked or the air used for regeneration or removal of coke from the catalyst.

In the Bayway fluid catalyst cracking plant, for example, this finely powdered catalyst is circulated through portions of the unit at the rates of hundreds of tons an hour. And this is accomplished without the use of any mechanical means other than the pumps which initially deliver the oil to the vaporizing furnaces and a blower which delivers air to the catalyst regenerator.

Of particular significance is the fact that the fluid catalytic cracking process enables the use of types of catalysts and operating temperatures which would not be possible with other catalytic cracking processes. This permits greater control over the products produced in the cracking operation. These units can, therefore, be converted to work much more effectively in the production of materials from a given amount of type of crude available.

Plastics Conserve Phenol

The Bakelite Corporation has announced the development of several new phenolic molding plastics which help to conserve the supply of phenol. These materials may be used for many purposes where it is not necessary to meet highly exacting specifications.

According to the company BM-15983 Black, BM-16044 Brown, and BM-16325 Black were developed for uses that formerly required general-purpose phenolics. BM-16749 Black, BM-16750 Brown, BM16785 Black, and BM-16786 Brown are suitable for bottle caps and closures. BM16499 is suitable for jobs that normally require a high impact-resistant material such as BM-3510.

Anti-Freeze Inhibitor

According to a recent announcement from the Chemical Specialties Department of the Du Pont Co., a new chemical inhibitor for reconditioning last winter's anti-freeze solution is now available. The new compound, developed by Du Pont last year for the U. S. Army, is being released for civilian use in cooperation with a WPB request that motorists conserve their old anti-freeze solutions.

The product does not contribute to the anti-freeze properties of a solution, but simply neutralizes any acid formation and restores the lost rust inhibitor. When treating the anti-freeze, it is advisable also to filter it in order to remove dirt and rust particles.

Ethylene-glycol "permanent" anti-freezes need reconditioning more than the alcohol types, according to the company, but the new inhibitor can be safely used in any standard anti-freeze solution. In fact it may also be used as an anti-rust with plain water during the summer months.

Mg from Asbestos Tailings

A process has been patented in Canada for the production of magnesium chloride, and thereby magnesium metal, from asbestos tailings. Some 20,000 tons of tailings are dumped daily by the mines of the Thetford district, and a 200,000,000 ton stockpile has been built up from asbestos operations of the past sixty years.

The Bureau of Mines has reported that preliminary small scale experiments and pilot plant investigations have confirmed the feasibility of the process. The Bureau found the process to be comparatively simple and easily controlled, adding that capital expenditure on the plant could be kept to a minimum by the use of standard equipment of conventional design.

It is claimed that magnesium can be produced by this process for less than fifteen cents a pound. The tailings, essentially antigorrite, average 25 per cent theoretically available magnesium, although commerical yields are expected to run between fifteen and twenty per cent of ore treated.

The tailings are received from the mines crushed to about fifteen mesh, passed through a magnetic separator, leached with dilute hydrochloric acid to form a twenty per cent magnesium chloride solution, impurities are precipitated out, and evaporation yields pure magnesium chloride for electrolysis.

If current plans materialize a plant will be erected in Quebec. Sulfuric and hydrochloric acid will be manufactured from nearby pyrites and Nova Scotian salt and coal. Low cost power will be available in this area and water transportation utilized for raw material and magnesium shipment.

Byproducts of the industry would be salt cake, chlorine, chrome-nickel, iron oxide, and fine silica.

2-Vinylpyridine

A new raw material which offers interesting possibilities in the development of synthetic elastomers has been made available by Reilly Tar & Chemical Corporation. The new chemical, developed in the Reilly Laboratories, research division of the Reilly organization, is 2-Vinylpyridine, which is the pyridine analog of styrene.

According to Reilly chemists, 2-Vinylpyridine copolymerizes similarly with butadiene and styrene and with butadiene and styrene together, to form a synthetic elastomer which is said by rubber experts to have very interesting properties. The material boils at 159° C. (760 mm.) and can be distilled at about 98° C. at 100 mm. It is soluble to the extent of about 2.5% in water and is readily emulsified with water, about 15% of the water dissolving in it.

Reilly officials announce that the company is now in production on 2-Vinylpyridine, and that the Reilly technical staff will be pleased to consult and cooperate with producers interested in investigating the possibilities of the new material as a modifier in the copolymerization of styrene and butadiene, also in the manufacture of elastomers for specialized uses.

Sealing Cap Compound

A cellulose sealing cap similar to that used for sealing medicine bottles has been instrumental in saving many man-hours of labor in one of General Electric's plants producing small instrument-type motors. It is used to mask off cylindrical surface areas of small assemblies during impregnation with insulating varnish.

The sealing material comes in the form of a thin-walled tube or cap, either of which may be slipped over the work. In air-hardening, the material shrinks evenly to the point where it closes down over the surface to be masked, preventing the impregnating fluids from contacting the masked surface area. The area so masked requires little or no subsequent cleaning.

Hydroxyacetic Acid Available

The ammonia department of E. I. du Pont de Nemours & Co. is now manufacturing and selling hydroxyacetic acid as a seventy percent aqueous solution. This should be of interest to both tanners and dyers as the product offers the possibility of a replacement for lactic, formic and acetic acids in the leather-tanning and dyeing fields. The new acid which is non-volatile, is slightly stronger than acetic acid on a 100 percent basis.

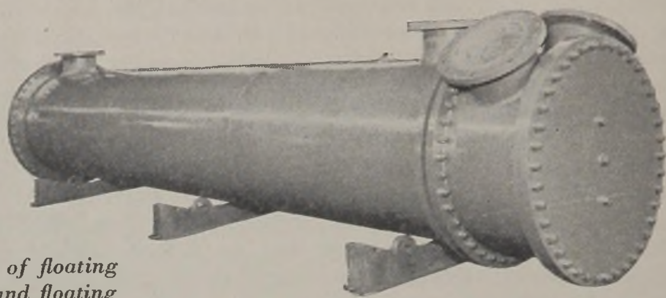
New Wetting Agent

Greater speed in application and adhesion of surfaces using water soluble adhesives is claimed by Glyco Products Co. through the use of small amounts of a special wetting agent marketed under the name of Sulfatate.

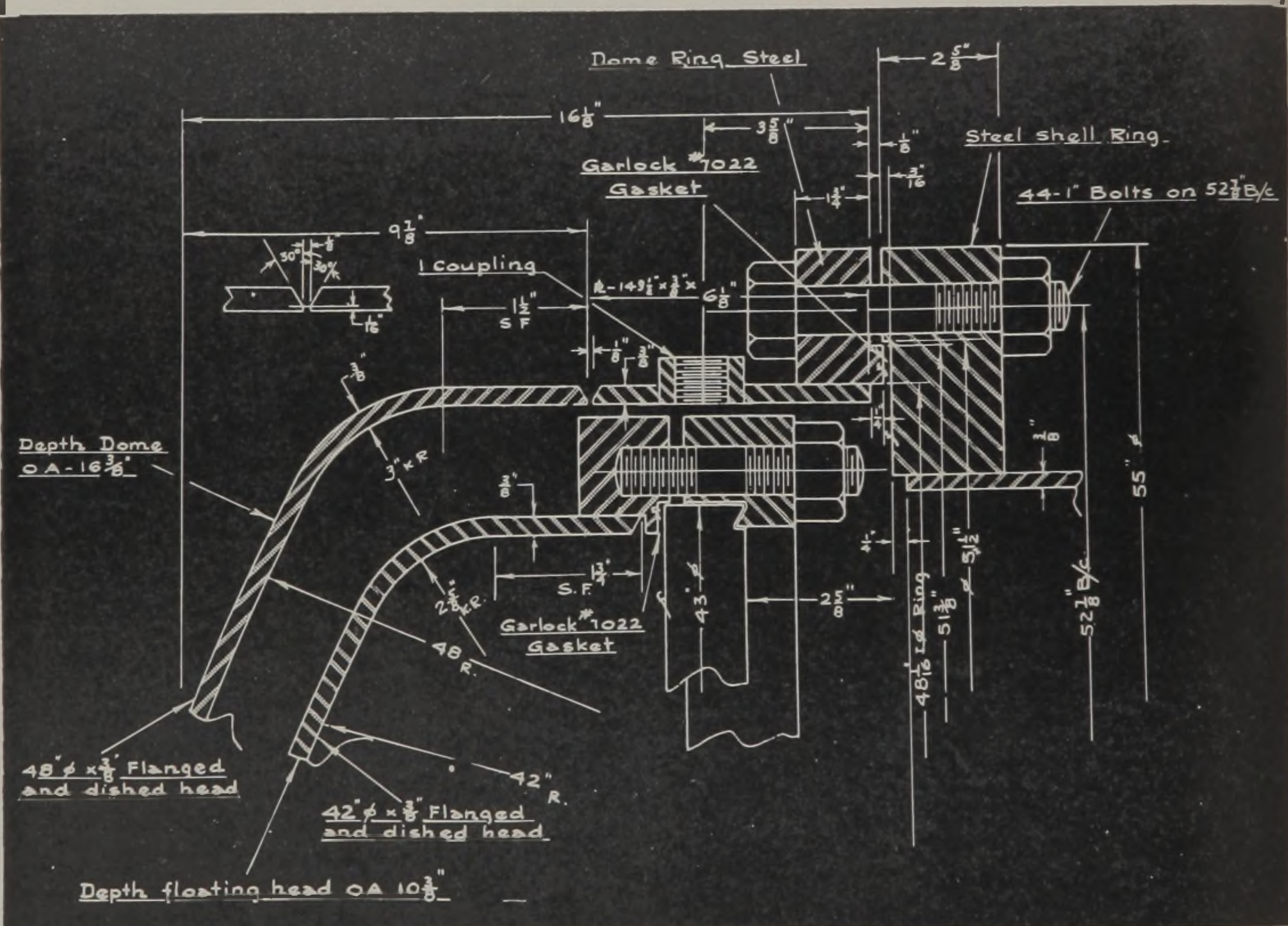
Its usefulness is said to be especially marked when a few drops of Sulfatate are added to the water used in moistening paper sealing tapes as the wetting agent causes rapid penetration of the solution with almost instantaneous "setting" or adhesion. The product can also be incorporated in finished glues, pastes, mucilage and silicate adhesives.

PATTERSON-KELLEY *Floating Head Straight Tube Exchanger*

This method of floating head construction permits the withdrawal of the complete tube section, for inspection and repair. Shell, cover plates and channels are steel. Tube heads are brass, with admiralty metal tubes and brass baffles.



A.S.M.E. APPROVED DRAWING — *showing detail of floating head assembly outlining steel shell ring, dome and floating tube head with split backing ring.*



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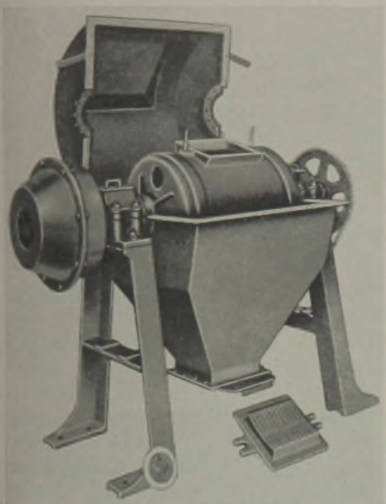
MANUFACTURERS FOR THE CHEMICAL AND PROCESS INDUSTRIES

NEW EQUIPMENT

Combination Grinding Mill QC277

Abbe Engineering Co. has developed a new grinding mill which incorporates in one machine several functional variations, making it useful for multiple processing requirements of laboratories or for special plant operations.

This machine, similar to the usual ball or rod mill, consists of a steel cylinder rotating in bearings. The main trunnions or shafts are hollow to permit the introduction and removal of the material to be ground or processed. The material is fed into the mill by means of a drum type spiral feeder attached to one of the hollow trunnions. The hollow trunnion at the opposite end is provided with a grating to prevent the discharge of the grinding media. Provision is made for quickly closing both trunnion openings when the mill is to be used for batch grinding.



A manhole opening is located in the shell of the mill. This is provided with a solid cover, a slotted cover for dry discharge and a wet discharge cover.

The mill can be used in any of the following ways:—

FOR BATCH GRINDING
(Both Wet and Dry Grinding).

1. As a pebble mill, using flint pebbles or porcelain balls as the grinding media.
2. As a ball mill, using steel balls or balls of other materials such as Bronze, Stainless Steel, Wood, Rubber or Rubber covered metal, etc.
3. As a rod mill, using rods made of steel or any other suitable metal.
4. As a chemical processing mill, which may be heated or cooled by means of a jacket and which can also be provided with stuffing joints on each hollow trunnion, so that the contents of the mill can be subjected to vacuum,—pressure—the admission or withdrawal of gases or liquids—all during the grinding or mixing process. Thus, for instance materials may be processed wet and then dried and pulverized, all in the one unit, thus saving handling time, avoiding loss of material and doing the job with much less floor space.

FOR CONTINUOUS GRINDING

1. Can be used either as a pebble, ball or rod mill.
2. The drum type feeder can be used for feeding either dry materials or wet slurries.
3. Gases or liquids can be introduced or withdrawn while mill is in operation.
4. Mill can be jacketed for heating or cooling.
5. To produce a granular product with little "fines"; the discharge takes place through the grated or slotted cover, in which case a dust-tight discharge housing is provided.

Air-Steam Rotary Pump QC278

A new rotary pumping unit of 50 GPM capacity, powered by an air-steam engine, is being produced by Blackmer Pump Co.

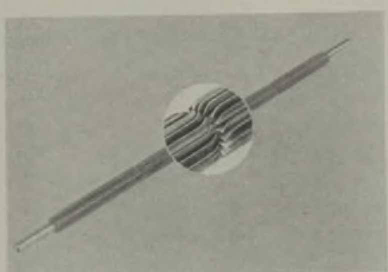
The new unit was developed for handing gasoline and oils under conditions where electric power is not available, such as unloading wrecked tank cars or other carriers. The engine operates with either steam or compressed air and is connected to the pump through single reduction gears. Pump, gearing, engine and controls are mounted on a common bedplate.

The pump is iron fitted and has a capacity of 50 GPM at 76 psi pressure and a speed of 460 RPM. The engine is 3 HP at 700 RPM.

Improved Heat Exchanger QC279

The Brown Fintube Co. has added "cut and twisted" fintubes to its line of heat transfer products.

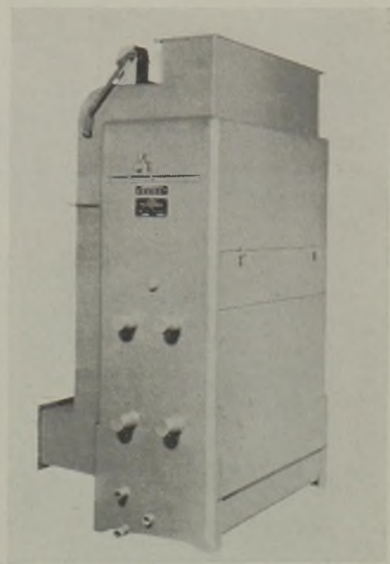
This development, according to a company spokesman, consists of taking standard types of Brown "longitudinal" fintubes, cutting the fins transversely at desired intervals, and twisting the ends, see the illustration below.



This cut and twist is said to produce much greater turbulency of the shell side commodity than when straight untwisted fins are used,—and produces increased thermal efficiencies ranging up to 50% in Sectional Hairpin and other types of heat exchangers in which the shell side commodity is held closely against the fintube, resulting in still further savings in weight, pressure drop, shipping, etc.

Heat Controller QC280

A new development for adding heat to industrial liquids for the purpose of maintaining constant temperatures as desired, with automatic control, is announced for the Niagara Aero Heat Exchanger. This has not been previously done with the evaporative type liquid cooling unit using a water spray and fans to draw air over coils containing liquid whose temperature is to be controlled. This is accomplished by using either a steam coil or injector or an electric heating unit to heat the spray water.



The result is control of liquid temperatures within prescribed limits, alternately cooling or heating as required. The heating device is put into operation by thermostatic control at the desired point, preventing the liquid from becoming too cold for the process in which it is used, or from becoming viscous with retarded flow and loss of capacity, or from congealing or freezing. This also makes it possible for the Heat Exchanger to be successfully installed out of doors, or to use fresh, out-of-door air to increase its evaporative cooling capacity and avoid damage from handling air containing corrosive substances.

Synchronous Motors QC281

A new line of vertical high-speed, hollow-shaft synchronous motors has been announced by the Motor Division of the General Electric Company. Furnished in ratings from 100 to 1000 hp, and in speeds from 514 to 1800 rpm, these motors are used for pumping applications where a large volume of fluid is handled, such as in ordnance and synthetic rubber plants, and on municipal and government water projects.

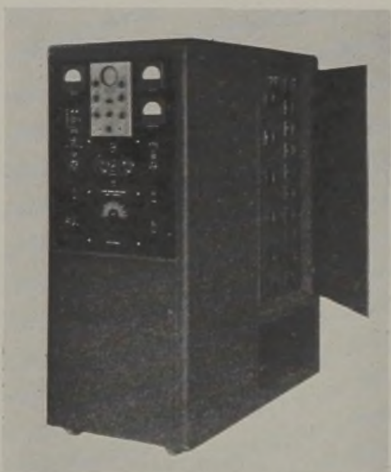
For protection, these motors have a dripproof enclosure. They are streamlined throughout to provide a pleasing appearance, and their smoothly contoured lines will not easily collect dirt and dust. The top cover of the motor is easily removed to permit adjustment of the pump shaft. In addition, easy access to the brushes and the collector rings is obtained by simply unlatching a flush-mounted steel plate.

The frames of these motors are of cast-iron construction, which provides strength to withstand the high-thrust loads often encountered in pump applications.

The motors can be furnished with non-reverse ratchets to prevent reversal of pump rotation at shutdown or on starting. They are also available in solid-shaft construction.

Electrical Multisource Unit QC282

The Harry W. Dietert Company have announced a new electrical source unit for spectrographic analysis.

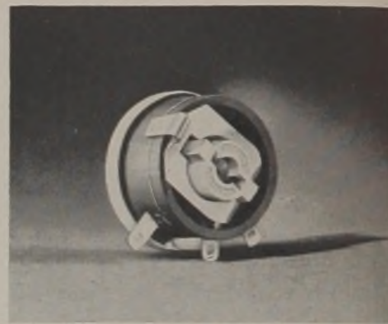


With this "Multisource Unit" the three factors of an electrical circuit, resistance, inductance, and capacitance may be set and precisely controlled to selected values over wide ranges. By virtue of the wide variation in excitation conditions obtainable, either very arc-like or spark-like spectra, with all variations in between, may be had. Moreover, the fine adjustment and control of the discharge afforded by the adjustable resistance, inductance, and capacitance means that the Multisource excitation combines the sensitivity of the arc with the accuracy of the spark.

The unit can be described briefly as follows: It consists of a main control panel mounted at the front, and a selector panel mounted at the side. The selector panel is equipped with pull knobs which allow selection of the conditions of discharge. Seven knobs at the front of the condensor section allow the selection of capacitance values from one to sixty microfarads in steps of one microfarad. Ten knobs allow the selection of resistance values from one to four hundred ohms in steps of one ohm, while five knobs on the inductance section allow values from twenty-five microhenries to four hundred microhenries to be utilized. This switching is all done behind the panels by means of heavy well-insulated knife switches which assures certainty of contact and freedom from trouble. The main panel is supplied with an oscillograph so that the current, duration, and waveform of an average, individual discharge can be studied. This proves indispensable, both as a means of predicting the properties of a particular discharge, and for adjusting the phase of the charging cycle with respect to that of the discharge. Besides this indicator, an ammeter is furnished to check the power of consumption of the unit and a voltmeter to check the consistence of the voltage across the condensors before discharge. Another voltmeter indicates the difference between the input voltage and regulated voltage so that the instrument can be adjusted to take into account the extremes of line voltage variations, thus preventing any decrease in accuracy on this account. A phase control knob, coupled directly to the synchronous gap, provides the necessary adjustment of the ignition point of the discharge. An adjustable zero to two-minute synchronous timer allows the total time of operation to be precisely controlled. All necessary switches for starting and adjusting the unit are also provided on his panel.

Slide Wire Rheostat QC283

Designed especially for low resistance low wattage applications, a rheostat-potentiometer produced by Ohmite Manufacturing Co. has found several applications in the instrument field. A length of resistance wire is stretched tightly around the outside of a cylindrical core which is bonded to a ceramic base. The wire is firmly anchored to two terminals. Contact to the wire is made by a phosphor-bronze spring arm which is connected to a third terminal. The provision of three terminals allows the unit to be used as a potentiometer or voltage divider. The



maximum resistance which can be supplied on this unit is approximately 1 ohm while the minimum total resistance can be made approximately 0.1 ohm. Since the contact arm travels along the wire from end to end, the resistance variation is stepless. Shafts for knob control or for screw driver control can be supplied.

Automatic Controls QC284

A "robot" control which opens and closes dozens of valves with split-second timing now controls processing in many of the nation's plants producing aviation gasoline, butadiene for synthetic rubber, and toluene for explosives, according to B. M. Mills, of the petroleum and chemical section of General Electric's industrial engineering department.

In such plants steam, air, and hot gases flow intermittently through a complex system of piping and tanks. These gases must follow each other at predetermined intervals, and any error in timing or route of flow would slow up production not only through loss of materials but possible damage to equipment.

"The processing might be compared to the job of scheduling, dispatching, and regulating trains on a congested railroad system," Mr. Mills said. "One small error can tie up railroad traffic for hours, possibly resulting in collisions which

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What care I how fair she be?"

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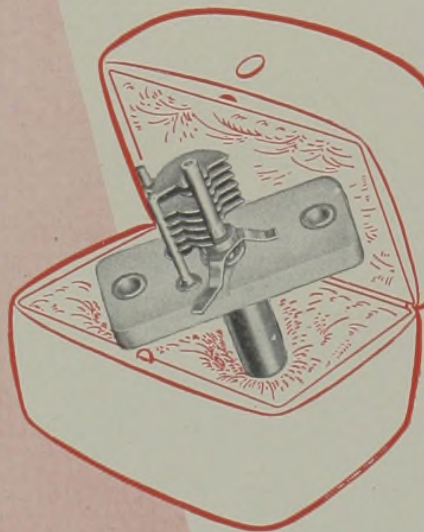

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ELECTROMECHANICAL DEVICES

Army-Navy "E" awarded to Auto-Ordnance Corporation for excellence in production of "Tommy" Guns.

GENERAL *Electronic* INDUSTRIES
Division of Auto-Ordnance Corporation

GREENWICH • STAMFORD • BRIDGEPORT • NEW YORK would damage both trains and goods in transit."

"Robot" control performs the same functions in gasoline, butadiene, and toluene plants as dispatchers and switchmen do in a railroad system. In many of these plants, even if required numbers of skilled operators were available, it would be humanely impossible for them to open and close the numerous valves with the precise timing provided by the "robot" control, consisting of automatic cycle-timers and valve control.

The operator's section of the "robot" consists of a long control panel somewhat resembling the main switchboard in a telephone exchange. Covered with banks of switches, dials, lights, and other indicators, it is the focal point for valve control. When a valve is opened or closed, a light on the board goes on. If any valve should fail to open or close, the board would automatically suspend further operations and sound the alarm for an operator. A glance at the board would give the operator the trouble location and he could arrange for quick repairs.

Before the war this equipment was developed principally to produce high octane gasoline for planes and cars. Because the same methods may be used in producing butadiene and toluene, the robot is now widely used in these two types of plants as well. Plans for extension to other types of plants requiring precise timing or valve control are also under way.

New High Lift Truck QC285

The Baker Industrial Truck Division of The Baker-Rauling Company, has announced a new 4000 lb. capacity Hy-Lift truck known as the Type H-2 which is a companion truck to the Type E-2 announced recently and can be used interchangeably in the same material handling system with it. This new Hy-Lift truck combines the "self-loading" feature with tiering and is useful for both transporting and tiering skidded material.

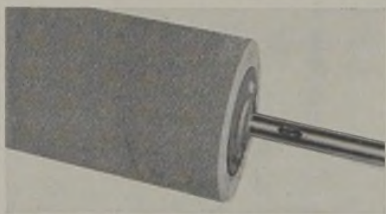
The truck is built on a 66" wheelbase; the overall length, including the operator's guard, is 123-¾" and the truck is designed for operation in intersecting aisles 67" wide. Its overall height of 83" permits ready entrance into box cars for loading and provides a maximum lift of 67". The platform is 26-½" wide x 54" long x 11" high in the low position.

The battery box has been increased in size from 27" x 36-⅝" to 32" x 39-½", providing space for enough additional battery capacity so that the truck may be operated continuously on the longer shifts necessitated by the war emergency. Thus, under most conditions, there is no need to stop during a working shift to change batteries.

An improved and efficient hydraulic lift system provides positive control of hoisting and lowering. The control lever, convenient to the operator's right hand, starts the pump motor and closes the valve forcing oil into the jack cylinder. Lowering is by gravity controlled by the same lever. A limit switch shuts off the pump motor at the upper limit of platform travel with auxiliary safety through a relief valve. The platform travels vertically on ball bearing rollers running in upright channel guides. The power is supplied by a single hydraulic jack and travel is compounded by sprockets and roller chains.

Friction Surface for Rolls QC286

Certain stages in the manufacture of textile fabrics and other products call for a wood roll with more surface friction than the wood itself can provide. One example is the measuring roll used in textile mills where it is important that the open width fabric will hug the roll with no slippage.

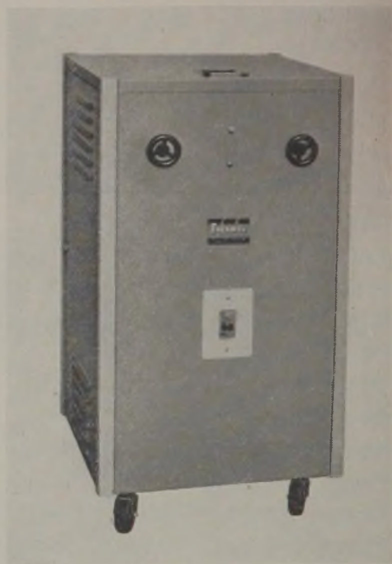


The roll illustrated is one of several special rolls designed and built by the Rodney Hunt Machine Company to give this high surface friction quality. In this case the wood roll has been covered with a spirally wound sponge rubber webbing.

The critical shortage of rubber makes only a limited amount of this particular type of covering available, but similar results have been obtained by covering the roll surface with various types of webbing, synthetic leather-like materials, emery cloth, etc.

Heating Non-Metallic Substances QC287

Almost any non-metallic material can be heated quickly and uniformly throughout with the new Thermex high frequency heating equipment, according to a recent announcement of The Girdler Corp. Heating is accomplished within the article or molecule itself by reason of its molecular resistance to the high voltage, high frequency current passed through it from flat electrode plates covering opposite sides or top and bottom of the mass to be heated. All coils, tubes, controls, etc., are housed with a compact safety cabinet, certain models of which are portable and mounted on casters. An average-good workman can be trained to operate the largest units, simplest units have single-knob control. Equipment is extremely efficient in its transformation of electric current energy into heat energy, improves quality of product, increases production, simplifies auxiliary equipment and saves floor space.



The application of this type of heating is quite well established in the wood-working or wood-fabricating field, where it is used in the processing of plywoods and laminated woods. Other successful applications are said to be in the following fields: cellulose, paper, textiles, powders, felts, woolens, cottons, ceramics, clays, oxides, tobaccos, plastics, rubber, cork, glue, etc.

Light Weight Blower QC288

The L-R Manufacturing Co. is now manufacturing a new lightweight blower as shown in the photograph below. The following performance data and features have been listed for the new product.

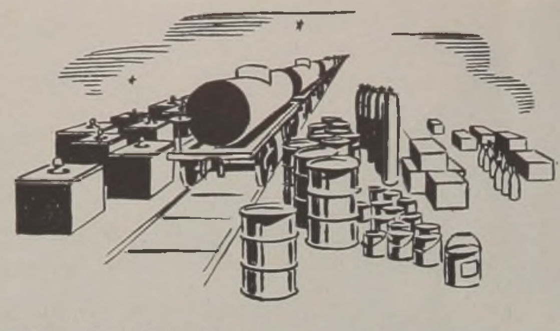
Output—15 C.F.M. at 3,000 R.P.M.

Housing—One piece, molded high impact plastic.

Wheel—Turbo type, 1½-inch in diameter, steel, cadmium plated.

Weight—Wheel and housing, 2 ounces.

Mounting—Black plate facilitates mounting on any type motor.



PACKAGING & CONTAINER FORUM

Drum Restrictions for Certain Chemicals Removed

Restrictions which prohibited the use of new or used steel drums for packing 16 chemical products were removed July 23 by the War Production Board. The action was taken under the terms of Limitation Order L-197, as amended. It was necessary because satisfactory substitutes were either not available or not available in sufficient quantity.

The 16 chemicals on which restrictions were removed for packing in new or used steel drums are as follows: Arsenic Acid Solid Trioxide, Arsenical Mixtures, Bottle Washing Compounds, Calcium Arsenate, Cements (dry Portland), Chloride of Lime, Dry Cleaning Compound, Organic Colors, dyestuffs (dry), Lime Sulfur (dry), Metal Degreasing Alkalines, Moulding Powder, Sodium Arsenate, Sodium Hydrosulfite, Zinc Hydrosulfite. The amended order also provides the following changes:

1. Use of new or used steel drums for packing corn syrup, molasses or fruit juices is prohibited for the first time. Substitute packages are available for packing these products.

2. Products which formerly were listed in the order separately under lists A and B, are consolidated into one list, Schedule A. Heretofore, products listed on List B could be packed only in new drums which were in a packer's inventory on or before September 14, 1942, and in used drums which were in his inventory on or before November 7, 1942. This meant that new or used drums purchased after these respective dates could not be used to pack products on List B. Under this recent amendment most of the products formerly on List B can be packed in used drums without regard to date on which they were purchased.

Sales of rejected new steel drums and seconds were placed under control of the War Production Board by an amendment to General Preference Order M-255, the Containers Division of the War Production Board has announced.

The order provides that after July 17, no manufacturer of steel drums shall sell or deliver to anyone except the Army, Navy, Maritime Commission or War Shipping Administration, any rejects or seconds in excess of three-quarters of one per cent of his monthly production without express authorization of the War Production Board. Rejected drums totaling less than the restricting percentage, may, however, be sold without authorization but only for an amount less than the unit price of the order or contract under which they were manufactured and not in excess of any applicable maximum price regulation. Where a sale of rejects or seconds in excess of the restricting percentage is made to a user, it is necessary for the user to file Form PD-835; where the sale is made to a reconditioner, the manufacturer simply applies to the War Production Board Containers Division by letter for the authorization to sell.

Fibre Drum Reports

The Containers Division of the War Production Board recently announced changes in the reporting requirements and delivery authorization periods under the fibre drum allocation program.

Under the amendment, fibre drum manufacturers report bi-monthly, instead of monthly, on their prospective production and deliveries of fibre drums. Allocation authorizations issued by WPB on the basis of those reports will cover a two-month period, rather than a one-month period as heretofore.

In addition, the restrictions of the order were extended to apply to companies which produce fibre drums for their own use. No such company may use fibre drums manufactured by it except as authorized by WPB.

Burlap Embargo Lifted

The War Production Board has lifted the embargo covering the export of filled burlap bags from the United States and the embargo on filled or empty, new or used burlap bags to Canada. The action was taken through an amendment to Conservation Order M-221. Exportation of empty, new or used burlap bags to any other point outside the Continental United States, however, is still prohibited unless the exporter obtains express authorization from WPB.

The amendment also deleted two provisions which are now obsolete. One related to bags made from stockpile burlap, as burlap will not be stockpiled any longer. The other provision deleted was that covering monthly reports, which are not required after June 15, 1943.

Container Crisis

The Containers Division of War Production Board is showing renewed concern over the shortage of suitable containers of all materials.

The present supply of steel drums, it is pointed out, is rapidly nearing exhaustion. The present steel drum inventory will be gone in six months, at current estimates. Since all available new steel will be needed for products for which wood cannot be used in manufacture, a forced shift from steel containers to tight wooden cooperage is foreseen as inevitable for many products, including oils and chemicals. This led to the recent action by Office of Price Administration putting a ceiling on suitable grades of tight cooperage, but one designed to promote manufacture, since this production has been moribund. Many users of steel drums were reluctant to change, it was found, and the expected trend to wooden containers has lagged.

Transportation Order Changed

The War Production Board announced recently that it had certified to the Office of Defense Transportation, as essential to the war effort, all commodities formerly appearing on list 3 of general transportation order T-1, as well as several additional materials. The certification requires that no other materials be delivered in tankcars except as authorized by ODT.

The title of the transportation order was changed to General Haulage Conservation Order T-1 and List 3, now the responsibliity of ODT, was removed. Other minor changes effected by the amendment move all types of molasses formerly on list 2, to list 1. Shipments of commodities on list 1 must be authorized in advance by WPB. Butyl acetate and ethyl acetate, now under allocation, were removed from list 2 and contemplated deliveries of these need no longer be reported to WPB.

Glass Order Clarified

The War Production Board in clarifying application of amendment to L-103T, issued on June 3, 1943 says that same

refers only to certain types of glass containers which vary in specified particulars from standards established by the order.

Order L-103 as amended on that date clarified and specified the respective dates before which certain types of non-standard glass containers must be manufactured in order to be used for packing each product which has been made the subject of standardization.

Such non-standard containers are limited to those which differ from the standards established by L-103 solely by reason of:

1. The location of indented or other label space.
2. The degree of curvature of the shoulder and heel of the container.
3. The amount and location of any lettering which indicates capacity only.
4. A difference in height or weight when such difference does not exceed 5 per cent of the height or weight shown for the applicable standard glass container.
5. The existence or location of stippling or fluting.

Under the order, glass containers possessing these minor variations can be used for a product which has been made the subject of a standardization schedule only if they were manufactured within nine months after that product was first mentioned in the schedule.

A.M.A. Packaging Course

In cooperation with the U. S. Forest Products Laboratory, Madison, Wisconsin, the American Management Association will sponsor a packaging course for representatives of industry. The instruction, which will be conducted at Madison, is planned to cover a period of five days. Two sessions of the course have been scheduled, one to be held from September 13-17, the other from September 27-October 1. Additional sessions may be provided during October, if sufficient enrollments are obtained. A moderate tuition charge will be made to cover the cost of the work.

The instruction will be patterned after the courses which have been given regularly for more than a year at the Forest Products Laboratory, under Army and Navy auspices, and will deal primarily with the packaging of war materials and supplies.

Fiber Drum Reporting Changed

Under a recent amendment to Conservation Order M-313 fiber drum manufacturers are to report bi-monthly, instead of monthly, on their prospective production and deliveries of fiber drums. The amendment included companies which produce fiber drums for their own use. No such company may use fiber drums manufactured by itself, except as authorized by WPB.

Steel Barrel and Drum Statistics

Production, Stocks and Orders for April, 1943, compared with Preceding Months.

Production of steel barrels and drums of heavy types for April 1943 amounted to 2,044,144 as compared with 2,005,333 for March 1943, 2,067,276 for April 1942, and 1,463,222 for April 1941. These statistics were released recently by Director J. C. Capt, Bureau of the Census, Department of Commerce. The statistics for 1943 were compiled from returns of 32 manufacturers operating 50 plants, for 1942 from 32 manufacturers operating 45 plants, and for 1941 from 32 manufacturers operating 44 plants.

The data in Table 2 for steel barrels and drums of light types were compiled from reports of 19 manufacturers for 1943, 18 for 1942, and 16 for 1941. In this group 11 manufacturers also produced heavy types for 1943, 13 for 1942, and 16 for 1941, data for which are included in Table 1.

The manufacturers whose data are included in these statistics (Tables 1 and 2) produced approximately 98 percent of the total value of the output of the types of steel barrels and drums specified in this release, as reported at the last Census of Manufacturers which covered the year 1939.

Table 1.—Heavy Types (Number of Barrels and Drums)[1]

Year and month	Ratio of production to capacity	Production	Shipments	Stocks, end of month	Unfilled orders, end of month: Total	For delivery: Within 30 days	For delivery: Beyond 30 days
1943[2]							
January	65.6	1,269,410	1,279,435	47,508	3,447,921	816,470	2,631.451
February	81.3	1,574,368	1,595,311	44,765	4,139,448	1,192,694	2,946,754
March	103.6	2,005,333	1,990,332	59,751	4,200,839	1,336,018	2,864,821
April	105.6	2,044,144	2,019,781	86,278	4,627,756	1,421,827	3,205,929
Total (4 months)	89.0	6,893,255	6,884,859	.....	....	....	....
1942[2]							
January	107.0	1,951,599	1,953,648	36,455	2,149.272	803,372	1,345,900
February	101.1	1,845,350	1,847,720	33,692	2,230,376	916,506	1,313,870
March	132.4	2,415,811	2,420,483	29,020	1,892,849	875,457	1,017,392
April	113.3	2,067,276	2,046,000	50,296	1,796,850	779,664	1,017,186
Total (4 months)	113.5	8,280,036	8,267,851	.....	....	....	....
Total (year)	97.1	21,254,429	21,234,721	.....	....	....	....
1941[2]							
January	79.7	1,454,298	1,443,945	62,771	370,172	237,500	132,672
February	56.7	1,034,681	1,045,853	51,599	276,013	179,110	96,903
March	58.8	1,072,308	1,076,523	47.384	314,504	222,122	92.382
April	80.2	1,463,222	1,473,734	36,872	427,606	284,404	143,202
Total (4 months)	68.8	5,024,509	5,040,055	.....	....	....	....
Total (year)	83.6	18,313,596	18,332,143	.....	....	....	....

[1] Steel barrels and drums (except beer barrels) of 19-gauge or *heavier* steel, and steel barrels and drums made wholly or partly of 20-gauge, when of other than open-head construction; also grease drums of 100-lbs. capacity when made of 20-gauge or *heavier* steel.

[2] Monthly capacity for 1943 was 1,936,000 barrels (one shift) and is based on the total number of steel barrels and drums which can be made with existing equipment in 25 working days of *one* 8, 9, or 10-hour shift, whichever is the normal operation of the respective plants. Monthly capacity for the period January 1941 to December 1942, inclusive, was 1,824,500 barrels (one shift). As some manufacturers operated more than one shift, this results, for certain months, in a ratio of production to capacity in excess of 100 percent.

Table 2.—Light Types (Number of Barrels and Drums)[1]

Year and month	Production: Total	Production: Welded side seam	Production: Lock side seam	Shipments: Total	Shipments: Welded side seam	Shipments: Lock side seam	Unfilled orders. end of month
1943							
January	250,375	61,194	189,181	262,343	88,501	173,842	776,815
February	193,530	60,823	132,707	201,726	72,992	128,734	722,654
March	204,073	61,585	142,488	222,031	70,756	151,275	776,605
April	242,969	33,979	208,990	254,687	41,746	212,941	705,319
Total (4 months)	890,947	217,581	673,366	940,787	273,995	666,792	......
1942[2]							
January	492,630	120,914	371,716	462,945	114,841	348,104	1,281,112
February	499,614	188,002	311,612	536,091	204,067	332,024	1,203,793
March	540,124	178,381	361,743	528,312	171,449	356,863	1,034,962
April	520,577	139,614	380,963	505,352	135,780	369,572	931,690
Total (4 months)	2,052,945	626,911	1,426,034	2,032,700	626,137	1,406,563	......
Total (year)	5,053,339	1,306,374	3,746,965	5,114,625	1,334,492	3,780,133	......
1941[3]							
January	256,465	69,111	187,354	255,824	69,596	186,228	60,164
February	239,613	74,320	165,293	238,330	73,407	164,923	58,756
March	264,624	71,730	192,894	265,105	72,410	192,695	71,571
April	355,068	93,224	261,844	356,764	93,092	263,672	81,921
Total (4 months)	1,115,770	308,385	807,385	1,116,023	308,505	807,518	......
Total (year)	3,751,627	1,189,646	2,561,981	3,757,565	1,191,819	2,565,746	......

[1] Steel barrels and drums (except beer barrels) of steel *lighter* than 19-gauge, excepting steel barrels or drums made wholly or partly of 20-gauge, when of other than open-head construction; also grease drums of 100-lbs. capacity when made of steel *lighter* than 20-gauge.

[2] Not strictly comparable with 1943, since statistics for 1943 include data for 4 additional plants.

[3] Not strictly comparable with 1942 and 1943. The statistics for 1943 include data for 11 additional plants and for 1942 for 7 additional plants.

. . . all produced with the help of International Potash

From a thousand feet below ground in New Mexico comes potash, a mineral salt, incredibly rich in precious chemicals. *Muriate* and *Sulphate of Potash* for the fertilizers with which farmers are growing, with less labor, the larger food crops needed by the nation. *Magnesium Chloride* for International Magnesium, the new light metal used in war planes today and in days-to-come in motor cars and hundreds of exciting new products. *Potassium Chlorate* that gives the firing spark to millions upon millions of small caliber bullets. Chemical research has developed many new ways to utilize the power of potash to improve manufacturing processes in the paper, glass, leather, food, drug and other industries. The discovery of potash in America and the rapid development of production at International's mines assure ample supplies of potash for the many ways it will be used in post-war days for your comfort and pleasure. *International Minerals & Chemical Corporation, General Offices: 20 North Wacker Drive, Chicago.*

International

MINERALS AND CHEMICALS

Mining and Manufacturing

PHOSPHATE • POTASH • FERTILIZER • CHEMICALS

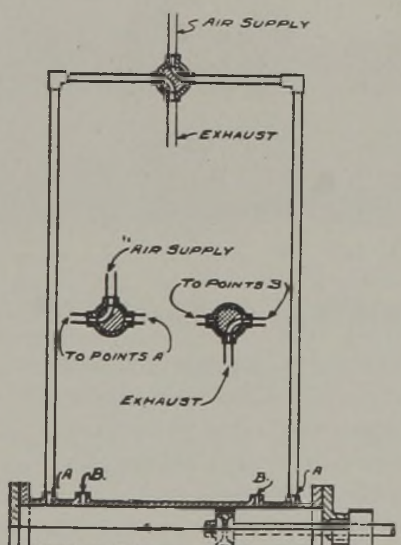
PLANT OPERATIONS NOTEBOOK

By W. F. Schaphorst

Home-made Air Cylinder

Compressed air is being increasingly used these days for doing our heavy work. An important advantage possessed by air over steam is that air doesn't condense and it can be stored indefinitely—provided there are no leaks.

This sketch shows a simple home-made mechanism that may interest many readers—a compressed air cylinder that can be used for many purposes. Thus the writer knows one plant manager who uses a cylinder of this type for opening and closing his office window. The plant is so noisy that he cannot converse over the telephone when the window is open, so he arranges an air cylinder with the manipulating valve conveniently beneath his desk. To open and close the window he doesn't move from his chair. Air cylinders of this type are also valuable for lifting and moving heavy objects such as doors, gates, and ash cans. Thus in one instance an ash hopper gate is opened and closed by air pressure..



The sketch shows how to make the cylinder and valves. Air is admitted into one end of the cylinder by simply manipulating the four-way cock shown at the top. This cock is so made, as shown, that when in one position the air admission and air exhaust are in correct position for pushing the piston in one direction. Then by swinging the four-way cock through 90 degrees the piston is pushed in the opposite direction as desired.

The cylinder can be made as long as wanted, depending on the length of pull or push wanted. And it can be made any size, depending on the force wanted. Multiply the air pressure by the area of the piston exposed to the pressure and you have the force that can be utilized for doing work.

Wire Guards

For the sake of safety it is commendable practice to place guards around dangerous moving machinery—motors, belts, gears, chains, etc. In many places guards are required by law. Guards made of high grade wire screen have these advantages:

1. They are more transparent than other guards. That is, all of the details of the guarded machine can be "seen" without difficulty.
2. Wire guards do not hinder or deflect air currents, which is important in the case of electric motors that are likely to heat where ventilation is poor.
3. Wire guards can be made strong enough for any guarding purpose.
4. They are light in weight, hence can be removed and handled without difficulty.
5. They are easily made. The fact that wire screen can be bent to almost any desired shape is important. Thus for some enclosures a single joint often suffices.
6. Stiff wire screen is self-supporting and seldom requires additional or intricate frame work.

An easy and excellent way in which to make wire guards for almost any purpose is to make the frame work out of angle iron and the sides out of wire screen of suitable mesh.

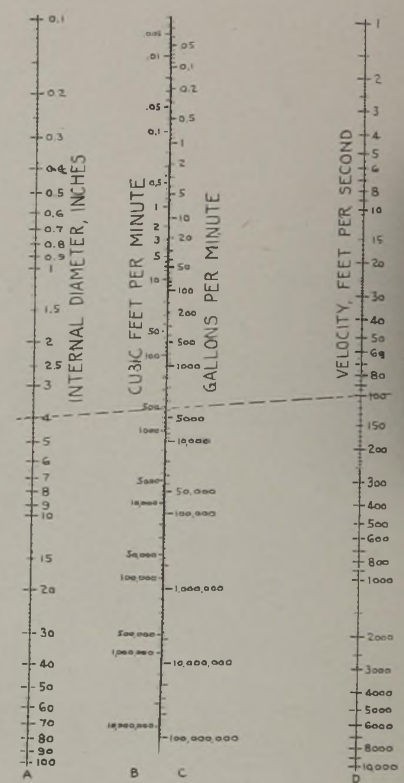
First make the frame. Angle iron is not easily bent without cutting out portions of the flange. That is, cut out some V's from the inner flange where the bend is to be made. If the bend is to be 90 degrees, cut out a square V. If the bend is to be 45 deg., cut out a 45-degree V, and so on. In other words, cut out a V whose angle is equal to the bend wanted.

After the frame is formed, put in the wire screen or wire cloth. The quickest way to fasten the wire in place is via the welding torch. The same torch may be usefully employed for welding the frame together before proceeding with the wire. Simply "spot weld" the wire terminals in place on the inner flange of the frame. If no welding outfit is available the wire may be either riveted or bolted in place. Punch holes through the inner flange at the wire terminals and then rivet or bolt. When carefully made entirely of metal, in this manner, a guard should last indefinitely.

Liquid Flow in Pipes

Many problems of liquid flow may be instantly answered by simply laying a straightedge across this chart.

For example, how many cubic feet of liquid or gas will flow per minute through a 4-inch pipe at 100 ft. per second?



The dotted line drawn across the chart shows how it is done. Connect the 4 in column A with the 100 in column D and locate the intersection with the middle column. Column B then tells us the answer—very close to 525 cu. ft. per minute. And at the same time column C tells us that the equivalent volume is 3900 gallons per minute.

"Double Check" Fuel Losses

If you burn considerable coal it may be worth your while to weigh your ashes. Thus if your ashes weigh less this year than they weighed last year, all other conditions being the same, it is obvious that you are getting more heat out of your fuel this year. Have you ever weighed your ashes?

Some people reason that it is silly to weigh ashes because ashes have no value. We are usually told to weigh the coal burned, and if we have boilers to keep a strict account of all water used in the boilers so as to determine whether or not we are getting the same good grade of coal that we always got. That is cor-

rect, but the simpler method is to weigh the ashes. It is the ash content, generally, that determines the heat value of the coal. Very often coal from the same mine shows a widely differing ash content. Therefore it is logical that one should keep tab on the refuse. The refuse costs just as much per pound as the good combustible matter, so why not weigh it?

Also, it is quite possible that a little experimenting along this line may do your plant some good. Try different coals of the size suitable for your furnaces and grates and the one with the least ash content which sells at a low price should show pretty good results. This can also be "double checked" by noting how well the coal evaporates the water. It is not difficult and it may be worth your while to work out a simple method of your own based on this plan that will tell you, year in and year out, just how well your coal and your heaters, furnaces, or boilers are performing.

Mass Spectrometer Speeds Control

An electronic device called the "mass spectrometer" will soon accelerate wartime chemical research by freeing hundreds of highly skilled chemists from tedious but important production testing in synthetic rubber plants. This new instrument is faster and more accurate than a dozen top-notch chemists. It is a valuable laboratory tool for scientists seeking more powerful gasolines, new plastics and improved synthetic rubber. An average college student can be taught to operate the spectrometer in a few weeks.

Developed by 32-year-old Dr. John A. Hipple, physicist at the Westinghouse Research Laboratories, the electronic "chemist" swiftly and precisely analyzes many of the complicated gases formed in making butadiene, the principal ingredient of several types of synthetic rubber. In 15 minutes this spectrometer will dissect a complicated gas molecule a twenty-five-millionth of an inch long and can be arranged to automatically produce an autograph that tells the chemist the composition of the gas.

At present, certain analyses require from 15 hours to three days of painstaking laboratory work by five to ten skilled chemists. Others cannot be done at all even by other processes. Results attained by these tedious methods are much less accurate than the molecular "portrait" that comes out of the spectrometer.

Leading research men of five major oil and chemical companies worked with Dr. Hipple for more than six months to make the instrument practical for use in oil refineries, butadiene plants and other chemical industries. The project was directed by Gaylord W. Penney, head of the electro-physics department of the Westinghouse Laboratories.

Butadiene molecules, Dr. Hipple explained, are carefully built up from carbon and hydrogen atoms according to definite chemical patterns, much as a tile-setter selects colored blocks to form a design on a floor. As the molecule is being put together in a butadiene plant, its composition must be checked at intervals to make certain that the chemical pattern is being followed.

Present methods of determining the molecular structure are so slow that a batch of butadiene has often gone through the various treatments of the process before the analysis is completed. If there is an error in the molecular design, the butadiene will make a poor quality synthetic rubber. Sometimes a batch of butadiene has to be reprocessed, causing lost production time.

The spectrometer is housed in a cube-shaped cabinet five feet high. Its key part is a yard-long glass vacuum tube shaped into a quarter-circle. This tube, lined with metal, is fixed between the poles of an electromagnet.

Molecules of the gas being analyzed are given an electrical charge at one end of the tube and are shot toward the other end at a speed approximately a million feet a second by high voltage electricity. The electromagnet pulls at these speeding molecules so that only those having a certain mass, or weight, travel down the center of the tube, around the bend and through a tiny slit in a metal target at the other end.

The molecules going through the target are collected on a metal plate where they give up their charges. Then the charges are amplified and counted by electric meters that indicate how many molecules of a certain weight are in the mixture.

Molecules weighing less than those hitting the target are pulled to the metal lining of the tube before they can get around the bend. Heavier ones offer more resistance to the electromagnet's pull and strike the other wall of the tube as they try to negotiate the bend.

The mass spectrometer requires only a thimbleful of gas for each test. Butadiene plant chemists now have to draw off a bucketful of gas for the involved laboratory procedure of breaking down the mixture by "fractionating" or distilling.

Dr. John A. Hipple, of the Westinghouse Research Laboratories, is shown at the controls of masss spectrometer used to analyze complex gases in a fraction of the time ordinarily required.

. . . MAYBE ONE OF THESE WILL HELP SOLVE THE PROBLEM

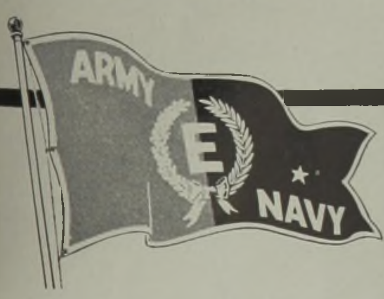
Salts of the alkyl acid phosphates . . . a newer series of organic phosphorus compounds to intrigue the interest of the research chemist . . . give promise of important commercial applications. The salts briefly described below are typical of many that have been the subject of considerable study in the Victor laboratories.

Because of present limitations in the supply of certain critical materials, samples of these and other Victor Research Chemicals announced from time to time, are not always available. Those that are will be sent promptly upon request. Some of the Victor Phosphorus Compounds . . . for which research has established important uses in essential war production . . . are already available in commercial quantities.

VICTOR ALKYL PHOSPHATE SALTS

PROPERTIES OF SEVERAL VICTOR ALKYL PHOSPHATE SALTS

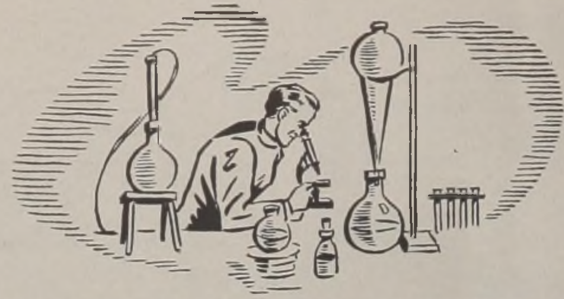
COMPOUND	Physical State	% Concentration	Sp. Gr. at 25° C
Ethyl Octyl Sodium Orthophosphate	Aqueous Paste	82	1.119 (30°)
Mono i-Propyl Calcium Orthophosphate	White Powder	100	1.928
Di-i-Amyl Potassium Pyrophosphate	Aqueous Solution	60	1.262
Penta i-Amyl Ammonium Tripolyphosphate	Aqueous Solution	70	1.187
Triethyl Ammonium Tetrapolyphosphate	Aqueous Solution	70	1.345 (30°)



VICTOR *Chemical Works*

HEADQUARTERS FOR PHOSPHATES • FORMATES • OXALATES

141 W. JACKSON BLVD., CHICAGO, ILL., NEW YORK, N. Y., KANSAS CITY, MO., ST. LOUIS, MO., NASHVILLE, TENN., GREENSBORO, N. C. PLANTS: NASHVILLE, TENN., MT. PLEASANT, TENN., CHICAGO HEIGHTS, ILL.



THE LABORATORY NOTEBOOK

Separation of CO_2

Salts of sulfurous acid as well as alkaline earth sulfides contain varying quantities of carbonates. Analysis of these salts may require determination of volatile sulfur compounds and the presence of carbon dioxide may introduce complications.

To separate the carbon dioxide from volatile sulfur oxides, the Publication of the Laboratory of Mauthner Brothers & Co., Ltd. Leather Factory in Ujpest, Hungary suggests the following procedure. The material to be analyzed is dissolved in dilute, CO_2-free, sodium hydroxide. Any insoluble portions remaining have no influence on results. Sulfites are transformed into sulfates by boiling them with excess hydrogen peroxide. The solution is then made acid with HCl, the carbon dioxide driven off and absorbed by soda-lime. Atmosphere of hydrogen is recommended for the entire operation.

Apparatus

Hydrogen gas is generated in Kipp apparatus "A", or drawn from a cylinder. It passes through wash bottles "B" and "C" containing potassium permanganate and copper sulfate solutions, respectively. From bottle "C" the gas enters U-tube "D" containing soda-lime where it is freed from CO_2.

Material to be analyzed is in wide-mouthed flask "E", which is closed with a rubber stopper. The latter has three openings. Hydrogen enters by one opening through a tube leading to bottom of flask. Second opening contains tube "G" which is surrounded by condenser "H". Third opening contains a dropping funnel "F" by which hydrochloric acid is introduced. The flask rests on a wire gauze and is heated by a Bunsen or micro burner.

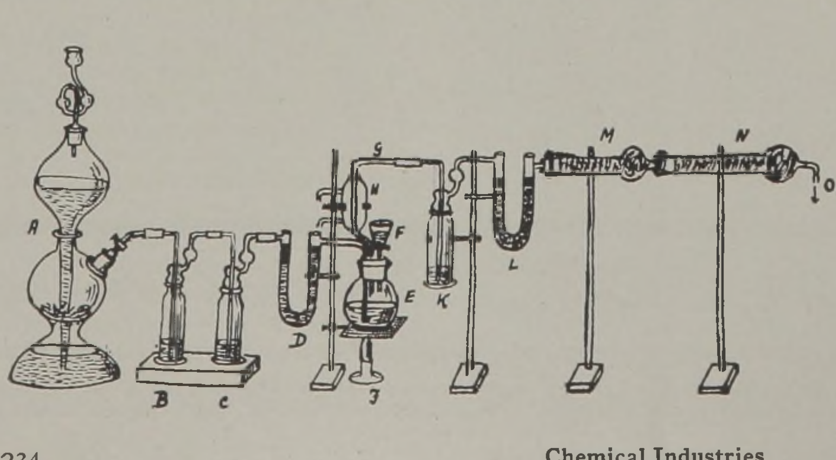
The vapors leave flask "E" through tube "G". Any condensate occurring by reason of condenser "H" falls back into flask while uncondensed vapors pass over to wash bottle "K" which contains sulfuric acid. The gas then passes through U-tube "L" where calcium chloride removes remaining traces of moisture. Soda-lime in tube "M" absorbs any carbon dioxide. Tube "N" may be filled with soda-lime to assure the non-escape of any CO_2, or with $CaCl_2$ to act as a trap against moisture entering tube "M". Tube "N" is connected to suction pump at "O".

Procedure

Weighed sample is placed in flask "E", together with dilute caustic soda and hydrogen peroxide in excess, and fixed immediately to the apparatus filled with hydrogen. Contents of flask are boiled until excess hydrogen peroxide is decomposed. Hydrogen gas is introduced continuously so that no air is present, and foaming is at a minimum.

Meanwhile, two collecting tubes "M" and "N" are weighed and fastened in the train. Hydrochloric acid is admitted to "E", dropwise from "F" while slight suction is applied at "O". Boiling is continued until all CO_2 is driven off. The stream of hydrogen is maintained until the system cools. Increase in weight of tubes "M" and "N" is due to absorption of CO_2.

Liquid remaining in "E" is transferred to a beaker, diluted, heated to boiling and sulfates determined by the usual barium chloride procedure. From the $BaSO_4$ precipitate, the amount of sulfurous acid can be calculated.



Hercules Powder Co. requires all laboratory employees to wear safety glasses. Those who wear regular glasses are given safety glasses with their prescription. An optometrist visits the Experiment Station to check up once or so a month.

Removing Glass Rods from Rubber Stoppers

What to do with that rubber stopper from which a jagged end of glass tubing projects? H. M. Burlage of University of North Carolina reports a simple solution in *The Chemist Analyst*. Select a cork borer which will just slide over the glass tubing or rod—that is, the inside diameter of the borer should be slightly greater than that of the glass in question. Then separate the glass from the stopper by manipulating the borer in the usual manner.

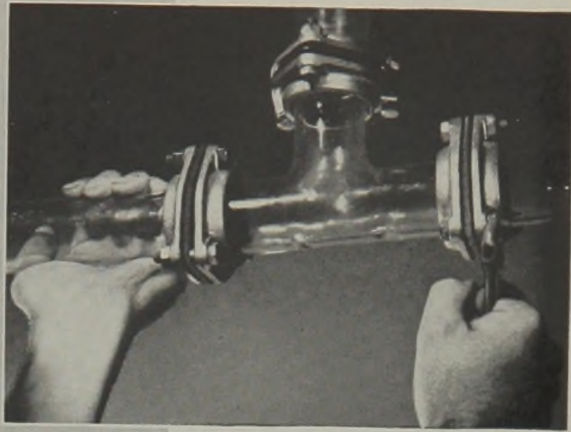
Another solution to this problem is placing a few drops of carbon tetrachloride (if you are fortunate enough to have it) around the stubborn glass rod or tubing. According to V. G. Isvekov, the latter will loosen quickly and can then be removed without much effort or danger of breakage.

Suggestions Wanted

Have you any convenient, time-saving suggestions for use in the laboratories? Send them to Chemical Industries, *522 Fifth Avenue, New York, N. Y. We will pay $2 for each contribution published.*

Users of Pyrex Piping say

"BREAKAGE IS NOT A PROBLEM"



Corning can give you scientific data about the toughness of Pyrex brand Glass Piping, its mechanical strength, degree of hardness, and so on. But the only effective answer to the breakage bugaboo comes from actual users—and in a recent survey not one user was found who would admit that breakage is a problem.

Here are three typical answers to the question: "Are you troubled by breakage?"

ABSOLUTELY NO BREAKAGE PROBLEM

"We've used Pyrex brand Glass Piping for fifteen years—use thousands of feet of the 2-inch size to carry heavy syrups. Though only one small section which runs alongside a loading platform is protected by a metal guard, we have absolutely no trouble with breakage."

"We have about 600 feet of 1½" Pyrex Piping in our bottling department. We installed it three years ago and have had no breakage. If a length were broken occasionally, it would mean nothing compared to the value to us of the visibility and purity features."

CAREFUL HANDLING IS INSTINCTIVE

"We started using Pyrex Piping in 1937 and never think about the chance of its being broken. Our men know glass when they see it and are governed accordingly. Breakage is much more likely to be a problem with a piping material such as ——————."

AVAILABLE NOW

The truth is that even in the most rough and ready plants, workmen recognize glass and almost automatically handle it with the necessary care. Corrosion-resistant to all acids (except HF) Pyrex brand Glass Piping does not deteriorate and may be considered a permanent investment. Its visibility, ease of cleaning, and perfectly smooth surface are factors that merit your serious consideration. Pyrex Piping has a full line of accessories including all usual elbows and joints. What's more, it is available today.

"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works, Corning, N. Y.

CORNING Glass Works Corning, New York

Pyrex Industrial Glass

INDUSTRY'S BOOKSHELF

Potash in North America, by J. W. Turrentine, Reinhold Publishing Corp., N. Y., 1943; 181 pp., $3.50. Reviewed by *M. V. Bailey,* director of agricultural research, American Cyanamid Co.

THIS A. C. S. Monograph might well be called Volume 2 of a 30 year history of the potash industry, as the author published a book on the subject in 1926.

The many difficulties encountered in the establishment of the American industry are very interestingly sketched. It includes estimates on American and world supplies of potash and gives the location of them. These are no doubt as authentic as any available. With agriculture using around 90% of the potash mined, it is logical that the author should devote considerable space to the theory and practice of the use of potash in fertilizers and the business organization of its distribution. The various uses of potash in industry are listed, but are not discussed in much detail.

The very complete data given on American and world trade in potash should be useful to anyone concerned. The chemical and mechanical engineering problems involved in the working of both the Searles Lake potash in California and the subterranean deposits in the southwest (chiefly New Mexico) are discussed in as non-technical language as possible. A gradual increase in potash consumption for agricultural uses, with a renewal of European imports after the war, is forecast, but the future possibilities of such chemicals in industry are not discussed. This book deserves a place in all reference libraries.

The Spirit of Enterprise, by Edgar M. Queeny. Charles Scribner's Sons, New York. 268 pp., $2.00. Reviewed by *Robert L. Taylor.*

THAT BUSINESS should find one of its most eloquent spokesmen in the chemical industry is something in which the industry can be justified in taking modest pride. That this spokesman has presented what is probably the clearest and most reasoned exposition yet published on the modern free enterprise system is cause for more than pride—it is cause for saying thank goodness somebody who knows what he is talking about has finally got up on his hind legs and presented some arguments for the private enterprise system that make sense and carry weight.

Edgar M. Queeny, who is chairman of the board of Monsanto Chemical Company, has, to paraphrase his preface, buckled on his armor and thrust a mean lance in defense of business. The power of the thrust is generated in the fact that he has gone far back into the underlying philosophies of the system he defends and of its adversaries. He has conscientiously avoided laying himself open to the charge of attempting to "criticize that with which one is not familiar," an accusation he makes of New Deal critics of business. He has studiously labored through the works of Veblen, Chase, Marx and other prophets of the opposing philosophies. The result is a book which goes far beyond the standard arguments against the New Deal "Hoyle" for business.

Mr. Queeny traces briefly the progress of business and industry in this country, the excesses and reaction which led to the New Deal, and then how the New Deal has outgrown its corrective phase and become the harbinger of an economic philosophy which holds out false promises to the people. He does not attack the New Deal indiscriminately, but makes careful distinction between methods and objectives, most of the objectives of which he is in full sympathy with. In his concluding chapters he offers an alternative to the "economic planners" calling for an acceptance of "more of the classic conception of the free enterprise system" and a willingness to acknowledge and correct certain points of criticism. To that end he makes specific suggestions relative to anti-trust laws, taxes, and pressure groups among other things. The possibilities of the future under such a system he views as unlimited.

"The Spirit of Enterprise" is a book which gives powerful voice and substance to the feelings of the average businessman who honestly believes that the free enterprise system can offer more to all classes of Americans than can any other system. More profound works may be written on the subject, but it is doubtful if any will be clearer or more forthright—or more honest.

The Theory of the Photographic Process, by C. E. Kenneth Mees. Macmillan Co., N. Y., 1942; 1124 pp., $12.00. Reviewed by *Carl Berkley*, Allan B. Du Mont Laboratories, Inc.

SCIENTIFIC WORKERS, for the past fifty years, have been intrigued by phenomena observed by means of the photographic process and they have attempted to find logical explanations therefor. This volume is essentially a summary of the methods by which these phenomena have been studied and their bearing on the basic nature of the photographic emulsion. Since such a summary must contain the methods and approaches used by scientists who have done photographic work in divergent fields, the usual technical monographic treatment would not be understood in its entirety except by those having an extensive acquaintance with technical methods. For example, these methods include the techniques used in such diverse spheres as sound reproduction and quantum mechanics.

To obviate too severe reader requirements, the author has in many cases included short discussions of basic theory. Thus, on p. 79, an explanation of the Donnan equilibrium is given. Also the introduction to Chapter 24 on sensitising dyes consists of a brief review of the chromophore theory of organic colors. The explanation of silver halide sensitivity involves a discussion of the lattice theory of photoelectric action in crystals.

The introduction defines the photographic process as consisting of the exposure, development, and after treatment of the sensitive material. In accordance with this, the first three parts are devoted to: 1. A description of the preparation and properties of the materials used; 2. The action of light; and 3. The development and after processes. The detailed discussion of the Intermittency, Clayden, Herschel, Sabattier, and Albert effects in Part 2 will prove especially useful to quantum physicists who will be able to correlate the gathered observations with similarly observable effects in other crystalline media.

Parts 4 and 6 are a consideration of sensitometric technique and the factors affecting spectral sensitivity. The remaining part (5) is devoted to the physics of the image as it affects reproduction of recorded phenomena.

There is an understandable tendency in a work of this type to try to include in an encyclopedic manner some reference to any connected information. It is difficult to see, however, how a treatment on the theory of the photographic process involves the considerable section which is devoted to methods of synthesizing cyanine dyes. Contrary to this, it is regrettable that it was not seen fit to include any information on the effects of X-rays, gamma rays, charged particles, or cosmic rays in view of their growing use for technical recording by photographic methods.

The above shortcomings, however, are more than compensated for by the fund of information contained in the book which will make it a worthy addition to any technical library.

(*Turn to page 258*)

How much coal-tar in this picture?

In the Tunisian victory, as in every other land or sea operation on America's far-flung fronts of war, coal-tar chemicals are in there fighting—co-operating inconspicuously yet effectively with American brains, brawn and bullets.

American tanks, half-tracks, trucks and jeeps, painted with Phthalic Anhydride finishes, roll forward on tires compounded with chemicals made from coal-tar. They are powered with motor fuel and lubricated with oils made better by the use of coal-tar products. In their intricate mechanisms are many parts made of Phenol plastics.

Toluol for TNT . . . Benzol for Tetryl . . . Naphthalene for smokeless powder . . . Quinoline for vitamins . . . Pyridines for sulpha drugs . . . Tar Acids for plastics, disinfectants and pharmaceuticals . . . Cumar* for waterproofing tarpaulins, tenting and other military fabrics — the list of war-time chemicals, for which Barrett is a key source of supply, is almost endless.

All Barrett's unmatched facilities and experience are today mobilized to produce these chemicals in ever-increasing quantities. And tomorrow these same chemicals will again provide the basic needs of industry to promote peacetime production and progress.

Awarded to the men and women of the Barrett Frankford Chemicals plant for excellence in the production of war materials.

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BOOKLETS & CATALOGS

Chemicals

A550. Adhesives for flexible bag molding of curved plywood are described in detail in Technical Bulletin No. 4. Sections are devoted to adhesive requirements, various available adhesives, mixing and spreading, alternate mixes, assembly time; pressure and temperature, and bonding time calculations for suggested adhesives. Also covered are methods of applying flexible pressure to molded plywood, including principal methods of bag molding, supplementary methods of applying fluid pressure, and flexible rubber bags for molding. The Resinous Products & Chemical Co.

A551. Fine Organic Chemicals, List No. 4, has recently been issued by this company. Catalog is divided into two parts—organic chemicals for research and spot test reagents for rapid analytical work. Melting and boiling points indicate the purity of the chemicals. Prices are also listed. Paragon Testing Labs.

A552. Insulation Coatings that are varnishes which protect equipment against excessive heat, heavy overloads, acid or alkali fumes, and abrasive materials are briefly reported in Bulletin 143. These Thermobonds are applied to units such as high speed armatures, high cycle drill and grinder motors, heavy duty motors and transformers, and marine engine magneto coils. The Sterling Varnish Co.

A553. Mineral Wool Standard. Commercial Standard CS105-43, Mineral Wool; Loose, Granulated or Felted Form, in Low-Temperature Installations has been published in booklet form. Covers both cold storage area and pipe line mineral wool insulation and includes recommendations by engineers of the refrigeration field. Industrial Mineral Wool Institute.

A554. "Molding Polyvinyl Alcohol" is title of Bulletin No. 3-243 which describes the molding of tough, elastic articles with rubber-like properties from plasticized polyvinyl alcohol. These resins are said to be unaffected by fats, oils, greases, and common organic solvents, but are not recommended where a high degree of water resistance is required. They may be prepared for molding or extrusion in conventional rubber and plastic equipment. Information about plasticizers, preparation of the molding compositions, and other properties of the resins is included. Electro-chemicals Dept., Du Pont Co.

A555. Oil Emulsifiers that are water-soluble resinates patented under the trade-name of Dresinates are briefly summarized in 4-page folder. Tables list the physical and chemical properties of the Dresinates, composition of various emulsions and observations after 48 hours, and typical oleic-acid-type formulations. Formulation procedure and specific directions for producing emulsions are also given. Hercules Powder Co.

A556. Plastics. Mechanical, thermal, optical, electrical, molding, and miscellaneous properties of Lucite, methyl methacrylate resin; Plastacele, cellulose acetate plastic; Pyralin, cellulose nitrate plastic; Nylon, monofilaments; Butacite, polyvinyl acetal resins, are tabulated for quick reference by industrial engineers and management in Booklet A-3352. Also lists the military and commercial uses for these plastics. E. I. du Pont.

A557. Protective Coating. Twelve-page bulletin summarizes the properties of Ucilon, a new surface coating material used to protect against corrosion. It is formulated with synthetic resins and produces a flexible coating said to be resistant to organic and inorganic acids, alkalies, salts, alcohols, gasoline, oils, greases and moisture; it is also claimed to have excellent dielectric strength and can be applied to wood, metal, concrete and other surfaces by brushing, spraying or dipping. United Chromium, Inc.

A558. Rubber. "Monsanto Magazine" for June and July leads off with the story of its Texas City styrene which was built in less than a year. Replete with photographs. Monsanto Chemical Co.

A559. Rubber. Report on Witcogum, a chemurgic rubber, summarizes its physical properties, compounding principles, processing procedure, and its use as an extender with rubber, reclaim and synthetic. It may be milled on standard rubber mills, according to the report, and processed in regular rubber extruders, calenders and vulcanizers. At present it is being used to replace rubber and reclaim in products where maximum tensile strength, abrasion resistance and elongation are not required. Can be supplied in unlimited quantities. Wishnick-Tumpeer, Inc.

A560. "Survey of Water Technology" is 10-page booklet reviewing progress made during 1942 in industrial water conditioning. Divided into following subjects: water in war production program, water the raw material, process water for industry, water treatment, water analysis, corrosion, boiler feedwater and cooling water, bacteriology and biochemistry of water, equipment, recent books on water and related subjects. Under each of these ten headings appears a brief descripton and listing of the important articles written on the subject during the past year. Technical Paper No. 86, W. H. & L. D. Betz.

A561. Water Softener. Reprint No. 25 describes a high temperature water softening treatment which reduces hardness using lime and soda process. The company believes this to be the only hot process water softener operating at this high temperature utilizing lime and soda ash treatment on two stage softening method. According to them the chemical feed maintains correct treatment in spite of varying composition of raw water supply. Cochrane Corp.

Equipment — Containers

E931. Bearings. Customer service feature which lists pertinent information on porous bronze bearings carried in stock and available for immediate delivery. An up-to-date stock list will be issued every 6 to 8 weeks. Keystone Carbon Co.

E932. "Electric Heat in Industry," second quarter issue, discusses in short, informative articles, cartridge heaters, strip heaters, immersion heaters, fin Calrod heaters, uses of electric furnaces, and new applications for induction heating. General Electric Co.

E933. Electric Vibrating Equipment for feeding, conveying, cooling, drying, packing, screening, and other special applications are catalogued in 176-page booklet, No. 750. Included are general specifications, dimensional diagrams, and photographs of feeders, waytrols, bin valves, conveyors, dryers, coolers, packers, and screens. The Jeffrey Mfg. Co.

E934. Enamel Coatings for pipes and other corrodible equipment are briefly described by short articles in No. 24 of the "Bitumastic Bulletin." Includes chart which lists various surfaces, the corrosive conditions to which they are subjected, and the recommended solution. Wailes Dove-Hermiston Corp.

E935. Equipment for the process industries including continuous rotary kilns, coolers and dryers, roasters, retorts, calciners, incinerators, crushing rolls, pulverizers and grinding mills, briquetting machines for coal, ore, and flue dust, hoists, sheaves, gears, shaking-chute conveyors, etc., are described in Bull. A-375. Vulcan Iron Works.

E936. Heat Exchanger and Condenser Tubing. This manual of welded steel tubing for heat transfer apparatus is a buyers' guide and reference data book for those concerned with the procurement or use of such equipment. Sections are devoted to an illustrated description of the manufacturing process, a discussion of the identification of each manufacturer's product by means of an individual symbol, suggestions as to the information to give when ordering tubing. Chart shows the dimensions of standard sizes of welded tubing commonly used in heat transfer processes. Formed Steel Tube Institute.

E937. Metal Reclamation from waste piles is described in Bulletin No. 8-A. Discusses the values in foundry waste and the recovery of brass, aluminum, magnesium and zinc and other wastes from dross and skimmings. Schematic diagrams outline various systems for the recovery of the metals. Hardinge Co.

E938. Mixers and Blenders of the horizontal type are covered in new Bulletin No. 117. Includes table of various size and their capacities, schematic diagrams and photographs. Edge Moor Iron Works.

E939. Ovens. "Blueprint for Industry" is name of 18-page booklet of engineering information on high-production convection heated ovens for bath and continuous heating processes. Starting with a convection-heated box type or single compartment oven, the printed descriptions cover multiple compartment ovens, continuous ovens and furnaces, multi-pass conveyor ovens for preheating, double-dipping, baking and cooling, and a number of complete oven-materials-handling systems. Illustrated with reproductions of blueprints showing typical installations. Industrial Oven Engineering Co.

E940. Radiant Heat Drying Lamps for baking, heating and drying processes are recommended in new illustrated Booklet A-3817 that tells what radiant heat is and discusses its advantages. The bulletin also takes up the design of radiant heat installation, the arrangement and spacing of equipment, and electrical circuit design. Specific data are given for the three general classes of applications for industrial purposes; namely, evaporation of water or other solvents, paint drying, and increasing temperatures of materials to facilitate manufacturing processes. Formulas are stated for determining the wattage required for each application. Lamp Division, Westinghouse Electric and Mfg. Co.

E941. Screen Filter Separator, "QS," of the magnetic type, is described and illustrated in Bulletin No. 120. Stearns Magnetic Mfg. Co.

E942 Screws. Multiple Spline and Hex Socket, are catalogued in two new price lists, Bulletin No. 849 and No. 850 respectively. The Bristol Co.

E943. Storage Tank Oil Heater utilizing the fin construction principle is described in Bulletin 1641. Explains the construction of the fin elements to strengthen the bond between fins and tubes, the advantages of the heater design, and the different arrangements in which the heater is furnished. Includes tables of dimensions and ratings. The Griscom-Russell Co.

E944. Surface Condensers are discussed in attractive bulletin, No. 9327. Among the subjects covered are structural and design features; steam penetration; air removal equipment; marine condensers; cross-flow condensers; essentials of a condenser plant; condenser accessories and pumping equipment. Illustrated with photographs and cross-sectional views. Ingersoll-Rand Co.

E945. Time Delay Relays, their application, features, construction, and standard types are catalogued in Bulletin 800. Contains time scale, price list, wiring diagrams and circuit table. Schematic diagrams of housing dimensions and photographs illustrate the text. The R. W. Cramer Co., Inc.

E946. Timers. Condensed catalog describes and illustrates the function of the different types of timers, for what applications the particular timers are generally used, and the features of each timer. The R. W. Cramer Co., Inc.

E947. Tool Steels. Pocket size, wire bound, 48-page handbook designed to serve as a working tool. Featured section contains descriptions, working suggestions, and demonstration photographs for the manufacturer's Coppco tool steels. Included also is a shop chart listing more than 70 common tool applications and recommendations for selection of the proper steel. Another section comprises useful tables on fractions and decimal equivalents, hardness conversion, etc. Copperweld Steel Co.

E948. "Tower Packing" Bulletin 51 of 16 pages, covers in detail the subjects of raschig rings, "Cyclohelix" spiral rings, "Hexahelix" spiral packing, resistance of tower packing to gas flow, tower sections, acid-proof masonry towers, and catalytic carriers. Attractively illustrated with photographs and includes tables listing the characteristics and the dimensions of the various tower packings. The United States Stoneware Co.

E949. Transformers, air-cooled, are described in Bulletin 160 which outlines and gives examples of air cooled transformer application in industry. Includes details on various types of these transformers—complete range of 55 degree ratings in auto type, two winding type, three winding type and four winding types transformers up to 50 KVA. The Acme Electric & Mfg. Co.

E950. Tubing, Flexible Metallic used to convey oils, gases and liquids are described in Catalogue 113. Data are given on available fittings, both industrial and S.A.E.. Also included are pressure charts, charts showing radius of bend and recommended types and sizes for various applications. Titeflex Metal Hose Co.

E951. Valves. Four-page illustrated Bulletin No. 16-B contains complete dimension tables for butterfly valves, 15 to 125 psi. Features valves for regulation and shut-off duty for air, gas, steam, liquids and semi-solids; involving manual and automatic control. R-S Products Corp.

E952. Welding. A recent development, the "WSR" method of rating welding machines, is said to show the exact range of usable welding current. Principle of "WSR" rating and how it differs from nominal ratings, as well as its user benefits, are described in non-technical language in this illustrated booklet. Harnischfeger Corp.

E953. Wire-Enameling Systems, using either the die or dip method, and for wire either lighter or heavier than 31-gage, are described and illustrated in bulletin. General Electric Co.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

Chemical Industries, 522 Fifth Avenue, New York, N. Y. (8-3)

I would like to receive the following booklets or catalogs.

A550	A554	A558	E931	E935	E939	E943	E947	E951
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A552	A556	A560	E933	E937	E941	E945	E949	E953
A553	A557	A561	E934	E938	E942	E946	E950	

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CANADIAN REVIEW

Chemicals at Peak

Production and consumption of chemicals in Canada continue at peak level, with the index for the production of chemicals, exclusive of special chemicals and explosives of Government plants, up a full ten points over the corresponding month of last year.

Latest information available indicates that the heavy acid and alkali situation here is comfortable, with present plant capacity deemed able to cope with all anticipated needs. A marked tightening has been evident in phosphates and casein.

Overall manufacturing output of Canada for the first six months of 1943 is estimated to be some 25 per cent above that of the corresponding period of last year. The proportion of manufactured output devoted to war purposes appears to have risen from about 55 per cent to 70 per cent of the total.

Two developments which are causing concern are the coal and pulpwood situation. It is possible that some non-essential industries in Ontario and Quebec may have to close this winter due to shortage or restricted use of coal. A survey is being made by the Department of Munitions and Supply to arrive at final conclusions.

The pulpwood cut this year is a million cords short, as a result of acute labor shortage in the woods.

Both these conditions may have a profound effect on Canadian industry.

Flaxseed to U. S. A.

The Department of Agriculture estimates that some ten million bushels of Canadian flaxseed will be exported to the U. S. A. this year from the anticipated fifteen million bushel crop. Prior to the war Canadian flaxseed production had fallen to less than a million bushels annually.

Present indications are that the Dominion will produce some nine million pounds of soybean oil, although favorable circumstances may increase this figure by a third.

Sunflower seed oil, of which there was no commercial production in 1942, should total ten and a half million pounds.

Slightly less than a million pounds of rapeseed oil, which is in heavy demand for blending with mineral oil in the manufacture of high speed lubricants, will be produced.

Experimental production of safflower seed in the more arid regions is under way, but no commerical yield is anticipated this season.

In spite of tremendously increased acreage of vegetable oil crops, Canada will not be self sufficient in this respect this year and substantial imports must be made to meet essential needs.

Associations May Unite

The Canadian Chemical Association, Canadian Institute of Chemistry, and Society of Chemical Industry, have appointed a committee to formulate plans for the consolidation of the three groups to form a single, stronger, Canadian chemical organization.

Initial committee discussions have been held, and although plans have not crystallized in detail, it is anticipated that amalgamation will be effected within the next few months.

Lignin Recovery Investigated

Two major Canadian pulp and paper producers have been actively investigating the possibilities of recovering lignin from sulfate and soda liquor for the past year, and it is reported that developments have reached the stage where large scale commercial operations will be functioning in the near future.

Conservative estimates place the quantity of lignin reclaimable from these liquors at more than 120,000 tons annually. Hitherto most of the sulfate discharge has been concentrated and burned as fuel.

The lignin as recovered appears to have relatively low elasticity, and high water absorption, and until these properties are modified primary work will be devoted to the manufacture of structural materials. Lignin impregnated paper boards have been molded possessing extraordinary tensile strength and workability. The compatibility of lignin with phenol-formaldehyde and urea-formaldehyde resins, and its potential value in rubber compounding and as a coating material, have not been overlooked.

The main research has centered on sulfate and soda liquor, for although their volume is much lower than that of sulfite, the recovery process is simpler. However, additional work is being done relative to the reclamation of the estimated 500,000 tons of lignin present in the sulfite waters of Canadian mills. The recovery is complicated by the fact that sulfite lignin is present as lignin sulfonic acids. Progress has been made, but commercial production of soda and sulfate lignin is more promising at present.

The industry is considering tall oil production, and is experimenting on processes to recover the estimated 40,000 tons of acetic acid, 50,000 tons of lime, and 90,000 tons of sulfur, discharged in sulfite liquor annually.

Phosphate Survey

The Department of Mines and Resources is conducting an extensive geological survey to ascertain the economic potentialities of Canadian phosphate rock deposits.

Major deposits charted to date are apatite in Eastern Canada. It is felt that with ore prices at the highest level in fifty years, and by the use of a flotation process for the beneficiation of ore, they may be worked profitably.

Domestic production of apatite has been insignificant for some years, and virtually all Canadian phosphate ore needs, of the order of a quarter of a million tons annually have been supplied by Florida and Montana fields.

It is understood that the Government is interested in the phosphate program, both from the standpoint of raw material for the manufacture of elemental phosphorus and industrial phosphates, and to encourage increased production of phosphate fertilizers, now and for post war, in the interest of the vast Canadian agricultural industry.

New Plant for Celanese

Canadian Celanese Ltd. is undertaking the construction of a five million dollar plant in Drummondville, Quebec, to manufacture strong yarns, artificial wool, plastics, and some chemicals.

The original Canadian Celanese plant, established in 1927, is a self-contained vertical unit for the production of acetate yarns and employs some 3000 workers. It is understood that the new factory will require an additional 2000 employees.

It is believed that the new plant will manufacture products similar to those of the Celanese Corporation of America, although detailed information is as yet not available.

New Research Laboratory

A $300,000 research laboratory is being erected near Montreal by Ayerst, McKenna and Harrison Ltd. recently acquired pharmaceutical subsidiary of American Home Products.

According to Wm. Harrison, chairman of the board, this laboratory, which will be completed within six months, will form the nucleus of a broad plan for expansion of manufacturing facilities to be completed in the post-war period.


Recipe for Synthetic Rubber
"In seven parts of 'soapy water' mix three parts of butadiene and one part of styrene. Add a catalyst and polymerize. Coagulate with salt and sulfuric acid, filter and dry."
For the all-important "soapy water"—heart of the GR-S process—Nacconol is being successfully used. This leading synthetic organic detergent has high emulsification power and inherent water-softening properties. Holding salts in solution and preventing the formation of curd, Nacconol reduces the amount of preliminary water treatment needed in synthetic-rubber manufacture.
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NEWS OF THE MONTH

4,000 Chemists to Meet in Pittsburgh

Progress in wartime research and methods of alleviating the manpower crisis, the most serious problem confronting chemical industry, will highlight the five-day session in September.

"CATALYSIS OF War Chemistry" will be the central theme of hundreds of papers and addresses to be presented before the 106th meeting of the American Chemical Society, to be held in Pittsburgh, September 6 to 10. Advances in wartime research, now at its peak in the laboratories of industry, technical schools, and the Federal Government, will be reported at the many sessions, declares the announcement.

The most serious problem confronting the chemical industry, manpower, will be the subject of a three-day symposium at which industrial leaders will discuss measures to overcome shortages of trained scientific workers essential to the war effort. W. L. Elder of War Production Board will preside at the session which will discuss both current and anticipated shortages. Plans to improve existing conditions will be suggested by experts familiar with employment of women, successful training programs, draft deferment, and other fields concerned with the problem of recruiting personnel for industry.

Dr. Francis J. Curtis, development director of Monsanto Chemical Co., will deliver an address on "How Industry is Solving its Manpower Problems." James W. Raynolds, deputy director, chemicals division, W.P.B., will discuss "Production Requirements of the Chemical Industry." Dr. Herman T. Briscoe, vice-president of Indiana University will speak on "Training Programs for Chemists."

Symposia dealing with recent advances in the chemistry of dairy products, vitamins, proteins, and boron in agriculture will explore the food needs of the United States, civilian and military, and of the United Nations. Other symposia will be devoted to antisyphilitic agents, industrial hygiene, research tools of the colloid chemist, research management in small laboratories, unit processes, paint, plastic, reactions of solids, molecular addition compounds, and library technique.

Papers to be read at divisional meetings will outline progress in petroleum, gas and fuel, fertilizers, sugar chemistry and technology, cellulose, water, sewage and sanitation, and chemical education. The society's divisions of organic chemistry, physical and inorganic chemistry, biological chemistry, analytical and micro chemistry, colloid chemistry and industrial and engineering chemistry will also convene.

Francis C. Frary, director of research of Aluminum Co. of America, has been appointed honorary chairman of the convention. Professor J. C. Warner of department of chemistry, Carnegie Institute of Technology, is general chairman; William P. Yant, director of development and research, Mine Safety Appliances Co. is general vice chairman. Four thousand scientists, industrialists, and representatives of allied fields are expected to participate.

The symposium on antisyphilitic agents, lasting two days, will be sponsored by the division of medicinal chemistry, of which John H. Speer of G. D. Searle & Co. is chairman. Technological developments in industry will be traced in a unit process symposium. F. J. Curtis of Monsanto Chemical Co. will head the symposium of research management of small laboratories under the auspices of the division of industrial and engineering chemistry. Divisions of biological chemistry and agricultural and food chemistry will hold joint sessions on vitamins.

Divisional meetings will begin on Monday, September 6, at 9 a. m. and conclude on Friday at 2 p. m. Sessions are scheduled by the society's council and board of directors, of which Thomas Midgley, Jr., vice president of Ethyl Corp., is chairman. A public meeting at which general addresses will be delivered has been arranged for Wednesday, September 8, at 2 p. m. Headquarters of the convention will be at Hotel William Penn, where registration of delegates begins Sunday afternoon, September 5.

Renegotiations Save $3,555,174,000

War contract renegotiation has saved $3,555,174,000, exclusive of the fiscal economies obtained through lower prices in successful contracts for the War and Navy Departments and the Maritime Commission in the first fourteen months of operation, according to a joint report issued recently.

The report stated that the savings were effected through "commitments for the elimination of excess profits." It covered the period from the beginning of renegotiation through June 30.

The report further emphasized that the "savings secured through lower prices in successive contracts" which the agencies were unable to estimate accurately, are "undoubtedly many times greater" than the $3,555,174,000 mentioned in the statement.

Chemical Exposition Sold Out

The 19th Exposition of Chemical Industries, which will be held in New York's Madison Square Garden Dec. 6-11 instead of Grand Central Palace as formerly, has no more exhibit space available, according to Charles F. Roth, manager. The Exposition was sold out much earlier than usual and there is already a sizeable waiting list of exhibitors, Mr. Roth said.

Big Wheat Buying Laid to Distillers

Distillers are reported to have bought large quantities of cash wheat in various markets, and it was estimated that 1,000,000 bushels or more had been taken. Part of the grain was obtained by an exchange for the future, the latter having been bought earlier in July.

At the same time country offerings are said to have fallen off and distillers are said to be outbidding other interests in Illinois and Indiana in an effort to get the grain while the after-harvest movement is on. Reports that the Government is planning to use sugar in place of grain in the manufacture of alcohol attracted considerable attention but failed to have any effect on prices.

Tank Car Mileage Decreased

Approximately 150,000,000 ton-miles of chemical tank car transportation have been saved in the first three months' operation of War Production Board Transportation Order T-1, according to the Chemicals Division of WPB. The order was recently retitled General Haulage Conservation Order T-1.

Additional savings are also being made through administration of WPB chemical orders which allocate some 200 chemicals to individual customers. Through these orders, the Chemicals Division generally allocates a supply to each user from the nearest available producing point. Order T-1 is for chemicals which are not in themselves scarce enough to require an allocation order, but which, nevertheless, do use tank cars. The great tank car shortage warrants control of distribution from transportation standpoint.

Alcohol Raw Materials Problem Looming

A fundamental decision facing WPB is what future alcohol will be made from. Pressure to conserve grain for food plus a still narrow sugar margin point to increased return to molasses.

NATIONAL PRODUCTION of alcohol for the full year 1944 is being considered on a scale of about 545,000,000 gallons. For the remainder of 1943, officials probably will settle on 249,000,000 gallons.

In the light of the various considerations one of the fundamental decisions facing the Chemical Division is what this production will be made from—whether to continue making a substantial part from grain, increase the trend back to molasses, or, subject to still further considerations, revert in a large measure to sugar.

The industry itself is very elastic in its capabilities—it can switch from one to another of the basic materials without too great difficulty, a factor recognized and weighing heavily in the discussions now taking place on the problem. To get an identical yield of alcohol, the industry can figure on 1 ton of sugar, or 2 tons of molasses, or 1½ tons of wheat, although generally speaking the sugar-base materials are favored as the most efficient.

Most officials are inclined to write off any possibility of large-scale reversion to sugar for the time being. The supply margin is still too narrow, psychologically and politically, if not in other respects. Those who are now advocating that remaining grain stocks be safeguarded by reducing the drain on them for alcohol are matched by other elements who favor continued and extensive use of grain for this purpose, and who do not admit any scarcity or even a potential grain shortage. These arguments leave molasses for consideration.

Stocks of this commodity are causing mounting concern in this country, matching the uneasiness in the islands where the stocks are accumulating. There is close to a half-billion gallons of molasses in sight in the Caribbean area, counting only stocks in Cuba, Puerto Rico and Santo Domingo, and not counting equally heavy producers in other islands and the mainland Latin America.

Probably close to two-thirds of this reservoir is potentially available to United States industry. Shipping is a vital question in this case. Left in the islands there is a danger that an untold amount of this reserve may be dumped, or otherwise lost to the United States, for lack of storage, inability of the owners to continue holding it indefinitely, and other causes. A large proportion is already earmarked for U. S. government account, and improved shipping facilities will result in heavy movements from these stores to the American coast, which have in fact already started. But shipments in sight are not believed adequate to meet the situation, either as to industrial demand here, or as a healthy depletion of the accumulated stocks in the islands.

Still another alternative has been proposed, in view of this outlook. That is to find what can be done in the way of making alcohol in the islands and shipping it to this country. If certain proposals now being considered are put in action, a sizeable off-shore alcohol industry is in sight. A recent survey of the possibilities indicates a possible supply from this source aggregating about 60,000,000 gallons, as follows: Santo Domingo, 4,000,000, Puerto Rico, 2,000,000 Cuba, upwards of 28,000,000, Colombia, 1,500,000; Guatemala, and Salvador, 750,000 each; Venezuela, Jamaica, Haiti, 1,000,000 each, and Martinique, 500,000, plus an estimated 18,000,000 from Canada and Mexico, from which last two most of the current imports are now received.

The catch is that distillery equipment in the off-shore areas may need bolstering, both as to capacity and renewal of equipment. The equipment would have to be found in the United States and exported.

Failing any of these, the proposal has been under study to convert some of this molasses, through local operations, into yeast products and, possibly, to ship it as dry-cargo through a process now in the experimental stage.

Meanwhile, the tentative production program for the United States contemplates an apportionment for the remainder of 1943 approximately as follows: 39,000,000 gallons from synthetic production or imports, the remainder from grain and blackstrap; 1944 program, 77,000,000 gallons from synthetics, balance from grain and blackstrap.

Allied Continues Fellowships

Allied Chemical & Dye Corp. announces continuation of its graduate fellowship plan in the school year 1943-44. Although the plan was conceived and established in peacetime, the company feels that in view of the valuable assistance in the war effort being rendered by well trained chemists and chemical engineers, aid to outstanding graduate students in completing their work for the Ph.D. degree is still of the highest importance. The recipients of the fellowships and the subjects are chosen by the universities; subjects are not restricted to those connected with the products or interests of Allied's operating divisions and subsidiaries. Stipend of each fellowship is $750.

The universities and colleges to which awards have been made for 1943–44 are:

Univ. of California, California Institute of Technology, Columbia Univ., Cornell Univ., Harvard Univ., Univ. of Illinois, The State Univ. of Iowa, Massachusetts Institute of Technology, Univ. of Michigan, Univ. of Minnesota, Northwestern Univ., Ohio State Univ., Univ. of Pennsylvania, Pennsylvania State College, Princeton Univ., Purdue Univ., Univ. of Wisconsin, Yale Univ.

Critical Chemicals

National Registry of Rare Chemicals, Armour Research Foundation, 35 W. 33rd Street, Chicago, Ill., requests information concerning the following chemicals which are urgently needed by war industries:

1. Pure Estriol (Theelol 500 mg.)
2. Pure Indene (500 g.)
3. Phlorhidzin (Phlorizin)
4. Parinoic Acid
5. Biallyl (1,5 Hexadiene)
6. Deca Tetra Enoic Acid
7. Octa Trienoic Acid
8. 1-3 Pentadiene
9. Ethyl Allene
10. Alkyl dimethyl benzyl ammonium chloride
11. Copper Selenite Dihydrate
12. Titanium Oxy Sulfate
13. P-Chlorobenzaldehyde
14. Dihydroxy Maleic Acid
15. N-Ethyltetrahydro derivative of 8-hydroxyquinoline

Chemical Developments President

E. L. Luaces has been elected president and member of the board of directors of Chemical Developments Corporation, Dayton, O. Mr. Luaces is well known as a chemical engineer and has designed plants in many countries.

Canadian Chemical Production at Record Heights

Soaring to the all-time peak of $472 millions, according to preliminary official figures prepared by the Dominion Bureau of Statistics, production of chemicals and allied products in Canada in 1942 showed a 56% gain over 1941, and an increase of 196% over 1939 production. Production in 1941 was estimated at $304 millions and in 1939 just under $160 millions.

The bureau's tabulation shows the average number of employees rose, during 1942, to 80,101 compared with an average of 54,000 in 1941 and a ten-year pre-war average of 17,700.

Salaries and wages paid in the industry in 1942, totalled almost $115 millions compared with $75.6 millions in 1941.

Ontario with its 453 plants (it had 412 before the war) produced 49% of the entire 1942 production. Its output was valued at $230 millions. Quebec produced 43% or $203 millions of chemicals and explosives in 1942 from its 278 factories. British Columbia produced about 4% of the production ($17.6 millions) while Manitoba was fourth with output of $10 millions.

Almost half the Canadian production was produced in what the bureau describes as the "miscellaneous" chemical group. This is the "basket" item which is largely the shell-filling and explosives program of the Canadian industry. This "miscellaneous" group had production valued at about $25 millions in 1938 and 1939. In 1940 it rose to $37.5 millions and in 1940 to just over $100 millions. Employment in this part of the industry averaged last year about 52,500, which is two-thirds of the entire chemical and allied products total.

CALENDAR OF EVENTS

AMERICAN CHEMICAL SOCIETY, 106th Meeting, Hotel William Penn, Pittsburgh, Pa. Sept. 6-10.
AMERICAN GAS ASSOCIATION, 25th Annual Meeting, Jefferson Hotel, St. Louis, Mo. Oct. 11-13.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Pittsburgh, Pa. Nov. 14-16.
AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS, INC., Iron & Steel Div. and Inst. of Metals Div., Annual Convention, Sherman Hotel, Chicago, Ill. Oct. 17-19.
AMERICAN PETROLEUM INSTITUTE, 24th Annual Meeting, Palmer House, Chicago, Ill. Nov. 8-11.
ELECTROCHEMICAL SOCIETY, INC., New York Convention, Hotel Pennsylvania, New York, N. Y. Oct. 13-16.
19th **EXPOSITION OF CHEMICAL INDUSTRIES**, Madison Square Garden, New York, N. Y. Dec. 6-11.
GYPSUM ASSOCIATION, Fall Meeting, Hotel Commodore, New York, N. Y. Sept. 15.
NATIONAL SAFETY COUNCIL, 32d National Safety Congress and Exposition, Sherman Hotel, Chicago, Ill. Oct. 5-7.
PACKAGING INSTITUTE, INC., Annual Conference, Hotel New Yorker, New York, N. Y. Nov. 4-5.
SALESMEN'S ASSOCIATION OF THE AMERICAN CHEMICAL INDUSTRY, Pomonok Country Club, Flushing, N. Y. Sept. 14.
TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Wartime Service Conference, Palmer House, Chicago, Ill. Sept. 21-24.

Earth Pigments Expanded

Although imports of earth pigments, such as French yellow ochers, Spanish and Persian Gulf red iron oxides, Italian siennas, and many others have been curtailed as a result of the war, they have been offset without great difficulty by improvement in processing of domestic pigments. In fact, many producers believe that imports of foreign pigments, with the possible exception of Spanish and Persian Gulf red iron oxides, will continue to be negligible after the war.

While no complete 1941 sales figures for mineral pigments comparable with those for 1942 are available, Bureau of Mines, U. S. Department of Interior, estimates that total production was 30% greater in 1942 than in 1941. Sales of high-iron natural yellow oxides and ochers increased notably, and there were small increases in the output of natural reds and raw umbers. Slight declines in the production of metallic browns, burnt and raw siennas, and burnt umbers were observed in 1942.

To compensate for the shortage of scrap iron, needed in certain processes for making synthetic iron oxides, Pennsylvania pigment makers calcined increasing quantities of "sulfur mud," a yellow limonitic iron oxide deposited by coal-mine waters in baffles set up outside the mine.

Survey of Chemical Industries

Fifty-five-page survey of the chemical industry published by the investment firm of Merrill Lynch, Pierce, Fenner & Beane presents analyses of thirty-five of the leading companies in the chemical industry, touches upon the history of chemistry in America from the early days, points out the growth trend of sales and earnings, the dividend record, and the range growth prospects stemming from the industry's continued emphasis on research.

Monsanto Announces Promotions for Three of Its Executives

William M. Rand, vice-president of Monsanto Chemical Co. and general manager of the Merrimac Division was elected to the executive committee. Assistant general manager of the Organic Chemicals Division, Daniel S. Dinsmoor, has been elected a vice-president of the company and will succeed Mr. Rand as general manager of the Merrimac Division.

Osborne Bezanson, vice-president of Monsanto and general manager of the Texas Division, will succeed Julius A. Berninghaus as general manager of the Organic Chemicals Division. Mr. Berninghaus will retire when these changes become effective on November 1.

William M. Rand

Daniel S. Dinsmoor

Osborne Bezanson

Winthrop Increases Production of Penicillin

Winthrop Chemical Co., Inc., has announced plans for a "vast increase" in production of penicillin, new highly concentrated extract from common cheese mold which kills bacteria and which has proved to be rapidly curative in such diseases as blood stream infection, osteomyelitis, pneumonia and gonorrhea. Additional facilities for the manufacture of this potent drug have been acquired in Rensselaer, N. Y., and will be devoted to the manufacture of the drug which is now allocated to the armed forces.

One of the first and today among the five largest producers of penicillin, Winthrop started to work with the drug in December 1940, and is currently supplying millions of units weekly to the armed forces. The "unit" system of measurement derives from Oxford University, where outstanding important basic contributions to our understanding of the value of the drug were made. Pure penicillin has not yet been isolated, and the "Oxford Unit" is based upon comparison with standard material furnished by Oxford University to laboratories throughout the world.

One million units weigh approximately 1/5 ounce. Yet one ounce is sufficient for treatment of many cases of gonorrhea. Sulfonamide-resistant cases of gonorrhea can be cured by as little as 100,000 units of penicillin in two days. Larger doses are usually needed for osteomyelitis and other infections.

Important information regarding the chemistry of the extract was obtained in 1939, and it was found that the calcium and sodium salts of penicillin are much more stable than the parent substance. The exact structure of penicillin is unknown at present, and until it has been determined, artificial production by synthesis is impossible. However, much has been learned about the "empiric" or general formula, which is stated differently by several investigators. Dr. E. P. Abraham and Dr. E. Chain of Oxford University suggest two formulas for penicillin: Either $C_{24}H_{32}O_{10}N_2$ or $C_{23}H_{30}O_9N_2$. Drs. Karl Meyer, Gladys L. Hobby and Eleanore Chaffee of Columbia University suggest $C_{14}H_{19}O_6N$ or $C_{19}H_{17}O_3N$.

Penicillin is probably the most active antibacterial drug known. It completely stops the growth of the pus-forming germ known as staphylococcus aureus when penicillin is added in a dilution as high as 1 to 25 million, and partially checks it in a dilution of 1 part to 160 million. Penicillin not only stops the growth of bacteria, but it actually kills bacteria. When penicillin can be made on a large scale it promises to replace the sulfonamides for some of the conditions in which they are now used because of the great potency of penicillin and the fact that side-effects have been relatively uncommon.

Assistant Technical Director

Dr. Warren H. Steinbach, formerly assistant professor of chemistry at University of Arkansas, has accepted a position in Research Department of Varcum Chemical Corp. to aid in the development of new resins and products.

WPB Members

Following revised list of executive personnel of War Production Board includes those members of particular interest to the chemical and process industries. It does not, however, contain the names of all W.P.B. personnel.

Executive Office of Chairman: Chairman, Donald M. Nelson, rm. 5055 SSB.; assistants to chairman: Sidney J. Weinberg, rm. 5403 SSB.; A. C. C. Hill, Jr., rm. 5036 SSB.; E. A. Locke, Jr., rm. 5036 SSB. Special assistants to chairman: Morris Creditor, rm. 5055 SSB.; G. Keith Funston, rm. 5055 SSB.; executive secretary, G. Lyle Belsley, rm. 5518 SSB.; assistant executive secretary, Frederick Roe, rm. 5518 SSB. Vice-chairman on Smaller War Plants Corp. Col. Robert Johnson, rm. 316 HOLC Bldg.

Office of Rubber Director: Director, William M. Jeffers, rm. 5014 Municipal Bldg. Office of War Utilities: Director, J. A. Krug, rm. 5300 SSB.

Vice Chairman, Ralph Cordiner, rm. 5027 SSB.

Office of Production Research and Development, Harvey N. Davis, Director, 420–5th St. NW.; assistant director, Harold H. Thurlby, 420–5th St. NW.; assistant director, Richard A. Wolff, 120–5th St. NW.

Program Vice-Chairman, J. A. Krug, rm. 5300 SSB., Requirement Committee, J. A. Krug, Chairman, rm. 5300 SSB.; Office of Food Consultant, Lee Marshall, rm. 4060 SSB.; Production Controls Bureau, Harold Boeschenstein, Director, rm. 3006 RRB.; Controlled Materials Plan Division, Walter C. Skuce, Director, rm. 3006 RRB.; Scheduling Division, Harry Zellman, Director, rm. 3018 RRB.

Vice-Chairman for Operations, Donald D. Davis, rm. 5006 RRB.; Commodities Bureau, H. D. Huges, Director, rm. 2003 TemS.; Chemicals Division, Dr. D. P. Morgan, Director, rm. 1007 TemS.; Containers Division, R. C. Mower, Director, rm. H–139 TemE.; Cork, Asbestos, and Fibrous Glass Division, Fred W. Gardner, Director, rm. 1103 TemS.; Pulp and Paper Division, Arthur G. Wakeman, Director, rm. 43 Fisheries Bldg.

Equipment Bureau, Harry A. Rapelye, Director, rm. 2061 TemR.; General Industrial Equipment Division, W. K. Frank, Director, rm. H–283 TemE.; Safety and Technical Supplies Division, Francis M. Shields, Director, rm. 606 Lenox Bldg. Minerals Bureau, Howard I. Young, Director, rm. 1106 TemR.; Mica and Graphite Division, M. H. Billings, Deputy Director, rm. 1304 TemR.; Mining Division, A. S. Knoizen, Director, rm. 1035 TemR.; Miscellaneous Minerals Division, R. J. Lund, Director, rm. 1011 TemR.; Tin and Lead Division, Erwin Vogelsang, Director, rm. 2033 TemR.; Zinc Division, George C. Heikes, Director, rm. 3–222 TemE.

Seek Substitutes for Mercury Salts

Substitutes for corrosive sublimate, calomel, and other mercury salts which have become the standard chemicals for use in treating cabbage, cauliflower, and closely related plants to combat the cabbage root maggot are being sought by entomologists at N. Y. State Experiment Station at Geneva to meet a growing scarcity of these materials. Because of unsettled conditions in countries which supply most of the mercury used in the United States, the costs have also advanced sharply.

Anticipating this situation, nearly forty different materials or combinations were tested at the Experiment Station last year, but none of them were found to approach the mercurials in effectiveness or to give promise as possible substitutes in root maggot control at concentrations at which they can be safely used. The tests were made on a quick-growing type of radish which is extremely susceptible to maggot attack as well as to injury from chemical treatments.

New WPB Committee

War Production Board has announced the formation of a Sodium Hydrosulfite Manufacturers Industry Advisory Committee consisting of—Government Presiding Officer: Morris R. Stanley, Committee members are: A. R. Chantler, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; G. J. Desmond, Jacques Wolf & Co., Passaic, N. J.; Augustus H. Eustis, Virginia Smelting Co., Washing-

 Prepared Monthly by U. S. Industrial Chemicals, Inc.

U.S.I. CHEMICAL NEWS

August ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1943

U. S. Industrial Alcohol Co. Merged Into U. S. Industrial Chemicals, Inc.

New Acetone Uses Developed Covering Many Varied Fields

Importance of Chemical Shown By Study of Recent Patents

Although generally considered a staple chemical with a fairly limited although important field of utility, acetone is finding many new uses in a wide variety of processes. As an indication of the unexplored possibilities of this highly reactive chemical, a study of recent patents reveals many such applications. A few of the more interesting are outlined in the following paragraphs as described by their inventors.

In the rubber compounding field, for example, a typical new use for acetone is in condensation with aryl amide to produce an age resistor for rubber which is particularly effective at elevated temperatures.

For inhibiting oxidation in rubber, another inventor recommends incorporating about 0.1% or more of a product of thermal reaction of a ketone such as acetone, an aliphatic "hydrocarbon alcohol" such as isopropanol, and a secondary di-aromatic amine such as diphenylamine in the presence of an acidic catalyst, with elimination of water.

One use for acetone in the metal-working field is its use in combination with boron trifluoride. An organic flux for soft soldering metals is obtained which is described as non-corrosive when left in contact with the metal being soldered and yet which mildly, but uniformly, attacks the metal surface during the soldering operation.

To produce a solvent for dewaxing mineral oils, acetone is recommended in combination with amyl mercaptan. Certain treated waxy lubricating oil stocks of 70 seconds Saybolt universal viscosity when mixed with such a

(Continued on next page)

Composition Developed for Treating Plastic Materials

BURBANK, Calif. — A patent has been awarded to an inventor here for a composition suitable for use in the treatment of cellulose derivatives, such as photographic film, which is claimed to be effective either to prevent shrinkage and deterioration or to restore the normal characteristics of such materials after having undergone a loss of their volatile constituents.

The composition comprises an azetropic mixture of one or more volatile organic solvents, such as dibutyl phthalate, and one or more volatile plasticizing agents such as ethanol, isopropanol, butanol, and ethyl acetate.

By constant research and development, U.S.I. has expanded its activities until it is not only one of the largest industrial alcohol manufacturers, but a major producer of chemicals and solvents derived from alcohol.

High Bactericidal Properties Claimed for New Compound

DALLAS, Tex. — A new compound, hexamethyl-para-rosaniline-chloride-copper, has been patented by two inventors here which is said to have remarkable bactericidal, protozoadidal, ovacidal, and fungicidal action while remaining relatively harmless to body tissues.

As described by the inventors, the process of preparing this compound includes dissolving 1.5 grams of crystal violet dye in 10.5 cc. of ethanol and 90 cc. of water having 2 cc. of 95% U.S.P. lactic acid therein. Approximately 90 cc. of the first solution is then mixed with 8 cc. of the second solution and 2 cc. of water.

Improving Soya-bean Oil

A process for improving the color and extending the pre-reversion period of soya-bean oil which may be partly hydrogenated or refined has been reported. The oil is heated for several hours under reduced pressure in the presence of superheated steam if desired, at 205-260° with 0.01 to 0.5% of glycerol to remove volatile constituents.

New Name Signifies Increasing Interest in Growing Chemical Field

Effective at the close of business on July 16th, U. S. Industrial Alcohol Co. has been merged with, and into, U. S. Industrial Chemicals, Inc., in line with the Company's increasing interest and growing activities in the broader field of industrial chemicals — and consistent with the present trends in the research and development of U.S.I. products.

Originally organized in 1906 under the name of U. S. Industrial Alcohol Co. for the express purpose of manufacturing industrial alcohols, the Company has gradually increased its activities in alcohol-derived solvents, chemicals and intermediates.

U.S.I. Activities Increase

Interest in the development of related alcohol-chemical products has continued until today U.S.I. offers a most complete line of these products for applications and for organic syntheses in new fields of endeavor.

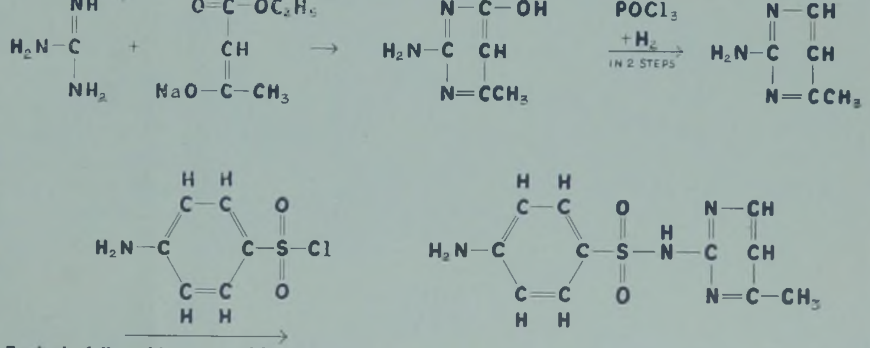
Among important recent additions to the U.S.I. line are a number of new acetoacetarylides, developed in recognition of the growing importance of yellow pigments and dyestuffs, and ethyl benzoylacetate, an intermediate useful in the manufacture of dyes and the synthesis of many chemical compounds. U.S.I. has also recently manufactured quantities of Indalone, insect repellent outstanding for slow-evaporating and film-forming characteristics, and ethyl sodium acetone-oxalate, a highly reactive chemical.

New Glycerol Method

Another significant contribution made by U.S.I. during the past year was the development of a commercially practical method for producing glycerol by fermentation of molasses which is expected to alleviate the cri-

(Continued on next page)

Ethyl Acetoacetate Used as New Sulfa Drug Intermediate



Typical of the wide range of important products made with the aid of ethyl acetoacetate is its use as an intermediate for the new sulfa drug sulfamerizine, which is reported to be more powerful than sulfadiazine and less liable to cause damage to the kidneys. Sulfamerizine can be produced in accordance with sequence shown above.

U.S.I. Merger

(Continued from preceding page)

tical demand for this war-important material.

Intermediates Developed

One of the major undertakings of U.S.I.'s laboratories at the present time is the development of new chemical intermediates for use in the manufacture of hormones, amino acids, vitamins, insecticides, and chemo-therapeutics.

To exploit further uses for the staple products and develop new ones, a Technical Sales Development Department was established by U.S.I. with headquarters in a newly constructed laboratory building.

A significant step in the widening of U.S.I.'s chemical activities was its entrance into the field of synthetic resin manufacture with a fairly complete line which includes modified and pure phenolics, alkyds, urea-formaldehydes and ester gums. A line of natural resins was added a short time later.

Two new plants have been built to increase U.S.I.'s resin manufacturing capacity. Both the manufacture and sale of these materials are now conducted by U.S.I.'s Stroock & Wittenberg Division.

Through an active research and development program, coupled with the maintenance of high standards of purity and uniformity, U.S.I. has been able to serve not only virtually every important industry, but to make a substantial contribution to America's fight for freedom as well.

Patent Awarded for Process To Separate Fatty Acids

A method for obtaining fatty-acid fractions relatively rich in stearic and palmitic acids from mixtures such as tallow and garbage grease is the subject of a recent patent.

The method comprises dissolving the fat in a solvent such as 90% methanol, and establishing in the solution a quantity of neutral fat amounting to about 0.5 to 3.5% of the weight of the fatty acids. The solution is then chilled to provide a fraction purer in stearic than in palmitic acid. After this fraction has been removed by filtration, the solution is again chilled to effect crystallization of an eutectic mixture of stearic and palmitic acids. This fraction is also removed by filtration and the solution again chilled to precipitate a fraction richer in palmitic acid than in stearic acid. This final fraction is also removed by filtration.

New Acetone Uses

(Continued from preceding page)

solvent are claimed to produce a dewaxed oil with a pour point of 5° F.

A recent pharmaceutical application of acetone is in dissolving the salt of calabash-curare as a preliminary step in purifying toxiferine. The patent also outlines subsequent steps in the process.

Another new pharmaceutical use for acetone is in the extraction of stings and poison glands of bees. The extract is then evaporated in vacuum at 20° and extracted first with a concentrated alcohol, such as ethanol or methanol, and with 55-65% aqueous alcohol.

New uses for acetone are discovered frequently in the paint, varnish and lacquer industries where this chemical has long been one of the most useful solvents. One recent application is found in a process for a drying oil composition claimed to possess improved hardness and adhesion, as well as greatly reduced wrinkling tendencies. It comprises an unsaturated ketone condensation product of acetone in which tung oil is dissolved.

A rapid, uniform method of producing a luminous coating for electric lamps was discussed recently in which luminescent particles are dissolved in a medium of acetone, nitrocellulose and dimethyl phthlate. Another inventor recommends the addition of colloidal graphite dissolved in acetone and aluminum to lacquer that is to be used on aircraft.

Among the new uses for acetone in organic synthesis is one in which it is used in preparing a pure grade of hydroxylamine hydrochloride. Acetone is reacted with a mixture of nitric acid and hydrochloric acid to produce chloroisonitrosoacetone, which is dissolved in water and reacted with chlorine gas, then hydrolyzed in dilute hydrochloric acid.

The preparation of new emulsifying agents which disperse calcium soap also involves the use of acetone. Lauryl chloride is condensed with a sulphonic acid of para-toluidine or para-chloroaniline in the presence of caustic soda ash or other alkalies and acetone.

An improved method of manufacturing vinyl crotonate makes use of acetone. Acetylene is brought into contact with crotonic acid in the presence of acetone and in the presence of a catalyst at a temperature not exceeding about 50° C.

One of the foremost producers of this basic chemical for many years, U.S.I. offers acetone of highest purity to meet essential needs.

TECHNICAL DEVELOPMENTS

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

A textile sample dryer is offered which is claimed to perform both drying and conditioning operations on samples of materials in from one to two minutes. Swatches are placed on a wire screen on the disc or rotor attached to the inside of the door of an insulated cabinet, and rotated first with door closed, then opened. **(No. 720)**

U S I

A portable parts-testing unit has been developed which the maker says can subject specimens to any temperature between 165° F. and 100° below zero. Using carbon dioxide as refrigerant, the unit may be attached to a small enclosure built around test parts. A small electric heater provides heat. **(No. 721)**

U S I

A moisture-resistant white pencil tracing cloth has been put on the market which is said to guard against spots from perspiration or moist hands and climatic conditions. It is described as having glass-like transparency and a fine-tooth surface. **(No. 722)**

U S I

A floor cleaning and disinfecting powder is offered which is said to form a non-caustic solution that is effective on floors of wood, tile, terrazzo, cork, linoleum, and rubber. The maker says it rinses readily, does not turn rancid, and is harmless to the skin. **(No. 723)**

U S I

A resin-base paint has been developed which is said to protect the surfaces of metal, wood, and concrete against attack by organic and inorganic acids, alkalis, salts, alcohol, gasoline, oils, and moisture. It is applied by brushing, spraying or dipping. **(No. 724)**

U S I

A salve for treating burns has been developed which is claimed to offer ease of application, relief of pain, acceleration of rate of healing, shortening of disability period, and the prevention of disfiguring scars in many cases. **(No. 725)**

U S I

An acid rust solvent and metal cleaner has been developed for ferrous metals and galvanized sheets. The maker says it will remove oxides quickly in cold solutions without attacking the metal, and that it is fumeless and will not damage clothing, shoes, or hurt hands in any way. **(No. 726)**

U S I

A paint-type marking crayon is offered for use on cold surfaces of steel, lumber, rubber, stone, glass, porcelain and plastics. Colors include white, black, red, blue, green, and yellow. **(No. 727)**

U S I

A flame-proofing material is offered for cloth and fabric that is said to prevent them from igniting even when exposed to actual flames. The maker says it is non-injurious to woolens, cotton or rayon, non-injurious to the skin, and non-poisonous and odorless. **(No. 728)**

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- *Solox Proprietary Solvent
- *Solox D-I De-icing Fluid

***ANSOLS**
- Ansol M
- Ansol PR

ACETIC ESTERS
- Amyl Acetate
- Butyl Acetate
- Ethyl Acetate

OXALIC ESTERS
- Butyl Oxalate
- Ethyl Oxalate

PHTHALIC ESTERS
- Amyl Phthalate
- Butyl Phthalate
- Ethyl Phthalate

OTHER ESTERS
- *Diatol
- Ethyl Carbonate
- Ethyl Chloroformate
- Ethyl Formate

INTERMEDIATES
- Acetoacetanilide
- Acetoacet-ortho-anisidide
- Acetoacet-ortho-chloranilide
- Acetoacet-ortho-toluidide
- Acetoacet-para-chloranilide
- Ethyl Acetoacetate
- Ethyl Benzoylacetate
- Ethyl Sodium Oxalacetate

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

OTHER PRODUCTS
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- Collodions
- *Curbay B-G
- *Curbay Binders
- *Curbay X (Powder)
- Ethylene
- Ethylene Glycol
- *Indalone
- Nitrocellulose Solutions
- Potash, Agricultural
- Urethan
- *Vacatone

ton, D. C.: D. S. Frederick, Rohm & Haas Co., Philadelphia, Pa.; A. J. Royce, Royce Chemical Co., Carlton Hill, N. J.

COMPANIES

Industrial Alcohol Merges

U. S. Industrial Alcohol Co. and U. S. Industrial Chemicals, Inc., were merged last month by vote of stockholders to form U. S. Industrial Chemicals, Inc., a Delaware corporation. The chemicals company was formerly a wholly owned subsidiary of the alcohol company.

Diamond Alkali Absorbs George Chemical Co.

Effective August 1st, Diamond Alkali Sales Corp. will take over the operation of The George Chemical Co., Inc., with C. V. Douglas as New York district manager. New headquarters have been established in General Electric Bldg., 570 Lexington Avenue.

J. M. Willimas, H. B. Clark, F. C. Whitrock, and H. H. Harbers, formerly with the George Chemical Company, Inc., and V. L. Flaccus, Jr., will be associated with Mr. Douglas.

American Cyanamid Co., Calco Chemical Division, Bound Brook, N. J.—Star added to flag.
American Cyanamid Co., Lederle Labs., Inc., Pearl River, N. Y.
Babcock & Wilcox Co., Refractories Division, Augusta Works, Ga.—Star added to flag.
F. W. Berk & Co., Woodridge, N. J.
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Dow Magnesium Corp., Velasco, Texas.
Dow Chemical Co., Freeport, Texas.
Du Pont de Nemours & Co., Rocky Mountain Arsenal, Denver, Col.
B. F. Goodrich Co., Los Angeles, Cal.
Hercules Powder Co., Hopewell, Va.
Hercules Powder Co., Port Ewen, N. Y.
A. F. Holden Co., West Haven, Conn.
Lamber Pharmacal Co., St. Louis Laboratory, St. Louis, Mo.
Norwich Pharmacal Co., Norwich, N. Y.
Thresher Varnish Co., subsidiary of Pittsburgh Plate Glass Co., Dayton, O.
Union Metal Mfg. Co., Canton, Ohio.

Larbig Chemical Formed

Larbig Chemical & Mfg. Co. has been formed with offices in 1210-12 West Ninth Street, Kansas City, Mo. The company will distribute chemicals for industry in mid-west territory. C. A. Larbig previously had been secretary of Thompson Hayward Chemical Co. for fifteen years. The company will carry stocks at its warehouse for servicing Missouri, Kansas, Arkansas, Oklahoma, Iowa and Nebraska.

R.S.A. Corp. Moves

R. S. A. Corp., successor to Organic Products Co., has removed its offices and plant to larger quarters in Ardsley, N. Y.

Builds Battery Carbon Plant

Godfrey L. Cabot, Inc., Boston, Mass., announces the completion of a million pound dry cell carbon plant at Pampa, Texas, for the manufacture of battery carbon.

This new product, according to the statement, will help relieve the shortage of a critical material for the dry cell battery industry. Heretofore, American dry battery manufacturers have been dependent on sources of supply outside the United States.

Marco Chemicals, Inc., Expands

Marco Chemicals, of Philadelphia, has announced the transfer of its business to Marco Chemicals, Inc., a New Jersey corporation, with Irving E. Muskat as president. The latter company, which manufactures a synthetic impregnating resin plastic used in the fabrication of military aircraft parts, will henceforth be located at Sewaren, N. J..

Continental Can Co. and Vulcan Detinning Co. have acquired a substantial interest in Marco Chemicals, Inc., and are represented by Carle C. Conway, chairman of Continental Can and W. J. Buttfield, president of Vulcan Detinning, who are directors.

ASSOCIATIONS

Junior Engineers Meet

New officers for the coming year have been announced by Junior Chemical Engineers of New York. Lt. Raymond P. Devoluy, U. S. Navy Materials Lab., was elected president, while Edward T. Maples, M. W. Kellogg Co., will serve as vice president. The new secretary-treasurer is Andrew E. Chute, Foster-Wheeler Co., and the assistant secretary-treasurer is Frank Melaccio, Fratelli Branca & Co.

Glycerine Research Continues

Due to the enormous demand for alkyd resin paints by the army and navy, the Glycerine Producers Ass'n has placed resins first on its research program. Looking forward to post-war demands, however, the association sees important prospects for glycerine in the food industry.

Glycerine and phthalic anhydride, according to the association's research committee, are essential ingredients for the alkyd resin paints which are used universally to protect our ships, tanks, planes, jeeps, trucks and other military equipment against weather, salt water, driving sand, rust and hard wear. Estimates show that 42% of the 1943 glycerine production available after fulfilling lend-lease requirements will go into these extra-tough coatings.

Next to resins as the objective of glycerine allocations this year come explosives. It is expected that 23% of the 1943 absolute glycerine production, now estimated at about 150,000,000 pounds, will be for this war purpose.

Various federal and state departments have collaborated with private individuals in the development of an economical quick freezing process using a 50% glycerine solution. It was found that by immersion in this liquid, food products could be frozen quicker and better, and at higher temperatures than those required for air freezing. Another recent discovery related to the value of glycerine in making chocolate bars resist hot weather, and in preserving peanut butter.

Although the search for new sources of glycerine has gone on for several years, the committee reports that, up to the present, none has been found comparable to animal and vegetable fats and oils. Experiments in the recovery of glycerine from distillers' waste have shown laboratory possibilities which, however, have not been turned to practical use, owing to the difficulty of getting the special machinery required, and to the doubt of a commercial post war market for glycerine from fermentation sources.

Commenting on the results of a series of experiments on the value of glycerine as a food the Journal of American Medical Ass'n said editorially: "An extensive reinvestigation of the subject, involving the feeding of varying amounts of glycerine to different species, including man, has recently been completed at the department of physiology of the University of Chicago. This shows that glycerine as such can safely be incorporated into the regimen in far larger proportions than that in which it is liberated from even large quantities of dietary fat. It readily replaces carbohydrates, having about the same caloric value. In the case of man, glycerine was fed over a period of fifty days in amounts as large as 110 gm. daily without any demonstrable undesirable effects."

PERSONNEL

General Foods Appoints

Roy H. Walters has been advanced to position of director of engineering research for General Foods Central Laboratories. Dr. Harold S. Levenson, former research project leader, has been made a division head in the physical chemistry section.

Dr. John H. Lutz, former assistant professor of chemical engineering at Massachusetts Institute of Technology, has been appointed a research staff project leader in charge of packaging research. Millard O. Ricker, formerly employed by Trojan Powder Co., has joined the research staff as project leader in the engineering research section.

Cordiner Returns to G. E.

Appointment of Ralph J. Cordiner as assistant to president of General Electric Co. has been announced by Gerard Swope, president. Mr. Cordiner, who resigned in June as vice-chairman of War Production Board, was formerly president of Schick, Inc., prior to which he was manager of the appliance and merchandise department of General Electric. His office will be at 570 Lexington Avenue, N. Y.

Dr. Clifford B. Purves of M. I. T. has been appointed E. B. Eddy professor of industrial and cellulose chemistry at McGill University, Montreal. The activities of the Eddy professor are intimately related with the research and development work in the field of cellulose chemistry conducted by Pulp and Paper Research Institute of Canada.

United Merchant & Manufacturers, Inc., have announced the consolidation of two committees to develop new fibres and fabrics for postwar use, under the direction of **Edgar L. Schlesinger.** Mr. Schlesinger will head the company's research on new fibers and materials which may have a textile application.

Walter E. Scheer has been appointed to the staff of Amecco Chemicals, Inc.,

Commissioned in Marines

J. Rivers Adams, sales manager Westvaco Chlorine Products Corp., has been commissioned as a captain, United States Marine Corps Reserve.

Sales Managers Advance

Mathieson Alkali Works announces the appointment of J. B. Peake, formerly N. Y. district sales manager, to assistant general manager of sales.

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and will be in charge of the company's new branch office located at 60 East 42nd Street, N. Y. Mr. Scheer, who was formerly employed by Commercial Solvents Corp., will handle technical and sales work.

Walter J. Murphy, editor of Industrial and Engineering Chemistry, and Chemical and Engineering News, publications of American Chemical Society, has been appointed a member of the National Research Council, Division of Chemistry and Chemical Technology, for a period of three years ending June 30, 1946.

Chemists Join Breon & Co.

Dr. Robert Bruce Moffett, Ph.D. University of Illinois, has been appointed senior research chemist of George A. Breon & Co. Prior to joining the company Doctor Moffett was post doctorate fellow in biochemistry at Northwestern University.

Other scientists recently added to the staff include: Mary Bea Flint, B.S. University of Kansas, junior chemist; Carroll Moore, B.S. University of Kansas City, chemist; Jane Stickley, B.S. Washburn University (Topeka), junior chemist; Janet Stoltenberg, M.S. University of Minnesota, research chemist; Reola Durand, B.S. University of Kansas, bacteriologist; and Silas A. Klug, M.S. University of Minnesota, control chemist.

Delgado Resigns as OPA Drug Head

Frank A. Delgado, after twenty-two months with Office of Price Administration, has resigned as head of the Drugs and Fine Chemicals Unit. He is joining the Office of Foreign Relief and Rehabilitation Operations.

Course for Petroleum Experts

Columbia University's School of Engineering will offer a specialized sixteen-week night course at the request of eighteen New York engineers. Members of the group are all engaged in petroleum engineering and are working on government contracts as employes of E. B. Badger & Sons Co.

The course is designed to assist the men in solving problems arising from their work by applying the school's courses in fuel technology specifically to war industry.

OBITUARIES

Alfred J. Curr, Sr., superintendent of Linde Air Products Co. plant in Newark, died June 16 after a short illness. His age was 57.

Byran Brewster Gilmer of Houston, Texas., for the last fifteen years a director of McKesson & Robbins, Inc., and regional vice-president in charge of that company's southwestern district, died on August 2 at the age of 66.

Arthur J. Hettel, manufacturing chemist, died July 16 in Rochester, N. Y., at the age of 55. Mr. Hettel was an inventor of disinfecting fluids, hardening compounds and other preparations required by embalmers.

Kay E. Lindberg, chemist with F. L. Smith & Co. died July 15 at his home in Elizabeth, N. J. His age was 55.

Gould Grant Rheuby, 74, who had retired as vice-president, director, and member of finance committee of Hercules Powder Co., died July 28 at his home in Glen Mills, Pa., of angina pectoris. He had suffered another attack several days ago.

Theodore J. Schmidt of Brooklyn, N. Y., special representative of industrial department of Palmolive-Peet Co., with which, and its predecessor, he had been associated for twenty-seven years, died July 21 after a brief illness. He was 58 years old.

Dr. J. W. Shipley, former head of the chemistry department of the University of Alberta, died June 30 after a lengthy illness. A noted chemist, Dr. Shipley had won international fame in the field of electrochemistry.

Company	*Period*	**Taxes** *1943-1942*	**Net Profit** *1943-1942*
Air Reduc. Co., Inc.	Second quarter	$3,588,606-$3,304,394	$1,715,512-$1,647,368
	Six months	$6,891,671-$6,037,113	$3,446,145-$3,252,908
American Home Products Corp.	Six months	....	$2,220,797-$2,036,477
Atlantic Ref. Co.	Six months	....	$2,692,000-net loss of $1,577,000
Atlas Powder Co.	Six months	2,014,000-.........	767,012-.........
Com'l Alcohols, Ltd.	Second quarter	$64,920-$117,500	$63,701-$90,111
Com'l Solvents	Second quarter	....	$568,695-$596,730
	Six months	$2,648,300-$3,818,100	$1,220,324-$1,143,911
Dow Chemical Co.	Year ended May 31	$18,248,433-$10,079,126	$8,225,301-$9,221,486
Freeport Sul. Co.	Second quarter	....	$864,495-$735,417
Harshaw Chem. Co.	Nine months to June 30	....	$274,184-$373,181
Hercules Pdr. Co.	Six months	$9,999,369-	$2,716,789-
	Second quarter	$4,936,401	$1,338,379
Libbey-Owens-Ford Glass Co.	Six months	....	$1,392,682-$754,966
Mathieson Alkali Works, Inc.	Second quarter	$530,000-$580,000	$365,532-$211,231
	Six months	$940,000-$925,000	$704,697-$556,092
National Lead Co.	Six months	$4,754,917-$5,618,550	$2,248,954-$1,977,828
Owens-Illinois Glass Co.	Year to June 30	....	$9,146,118-$9,090,273
Parke, Davis & Co.	Six months	$4,980,000-$3,714,866	$3,905,704-$3,149,165
	Year to June 30	....	$7,075,666-$7,807,560
Shell Union Oil Corp.	Six months	....	$10,435,194-$7,228,950
	Second quarter	$9,847,000-$2,104,000	$5,368,007-$2,572,404
Sinclair Oil Corp.	Six months	$5,000,000-.........	$9,536,952-$8,423,448
Socony-Vacuum Oil Co., Inc.	Six months	....	$15,000,000-$15,500,000
Texas Gulf Sul. Co.	Second quarter	$1,788,000-.........	$2,092,120-.........
Union Carbide and Carbon Corp.	Second quarter	$23,066,208-$19,010,219	$9,696,633-$7,611,940
U. S. Industrial Alcohol Co.	Year to Mar. 31	$1,280,000-$1,950,000	$1,152,675-$1,996,077
Westvaco Chlorine Products	Six months	....	$553,053-$501,661

INDUSTRIAL TRENDS

Agriculture: Prices received by farmers in mid-May averaged 187 per cent of their 1910-1914 level, the highest point reached since 1920. The price average was 23 per cent higher than a year ago.

The price trend has been about the same during this war to date as it was in the corresponding period of World War I. It seems doubtful, however, if the advance will continue until the price average reaches the earlier peak of 244, recorded in May 1920. The rate of increase has been slowing up since last December.

Superphosphate production in April continued well above last year's level, with the increase over April 1942 amounting to 16 per cent. Total production in the first four months of this year was 14 per cent larger than output in the corresponding period of 1942. There was a moderate seasonal drop from March.

Oil: Supplies of major oil products on the Atlantic seaboard declined moderately during last week in July, according to the American Petroleum Institute. The Institute's index, covering gasoline and light and heavy fuel oil, stood at 34.9, compared with 35.2 a week earlier and a low point of 25.5 on May 8, 1943. The index is based on stocks in 1940 and 1941 and adjusted for seasonal variation.

The country's crude oil production for week of July 31 averaged 4,133,300 barrels daily, an increase of 14,600 over the 4,118,700 in the previous week. Production was 195,200 barrels below the recommendation of 4,328,500 daily for July by the Office of the Petroleum Administration.

Business Barometers: Electric power production increased more than seasonally during week ending July 31, and the adjusted index rose to 151.4 from 150.6 in the preceding week. The figure was 133.8 for the week ending Aug. 1, 1942.

Production totaled 4,226,705,000 kilowatt hours, compared with 4,196,357,000 in the preceding week and 3,649,146,000 in the corresponding 1942 period, according to the Edison Electric Institute.

Bank clearings in twenty-two leading cities outside New York rose moderately in the last week in July from $3,618,682,000 to $3,776,348,000, reflecting a gain of 21 per cent over last year.

Commodity prices moved irregularly during the week. The Dun & Bradstreet daily wholesale price index of 30 basic commodities moved from 170.79 on July 29 to 170.75 on Aug. 5th. The wholesale food price index rose 1c. in the week to $4.04. This is an 8 per cent increase over last year. Volume was lower and while the market displayed slight recovery tendencies late in the week, the Dow-Jones industrial stock average closed at 136.76 in comparison with 139.41 for the last week in July.

Steel: Bettering the 1942 output, steel operations for the week ending August 7 were estimated at 99% of rated capacity, unchanged from the week before. There is a possibility that the rate may be slightly higher during the week of August 15. Steel men point out, however, that with the tight coke situation, and with necessary repairs there may be some difficulty in attaining a rate much higher than the present one. The output represented by the 99% figure, however, reflects a greater steel tonnage than a year ago, since more capacity has been brought in since that time.

Construction: Despite the tremendous war-plant construction program of the past three years and despite the anticipated surplus-plant problem of the postwar era, F. W. Dodge Corp. anticipates a larger volume of industrial plant construction during the ten years following the war than in the 1930-1939 decade. The estimated increase of the postwar decade over the pre-war decade is about 30 per cent, in terms of 1940 dollars.

Washington

(*Continued from page* 148)

to meet vital war needs, and pressure for broad price action to ease the situation continues.

Meanwhile the difficulty in maintaining grain supplies and in adjusting prices of war supplies using grain has led to alterations of price ceilings on some types of alcohol, amounting to subsidy of a few producers.

New supplies of sugar syrups are in prospect from Mexico and other foreign sources, but the present outlook is for controls which will channel these supplies very rigidly. There is a dispute currently in OPA over this policy, which has not broken into the open, but is going on between more conservative elements recently taking over in that besieged agency, and entrenched members of the old organization. The outcome, promised for early August, may see a reversal of the present plans on these imports, but the supply involved at present is not significant in any case.

Return to Molasses Alcohol

Eastern plants producing industrial alcohol from grain will be informed shortly, and some already have been warned unofficially, that they must return to using molasses, and to some extent raw sugar, beginning September 1.

This reversal of a situation which forced many Eastern plants to switch from molasses to grain is just taking place. At this writing, nothing has been said about the plan publicly. Plant officials concerned, where they learned of it, protested that they were not equipped to use raw sugar, which involves both a manpower situation and extra equipment.

They were told that as far as possible, they would be supplied with molasses. At this writing, arrangements are being negotiated for use of a number of tankers which were lying idle at Martinique and elsewhere in the Caribbean, and which are potentially available due to the changed international situation in those islands. Optimism over the possibility of getting tankers is matched by an equally favorable supply report on molasses stocks in Cuba, Puerto Rico and other islands, including some whose status has recently altered in the shifting war situation.

The change is explained in some quarters as necessary because of the growing pressure on grain supplies in the United States. While the common picture is that granaries are bulging with both corn and wheat, and this is generally true, authorities are beginning to visualize new demands from populations in conquered areas abroad for bread grains. This outlook is reflected in a new tendency in Washington to re-examine grain stocks, and to begin to weigh the amounts hitherto freely available for such uses as alcohol production. Hence the argument for a return to molasses.

The change has been the subject of considerable bitter discussion behind doors, according to reliable indications, and repercussions are expected in Congress when that body assembles again in September. Sponsors of the molasses program have assured those who raised a question as to the fate of sugar consumers in the civilian ranks, that no threat to domestic supplies is involved. They believe they can swing back to molasses for alcohol and still leave plenty for home use, even ration-free perhaps, which is what the politically-minded in Washington are insisting on.

A potent source of criticism is in the grain belt, however, and its members in Congress who have fought a year-long battle to force utilization of agricultural surpluses, are not expected to take the change without doing something. Senator Gillette's sub-committee which has led in this fight, is expected to go into the details of the change as soon as Congress re-convenes.

CHEMICAL SPECIALTY COMPANY NEWS

Skin-Penetrative Properties of Oils and Fats

Makers of creams, muscle oils and similar preparations may be interested in the results of experiments carried out by scientists (reported in Brit. J. Derm. Syph. 53, 41, 65) to determine the skin-penetrative properties of oils and fats, emulsions and aqueous solutions.

The experiments entailed the use of oil-soluble dyes and fluorescent substances or dyes such as naphthol green B which may be detected in infra-red radiation. Chemicals, such as copper sulfate or silver salts, which are readily detected histologically were also used.

The stratum corneum of the skin is only penetrated to the depth of one-third by oils, fats, and aqueous preparations it was found. There was penetration by way of the hair follicles and sebaceous glands.

Oleic acid and volatile oils proved to have the greatest powers of penetration, followed by animal oils, fats and waxes. Vegetable oils showed less penetration, and mineral oils the least. Emulsification did not prove to have any effect on the penetrative properties of the oils. The aqueous phase of the emulsion was not absorbed and the type of emulsion had no effect on the absorption of water-soluble materials. The pH of emulsions had no effect on skin penetration.

"Thanite" Price Lowered

Hercules Powder Co., Naval Stores Dept., has announced a ten % reduction in the price of "Thanite," insecticide concentrate derived from chemicals extracted from pine wood. The new price of the concentrate is $4.95 a gallon retroactive to March 1, 1943. "Thanite" is known chemically as bornyl and fenchyl thiocyanoacetate.

New Raw Materials

The constant search for new raw materials brings news items to the industry continuously:

1) The cosmetic industry is interested in an oil expressed from the kernel of oyster nuts which are grown widely in Tanganyika and yield 62% oil.

2) In Puerto Rico the shrub *Lippia helleria,* known as oregano or mejorana has long been used locally, both as a condiment and in rubbing compounds for colds. Its oil resembles that of oreganum and marjoram and it is suitable for use in shaving and hair lotions and soap.

3) South Africa has recently experimented with the production of avocado pear oil and farmers claim they can produce oils similar to those generally obtained from California to provide bases for face creams and other cosmetics. When the war and its attendant shipping difficulties are over, South Africa hopes to offer the oil at low enough prices to permit its use widely.

Heads Control Lab

Appointed to direct the control materials dept. of the Turco Products laboratory, Earnest R. Long expects to work with metal surface preparations.

Vitamin F in Cosmetics

Opinion has varied for some time as to the efficacy of the external application of any vitamin-containing preparations. Actually vitamin F has long been used in creams and soaps by virtue of its presence in linseed, walnut, sunflower, and soy bean oil, to the extent of from 250 to 1000 Shepherd-Linn units.

The use of this vitamin in face creams of the water-in-oil type is not altogether easy, as such additions of unsaturated fatty acids seriously reduce the stability of this type of cream. In this case therefore, the quantity of water is usually reduced and the percentage of emulsifier increased. In such instances it is not recommended to add more than 65% of water and glycerine combined.

As vitamin F is subject to oxidation, a suitable preservative, such as p-oxybenzoic acid ethyl ester should be added (.2%). If vitamin F is used in water-in-oil emulsions, a small addition of p-oxy-sodium benzoate will prove a useful preservative.

Several suggested formulas for cream containing vitamin F follow:

A day cream might be made as follows:

Beeswax	[illegible]
Spermaceti	2
Cocoa butter	3
Emulsifier	.2
Lecithin	.2
Vitamin F concentrate	.2
Preservatives	.3
Water	approximately 80%

Fatty creams will take an addition of .2 to .4% vitamin F. If the cream contains a borax-wax emulsion, the vitamin is best added to the finished cream.

A nourishing cream with emollient qualities could be made as follows:

Cocoa butter	5
Protegin X	25
Cetyl alcohol	1
Lanolin	10
Preservative	.2
Water	55
Vitamin F	.3
Perfume to suit.	

The first four ingredients are melted by heating to approximately 55° C. Heat the water likewise to 55° and add while stirring constantly. Just before solidification takes place, vitamin F, the perfume oil and the preservative are added.

A liquid cleansing cream containing vitamin F would call for formulation along the following lines:

White oil (of low viscosity)	20
White oil (of medium viscosity)	72
Vitamin F	.3
A suitable vegetable oil	7.7

A vitamin F concentrate has been obtained from wheat which is said to be particularly efficient. It has the advantage of being without trace of linseed oil odor.

Promoted to West Coast

Ray Ewing, formerly sales manager for agricultural dept., has been promoted to Pacific Coast sales manager of Vitamins Divisions, National Oil Products Company, Harrison, N. J.

Industry's Bookshelf

(*Continued from page 236*)

Adsorption of Gases and Vapors—Vol. 1, Physical Adsorption, by Stephen Brunauer. Princeton University Press, Princeton, N. J., 1943; 511 pp., $7.50. Reviewed by *Ralph H. Munch*, Monsanto Chemical Co.

RANKING AS A CLASSIC in its field, this monograph will be invaluable to all interested in physical adsorption whether they are academic workers studying further theoretical development of the subject or industrial workers intent on immediate practical application to gas purification, separation and recovery of gases, or catalysis.

The plan of the books is to focus attention on the phenomenon of adsorption itself and to inquire what experiments teach about the nature of the adsorption process rather than to try to find out what they reveal about the adsorptive properties of specific adsorbents. Although the theoretical approach has been followed, the exposition of the subject is so clear that those interested in practical application of the theory should have little difficulty following it.

The book is divided into two parts. Part I, a general discussion contains chapters headed Introduction, The Data of Adsorption, and Experimental Methods. All three of these are admirably written. This reviewer would, however, have preferred to see the chapter on Experimental Methods expanded since there is no comprehensive up-to-date treatment of these outside the original literature.

Part II of the book contains three chapters on The Adsorption Isotherm, two on The Heat of Adsorption, two on The Surface of the Adsorbent and single chapters on The Pore Structure of the Adsorbent, The Adsorbate, The Kinetics of Physical Adsorption and Mixed Adsorption—an excellent exposition of the theory of adsorption. The chapters on the surface area of the adsorbent contain the first complete unified treatment of the gas adsorption method of surface area determination based on the original work of Brunauer and Emmett. Until the publication of this book, one taking up work in the field had to track down theory and experimental details of the method through about two dozen journal articles. This method now has become a practical tool in many branches of applied science, valuable in studies of catalysis, as an analytical tool, in the study of soils, in the study of pigments and in many other ways. It is therefore valuable to have in book form this treatment of the theory and experiment on which it rests.

It is to be hoped that circumstances will soon be such as to permit Dr. Brunauer to write Vol. II of this book, for surely the reception that Vol. I will receive will encourage him to write it as soon as possible.

Chemical Technical Dictionary, by A. W. Mayer. Chemical Publishing Co., Inc., N. Y., 1942; 872 pp., $8.00.

USEFUL for those who wish to study the German, French and Russian chemical literature, this dictionary is recommended for translators of these languages and for college students.

Transactions of the American Institute of Chemical Engineers, Volume XXXVIII, 1942, published by American Institute of Chemical Engineers, N. Y., 1943, 1097 pp.

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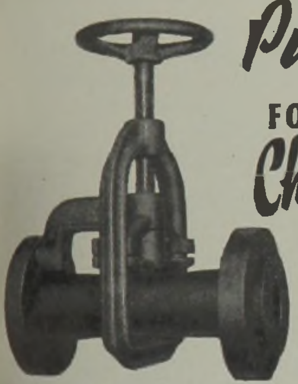

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Summary of War Regulations

Acetic Anhydride—Allocation order amended to cover acetic acid and acetaldehyde. WPB Order M-243, effective September 1.

Benzene—Manufacturers using less than 50 gallons per month must certify to their suppliers and to WPB that they are not using more than that amount, WPB Order M-137, amended July 23.

Butyl Alcohol and Butyl Acetate—Specific dollars and cents ceiling prices for grain fermentation butyl alcohol and acetate are made adjustable with grain cost. Base prices are figured on cost of whole grain (corn or wheat) of $1.22 per bushel, with provisions for a 1c increase in the butyl alcohol ceiling for every 7c increase in the price of grain. Formula applies in case of reduction of grain prices also. MPR. 37, Am. 6, July 1.

Cadmium—Prohibited for use in pigments, except for specific purposes, most of which are military. Conservation Order M-65, amended July 26.

Carbon Black—Users of furnace-type black requiring between 100 pounds and 500 pounds in any month must obtain specific allocation from WPB. Order M-224, July 20.

Catalysts—All catalysts sold for use in manufacture of synthetic rubber, aviation gasoline and toluene from petroleum are exempt from price control. GMPR Revised Sup. Reg. 1, Am. 21, July 27.

Cellulose Plastics—Allocation basis changed from month in which deliveries are to be made to month in which they are to be put into production. WPB Order M-326a.

Chrome Ores—Sellers of chrome ores permitted to charge buyers for transportation from ship unloading docks to users' plants in base point cities. MPR 258, Am. 3, July 23.

Color Pigments—Inclusion of transportation charges in sales of less than 100 pounds of color pigments is again permitted. RMPR 180, Am. 2, July 30.

Cotton Seed—Minimum support price for 1943 crops established by W.F.A. at $55 and $56 per ton f.o.b. depending on shipping point.

Denaturants—Four more denaturants "ST-115," Dehydrol-O, "GC-78" and acetaldol placed under allocation control. Allocation Order M-340, July 26.

Dibutyl Phthalate—Sliding scale of maximum prices established ranging from 21c to 26c per pound, based on each producer's average monthly cost for butyl alcohol. MPR 37, Am. 7, July 29.

Distilled Spirits—Use of corn in manufacture of distilled spirits and high wines prohibited. Directive under WPB Order M-69, July 11.

Dyestuffs—Canada exempted from quota and export restrictions. WPB Order M-103, amended July 30.

Ethyl Alcohol—Restrictions removed on delivery and use of ethyl alcohol outside continental United States. WPB Order M-30 July 15.

Fibre Drums—Allocation authorization to cover two months instead of one month. New restrictions added affecting producers. WPB Order M-313, amended August 3.

Glycol—Producers prohibited from delivering without special authorization more than 5 per cent of total quantity authorized by WPB to be delivered in any one month. WPB Order M-336, amended July 14.

Guanidine Carbonate — New price ceilings established ranging from 57c to 73½c per pound. GMPR Revised Sup. Reg. 14, Am. 4, July 30.

Molasses — Distributors of cane, blackstrap and beet sugar final molasses produced in the U. S. are permitted to make tank carlot sales at the March, 1942, price and less than carlot sales under schedule provided in Sup. Reg. 14. GMPR, Revised Sup. Reg. 14, Am. 9, August 7.

Natural Resins—Order discontinued which restricted use of dammars, batus, copals and other natural resins. Order M-56 revoked, July 29.

Neoprene—Price ceilings reduced on neoprene rubber hose and neoprene rubber belting, reflecting decreased cost of neoprene. MPR 149, Am. 12, July 20.

Penicillin—Placed under allocation control. WPB Order M-338, July 11.

Petroleum Products—Naphtha, petroleum insecticide bases, petroleum wax and petrolatum have been added to the list of petroleum products for which preference ratings may not be used in obtaining supply. Preference Rating Exclusion Order M-201, amended July 9.

Petroleum Solvents — High - flash naphtha placed under allocation control. Small order exemption for other petroleum solvents increased to 550 gallons. WPB Order M-150, amended July 29.

Plastic Pipe—Uniform price ceilings and sales discounts established for plastic pipe, tubing and fittings produced from Saran B-11 (vinylidene chloride). MPR 188, Am. 18; MPR 188, Order A-1, Am. 8; MPR 406, Am. 1; effective August 9.

Protective Coatings—No producer or dealer may deliver linseed oil or fish oil having a non-volatile content of more than 70 per cent by weight or less than 65 per cent. Oil represented to be "Linseed Replacement Oil" must meet federal specification TTO-371. WPB Order M-332, Am. 1, July 27.

Pyridine—Standard PD-600 and PD-601 forms substituted for special allocation forms previously required. WPB Order M-185, amended July 29.

Refrigerants—Control tightened over delivery and use of chlorinated hydrocarbon refrigerants. Delivery of freon prohibited for use in refrigerating equipment for dispensing and storing carbonated or malt beverages. WPB Order M-28 July 12.

Refrigerants—Monthly inventory reports required under WPB Order M-28 must be made regardless of whether the refrigerants are held for use or for resale. WPB Order M-28, Interpretation 1.

Refrigerants—Restrictions tightened on chlorinated hydrocarbon refrigerants. Consideration by the General Industrial Equipment Division of WPB required on all applications for allocations on an individual basis. Requirements for food processing, storage and dispensing units are excepted. WPB Order M-28 amended.

Steel Drums—Sales of rejected new steel drums and seconds in excess of three-quarters of 1 per cent of a producer's monthly output may be sold only with WPB permission. General Preference Order M-265, amended July 17.

Tallow—Suppliers are required to give up 30% of their tallow and grease production to industrial users holding specific government authorization. FDO 67, July 28.

Toluene—Laboratories may accept delivery of 5 gallons or less of toluene in any one month without specific authorization. WPB Order M-34, amended July 23.

Zinc Dust—Sale of small amounts without an allocation order authorized under certain specified conditions. WPB Order M-11-I, July 11.

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Transportation and Storage of Specified Materials

Haulage Request TR-2 was issued July 13 by the War Production Board.

TR-2 supersedes Transportation Request No. 1, which has been utilized by the chemical industry since January, 1943. TR-1 permitted producers to make sales, exchanges and loans of materials and facilities with a provision for exemption from anti-trust law prosecution in connection with exchanges, etc., approved by the War Production Board, such arrangements being made to the end that cross hauling and excessive hauling of these materials be minimized.

The provisions of TR-2 (Certificate 93) are substantially the same as TR-1, particularly as to the extent of the protection afforded producers in making exchanges pursuant thereto.

However, while TR-1 was designed to cover only those materials moving in tank cars, under TR-2 the industry may apply the same provisions to solids, bulk or packaged shipments without regard for the type of transportation equipment used.

Schedule X, naming the materials which may be exchanged, etc., has been enlarged by the addition of some fifty commodities. In addition to the chemicals added cement, coke and fluxstone are now also included.

SCHEDULE X

Acetate:
  Amyl, Butyl, Ethyl, Vinyl
Acetic Anhydride
Acetone
Acid:
  Acetic, Citric, Hydrochloric (Muriatic), Mixed (Niric and Sulfuric), Nitric, Picric, Sulfuric
Alcohol:
  Amyl, Buytl, Diacetone, Ethyl, Isopropyl, Methyl (Methanol)
Aluminum:
  Acetate, Ammonium Sulfate, Chloride (Anhydrous & Crystals) Formate, Potassium Sulfate, Sulfate
Ammonia:
  Anhydrous and Solutions
Ammonium:
  Bicarbonate, Carbonate, Chloride (Gray), Nitrate (including fertilizer grades) Sulfate
Aniline
Antifreeze Preparations
Calcium:
  Arsenate, Carbide, Chloride, Phosphates
Castor Oil
Caustic Potash
Caustic Soda
Cement (Portland Cement)
Chemical Cotton Pulp and Cotton Linters
Chlorinated Hydrocarbons
Chlorine
Coal Tars
Coke
Copper Sulfate
Corn Oil
Corn Syrup (Glucose)
Cottonseed Oil
Distillates and distillation residue of coal tars or coke oven crude light oils (including but not limited to benzol, creosote, cresol, cresylic acid, naphthalene, phenol, solvent naphtha, toluol, xylanol, and xylol)
Drugs, Medicine, Toilet Preparations and basic medicinal chemicals
Formaldehyde
Glycols
Hydrogen Peroxide
Lead Arsenate
Lard and Lard Oil
Lime and Limestone (including but not limited to fluxstone)
Linseed Oil
Litharge
Magnesium; Carbonate and Sulfate
Methyl Ethyl Ketone
Molasses
Methyl Isobutyl Ketone
Paint Driers, Solid and Liquid
Paints, Varnish, Lacquers and Stains
Peanut Oil
Phosphorus
Pigments, Colors and Extenders
Plasticizers, Phosphate and Phthalate
Potash Salts
Pyridine, Crude and Refined
Pyrites
Road Tar and Road Oil
Sodium:
  Bicarbonate, Carbonate, Chlorate, Chloride, Hydroxide, Nitrate, Nitrite, Phosphates, Silicates, Sulfate, Pyrophosphate, Thiosulfate
Solvents, Alcohol
Solvents of Petroleum Origin
Soyabean Oil
Superphosphates
Tallow: Inedible and Edible
Vegetable Oil Foots and Fatty Acids
Water Gas Tar

Tank Cars

The Office of Defense Transportation issued on July 24 two special directions designed to effect more efficient use of the tank cars which are moving petroleum products, chemicals, and other important war materials.

One (Special Direction ODT 7, Revised 1) prohibits the use of tank cars for the movement of any commodity not included in a list of approximately 250 products designated by the War Production Board as essential to the war, unless such movements are authorized by ODT permits.

The other (Special Direction ODT 7, Revised 2), requires that tank cars be loaded to certain specific standards of capacity, except as specifically allowed by ODT permits.

Essentially, the maximum-loading direction requires loading in the dome of the tank car with a resulting increase in capacity of three to five barrels. For products, such as gasoline, which cannot be loaded in the dome safely, other standards are provided by the direction. Heavy fuel oils, gas oil, furnace oils, vegetable oils and some chemicals, however, can be dome-loaded without danger.

The ban on movement of non-essential commodities in tank cars applies to loading, offering for shipment, accepting, and shipping. Exempt from its provisions are cars containing commodities consigned by or to the Army, Navy, or Marine Corps. The direction has no effect on a previous ODT order requiring permits for all tank car movements for distances of less than 200 miles.

Requests for permits under the directions must be made to the Section of Tank Car Service, Division of Petroleum and Other Liquid Transport, ODT, Washington, D. C.

Yam Bean Supply Found In Mexico

A limited supply of yam bean seed will be available this season for manufacturers to process into a new insecticide of a relatively non-poisonous class.

Cornell University scientists have studied yam beans for two years for their insecticide possibilities; the findings recently were publicized widely. It was generally believed that commercial importance would not develop until after the war, when enough could be grown and processed. Now a substantial acreage has been found in Mexico, grown for food with no original thought of insecticide possibilities. Tests have been made and it is now planned to divert part of this year's bean crop to insecticide use and to increase future plantings.

According to Prof. Roy Hansberry of Cornell, the plant's tuber-like roots have been used for food throughout the world's tropical regions. Its seeds have long been used in such countries as a fish poison. In 1941 two Chinese scientists found they had insecticidal value.

The Cornell research followed. It indicated that the effect was not primarily due to rotenone, of which only a fraction of a per cent could be found in the bean, but to some other substance. Processed and used in a dust mixture, this was effective against several types of insects.

Professor Hansberry did his laboratory work on material sent from China. Very recent tests showed similar values in the bean from Mexico. The plant is an annual, producing a crop ready for harvest four to six months after planting, and known in Mexico as "jicama." Though Chinese first used it on insects, botanists believe it originated in Central America.

Dunkel Names Distributor

Paul A. Dunkel & Co., Inc., N. Y., have appointed Clarence Morgan, Inc., Chicago, Ill., as their exclusive representative on all products in mid-western territory effective September 1.

Aluminum Plant Yield Huge

Aluminum Co. of America has reported that the production of aluminum at the government-owned Alcoa-operated plants is now exceeding the total production of all of the company's own plants. Company officials said that aluminum sheets were turned out at a rate fifty times faster than was possible before the war.

MARKETS IN REVIEW

WAR PRODUCTION continued to provide government officials with reason for grave concern at the start of August, and industry was equally justified in its apprehensions over adjustments demanded in production, over "cutbacks" in schedules and the employment situation. The Federal Reserve Board production index for June eased two points from May to 202, while that for chemicals at the same time advanced two points to 222.

Further, while all industrial production in June showed a net gain of 25 points in the board's index, the corresponding figures for chemicals rose 56 points. There is ground for belief that chemical production would fare even better if some factors of uncertainty could be removed. The manpower situation has not improved, and the opposition of the War Manpower Commission to blanket draft deferments, as was granted recently to the aircraft industry on the West Coast, complicates an already difficult problem for industry.

There are, notwithstanding, some very encouraging developments in the war production picture. One is a change in the attitude of government officials from criticism and loud complaint to one of helpfulness in getting the war job done. The Army Supply Services and the War Production Board, in calling attention to a $300,000,000 loss in output (a deficit from the planned program) during the past three months, promised that under a new arrangement both industry and labor will be notified well in advance of contemplated cutbacks in production schedules. This will enable manufacturers to spread out the period of adjustment and avoid plant shutdowns.

The progress achieved in war plant building, of which more than 80 per cent of government-financed projects were completed at mid-year, must be highly gratifying. In the field of chemicals the expansion was unusually rapid. One year ago only 31 per cent of the new plants was completed; at the beginning of this year the completion total has risen to 66 per cent, while at the start of August chemical construction was more than 90 per cent ready.

One of the most difficult phases of the war building program, considering the engineering, equipment and planning required, is offered by synthetic rubber. One year ago only 3 per cent of the rubber plan had been completed, and at the start of 1943 not more than 15 per cent was in place. At the end of June the rubber program was 61 per cent ready.

Synthetic Resins. The difficulties which beset chemicals manufacturers arising from OPA price control are best illustrated by what took place over the past month in the plastics field. Despite the necessity of having to make a series of downward price adjustments in Neoprene synthetic, affecting a long list of industrial products manufactured from that product, the OPA froze both prices and discounts for products made from Saran B-11 (vinylidine chloride). Should the resin manufacturers now achieve a reduction in the production of this material, which is entirely conceivable in a new product, the whole price and discount situation in pipe fittings, tubing and other parts made of Saran will have to undergo further revision.

The supply situation in plastics and resins also appears to be growing progressively worse. Only a comparatively short while ago the thermosetting resins, with their involved end-use requirements, gave the industry the most trouble. Now, if reliable industry sources are correctly informed, cellulose acetate users face substantial reductions in supplies. The acetate group on the whole, in fact, is the subject of increased regulation. Ethyl and isopropyl acetate a short while ago were placed under allocation, and the supply available to the paint and lacquer trade is not plentiful. The makers of acetate yarn and staple fiber also had their allotments of acetic anhydride curtailed recently in favor of acetate plastics, aspirin, acetanilid, and acetophenetidin.

The War Department meanwhile has dropped its program for a fleet of wood cargo-carrying planes, a program which got under way in 1942 and which would have called for gigantic amounts of plywood and resin adhesives. Expanding production of aluminum is the first explanation of the government's action, but this may not necessarily mean that the metal is always to get preference in the manufacture of airplanes. It is more likely that a shortage of the woods required played the bigger part in the War Department's decision. Resins of the urea, phenolic and casein varieties have been developed to a high state of efficiency for this type of wood-resin lamination, and probably could have been supplied in the desired quantities.

Textiles production evidently has been brought to the point where the Army and Navy authorities can afford to relax their demands. The Army for one thing, is curtailing its purchases of woolen goods by about 50 per cent so as to permit an increase in production for civilian needs over the coming winter. The government also is said to have cancelled a considerable amount of business in cotton cloths on the books of mills during the latter half of July. The cancellations include various cotton construction in which chemicals are necessary in processing such as ducks, drills, twills, and print cloths.

Rayon yarn deliveries during July were about on the same level as June but exports, particularly to South America, were great enough to effect a reduction in stocks on hand. During the first half of the year the industry ran plants at full capacity and established new sales records. Yet there is one factor making for uncertainty in rayon manufacture, that of equipment depreciation resulting from capacity operations. Plants in this field also have been compelled to employ increasing percentages of inexperienced workers.

The Soap Industries are facing the two-pronged dilemma of a severe and growing shortage of raw materials and the necessity of having to supply enormous requirements of its products to the Army and Navy. During the first quarter soap sales amounted to 713,000,000 pounds, and for the three-month period ending June 30th the volume fell off to 656,362,000 pounds. Soap sales for the first half also fell below those for the first six months of 1942. Aside from the waste salvage program in fats for glycerine, the government is endeavoring to bring in more of the oils required by the soap industry, especially, coconut, palm and olive.

One plan considered would utilize empty gasoline and fuel oil drums on the return voyages of vessels from the African coast. The activities of the government itself in the fats and oils markets are enormous. During one recent five-week period the Food Distribution Administration purchased 302,000,000 pounds (in terms of fat content) as against the peak of 189,000,000 pounds taken in April this year.

Some relief is promised to the paint industry from the linseed and castor supply shortage, and supplies of dehydrated castor oil have loosened up to an extent. Seed supplies have been reaching processors in volume sufficient to justify hopes that government restrictions on the use of the oil, needed for metal cutting, recoil mechanisms and the like, might be eased. In the fats and oils emergency linseed oil is finding edible uses and large shipments for this purpose have gone abroad. Civilian consumption here has been held down to one-half of that used in 1940-1942. Oil producers are required to deliver 45 per cent of the linseed crush to the government. The domestic seed crop meanwhile will not become available until September or October.

Pharmaceutical manufacturers and related lines have been given some

Tri-Sure News

NUMBER 8 ★ 30 ROCKEFELLER PLAZA, NEW YORK, NEW YORK ★ AUGUST, 1943

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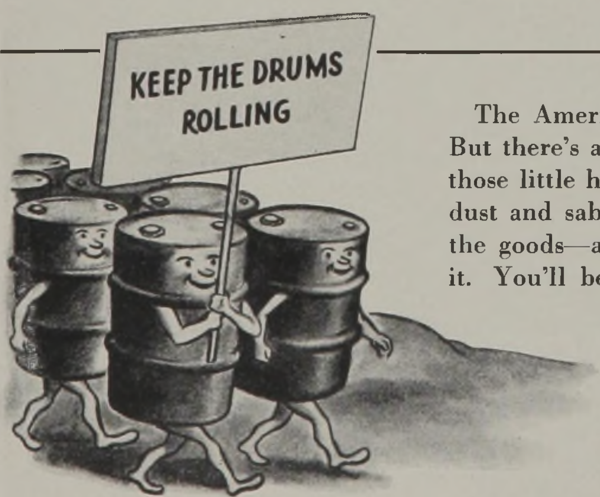

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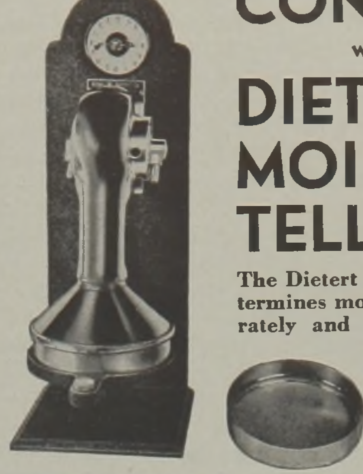

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basis for anticipating a relaxation of some raw material restrictions, although at this writing the relief has not appeared. The situation in crude glycerine is definitely improved, and if vegetable oil importations are expanded as planned, hopes for modified regulations may not be belied. Several million pounds of glycerine also are being sent here by Canada. Still, glycerine is such a highly strategic and critical war chemical that only a large increase in supply could be expected to ease WPB regulations.

The concern of official quarters over the grain crop prospects is plainly shown in discussions reported to have taken place on a plan to switch back to molasses as a raw material. The idea is credited to the War Food Administration, and it evidently involves, at least for the time being, alcohol fermentation plants on the Atlantic seaboard and at Gulf ports. Earlier in the war molasses fermentation plants were instructed to switch over to grain in view of the difficulty of bringing in the raw material from Cuba and Puerto Rico. Normally some 20 tankers were employed in that trade. Both situations to an extent have now reversed themselves. Shipping conditions are better, and grain is not that plentiful, to quote an official view, that we can "afford to use it indiscriminately."

WFA also is said to favor the use of sugar for alcohol-making if tankers are not available for the molasses haul. In either case the switch would entail some hardship and the erection of storage facilities. The progress of the war may demand a decision at an early date. The production program for 1944 calls for some 560,000,000 gallons of alcohol and the industrial alcohol producers (reconverted beverage plants will probably remain on grain) should be provided with a definite idea in the matter before we enter the final quarter.

Heavy Chemicals. Alkalies and insecticides were two heavy tonnage groups unfavorably affected by manpower shortages although urgent war demands and agricultural needs are being met. While the boll weevil menace was not abnormally disturbing to cotton growers, it was estimated that calcium arsenate production for the year would exceed that for 1942 by about 16 per cent. Calcium arsenate is under allocation. Supplies were about ample in chloropicrin, and Victory gardeners needs in cryolite were met through small package distribution. While South American demands for caustic soda and soda ash remained at good levels, producers were not able to meet them promptly. Alkali makers also doubted that production of caustic was sufficient to permit stock-piling of this chemical as reported in Washington dispatches. Shortages were noted throughout the acids, sulfuric not excepted. The situation in acetic threatened curtailment of acetate supplies, for the fabric as well as plastics. Prompt shipments of muriatic and formic acids could not be promised by producers. Those who supply alumina sulfate, kaolin, casein and other materials to the paper industry learned the paper production was being adversely affected by wood pulp shortages. Crude sulfur supplies above ground remain ample, but labor shortages and transportation troubles are delaying some shipments.

Fine Chemicals. Synthetic vitamin products were sent to new all-time low prices while the raw material for Vitamin A, fishliver oil, was advanced one cent. Vitamin B-1 or thiamin hydrochloride is now available at 29c per gram, compared with a price of $7.50 per gram for this substance at the start of 1937. Vitamin C, or ascorbic acid, is priced currently at $1 an ounce compared with $3.60 an ounce in the spring of 1937, an B-2, (Riboflavin) sells for 49c per gram, in place of the $17.50 per gram which prevailed five years ago. Pressure is now being brought to bear on the retail distribution trade in vitamins by the OPA, and a price rollback is threatened. Lower prices were effected for glycocoll, or glycine, and for aminoacetic acid USP. Solvents generally continued in a tight supply position and demands were active for acetone, butyl acetate, and ethyl acetate. Manufacturers of lotions and cosmetics were experiencing difficulty in obtaining supplies, especially lanolin.

Coal Tar Products. Recovery of coke-oven and steel operations from the recent coal strike has not been immediate. Steel operations got up to 98 per cent during the last week in July, compared with the low of 90.3 per cent one month previous. All coke-oven and coal-tar chemicals remained in an exceedingly tight position. With the greater part of the synthetic rubber program completed, rising demands reached supply sources for benzol, supplemented with heavier requirements for aviation gasoline. Toluol moved in heavy volume to explosives plants, while xylol showed new strength and stocks of both the coke-oven and petroleum varieties shrank to small quantities. WPB may round up and retrieve xylol in hands of non-military users, it was said. All intermediate coal tar chemicals were scarce and strong, especially paradichlorbenzol, which finds wide use at this time as moth-repellant. Makers of sulfonamides and vitamins were understood to have taken larger quantities of pyridin out of the market.

Statistical Reviews of Minerals and Chemicals in 1942

Sulfur Production

Compared with the first six months of 1942, production and mine shipments of native sulfur through June of this year were 25 and 18 per cent lower respectively, but apparent sales were down only 2 per cent. The rate of depletion of stock is not alarming, as the January-June reduction totaled only 4 per cent of the 5,148,206 long tons on hand January 1, 1943.

Bureau of Mines statistics for the six-month periods are as follows (figures are in long tons):

Period	Production	Mine Shipments	Apparent sales*
May '43	232,637	244,142	287,770
June '43	219,589	268,215	289,934
Jan.-June '42	1,778,269	1,678,009	1,552,577
Jan.-June '43	1,329,222	1,369,179	1,525,823

* Calculated from production and change in stocks during the period.

1942 production of native sulfur attained a new record of 3,460,686 long tons, exceeding by 10 per cent the previous high established in 1941. More than 83 per cent of the total came from deposits in Texas and over 16 per cent from Louisiana. In addition, approximately 1,600 tons of native sulfur-bearing ore, containing 10 to 50 per cent sulfur, is mined in Colorado and Texas for agricultural purposes.

In 1942, for the third successive year, a new record was attained in the production of pyrites in the United States, the

Pyrites Produced in U. S., 1938-42.

Year	Quantity: Gross weight (long tons)	Quantity: Sulfur content (per cent)	Value
1938	555,629	39.4	$1,685,766
1939	519,497	42.3	1,580,000
1940	626,640	41.8	1,920,000
1941	645,257	41.9	2,009,000
1942	720,363	42.6	2,464,000

Sulfur Produced and Shipped in the United States, 1938-42.

Year	Production (long tons): Texas	Louisiana	Other States[1]	Total	Shipments: Long tons	Approximate value
1938	2,060,845	328,405	4.158	2,393,408	1,628,847	$27,300,000
1939	1,665,400	422,600	2,979	2,090,979	2,233,817	35,500,000
1940	2,212,839	512,935	6,314	2,732,088	2,558,742	40,900,000
1941	2,596,731	533,620	8,902	3,139,253	3,401,410	54,400,000
1942	2,885,621	570,345	4,720	3,460,686	3,128,559	50,100,000

[1] 1938-40 and 1942: California and Utah; 1941: California.

total being 12 per cent higher than in 1941.

In 1942 the recovery of hydrogen sulfide (largely for sulfuric acid manufacture) was equivalent to 19,097 long tons of sulfur. In addition, gases supplied 5,125 long tons of elemental sulfur, which is valuable as a fungicide and insecticide owing to its fine particle size.

Petroleum Gases Active

Sales of liquefied petroleum gases continued to expand strongly in 1942 as in recent years, although difficulties connected with the war probably prevented the full supplying of the potential market. Distributors of liquefied petroleum gases reported sales of 585,440,000 gallons in 1942, a gain of 27 per cent over 1941 deliveries of 462,852,000 gallons, according to data prepared by the Bureau of Mines. The increase in 1942 compares with a 48 per cent growth in 1941 and a 40 per cent gain in 1940.

All principal uses of liquefied petroleum gases showed important gains in 1942. Manufacturers of chemicals required 53,038,000 gallons in 1942, or 20 per cent more than the 1941 total of 44,206,000. This compares with a 1941 gain of 28 per cent over 1940.

About one-fifth (22 per cent) of total liquefied petroleum gas sales in 1942 was reported as butane, compared with one-fourth (24 per cent) in 1941 deliveries. This drop in the butane proportion in the 1942 total followed a downward trend of recent years and a change which will probably continue as more butane is diverted for the manufacture of motor fuel, rubber and other products. The gains for the principal uses of butane were smaller than those reported for 1941 except for the chemical manufacturing industry, which purchased 5,256,000 gallons of butane in 1942 compared with negligible amounts in previous years. Butane as well as propane is evidently replacing butane-propane mixtures as raw material at chemical plants, as "mixtures" showed a small decline in 1942. The requirements for propane by chemical plants increased from 1,528,000 gallons in 1941 to 5,850,000 in 1942.

Deliveries of pentane increased slightly from 4,387,000 gallons in 1941 to 4,452,000 in 1942. The larger share of this gas is used in the manufacture of chemicals, the quantity increasing from 3,146,000 gallons in 1941 to 3,607,000 in 1942.

Barium Chemicals at High Level

Production of crude barite, natural barium sulfate used in making paint pigments and barium chemicals and in drilling oil wells, reached 449,873 short tons in 1942, exceeding output in all previous years except 1941, when the record quantity of 483,391 tons was mined, according to data compiled by the Bureau of Mines, United States Department of the Interior. These figures include a small amount of witherite, natural barium carbonate, mined at El Portal, Calif. The quantity of crude barite sold or used by producers in 1942, 429,484 short tons valued at $2,673,002, has been exceeded only by 1941 sales, 503,156 tons valued at $3,134,234. Similarly, the quantity of barium chemicals sold or used by producers in 1942, 207,434 short tons valued at $17,678,769, was higher than during any previous year except 1941, when sales were 245,952 tons valued at $16,940,120. The chief war uses of barium chemicals are in making flares and shell primers, and in the case hardening steel.

Crude Barite (domestic and imported) Used in the Manufacture of Ground Barite and Barium Chemicals, 1938-42 in Short Tons.

	In manufacture of—			
Year	Ground barite[1]	Lithopone	Barium chemicals	Total
1938	193,728	117,007	54,250	364,985
1939	192,112	141,556	58,015	391,68
1940	200,899	136,885	66,604	404,38
1941	243,846	153,982	93,005	490,83
1942	200,443	144,821	104,160	449,42

[1] Includes some crushed barite.

Production of lithopone, long a major outlet for barite, declined in 1942 to 137,320 short tons, the lowest figure since 1938. There were 9 producers in 1942, a in 1941. Paint remained the largest use of lithopone, but increasing military use of paint did not compensate for losses in civilian paint markets. Lithopone pain markets were also said to have been adversely affected by a growing use titanium pigments in the white pigm field. Shortages of linseed and ot drying oils used with lithopone in manufacture of linoleum and oil cloth h down production of these two comm ties, which ordinarily consume 17,000 20,000 tons of lithopone annually. declining production of rubber w

(*Turn to page 277*)

Barium Chemicals Sold or Used by Producers in the United States, 1938-42[1]

Chemicals	1938	1939	1940	1941	1942
Lithopone:[2]					
Plants	11	11	11	9	
Short tons	125,746	142,759	151,802	176,642	137,32
Value	$9,975,012	$10,461,102	$10,197,897	$12,550,193	$10,828,92
Blanc fixe (precipitated barium sulfate):					
Plants	7	6	6	6	
Short tons	19,428	18,652	22,247	29,352	21,2
Value	$921,203	$898,198	$1,250,303	$1,806,882	$1,403,6
Artificial barium carbonate (chemically precipitated):					
Plants	4	5	5	5	
Short tons	9,543	12,478	13,399	17,477	18,1
Value	$459,901	$617,799	$616,331	$785,486	$1,012,5
Other barium chemicals:[3]					
Plants	5	7	7	7	
Short tons	10,963	9,858	10,813	22,481	30,6
Value	$728,896	$814,170	$803,886	$1,806,559	$4,433,6
Total barium chemicals:					
Short tons	165,680	183,748	198,201	245,952	207,4
Value	$12,085,012	$12,791,269	$12,868,417	$16,949,120	$17,678,7

[1] 1938-41: To avoid duplication, the barium chemicals reported here do not include the outp of firms that make these chemicals from such products as barium chemicals and imported bar and witherite purchased in the open market. 1942: includes barium chemicals made from bari chemicals and imported barite and witherite purchased in the open market. The data have be adjusted to remove duplication.

[2] Does not include cadmium lithopone.

[3] Figures cover chemicals, in order of value, as follows: 1938: Chloride, dioxide, sulfide, hydr ide, and oxide; 1939: Chloride, dioxide, hydroxide, sulfide, and oxide; 1940: Chloride, dioxi hydroxide, sulfide, oxide, and nitrate; 1941: Chloride, sulfide, dioxide, hydroxide, nitrate, oxi and tribarium aluminate; 1942: Chloride, 13,414 tons, $960,876; nitrate, 11,489 tons, $2,483,1 dioxide, 2,844 tons, $666,283; hydroxide, 2,335 tons, $267,572; sulfide and oxide, 580 tons, $55,8

Sales of Liquefied Petroleum Gases in the United States, 1936-42 (Thousands of gallons).

Year	Butane	Propane	Butane-propane mixtures	Pentane	Total: Quantity	Total: Percentage increase over previous year
1936	40,200	36,302	27,375	2,575	106,652	38.8
1937	45,399	46,474	46,694	2,833	141,400	32.6
1938	52,768	54,130	56,050	2,253	165,201	16.8
1939	71,351	79,323	69,020	3,886	223,580	35.3
1940	77,056	109,216	123,348	3,836	313,456	40.2
1941	112,244	126,969	219,252	4,387	462,852	47.7
1942[1]	128,560	150,511	301,917	4,452	585,440	26.5

LEGAL ADVENTURES OF A CHEM

Wherein Chemist Smith, mythical chemist-manager of a small chemical manufacturing concern, records for any who may be interested an account of his many and varied adventures with the law.

9. Case of the Accepted Bid

"WE ARE BIDDING on the Arsenal contract. Find enclosed specifications and list of my requirements. Kindly quote me your lowest prices," the customer wrote.

"Enclose quotations and wish you luck," Chemist Smith replied.

"Owing to the general uncertainty in the chemical market, am forced to withdraw my last quotations," Smith wrote three days later.

"My bid has been accepted and rely on you to furnish the necessary supplies on the basis of your quotations," the customer wrote—and the letters crossed in the mails.

"It was too late to withdraw your quotations after I had bid on the strength of them," the customer wired. Smith refused to deliver. The customer sued for damages, and lost.

"In this case Smith offered to deliver the chemicals in return for the buyer's acceptance, not for his bid, which was a matter of indifference to Smith. That offer (to deliver) could become a promise to deliver only when the equivalent was received, that is, when the buyer promised to take and pay for the goods. There is no room in such a situation for the doctrine of promissory estoppel," said the Federal Court in Baird vs. Gimbel, 64 Fed. (2), 344.

10. Case of the Wired Payment

CHEMIST SMITH signed the order for assorted chemical supplies with the salesman's fountain pen.

"We'll mail a cashier's check to reach you on or before the 20th of this month," Smith told him.

"That will be more than satisfactory," the salesman agreed, and on the 19th Smith hustled to the cashier's wicket in the Electron Bank during business hours.

"If you don't pay on the nail in these strenuous days they sell the stuff elsewhere. I'm a little late on a payment if I depend on the mail. Get you to wire the money instead," Smith suggested.

"Gladly," the cashier agreed. The money was wired, the chemical supplies were duly shipped, but one of the seller's creditors attached them in transit, claiming that the seller was insolvent.

"I bought and paid for those supplies, and the title's passed to me," Smith contended.

"Not when you didn't pay in the manner retorted, but the Montana courts (in 235 Pacific Reporter, 767) ruled in Chemist Smith's favor.

"The mere fact that payment was not made exactly as required by the contract of sale will not prevent the title from passing," the Court ruled, and the creditor paid the costs.

Battelle Issues Publication List

One-hundred and forty Battelle-originated books, patents, and journal contributions are listed in a new catalogue published by Battelle Memorial Institute, Columbus, O., one of the country's largest organizations for industrial research. The catalogue, in booklet form, covers Battelle publications and patents for the years 1941–1942 and supplements a previous listing of over 500 publications and patents of prior date, which listing was published in 1941.

Since its beginning, Battelle has utilized the media of the various technical and scientific journals in disseminating the results of its research in chemistry, metallurgy, fuels, and ceramics. The new catalogue lists all the contributions to the technological literature made by Battelle staff members during 1941 and 1942.

Copies of the new catalogue and the prior listing which it supplements are available upon request.

PRICES CURRENT

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
July 1941 $1.048 July 1942 $0.923 July 1943 $0.903

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Acetaldehyde, 99%, drs. wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv (*PC*) ..lb.	...	.07	...	.07	.07	.158
ACIDS						
Acetic, 28%, bbls (*PC*) 100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. ......100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks .. 100 lbs	...	6.93	...	6.93	6.25	6.93
Acetylsalicylic, Standard USP ....lb.	.40	.54	.40	.54	.40	.40
Benzoic, tech, bbls ......lb.	.43	.47	.43	.47	.43	.47
USP, bbls ....lb.	.54	.59	.54	.59	.54	.59
Boric, tech, bbls, c-l, .. ton *a*	...	109.00	...	109.00	108.00	109.00
Chlorosulfonic, drs. wks lb	.03	.04½	.03	.04½	.03	.04⅕
Citric, crys, gran, bbls, c-l lb. *b*	.20	.24	.20	.24	.20	.21
Cresylic 50%, 210-215° HB, drs. wks, frt equal (A) gal	.81	.83	.81	.83	.81	.86
Formic, Dom. cbys ......lb.	.10½	.11½	.10½	.11½	.10½	.11½
Hydrofluoric, 30% rubber, dms. ....lb.	.08	.09	.08	.09	.06	.06½
Lactic, 22%, 1st bbls wks lb	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ..lb.	.073	.0755	.073	.0755	.073	0755
Maleic, Anhydride, drs ..lb.	.25	.26	.25	.26	.25	.26
Muriatic, 18° cbys .. 100 lb.	1.50	2.45	1.50	2.45		
20° cbys, c-l, wks ..100 lb.	.	1.75	...	1.75	1.75	1.75
22° cbys, c-l, wks 100 lb.		2.25		2.25	2.25	2.25
Nitric, 36°, cbys, wks 100 lbs. *c*	5.00	5.95	5.00	5.95	5.00	5.00
38°, c-l, cbys, wks 100 lbs. *c*	..	5.50	..	5.50	5.50	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	6.00	6.00
42°, c-l, cbys, wks 100 lbs. *c*	..	6.50	...	6.50	6.50	6.50
Oxalic, bbls, wks (*PC*) ..lb.	.11¼	.12½	.11¼	.12½	.11¼	.14⅕
Phosphoric, 75% USP, ..lb.	.10½	.13	..	.12	.12	.12
Salicylic, tech, wks (*PC*) ..lb.	.26	.42	.26	.42	...	.33
Sulfuric, 60°, tks, wks . ton	...	13.00	...	13.00	...	13.00
66°, tks, wks ....ton	...	16.50	...	16.50	...	16.50
Fuming (Oleum) 20% tks. wks ....ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls ......lb.	...	.70½	...	.70½	...	.70⅕
Alcohol, Amyl (from Pentane) tks, delv ....lb.	...	.141	...	.141	...	...
Butyl, normal, tks (*PC*) lb.	.10¾	.14¼	.10¾	.14¼	.10¾	.168
Denatured, CD, 14, c-l drs, (*PC, FP*) ....gal. *d*	...	.54½	...	.54½	...	.65
Denatured, SD, No. 1, tks. *d*	...	.50	...	.50		.53
Ethyl, 190 proof tks ....gal	...	11.90	...	11.90	8.12	11.92
Isobutyl, ref'd, drs .....lb.	...	.086	...	.086	.	.086
Isopropyl, ref'd, 91% gal.	.39	.66½	.39	.66½	.40½	.43½
Propyl, nor, drs, wks gal.	.67	.70	.67	.70	.69	.75
Alum, ammonia, lump, c-l, bbls, wks ....100 lb.	...	4.25	...	4.25	...	4.25
Aluminum metal, (*FP*) 100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd 99% wks lb.	.08	.12	.08	.12	.08	.12
Hydrate, light, (A) ....lb.	.14½	.15	.14½	.15	...	.14½
Sulfate, com, bgs, wks 100 lb.	1,15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, c-l, bgs. wks ....100 lb.	1.75	1.85	1.75	1.85	1.75	1.85
Ammonia anhyd, 100 lb cyl lb.	...	.16	...	.16	...	.16
Ammonium Carbonate, lumps, dms ....lb.	.08½	.09¼	.08¼	.09¼	.08¼	.09¼
Chloride, whi, bbls, wks, 100 lb.	4.45	5.15	4.45	5.15	4.45	
Nitrate, tech. bags. wks. lb.	.0435	.0850	.0435	.0850	.0435	.0455
Oxalate pure, grn, bbls ..lb.	.27	.33	.27	.33	.27	.33
Perchlorate, kgs (A) ..lb.	.55	.65	.55	.65	.55	.65
Phosphate, dibasic tech, bbls ....lb.	.07¼	.08½	.07¼	.08½	.09¼	.09¼
Stearate, anhyd, dms ...lb.	...	.34	...	.34	...	.24½
Sulfate, f.o.b., bulk (A) ton	28.20	29.20	29.00	30.00	29.00	30.00
Amyl Acetate (from pentane) c-l, drs, delv ....lb	...	.155	...	.155	...	.155
Aniline Oil, drs ....lb.	.11½	.12½	.11½	.12½	.12½	.16
Anthraquinone, sub, bbls ..lb.	...	.70	...	.70	...	.70
Antimony Oxide, 500 lb. bbls (A) ....lb.	.15	.15½	.15	.15½	.15	.16½
Arsenic, whi, kgs (A) ....lb.	.04	.04¾	.04	.04¾	.04	.04¾
Barium Carbonate precip, 200 lb bgs, wks ... ton	55.00	65.00	55.00	65.00	55.00	65.00
Chloride, delv, zone 1 ..ton	77.00	90.00	77.00	90.00	77.00	92.00

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs. less in each case; *d* Prices given are Eastern schedule. *a* Powdered boric acid $5 a ton higher; *b* Powdered citric is ½c higher;

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Barytes, floated, bbls. c-l ton	...	36.00	...	36.00	...	...
Bauxite, bulk mines (A) ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde, tech, cbys, dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal.	(A)	.15	(A)	.15	...	.15
Benzyl Chloride, cbys ....lb.	.22	.24	.22	.24	.22	.24
Beta-Naphthol, tech, bbls, wks ....lb.	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots...lb.	...	1.25	...	1.25	...	1.25
BlancFixe, Pulp, bbls, wks ton *h*	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks, 100 lb.	2.50	3.60	2.50	3.60	2.25	3.10
Borax, tech, c-l, bgs ....ton *i*	...	45.00	...	45.00	45.00	46.00
Bordeaux Mixture, drs ..lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases ....lb.	.25	.30	.25	.30	.25	.30
Butyl, acetate, norm drs, lb.	...	.1575	...	.1575	.124	.168
Cadmium Metal (*PC*) ..lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs. 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs (A) c-l ....lb.	...	.04¾	...	.04¾	...	.04¾
Carbonate, tech, c-l bgs, ton	18.00	22.00	18.00	22.00	16.00	20.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	...	21.00
Solid, 73-75% drs, c-l, ton	18.00	31.50	18.00	34.50	18.00	34.50
Gluconate, U.S.P., drs. lb.	.57	.58	.57	.58	.52	.59
Phosphate, tri, bbls ....lb.	.0o35	.0785	.0635	.0785	.0635	.0705
Camphor, slabs, cs. ......lb.	.85	.90	.85	.90	1.60	1.65
Carbon Bisulfide, 55-gal drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, Liq, 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, (*FP*) (*PC*) drs, c-l ....lb.	.73	.80	.73	.80	.73	.83
Casein, Acid Precip, bgs, 100 or more ....lb.	...	.24	...	.24	.15	.30½
Chlorine, cyls, lcl, wks, contract (*FP*) (A) .....lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract ..lb. *j*	...	.05¼	...	.05¼	...	.05¼
Liq, tk, wks, contract 100 llb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs ....lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude ....bbl.	8.25	8.75	8.25	8.75	7.50	9.25
Cobalt Acetate, bbls (A) lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs (A) ..lb.	...	1.84	...	1.84	...	1.84
Copper, metal *FP*, *PC* 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls lb.	.19½	.20	.19½	.20½	.18	.20½
Sulfate, bbls, wks (A) 100 lb.	5.00	5.50	5.00	5.50	5.15	5.50
Copperas, bulk, c-l, wks ..ton	...	14.00	...	14.00	...	17.00
Cresol, USP, drs, (A) ....lb.	.10¾	.11¼	.10¾	.11¼	.10¾	.11½
Cyanamid, bgs, c-l, frt (A) ....ton	1.52½	1.62½	1.52½	1.62½	no prices	
Dibutylamine, c-l, drs. wks lb.	...	.61	...	.61	.50	.61
Dibutylphthalate, drs .....lb.	.2070	.2120	.2070	.2120	.21	.23½
Diethylaniline, lb drs ....lb.	...	.40	...	.40	...	.40
Diethylphthalate, c-l, drs ..lb.	.212	.217	.212	.217	.21½	.22
Diethyleneglycol, drs lcl. wks. lb.	.14	.15½	.14	.15½	.14	.15½
Dimethylaniline, dms., cl., lcl. lb.	.23	.24	.23	.24	.23	.24
Dimethyl phthalate, drs ..lb.	.1970	.2050	.1970	.2050	...	.20
Dinitrobenzene, bbls ......lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls ......lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms ......lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks ....lb.	.15	.20	.15	.20	.15	.16
Diphenylamine bbls ......lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs ...lb.	.35	.37	.35	.37	.35	.37
Ether, Isopropyl, drs ....lb.	.06	.06½	.06	.06½	.07	.08
Ethyl Acetate, 85% Ester tks, frt all'd ....lb.	.107	.110	.107	.110	.11	.12
Chloride, drs ....lb.	.18	.20	.18	.20	.18	.20
Ethylene Anhydrous frt all'd ....lb.	...	.75	...	.75	...	.75
Dichloride, cl wks ....drs, E. Rockies dms, cl. ..lb.	...	.0842	...	.0842	...	.0742
Glycol, dms, cl. ....lb.	...	.10	...	.10	.14½	.18½
Fluorspar, 85.5% c-l, (*PC*) ton	25.00	28.00	25.00	28.00	28.00	34.00
Formaldehyde, c-l, bbls, wks (*FP*, *PC*) ......lb.	.055	.0575	.055	.0575	.055	.0575
Furfural drs, c-l. wks ....lb.	..	.12½	..	.12½	..	.12½
Fusel Oil, refd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18	.19½
Glauber's Salt, bgs, wks 100 lb.	1.05	1.25	1.05	1.25	1.05	1.28
Glycerin (*PC*) CP, drs, c-l, lb.	...	.18¾	...	.18¾	...	.18¼
Saponification, drs, c-l ..lb.	...	.12¾	...	.12¾	...	.12¾

GUMS

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Gum Arabic, amber sorts bgs ....lb.	.17	.17½	.17	.17½	.14½	.24
Benzoin Sumatra, CS ....lb.	.60	.65	.60	.65	.45	.55
Copal, Congo, ...lb.	...	.55¾	...	.55¾	...	...
Copal, East India, ...lb.	...	.12	...	.12	...	...
Macassar ....lb.	.07⅜	.11¾	.07⅜	.11¾	...	.17⅜
Copal Manila,	.13⅜	.15½	.13⅜	.15½	.14	.14½
Copal Pontianak, bold (A) lb.	...	.23⅜	...	.23⅜	.22⅜	.22⅞
Ester ....lb.	.09½	.12	.09½	.12	.08½	.10
Karaya, bbls, bxs, drs ...lb.	.14	.36	.14	.36	.14	.33

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

h Lowest price is for pulp; highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case;

Current Prices

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Kauri, N Y (A)						
Brown XXX, bgs ......lb.	...	.77	...	.77	.60	.77
B3 ... .lb.	...	.22	...	.27½	.18½	.27½
Pale XXX ....lb.	...	.65¾	...	.65¾	.61	.66
No 3 ....lb.	...	.22	...	.22	.17¾	.22
Sandarac, cs ....lb.	...	.97½	...	.97½	.95	1.10
Tragacanth, No. 1, cases lb.	4.00	4.25	4.00	4.25	3.50	4.00
No. 3 ....lb.	1.10	1.20	1.10	1.20	1.10	1.20
Yacca, bgs (*PC*) ....lb.	.06	.07¼	.06	.07¼	.06	.07¼
Hydrogen Peroxide, cbys ..lb.	.16	.18½	.16	.18½	.16	.18½
Iodine, Resublimed, jars .lb.	2.00	2.10	2.00	2.10	...	2.00
Lead Acetate, cryst, bbls ..lb.	.	.12½	...	.12½	.12	.13¼
Arsenate, bg, c-l ......lb.	.11½	.12	.11½	.12	.11	.12
Nitrate, bbls ....lb.	...	.12½	...	.12½	.11	.14
Red, dry, 95% Pb_3O_4, lcl lb.	.09	.10¾	.09	.10¾	.09	.10¼
97% Pb_3O_4, bbls delv .lb.	.09¼	.11	.09¼	.11	.09¼	.09½
98% Pb_3O_4, bbls delv .lb.	.09½	.11¼	.09½	.11¼	.09½	.10½
White, bbls, lcl ....lb.	.08¼	.08¾	.08¼	.08¾	...	.07½
Basic sulfate, bbls, lcl lb.	.07¼	.08	.07¼	.08	.06½	.07½
Lime, Chem., wks, bulk..ton	6.25	13.00	6.25	13.00	7.00	13.00
Hydrated, f.o.b. wks ..ton	8.50	16.00	8.50	16.00	8.50	16.00
Litharge, coml, delv, bbls lb.	.08	.09¾		.08	.079	.08
Lithopone, ordi., (*PC*), bgs lb.	.04¼	.04½	.04¼	.04½	...	.04¼
Magnesium Carb, tech, wks lb.	.06¼	.09¾	.06¼	.09¾	...	.06¼
Chloride flake, bbls, wks						
c-l ....ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, bbls.lb.	.14	nom.	.14	nom.	.13	.14
Dioxide, tech bgs, lcl ..ton	...	73.00	...	73.00	70.00	74.75
Sulfate, tech, 90-95%						
drms, ...ton *l*	.11¼	.11½	.11¼	.11½	.10½	.11½
Methanol, pure, nat, drs gal *l*	.63	.76	.63	.76	.55½	.61½
Synth, drs cl ......gal. *m*	.34½	.40½	.34½	.40½	.34½	.40½
Methyl Acetate, tech tks..lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, 90 lb cyl ....lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks ....gal.	...	.27	...	.27	...	.27
Naphthalene, crude, wks..lb.	2.75	3.00	2.75	3.00	2.50	3.00
Nickel Salt, bbls, NY.....lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks ...lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls ......lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs ...lb.	.	.32	.	.32	.	.32
Orthodichlorobenzene, drms lb.	.07	.08	.07	.08	.06	.07½
Orthonitrochlorobenzene, wks						
.........................lb.	.15	.18	.15	.16	.15	.18
Orthonitrotoluene, wks ..lb.	...	.09	...	.09	...	.09
Para aldehyde, 98%, wks..lb.	...	.12	...	.12	...	.12
Chlorophenol, drs ......lb.	...	.32	...	.32	...	.32
Dichlorobenzene, wks ..lb.	.11	.15	.11	.15	.11	.12
Formaldehyde, drs,						
wks (*FP*) ......lb.	.23	.24	.23	.24	.23	.24
Nitroaniline, wks, kgs ..lb.	...	.45	...	.45	...	.45
Nitrochlorobenzene, wks..lb.	...	.15	...	.15	...	.15
Penetaerythritol, tech, del lb.	.33½	.35½	.33½	.35½	.33½	.35½
Toluenesulfonamide, bbls lb.	...	.70	...	.70	...	.70
Toluidine, bbls, wks ....lb.	...	.48	...	.48	...	.48

PETROLEUM SOLVENTS AND DILUENTS

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Lacquer diluents, tks, East Coast ....gal.	...	.11	...	.11	...	.11
Naphtha, V.M.P., East tks, wks ....gal.	...	.11	...	.11	.10½	.11
Petroleum thinner, 43-47, East, tks, wks ......gal.	.08¾	.09½	.08¾	.09½	.08¾	.09½
Rubber Solvents, stand grd, East, tks, wks ..gal.	...	.11	...	.11	.10½	.11
Stoddard Solvents, East, tks, wks ....gal.	...	.09½	...	.09½	...	.09½

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Phenol, U.S.P., drs (A) ..lb.	.10½	.11¼	.10½	.11¼	.12½	.13
Phthalic Anhydride, bbls						
wks (A) ....lb.	.14½	.15½	.14½	.15½	.14½	.15½
Potash, Caustic, wks, sol lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
flake ....lb.	.07	.07½	.07	.07½	...	.07
Potassium Bichromate						
csks *(*FP*) ....lb.	.09⅝	.10	.09⅝	.10	...	.09⅝
Bisulfate, 100 lb kgs ..lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 83-85% calc lb.	.05½	.05¾	.05½	.05¾	.06½	.06¾
liquid, tks ....lb.	...	.0275	...	.0275		.0275
dms, wks ....lb.	.03	.03⅛	.03	.03⅛	.03	.03⅛
Chlorate crys, kgs, wks (A) lb.	.11	.13	.11	.13	nom.	.11
Chloride, crys, bgs, kgs lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks ......lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans ..lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, bgs, dom, blk unit						
Per Unit K_2O ....ton	.53½	.56	.53½	.56	.56	.58
Permanganate, USP,						
wks (*FP*) dms ......lb.	.20½	.21	.20½	.21	.19¾	.21
Sulfate, 90% basis, bgs ton	...	36.25	...	36.25	.	36.25
Propane, group 3, tks (*PC*) gal.	...	.03¾	...	.03¾	.02¾	.03¾
Pyridine, ref., drms ......lb.	...	.46	...	.46	...	.46
R Salt, 250 lb bbls, wks lb.	...	.55	...	.55	...	.55
Resorcinol, tech., drms, wks lb.	.68	.75	.68	.75	.68	.74
Rochelle Salt, cryst ....lb	.43½	.47	.43½	.47	...	.43½
Salt Cake, dom. blk wks .ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ⅛c higher.

Current Prices

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Saltpetre, grn, bbls ...100 lb.	8.20	8.60	8.20	8.60	...	8.20
Shellac, Bone dry, bbls ..lb. r	.42½	.46	.42½	.46	.39	.42½
Silver Nitrate, vials ....oz.	...	.32⅜	...	.32⅜	.26⅞	.32⅜
Soda Ash, 58% dense, bgs, c-l, wks 100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl ...100 lb.	...	1.13	...	1.13	1.05	1.13
Caustic, 76% grnd drms ....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms ..100 lb.	...	2.30	...	2.30	...	2.30
Liquid, sellers tks 100 lb.	...	1.95	...	1.95	...	2.00
Sodium Acetate, 60% tech, powd, flake, bbls, wks lb.	.05	.06	.05	.06	...	.05
Benzoate, USP dms ....lb.	.46	.52	.46	.50	.46	.50
Bicarb, bbl, wks 100 lb.	1.70	2.05	1.70	2.05	1.70	1.85
Bichromate, cks, wks (FP) lb.	...	.07¾	...	.07¾	...	.07⅜
Bisulfite powd, bbls, wks ....100 lb.	3.00	3.60	3.00	3.60	3.00	3.10
35-40% sol bbls, wks 100 lb.	1.40	1.65	1.35	1.80	1.35	1.80
Chlorate, bgs, wks (A) ..lb.	...	.06¼	...	.06¼	...	.06¼
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¼	.07¼	.08¼	...	.08
Hyposulfite, cryst, bgs, cl, wks ....100 lb.	...	2.25	...	2.25	...	2.45
Metasilicate, gran, bbl, cl, wks ....100 lb.	2.50	3.55	2.50	3.55	...	2.50
Nitrate, imp, bgs (A) ton	...	33.00	...	33.00	...	29.35
Nitrite, 96-98% dom, cl. lb.	...	.06¾	...	.06¾	...	.06¾
Phosphate, di- wks ..100 lb.	6.00	7.25	6.00	7.25	...	...
cryst, bgs, c-l 100 lb.	2.55	2.70	2.55	2.70	2.55	2.70
Tri-bgs, cryst, wks 100 lb.	2.70	3.45	2.70	3.40	2.70	2.85
Prussiate, yel, bbls, wks lb.	.10	.11	.10	.11	...	.11
Pyrophosphate, bgs wks c-l lb.	.0528	.0610	.053	.061	.053	.06
Silicate, 52°, drs, wks 100 lb.	1.40	1.80	1.40	1.80	...	1.70
40°, drs, wks, c-l 100 lb.	...	.80	...	.80	...	...
Silicofluoride, bbls NY ..lb.	.05	.05½	.05	.05½	.09	.15
Sulfate, Anhyd, bgs 100 lb.	1.70	1.90	1.70	1.90	1.70	1.90
Sulfide, c-l, bbls, wks ..lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, c-l, wks ..lb.	3.15	3.90	3.15	3.90	...	3.15
Sulfite, powd, bbls, wks lb.	.05¼	.06	.05¼	.06	...	.05¼
Starch, Corn, Pearl, bgs ....100 lb.	...	3.47	...	3.47	...	3.10
Potato, bgs, cl ....lb.	...	.0637	...	.0637	.061	.0637
Rice, bgs ....lb.	.09½	.10¼	.09½	.10¼	.09	.10
Sweet Potato, bgs ..100 lb.	no stocks		no stocks		no stocks	
Sulfur, crude f.o.b. mines ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs ....100 lb.	.18	.30	.18	.30	...	...
Flowers, USP, bgs .100 lb.	3.05	3.55	3.05	3.55	3.05	3.35
Roll, bbls ....100 lb.	2.40	2.90	2.40	2.90	2.40	2.70
Sulfur Dioxide, cyl ......lb.	.07	.08	.07	.08	.07	.09
tks, wks ....lb.	.04	.06	.04	.06	.04	.06
Sulfuryl Chloride ....lb.	.15	.40	.15	.40	.15	.40
Talc, crude, c-l, NY ....ton	...	13.00	...	13.00	12.50	24.50
Ref'd, c-l, NY ...ton	13.00	18.00	13.00	18.00	17.25	19.25
Tin, crystals, bbls, wks ...lb.	no stocks		no stocks		no stocks	
Metal, (PC) (A) ....lb.	...	.52	...	.52	...	.52
Titanium Dioxide (PC) ..lb.	.15	.15¾	.15	.15¾	...	.14½
Toluol, drs, wks (FP) (A) gal.	...	.33	...	.33	...	.33
tks, frt all'd (FP) ....gal.	...	.29½	...	.29½	...	.28
Tributyl Phosphate, dms lcl, frt all'd ....lb.	...	.47	...	.47	...	.47
Trichlorethylene, dms, wks lb.	(FP)	.09	(FP)	.09	...	.08
Tricresyl phosphate (FP) lb.	.24	.54½	.24	.54½	.25	.31
Triethylene glycol, dms lcl lb.	...	.26	...	.26	...	.26
Triphenyl Phos, drs (FP) lb.	.31	.32	.31	.32	.31	.32
Urea, pure, cases ....lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs ......lb.	.25	.26	.25	.26	.18	.20
Bees, bleached, cakes ...lb.	...	.60	...	.60	.58	.61
Candelilla, bgs ......lb.	.38	.48	.38	.48	.33	.38
Carnauba, No. 1, yellow, bgs. ....lb.	.83¼	.93¼	.83¼	.93¼	.83¼	.89
Xylol, frt all'd, tks, wks ..gal.	...	.27	...	.27	...	.27
Zinc Chloride fused, wks ..lb.	.05	.0535	.05	.0535	...	.05
Metal, high grade slabs, c-l, NY (FP) (PC) 1000 lb.	...	8.66	...	8.66	...	8.65
Oxide, Amer, bgs, wks lb.	.07¼	.07½	.07¼	.07½	...	.07¼
Sulfate, crys, bgs, ..100 lb.	3.60	4.55	3.60	4.35	3.60	3.65

Oils and Fats

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Babassu, tks, futures ....lb.	...	.111	...	.111	no prices	
Castor, No. 3, bbls ....lb.	.13¾	.14¼	.13¾	.14¼	.12½	.13¾
China Wood, drs, spot NY lb.	...	.39	...	.39	.39	.40⅛
Coconut, edible, drs NY ..lb.	...	.0985	...	.0985	...	...
Cod Newfoundland, dms..gal.	...	.90	...	.90	.85	.90
Corn, crude, tks, mills ...lb.	...	.12¾	...	.12¾	.12½	.12¾
Linseed, Raw, dms, c-l ...lb.	...	.1530	...	.1530	.117	.143
Menhaden, tks, Baltimore gal.	...	.089	...	.089	.63¾	.666
Light pressed, drs .....lb.	.1305	.1307	.1305	.1307	.11	.139
Oiticica, dms ....lb.	.23	.25	.23	.25	.29	.25
Oleo, No. 1, bbls, NY ...lb.	.13¾	nom.	nom.	.13¼	...	.13¼
Palm, Niger kernel, cks bulk ....lb.	...	.0825	...	.0825	.0925	...
Peanut, crude, tks, f.o.b. mill lb.	...	.13	...	.13	.12⅞	.13
Perilla, crude dms, NY (A) lb.	...	.245	...	.245	...	.246
Rapeseed, denat, bulk .....lb.	...	.1150	...	.1150	...	...
Red, dms ....lb.	.13¼	.14¼	.13¼	.14¼	.11¾	.143
Soy Bean, crude, tks, mill lb.	...	.1175	...	.1175	.12¼	nom.
Tallow, acidless, bbls .....lb.	...	.14¼	...	.14¼	...	
Turkey Red, single, drs ..lb.	.10	.13½	.10	.13½	...	.08¾

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b N. Y., refined 6c higher in each case.

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Statistical Review of Minerals and Chemicals in 1942

(Continued from page 268)

goods has forced a corresponding decrease in the amount of lithopone needed for this purpose.

Blanc fixe (precipitated barium sulfate) declined in demand owing to curtailment in use of white paint, rubber goods, linoleum, and oilcloth, its major outlets.

Barium carbonate production expanded to meet added demands in several fields. There were 7 producers in 1942, 5 in 1941. Barium carbonate is an intermediate in the manufacture of certain other barium chemicals, particularly barium peroxide and barium nitrate. There were 3 producers of barium peroxide in 1942, 2 in 1941. Five firms reported production of barium nitrate in 1942, compared with 3 in 1941. The nitrate is used in green signal flares and in explosives.

Barium chloride is used to purify salt brines for chlorine and sodium hydroxide manufacture, in making coatings for photographic paper, in the manufacture of extended titanium pigments, in color lakes, in finishing white leather, and in purifying beet sugar juice. Three firms produced barium chloride in 1942, as in 1941.

Barium hydroxide was produced by 4 companies in 1942 as in 1941, principally for use in beet sugar purification and for refining animal and vegetable oils.

Lithopone[1] Consumption by Industries, 1940-42.

Industry	1940 Short tons	1940 Per cent of total	1941 Short tons	1941 Per cent of total	1942 Short tons	1942 Per cent of total
Paints, enamels and lacquers	117,075	77	132,691	75	109,216	80
Floor coverings and textiles ..	18,738	13	21,114	12	15,775	11
Rubber	3,387	2	3,547	2	1,047	1
Other	12,602	8	19,290	11	11,282	8
	121,802	100	176,642	100	137,320	100

[1] Does not include cadmium lithopone.

Calcium Chloride Shipments

Shipments of calcium chloride and calcium-magnesium chloride derived from natural sources, used chiefly in dust-laying of dirt roads, were 35 per cent greater in 1942 than in 1941, according to the Bureau of Mines. However, total consumption of natural and synthetic calcium chloride is not believed to have increased significantly in 1942. The increased shipments of the natural material are said to have resulted from the shut-down of a former producer of synthetic calcium chloride. There were 13 producers of natural calcium and calcium-magnesium chloride in 1942, compared with 10 in 1941.

Calcium chloride and calcium-magnesium chloride, recovered from natural brines, are largely byproducts of the manufacture of bromine, sodium chloride, magnesium chloride, and certain other salts.

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Index to Advertisers

"WE"-EDITORIALLY SPEAKING

One of the nicest gestures we've seen appeared recently in the English publication, *The Chemical Age*. We thought our readers would like to see it, so we are reproducing it below.

"If in your travels you should happen to meet an American soldier wearing the badge represented in our sketch, you should take him to lunch. You should find much in common to talk about, for the crossed retorts and the benzene ring are the insignia of the American Army Chemical Warfare Service, and the great majority of the officers of this organization are fully fledged chemists, many of them with long experience of chemical industry. The Germans, if they are ever reckless or desperate enough to resort to the use of chemical weapons against American troops in the field, are likely to meet with some nasty surprises; the retaliation of the men with the crossed retorts will be swift and devastating, for the U. S. Chemical Warfare Service is second to none in efficiency and inventiveness. Another factor which should deter the Nazis from taking any action that would unleash a chemical Nemesis is the fact that behind America's front line chemists stand the almost limitless resources of the world's biggest chemical industry, capable of producing all the incapacitating gases in overwhelming quantities."

Government, these days, plays a much greater part in our lives than it used to. It does funny things to us. For example, have you heard the story about the lady, who finding herself the block leader (or captain) in the civilian defense lineup, set out one morning full of patriotic motives, to wise-up her neighbors in the matter of rationing and other O.C.D. matters. She paused, in due course, at the front door of a family, newly arrived in the neighborhood.

Confronted by the lady of the house, she put on her best professional air, drew herself up to full dignity, and said impressively, "Good afternoon, I am the block head."

The delicate precision and sensitiveness of modern instruments used by scientists in research and industry truly amaze the imagination. A recent note from the Westinghouse Research Laboratories tells of a sensitive balance that can weigh a single layer of oxygen atoms on a sliver of steel the size of a safety razor blade. Such a layer weighs two hundred-millionths of an ounce, or about a hundredth as much as a speck of pepper.

An interesting note which appeared on the front page of the *New York Times* a week or so ago, lends a humorous and ironical note to the war in the Orient.

Fifteen Years Ago

From our files of August, 1928

Union Carbide & Carbon Corp. concludes agreement under which it will acquire all the common stock of Acheson Graphite Corp. in exchange for shares of its own stock.

E. F. Brundage is appointed sales manager of Solvay Sales Corp. to succeed the late H. G. Carrell.

Directors of American Linseed Co. approve sale of its properties and inventories, one-half to Spencer-Kellogg & Sons and one-half to Archer-Daniels-Midland Co.

Hooker Electro-Chemical Co. begins construction of $1,000,000 plant at Tacoma, Wash. Original operations of the plant will probably be limited to manufacture of caustic soda and liquid chlorine, but its construction is being planned along such lines that expansion into other fields will be possible.

Barrett Co. is appointed sales agent for anhydrous ammonia to be produced at Hopewell, Va., plant of Allied Chemical & Dye Corp.

Air Reduction Co., Inc., acquires all assets of Ohio Oxygen Co. with oxygen manufacturing plant at Niles, Ohio.

Atmospheric Nitrogen Co. announces that first unit of its atmospheric nitrogen plant at Hopewell, Va., will be completed by January 1.

Philip G. Mumford announces retirement, to take effect September 1, as president, Commercial Solvents Corp., after serving for past six years.

It is reported that the Chilean government and the Nitrate Producers' Association are trying to devise some selling scheme which will eliminate the rate-cutting competition in consuming markets between consigning producers and importers that has been the feature during the last few months, and which by continually falling prices and resultant losses has caused many of the distributors to lose interest in the commodity.

It seems that so many of the Japanese bombs dropped in China's northwest territories have failed to explode that the picric acid taken from them has been found sufficient to dye this year's entire Chinese blanket supply. According to the New York Committee of the National War Fund:

"Word to this effect reached the committee yesterday through United China Relief," the committee spokesman said. "In addition, the committee learned, the Japanese bomb cannisters are being melted down and recast into farm implements.

"The blankets for which the Japanese are supplying the dye in this unintentional way are produced locally by the Chinese spinning and weaving cooperatives, which, with similar industrial cooperatives throughout free China, have proved a mainstay in China's fight."

An official of WPB, in a recent talk telling businessmen to place no dependence on the traditional way of doing business, of marketing, distributing and selling, urging them to seek for the new, to go on telling their story through advertising whether they had goods to sell or not, cited some interesting figures. He said, "A new customer is born every 10.4 seconds. An old one dies every 21.6 seconds. Industry loses 1,450,000 old customers in a year and gains 3,020,000 new ones who know nothing of you or your product."

Although the Truman Committee has done some good work it sometimes goes off the beam. One of these instances, it seems to us, occurred when it issued the recent report that rayon had not yet been proved better than cotton for tire cord, and indicating fear that Army officials had not conducted tests fairly. Even before the present war it was common knowledge that rayon was superior for heavy duty tires.

We like the cryptic reply of Rubber Director Jeffers, who recommended the rayon expansion. Informed of the committee's report, he said:

"So what? The committee says that there is no proof that rayon cord is better than cotton cord for use in synthetics. Experts of the Army, the industry and my office disagree.

"I'll trail along with those who have had a lifetime of experience with tires and tire-testing, particularly when essential truck and bus transportation, the civilian economy, the outcome of battles and the lives of soldiers are the price of being too late with too little without an insurance policy."

Part 2. Patents and Trademarks

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

From Official Gazette—Vol. 551, Nos. 3, 4, 5—Vol. 552, No. 1—p. 432

Petroleum Refining*

Continuous cyclic method for the catalytic conversion of hydrocarbons. No. 2,320,318. Thomas Simpson, John Payne and John Crowley, Jr. to Socony-Vacuum Oil Co.
Geochemical prospecting underground hydrocarbon deposits. No. 2,320,577. Thomas Dunn to Stanolind Oil and Gas Co.
Removal of organic fluorine compounds, from predominantly saturated hydrocarbon materials No. 2,320,629. Maryan Matusaak, to Phillips Petroleum Company.
Petroleum demulsifying composition, which comprises water-wettable, interfacial and surface active modified alkyd resin condensation product. No. 2,321,056. Truman Wayne.
Refining viscous mineral white oils. No. 2,321,290. Albert Giraitis to Standard Oil Development Co.
Decolorizing a viscous mineral oil. No. 2,321,458. William Chenault and Albert Miller to Sinclair Refining Co.
Decolorizing a mineral oil. No. 2,321,459. William Chenault and Albert Miller to Sinclair Refining Co.
Decolorizing mineral oil. No. 2,321,460. William Chenault and Albert Miller to Sinclair Refining Co.
Distillation of crude oils, containing acidic substances. No. 2,321,540. Edwin Atwood to Socony Vacuum Oil Company.

Photographic Chemicals*

Stabilizing prints obtained by photographic bleaching of layers containing bleaching dyestuffs and thiorea derivatives. No. 2,319,344. Andrea Polgar and Charles Halmos.
Process of color photography. No. 2,319,369. Virgil Sease and John Weber to E. I. du Pont de Nemours & Co.
Photographic composition containing unsymmetrical diacyclacetpoly-amino-arylides and color development processes. No. 2,319,426. Edmund Middleton and Andrew Jennings to E. I. du Pont de Nemours & Co.
Production of photographic sensitizing dyestuffs. No. 2,319,547. John Kendall and Ronald Collins to Ilford Ltd.
Producing a colored image in a silver halide emulsion layer. No. 2,319,984. Bela Gaspar to Chromogen, Inc.
Converting a silver photographic image carried in a gelatin coating on a suitable support into a transparent dye mordant. No. 2,320,-028. Percy Brewster.
Producing a natural color photograph, on a material including a transparent base. No. 2,320,108. Alan Tull to Latta Syndicate Limited.
Producing differently colored images, at different depths of a photographic silver halide emulsion coat. No. 2,320,109. Alan Tull, to Latta Syndicate Ltd.
Pyrazolone couplers for color photography. No. 22,329. Henry Porter and Arnold Weissberger, to Eastman Kodak Co.
Producing color separation images. No. 2,320,358. Bela Gaspar to Chromogen, Inc.
Producing a colored photographic record, by color forming development in a sensitive element having three superposed, differently sensitized silver halide layers. No. 2,320,418. John Eggert and Bruno Wendt to General Aniline & Film Corp.
Silver halide emulsion, containing as a color former fast to diffusion, an acetal of a polymer containing hydroxyl groups and an aldehyde. No. 2,320,422. Alfred Frohlich, to General Aniline & Film Corp.
Photographic sensitizer, an unsymmetrical trimethinecyanine. No. 2,320,439. Karl Kumetat, and Oskar Riester, to General Aniline & Film Corp.
Sensitization of photographic emulsions. No. 2,320,654. Oskar Riester.
Duplex photo-copy material, comprising a single ply opaque paper base or support coated on both sides with a light-sensitive photographic layer. No. 2,320,693. Edwin Yauck and John Dessauer to The Haloid Co.
Color photographic material, and method of using the same. No. 2,321,195. Paul Goldfinger, Chromogen, Inc.
Manufacture of antihalation layers. No. 2,321,279. Richard Brodersen and Gustave Wilmanns, to General Aniline & Film Corp.
Photographic fixing bath, containing a solvent and alkali to dissolve the aluminum compound tending to be precipitated by the alkali. No. 2,321,347. James Alburger to Radio Corp.
Photographic developer, containing a developing agent, more than 100 grams of caustic alkali per liter of solution and alum to saturation. No. 2,321,348. James Reid Alburger, to Radio Corp.

Resins, Plastics*

Preparing water-insoluble resins. No. 2,319,359. Hans Wassenegger.
Making a high melting primarily terpenic hydrocarbon resin compatible with ethyl cellulose. No. 2,319,386. William Carmody and Harold Kelly to Carmody Research Laboratories, Inc.
Comminuted material which is plastic during hot-molding operations comprising a compound of lignocellulose and a phenol. No. 2,319,-951. Arlie Schorger to Burgess Cellulose Co.

* Continued from Last Month, Vol. 550, Nos. 3, 4—Vol. 551, Nos. 1, 2.

Thermoplastic lignocellulosic product and method of making the same. No. 2,319,952. Arlie Schorger to Burgess Cellulose Co.
Preparing a coated sheet, of a thermoplastic resin. No. 2,320,536. Maxwell Pollack, Franklin Strain, and Irving Muskat to Pittsburgh Plate Glass Co.
Coffee molding plastic compound. No. 2,320,649. Herbert Polin.
Treating styrene-unsaturated dicarboxylic acid resins. No. 2,320,724. Howard Gerhart and William Bauer to Pittsburgh Plate Glass Co.
Polymerization of rosin and rosin esters. No. 2,320,795. Oscar Pickett to Hercules Powder Co.
Opalescent synthetic resins. No. 2,321,048. Calvin Schildknecht to E. I. du Pont de Nemours & Co.

Rubber*

Synthetic rubber prepared by the polymerization of a butadiene-1,3, and, as a softener therefor, an aliphatic nitrile containing an open chain of at least ten carbon atoms. No. 2,319,634. Doran Sauser to The B. F. Goodrich Co.
Rubber hydrochloride film. No. 2,319,918. William Calvert to Wingfoot Corp.
Combining foam rubber. No. 2,320,425. Charles Glaes and John Schott to Mishawaka Rubber and Woolen Manufacturing Co.
Altering rubber hydrochloride stock, which is naturally non-elastic to a state of rubber hydrochloride elastic so as to preserve it. No. 2,320,691. Le Moine Wright.
Vulcanized rubber composition, containing rubber, rubber filler, and pinene resin consisting preponderantly of beta-pinene polymers. No. 2,320,718. Frank Corkery and Samuel Burroughs to Pennsylvania Industrial Chemical Corp.
Incorporating in a rubber composition an anti-oxidant consisting of a 1,3,-diaryl, 1,3, dialkyl cyclobutane. No. 2,320,745. Philip Paul to United States Rubber Co.
Preserving rubber compositions, which comprises incorporating a product of acid catalyzed reaction of a polyhydric phenol and an aliphatic diene hydrocarbon. No. 2,320,746. Philip Paul to United States Rubber Co.
Adhesively uniting hard and soft rubber or rubberlike masses with surfaces of other materials. No. 2,320,937. Herbert Knoop and Hermann Miedel to American Lurgi Corp.
Process for forming foam rubber, and products thereof. No. 2,321,-111. Paul Stamberger, to International Latex Corp.
Accelerator of vulcanization. No. 2,321,305. William Messer to U. S. Rubber Co.
Accelerator of vulcanization. No. 2,321,306. William Messer to U. S. Rubber Co.
Latex coagulation. No. 2,321,552. Herbert Lubs, to E. I. du Pont de Nemours & Co.

Textiles*

Process of continuously forming cellulose films, staple fibers, and artificial silk. No. 2,319,305. Jan de Nooij and Ernest Bleibler.
Rope comprising a cabled assembly of strands made up of highly stretched high tenacity filaments having a basis of a saponified organic ester of cellulose. No. 2,319,312. Donald Finlayson to Celanese Corporation of America.
Treating a fabric containing potentially adhesive fibres. No. 2,319,-834. Roger Wallach to Sylvania Industrial Corp.
Patterning in relief a cellulosic fabric which comprises treating narrow, narrowly spaced areas only of the fabric with a mixture of a water insoluble hydroxy ether of cellulose and a compatible dyestuff to render said areas colored, stiff and resistant to shrinkage. No. 2,319,903. Harold Huey and William Russell to Sayles Finishing Plants, Inc.
Spinning of solutions, in organic solvents of cellulose derivatives containing free hydroxyl groups. No. 2,320,704. Siegfried Petersen to Leverkusen Schlebusch, and Paul Schlack.
Production of sulfur-containing cellulose derivatives. No. 2,321,069. Henry Dreyfus, to Celanese Corp.
Fleecelike web, comprising cotton fibers and curled or crinkled thermoplastic derivative of cellulose fibers. No. 2,321,108. George Schneider to Celanese Corp. of America.
Recovering textile material, from a mixture of the textile material with solvent-resistant rubber. No. 2,321,114. Ralph Tefft to Allied Chemical & Dye Corp.

Agricultural Chemicals

Maintaining viability of plant material during storage and shipment. No. 2,321,736. Robert Du Puis and Charles William Lenth to Association of American Soap & Glycerine Producers, Inc.
Retarding abscission of a part of a growing plant. No. 2,322,409. James Adams to General Chemical Co.
Process of steeping corn. No. 2,322,413. J. Paul Bishop and William Henry to Corn Products Refining Co.
Fixing undesirable substances in the skin and germ of whole soy beans comprising applying to whole soy beans a non-poisonous ionized liquid mixture. No. 2,322,516. Artemy Horvath to Horvath Laboratories, Inc.

Organic insecticide composition. No. 2,322,723. David Young to Jasco, Inc.
In the propagation of plants the method of retarding normal separation of parts due to deterioration of the absciss layer. No. 2,322,759. John Lontz to E. I. du Pont de Nemours & Co.
Plan regulant composition containing a nuclear halogenated arylketo monocarboxylic acid. No. 2,322,760. John Lontz to E. I. du Pont de Nemours & Co.
Plant regulant composition containing a monocarboxylic acid linked to a nuclear halogenated aromatic ring through a polyvalent, strongly negative, non-metallic atom. No. 2,322,761. John Lontz to E. I. du Pont de Nemours & Co.
Obtaining starch from corn in which the corn is steeped and subjected to germ and coarse slop separations yielding separate starch milk streams. No. 2,323,077. Albert Peltzer to Merco Centrifugal Co.
Insecticidal composition. No. 22,340. Clarence Dolman to Hercules Glue Co.
Treating land for the purpose of promoting plant growth, which comprises dissolving sulfur dioxide in water. No. 2,323,509. Dell Alvos.
Pyrethrum activated and stabilized with polyetheramines. No. 2,323,658. William Hester to Rohm & Haas Co.

Cellulose

Cellulose product. No. 2,322,427. Sidney Milton Edelstein.
Preparation of cellulose mixed esters. No. 2,322,575. Julian Hill to E. I. du Pont de Nemours & Co.
Producing an improved product of cellulose which comprises admixing an aqueous cellulosic solution and a solution containing urea and formaldehyde. No. 2,322,981. Leo Ubbelohde.
Process for saccharifying cellulose. No. 2,323,022. Demetrio Ferrari and Mario Torresi.

Ceramics

Mirror. No. 2,321,987. Wilbur Brown to Libbey-Owens-Ford Glass Co.
Producing ceramic bodies. No. 2,322,179. Willem Leendert van Zwet.
Glass composition having high chemical durability and being suitable for machine molding of bottles. No. 2,323,643. George Barton to Armstrong Cork Co.
Glass strand composed of a multiplicity of long, fine, attenuated glass fibers, and a coating of wax on the individual fibers. No. 2,323,684. Allen Simison to Owens-Corning Fiberglas Corporation.

Chemical Specialties

Compounded lubricant. No. 2,321,576. James Clayton and Bruce Farrington to Standard Oil Co. of California.
Compound hydrocarbon lubricant. No. 2,321,577. James Clayton and Bruce Farrington to Standard Oil Co. of California.
Compound lubricating oil. No. 2,321,578. James Clayton and Bruce Farrington to Standard Oil Co. of California.
Solid base material for suppositories, bougies or the like. No. 2,321.694. Grover Miller to Gromiller, Inc.
Non-fibrous cellulosic gel band containing water, softener and isopropanol. No. 2,321,762. Frank McDermott to E. I. du Pont de Nemours & Co.
Liquid lubricating composition. No. 2,321,804. Bruce Farrington, James Clayton and John Rutherford to Standard Oil Co. of California.
Waterproofing and preserving wood which comprises applying to the wood a solution derived by extracting sawdust with a hot aqueous solution of chromium trioxide. No. 2,321,849. Calvin Owens.
Polish and process of making it. No. 2,322,066. Lois Smith.
Mineral oil composition. No. 2,322,093. Robert Moran, Ebenezer Reid, and Lyle Hamilton to Socony-Vacuum Oil Co., Inc.
Preparation of varnish bases. No. 2,322,106. Laszlo Auer to Ridbo Laboratories, Inc.
Lubricating composition. No. 2,322,184. Ellis White to Shell Development Co.
Extreme pressure lubricating composition. No. 2,322,209. Carl Prutton to The Lubri-Zol Corp.
Compounded oil. No. 2,322,307. George Neely and Frank Kavanagh to Standard Oil Co. of California.
Non-curling slip-resistant carbon paper coated on one side with a conventional copying carbon composition, and on the reverse side with a waxy composition. No. 2,322,367. Arthur Kjellstrand to Interchemical Corporation.
Lubricating oil. No. 2,322,376. Rush McCleary and Stiles Roberts to The Texas Co.
Printing ink & process. No. 2,322,445. Walter Huber to J. M. Huber, Inc.
Composition for preservation of cellulosic materials from decay, stain and mold organisms. No. 2,322,633. Richard Hitchens to Monsanto Chemical Co.
Foundry mold composition. No. 2,322,638. Francis Kleeman to Westinghouse Electric & Manufacturing Co.
Mastic composition for flooring, etc. No. 2,322,641. Frank Jaros to The Patent and Licensing Corporation.
Mold and mold composition. No. 2,322,667. John Seastone and William Mahin to Westinghouse Electric & Mfg. Co.
Hemostatic analgesic and bactericidal preparation comprising a solution of tannic acid, chlorbutanol, and a solvent for chlorbutanol. No. 2,322,735. Nicholas Molnar to Albert Mizzy.
Lubricating material vermiculite in oil. No. 2,322,735. Benjamin Rouse, one-third to Floyd Lee and Corder Brown, and one-third to Clair Wilson, M. C. Eddy, Floyd Lee and Corder Brown.
Powdered fire-extinguishing compositions containing lycopodium and a substance evolving a fire-extinguishing gas upon subjection to fire. No. 2,322,781. Elden Hanks to Halco Chemical Corp.
Printing composition for printing textiles being an emulsion consisting of an interpolymer of styrene, vinyl acetate, and esters of methacrylic acid with a drying oil. No. 2,322,837. Linus Ellis to E. I. du Pont de Nemours & Co.
Lubricant compricing a lubricating oil, a glyceride phosphoric acid ester and a sulfurized fatty oil. No. 2,322,859. Clarence Loane and James Gaynor to Standard Oil Co.
Adhesive and method of making the same. No. 2,322,886. Seymour Saunders and Harry Morrison to Chrysler Corporation.
Cement for forming joints between the edges of adjacent wallboards. No. 2,322,930. Harry Gardner to Certain-Teed Products Corp.
Acidproof cement. No. 2,323,029. Hobert Goodrich to Gladding, McBean & Co.
Drawing compound substantially free from mineral oil. No. 2,323,071. Harley Montgomery.
Maintaining the original freshness of chewing gum, which consists in maintaining the moisture content of the gum. No. 2,323,102. Milfred Staples to Ontario Research Foundation.
Clean-up agents for thermionic valves, composed of comminuted active getter alloy of barium and magnesium and comminuted magnesia. No. 22,342. John McQuade to Kemet Laboratories Co., Inc.
Rubber and asphalt cement and adhesive comprising same. No. 2,323,336. Earl Knorr to Minnesota Mining & Manufacturing Co.
Extreme pressure lubricant suitable for use as a transmission lubricant. No. 2,323,360. Joseph Wallace to Standard Oil Co.
Solid powdery seasoning composition comprising spice-seasoning extracts and a solid carrier comprising finely divided porous absorptive protein of the animal body. No. 2,323,466. Carroll Griffith to The Griffith Laboratories, Inc.
Lubricant comprising a lubricating oil and a metal salt of polymerized rosin. No. 2,323,471. Irvin Humphrey to Hercules Powder Co.
Tread member for shoes comprising a tread surface layer of vinyl resin, a film of chlorinated rubber adhesively secured to said vinyl resin, a film whose basic constituents are a copolymer of butadiene and a acrylonitrile and a toughening agent. No. 2,323,562. Frederick Nugent to B. B. Chemical Co.
Tread member for shoes comprising a tread surface layer of vinyl resin, a film of chlorinated rubber adhesively secured to said vinyl resin, a film of polymerized chloroprene adhesively secured to said chlorinated rubber, and a layer of leather adhesively secured to said polymerized chloroprene. No. 2,323,563. Frederick Nugent to B. B. Chemical Co.
Mineral oil containing tetra methyl diamino diphenyl methane and sodium lauryl sulfate. No. 2,323,670. John Musselman to The Standard Oil Co.
Non-offset printing ink. No. 2,323,710. Donald Erickson and Paul Thoma to Michigan Research Laboratories, Inc.
Viscous mineral oil composition containing an oil soluble, water insoluble, sufficiently non-volatile alkyl amine ester of sulfurous acid. No. 2,323,789. Rolston Bond to Tide Water Associated Oil Co.
Extreme pressure lubricant composition comprising a lubricating oil and a minor proportion of a dixanthyl dialkyl thioether. No. 2,323,797. Elmer Cook to Tide Water Associated Oil Co.
Sensitizer for blue print paper and the like. No. 2,323,798. Clyde Crowley and George Goodyear to The Huey Co.
Sensitizer for blue print paper and the like. No. 2,323,799. Clyde Crowley and George Goodyear to The Huey Co.
Citronella candle. No. 2,323,804. Philip Driscoll to Clifford Stewart.
Process of adhesion. No. 2,323,831. Adolf Menger and Eugen Bock.
Making cement-asbestos products containing a filler material. No. 2,323,835. Philip Mooney to Medusa Portland Cement Co.

Coatings

Electrical conductive coating. No. 2,321,587. Preston Davis and Arthur Halvorsen.
Enamel coating for ferrous metals. No. 2,321,656. Allan Chester to Poor & Co.
Enamel coating for ferrous metals. No. 2,321,657. Allan Chester to Poor & Co.
Preparing a bonding compound for use in enamel-coating processes. No. 2,321,658. Allan Chester to Poor & Co.
Flexible abrasive sheet comprising among others a coating consisting essentially of diethylene glycol diabietate. No. 2,321,744. Robert Hackett to Abrasive Products, Inc.
Providing a coat of porcelain enamel applied directly to a ferrous surface. No. 2,321,763. Glenn McIntyre and Eugene Bryant to Ferro Enamel Corporation.
Moistureproofing coating composition comprising essentially a 12% solution in toluene of 10 parts wax, 90 parts cyclized rubber and 2 parts tetraethyl diamino diphenyl methane. No. 2,321,764. James Mitchell to E. I. du Pont de Nemours & Co.
Coating a ferrous metal surface with rubber. No. 2,321,889. George Bailey and Oscar Johnson to E. I. du Pont de Nemours & Co.
Bituminous coating for timber. No. 2,322,105. Walter Arnold, to Koppers Co.
Protective coating on magnesium. No. 2,321,948. Roy Shawcross to Aluminum Co. of America.
Producing a protective coating upon articles of magnesium and magnesium base alloys. No. 2,322,208. William Loose and Herbert De Long to The Dow Chemical Co.
Method of testing protective coatings. No. 2,322,228. Herbert De Staebler.
Producing a coating composition by subjecting rubber to a depolymerizing treatment and then colloidally dispersing the depolymerized rubber in a wax. No. 2,322,242. Francis Lanigan and Jacob Mark to Dewey & Almy Chemical Co.
Corrosion resistant coating for metal surfaces. No. 2,322,349. George Jernstedt to Westinghouse Electric & Manufacturing Co.
Compounding an enamel having a furan resin base and containing a flexibilizing agent to improve its qualities for use as a wire coating. No. 2,323,334. Henry Kauth to General Cable Corp.
Coating a transparentized tracing sheet of fiber base which is filled with a hydrophilic colloid and which contains a permanent transparentizing agent. No. 2,323,469. Walter Hinman and Walter Hollman to The Frederick Post Co.

Dyes, Stains

Sulfur dyestuffs obtained by acting with a sulfurizing agent on an anthracene derivative. No. 2,321,787. Werner Zerweck and Wilhelm Hechtenberg to General Aniline & Film Corporation.
Producing fast dyeings on fibrous materials. No. 2,321,816. Richard Huss to General Aniline & Film Corporation.
Improving the fastness of dyeings and prints by after-treatment with aldehyde condensation products. No. 2,322,333. Gustave Basel and Andreas Ruperti to Ciba Products Corporation.

Soluble trisazo dyes for cellulosic fibers. No. 2,322,746. Swanie Rossander to E. I. du Pont de Nemours & Co.
Trisazo dye. No. 2,322,750. Chiles Sparks and Joseph Trepagnier to E. I. du Pont de Nemours & Co.
Azo compounds and material colored therewith. No. 2,322,925. Joseph Dickey to Eastman Kodak Co.
Coloring liquid comprising aqueous zein a rosinate, aniline dye, and sulfonated castor oil. No. 2,322,927. Pierre Drewsen and John Little to The Hinde & Dauch Paper Co.
Azo compounds and material colored therewith. No. 2,323,314. Joseph Dickey and James McNally to Eastman Kodak Co.
Azo compounds and material colored therewith. No. 2,323,315. Joseph Dickey and James McNally to Eastman Kodak Co.
Color emulsion of the water-in-oil type suitable for coloring of textiles. No. 2,323,871. Roy Kienle and Alfred Peiker to American Cyanamid Co.

Equipment

Apparatus for drawing films of polymeric material capable of being cold drawn to permanent and substantial increase in length. No. 2,321,635. Guy Taylor to E. I. du Pont de Nemours & Co.
Funnel and method of filtering. No. 2,321,639. George Zarbo to Kimble Glass Co.
Oil filter comprising a porous filtering medium having intimately admixed therewith an alkylene polyamine. No. 2,321,883. Lewis Young to Douglas Young, Inc.
Apparatus for transferring asphalt, heavy road oil and other viscous material from a source of supply to a transporting truck. No. 2,321,908. Carl Gerlinger.
Erythrocytometer. No. 2,322,128. Carl Hausser and Anthony Hausser
Analytical furnace. No. 2,322,159. Edward Saxer and Robert Minto.
Simultaneously filling a plurality of capsules. No. 2,322,169. Daniel Darley Smith.
Apparatus for washing oleoresin. No. 2,322,252. Jesse Reed to Claude Wickard, Sec'y of Agriculture.
Device for changing the pH of fermentescible liquids. No. 2,322,545. Jacques Sandstrom.
Continuous flow viscosimeter including a closed circuit for a sample liquid. No. 2,322,814. George Binckley to Sydney William Binckley.
Spinning guide for molten silicates. No. 2,323,000. Max Aurwarter, Alfred Jedele, and Konrad Ruthardt.
Apparatus for the extraction of liquids such as petrol and all other hydrocarbons contained in jellies or like products. No. 2,323,056. Jean Francois Labour.
Thermohydrometer. No. 2,323,386. Leo Edelmann.
Apparatus for determining the volume of connected pore spaces in a porous body. No. 2,323,556. Elmer Mattocks to Phillips Petroleum Co.

Food Chemicals

Tenderizing animal tissue with enzyme. No. 2,321,621. John Ramsbottom to Industrial Patents Corporation.
Treatment of animal tissue. No. 2,321,622. John Ramsbottom and Levi Paddock to Industrial Patents Corporation.
Treating animal tissue. No. 2,321,623. John Ramsbottom and Levi Paddock to Industrial Patents Corporation.
Treatment of animal tissue. No. 2,321,624. John Ramsbottom and Levi Paddock to Industrial Patents Corporation.
Treating animal tissue. No. 2,321,625. John Ramsbottom and Levi Paddock to Industrial Patents Corporation.
Yeast food in dry solid form which is stable against deterioration of halogenate salt contained therein. No. 2,321,673. Lloyd Hall to The Griffith Laboratories.
Making cheddar cheese. No. 2,322,148. Clarence Lane and Bernard Hammer to Iowa State College Research Foundation.
Process of deep fat frying. No. 2,322,187. Howard Black to Industrial Patents Corporation.
Cheese coating waxy composition. No. 2,322,198. Clinton Parsons to Industrial Patents Corporation.
Thiamin containing compositions and their production. No. 2,322,270. Lawrence Atkin and Alfred Schultz and Charles Frey to Standard Brands, Inc.
Stimulating the growth of yeast. No. 2,322,287. Robert Eakin and Roger Williams to Standard Brands, Inc.
Yeast propagation. No. 2,322,320. Alfred Schultz and Lawrence Atkin and Charles Frey to Standard Brands, Inc.
Fibrous sheet containing SO_2 for use in packing leafy vegetables. No. 2,322,493. William Wilson to Fruit & Vegetable Processing Co.
Flash sterilizing milk spray with previously unheated chlorine gas. No. 2,322,721. Herbert Stiles.
Pickling, curing, and preserving fruits and vegetables. No. 2,322,880. Alfred Pollak.
Dry souring material comprising acid-forming bacteria substantially free from metabolic products and a flour. No. 2,322,940. George Kirby and Stanley McHugh and Marvin Helmar to Standard Brands, Inc.

Industrial Chemicals—Inorganic

Individual granule having a hardened cement surface comprising an aluminate cement and having on the exterior thereof a hardened coating comprising a thermo-setting resin. No. 2,321,674. Norman Harshberger to Carbide and Carbon Chemicals Corporation.
In apparatus for removal of vapors from gases, a plurality of absorptive bodies capable of absorbing such vapors. No. 2,321,745. William Harshaw to The Harshaw Chemical Co.
Producing coated fiber board. No. 2,321,937. Robert Quinn to Johns-Manville Corporation.

Producing coated fiber board. No. 2,321,938. Robert Quinn to Johns-Manville Corporation.
Separation of insoluble impurities from a soap nigre containing free alkali. No. 2,321,947. Leopold Sender and James Wilson to The Sharples Corporation.
Quaternary ammonium compounds. No. 2,321,963. Werner Zerweck and Otto Trosken to General Aniline & Film Corporation.
Condensation product. No. 2,322,036. Eugene Lieber and Harry Rice to Standard Oil Development Co.
Nontacky adhesive coated sheeting capable of being adhesively joined by application of heat and pressure. No. 2,322,048. Gale Nadeau and Clemens Starck to Eastman Kodak Co.
Regenerating powdered material contaminated with carbonaceous deposits. No. 2,322,075. Charles Tyson to Standard Oil Development Co.
Reclaiming spent pickling solution containing ferrous sulfate. No. 2,322,134. Willard Hodge to Mellon Institute of Industrial Research.
Making a printing plate adapted to reproduce an image drawn with a graphite pencil. No. 2,322,136. Edward Jahoda to Walter Fuchs.
Coated abrasive comprising a coating of abrasive grains anchored thereon by an abrasive grit-bonding organic adhesive selected from a group consisting of synthetic resins and animal glues. No. 2,322,-156. Nicholas Oglesby to Behr-Manning Corporation.
Flocculation of finely divided mineral matter suspended in an aqueous medium. No. 2,322,185. John Bicknell to S. D. Warren Co.
Producing a set calcium sulfate dihydrate product. No. 2,232,194. George King to United States Gypsum Co.
Dry solid product for absorbing acidic gases comprising calcium hydroxide and a material amount of barium hydroxide. No. 2,322,-206. Clyde Gardenier to Thomas Edison, Inc.
Yellow fluorescense material resulting from heating a mixture of oxides of zinc and vanadium to a temperature within the range of 600° C. to 900° C. No. 2,322,265. Woldemar Weyl to American Optical Co.
Magnesite for furnace linings. No. 2,322,274. Raymond Birch and Clyde Thompson to Harbison-Walker Refractories Co.
Recovering selenium as selenium dioxide from copper refinery slimes. No. 2,322,348. Charles Clark to Canadian Copper Refiners, Ltd.
Dielectric material. No. 2,322,353. Hal Fruth to Western Electric Co. Inc.
Flux. No. 2,322,416. John Coleman and Charles Ewing to General Motors Corporation.
Method for removing mud sheaths. No. 2,322,484. Robert Stuart to Stanolind Oil & Gas Co.
Preparing a sheeted surface covering of the linoleum type. No. 2,322,-542. Donald Patterson to American Cyanamid Co.
Apparatus for deposition of metals Al and Mg. No. 2,322,613. Paul Alexander.
Color printing method. No. 2,322,928. Pierre Drewsen and John Little to The Hinde & Dauch Paper Co.
Production of hydroxylammonium sulfate. No. 2,322.958. Philip Tryon to Commercial Solvents Corporation.
Removing entrained particles of bottoms product from distillate vapors passing upwardly through a distillation column when the quantity of condensate from said vapors flowing downwardly in said column is insufficient to effect such removal. No. 2,323,047. Joseph Jewell to The M. W. Kellogg Co.
Luminescent phosphor mixture having substantially invariant luminescent color under variable cathode ray intensity bombardment. No. 2,323,116. Carlos Burnett to Radio Corp. of America.
Preparing a luminescent material comprising: mixing an alkaline earth fluoride, a uranium oxygen compound and an oxide of the earth metals; and firing the same. No. 2,323,284. William Toorks to Sylvania Electric Products, Inc.
Preparing aluminum hydroxide powder of high neutralizing power and low bulk. No. 2,323,432. Bruce Walton to Sterling Drug, Inc.
Method of preserving quicklime. No. 2,323,435. Nathan Wiseblood.
Preparing a water-soluble basic aluminum sulfate of high alumina content from solutions of basic aluminum sulfate. No. 2,323,499. William Wilson to Monsanto Chemical Co.
Extracting bromine from an alkaline brine. No. 2,323,549. Frank Lindstaedt and David Shatto.
Ca CO_3 filler material for paint, rubber, paper, etc. No. 2,323,550. Alan Lukens.
Method of washing silica hydrogel. No. 2,323,583. Alvin Wilson to The Davison Chemical Corporation.
Manufacture of chlorine dioxide. No. 2,323,593. Clifford Hampel and Maurice Taylor to The Mathieson Alkali Works, Inc.
Production of chlorine dioxide by reaction of chlorites and aldehydes. No. 2,323,594. Clifford Hampel to The Mathieson Alkali Works, Inc.
Regeneration of deactivitated cuprous chloride solutions. No. 2,323,-630. Rolf Spencer to Electric & Musical Industries, Ltd.
Method and means for determining and regulating the mass of a component gas per unit volume of a gaseous mixture. No. 2,323,-675. Henry Rand to Bendix Aviation Corporation.
Producing catalysts by forming a superficial layer of catalytically active magnesia-silica complex upon the surface of inert siliceous particles. No. 2,323,728. Robert Ruthruff.
Producing a water dispersion of ultramarine capable of drying on a surface to a water-repellent non-dispersible ultramarine coating. No. 2,323,748. Henry Dieterle to American Cyanamid Co.
Producing a water dispersion of ultramarine capable of drying on a surface to a water-repellent non-dispersible ultramarine coating. No. 2,323,749. Henry Dieterle to American Cyanamid Co.
Casting slip comprising a mixture of titanium dioxide powder, sodium-alginate and montmorillonite. No. 2,323,759. Hans Thurnauer and George Fichter to American Lava Corporation.
Making a chromium-aluminum oxide gel type catalyst. No. 2,323,868. Everett Hughes to The Standard Oil Co.
Porous insoluble structure consisting of zinc oxide a porosity agent consisting of tripoli, bentonite in association with an inert material consisting of asbestos 15 parts by weight, and being adapted to permit hydrocarbon vapors to enter said structure and contact the zinc oxide associated therewith. No. 2,323,874. Earle McMullen and Donald Doan to The Eagle-Picher Lead Co.

Industrial Chemicals—Organic

Reaction product of a polymethylol melamine. No. 2,321,586. Gaetano D'Alelio to General Electric Co.
Preparation of (methoxy-methoxy) ethanol. No. 2,321,593. William Gresham to E. I. du Pont de Nemours & Co.
Amino carboxylic acid esters of higher molecular weight carboxylic monoesters of glycols. No. 2,321,594. Benjamin R. Harris.
Amino carboxylic acid esters. No. 2.321,595. Benjamin R. Harris.
Preparation of a dihydroxy cholanic acid. No. 2,321,598. Willard Hoehn and Alexander Schneider to George Breon & Co. Inc.
Alkoxymethoxy monohydric aliphatic alcohol. No. 2,321,608. Donald Loder, William Gresham and Donald Killian to E. I. du Pont de Nemours & Co.
Dihydroxyaryl alkane. No. 2,321,620. Burt Carlton Pratt to E. I. du Pont de Nemours & Co.
Separation of a non-acetylenic hydrocarbon having two carbon atoms to the molecule from gaseous mixture additionally containing methane. No. 2,321,666. George Felback to Carbide and Carbon Chemicals Corp.
Emulsion polymerization of halogen-2-butadienes-1,3. No. 2,321,693. Kurt Meisenburg and Ingofroh Dennstedt and Ewald Zaucker.
Interpolymer of a base substance selected from the methyl and ethyl esters of acrylic and methacrylic acids, co-polymerized with 10% of a substance from the acrylic and methacrylic anhydrides, and with 50% of a substance from the vinyl esters of acrylic and methacrylic acids. No. 2,321,728. Carl Barnes to E. I. du Pont de Nemours & Co.
Separation of mixtures of methanol and butyraldehyde. No. 2,321,-748. John Hopkins and Barnard Marks to E. I. du Pont de Nemours & Co.
Product of the reaction of maleic anhydride and a polymerized terpene composed largely of a diterpene of formula(ClOH16)2. No. 2,321,750. Irvin Humphrey to Hercules Powder Co.
Preparing a molding compound which comprises polymerizing together 100 parts of methyl methacrylate and 5-25 parts of a compound from the group consisting of styrene vinyl acetate, and methyl acrylate. No. 2,321,759. Maurice Macht and David Fletcher to E. I. du Pont de Nemours & Co.
Plugging limestone formations in wells including the step of impregnating the formation with a mixture of furfural, a urethane and a hydrochloric acid catalyst. No. 2,321,761. Clyde Mathis and Carl Rampacek to Phillips Petroleum Co.
Production of a 1,4-diamino-anthraquinone. No. 2,321,767. James Ogilvie to Allied Chemical & Dye Corp.
Oxidizing perchloroethylene. No. 2,321,823. Frederick Kirkbride to Imperial Chemical Industries, Ltd.
Copolymers of p-chlorostyrene. No. 2,321,896. Edgar Britton and Walter LeFevre to The Dow Chemical Co.
Production of solvents and wood preservatives. No. 2,321,909. Jacqueline Harvey, Jr., one-half to Southern Wood Preserving Co.
Amino diaryl dialkyl cyclobutane. Philip Paul to United States Rubber Co.
Making polymers which comprises heating in the presence of a metallic drier an ester of an unsaturated polycarboxylic acid and an acyclic and completely aliphatic mono-unsaturated monohydric alcohol. No. 2,321,942. Henry Rothrock to E. I. du Pont de Nemours & Co.
Reaction product of formaldehyde with an alkaline earth metal sulfamate. No. 2,321,958. Joseph Walker to E. I. du Pont de Nemours & Co.
Hydroxylated terpene ether. No. 2,321,978. Joseph Borglin to Hercules Powder Co.
Water-soluble hydroxylated terpene ether. No. 2,321,979. Joseph Borglin to Hercules Powder Co.
Tetrahydrotriazone. No. 2,321,989. William Burke to E. I. du Pont de Nemours & Co.
Cellulose ethyl ether composition. No. 2,322,013. Carl Gilbert to Hercules Powder Co.
Cyanoethyl alpha chloracrylate. No. 2,322,035. Joy Lichty to Wingfoot Corporation.
Treating fatty acid-containing stock. No. 2,322,056. Ralph Potts to Armour & Co.
Production of alcohols. No. 2,322,095. Otto Schmidt to General Aniline & Film Corporation.
Catalytic hydrogenation of high molecular aliphatic carboxylic acids. No. 2,322,906. Otto Schmidt to General Aniline & Film Corporation.
Catalytic hydrogenation of aliphatic carboxylic acid anhydrides. No. 2,322,097. Otto Schmidt to General Aniline & Film Corporation.
Catalytic hydrogenation of alicyclic carboxylic acids. No. 2,322,098. Otto Schmidt to General Aniline & Film Corporation.
Catalytic hydrogenation of organic compounds. No. 2,322,099. Otto Schmidt to General Aniline & Film Corporation.
Lubricating oil having a viscosity index of over 90. No. 2,322,116. Lloyd David, Bert Lincoln, and Gordon Byrkit to Continental Oil Co.
Method of preparing butadiene. No. 2,322,122. Per Frolich and Byron Vanderbilt to Jasco, Inc.
Improving the resistance to foaming of oleaginous materials. No. 2,322,186. Howard Black to Industrial Patents Corporation.
Talloil esters of organic sulfonic acid salts of amino alcohols. No. 2,322,202. David Jayne, Jr., Harold Day, Cos Cob, to American Cyanamid Co.
Dehydrohalogenation of halogenated organic compounds. No. 2,322,-258. Charles Strasocker and Forrest Amstutz to The Dow Chemical Co.
Manufacture of esters of mononitriles of dicarboxylic acids. No. 2,322,273. Burnard Biggs to Bell Telephone Laboratories.
Separation of piperylene isomers. No. 2,322,281. David Craig to The B. F. Goodrich Co.
Treatment of an industrial mixture comprising unsaturated organic compounds. No. 2,322,308. Wendell Moyer to The Solvay Process Co.
Flocculose vinyl halide polymers. No. 2,322,309. Leslie Morgan and William Morgan to Imperial Chemical Industries, Ltd.
Process of curing zein. No. 2,322,486. Lloyd Swallen and Albert James to Corn Products Refining Co.
Plasticized aminoplast. No. 2,322,567. Gaetano D'Alelio to General Electric Co.

Producing aromatic and alicyclic amines with at least one methyl group attached to the cyclic structure. No. 2,322,572. Harry Fisher to U. S. Industrial Alcohol Co.
Improving the uniformity of odorant concentration in a stream of gas withdrawn from a container charged with a predetermined quantity of liquefied hydrocarbons and a less volatile odorant. No. 2,322,617. Walter Dayhuff to Standard Oil Co. of California.
Manufacture of acrylic acid nitrile derivatives. No. 2,322,696. Peter Kurtz and Herbert Schwarz.
Sugar plasticizer product. Nathan Pike, Paul Kelm and George McLaren, Jr., to Applied Sugar Laboratories, Inc.
Cooking a malted liquid to produce wort which when fermented will be substantially free from precipitate proteins. No. 2,322,749. John Silhavy.
Preparation of amides. No. 2,322,783. Morris Katzman and Albert Epstein to The Emulsol Corporation.
Surface active ester product consisting essentially of a mixture of a hexitan fatty acid monoester and a hexide fatty acid monoester. No. 2,322,820. Kenneth Brown to Atlas Powder Co.
Oil and water emulsion containing electrolytes. No. 2,322,822. Kenneth Brown to Atlas Powder Co.
Recovering phenol from constant boiling mixtures of phenol and water. No. 2,323,881. John Pollock to Standard Oil Development Co.
Manufacture of mononitriles of dicarboxylic acids. No. 2,322,914. Burnard Biggs to Bell Telephone Laboratories, Inc.
Preparing oxalic acid by oxidation of carbohydrates with nitric acid in the presence of a vanadium catalyst. No. 2,322,915. Maxwell Brooks to General Chemical Co.
Stabilization of superpolymers. No. 2,322,938. John Howard to Bell Telephone Laboratories, Inc.
Producing thin threads from polyvinyl alcohol and its water-soluble derivatives. No. 2,322,976. Hilger Peter Schmitz.
Condensation of an imide of a dicarboxylic acid with a polyamine. No. 2,323,054. Hugo Kroeper.
Isolation of dicarboxylic acids. No. 2,323,061. Wolfgang Lehmann and Rudolf Schroter.
Preparing thiuronium salts. No. 2,323,075. Ludwig Orthner and Gernard Balle, George Dittus, and Hermann Wagner.
N-ethylthiomethyllauramide. No. 2,323,111. Paul Austin and Charles Frank to E. I. du Pont de Nemours & Co.
Condensation product of formaldehyde and a terpene alcohol and a process of making it. No. 2,323,129. Mortimer Harvey to Harvel Research Corporation.
Polymerized chloroprene-cashew nut shell liquid composition. No. 2,323,130. Mortimer Harvey to the Harvel Corporation.
Aldehyde condensation product of residual ethers of cashew nut shell liquid. No. 2,323,131. Mortimer Harvey to The Harvel Corporation.
Preparation of 2-chlorobutene-2. No. 2,323,226. Arthur Levine and Oliver Cass to E. I. du Pont de Nemours & Co.
Preparation of 2,2,3-trichlorobutane. No. 2,323,227. Arthur Levine and Oliver Cass to E. I. du Pont de Nemours & Co.
Production of shaped articles, which comprises extruding a molten super-polymer and passing the extruded material into an inert medium. No. 2,323,383. Henry Dreyfus to Celanese Corp. of America.
Beta-amino acid amides and method of making same. No. 2,323,391. Henry Goodman, Jr., to Carbide & Carbon Chemicals Corp.
Mercuric guanlyurea. No. 2,323,397. William Hill to American Cyanamid Co.
Ethylene sulfide reaction product of cyanamide. No. 2,323,409. Leonard Moore and Walter Ericks to American Cyanamid Co.
Extraction and recovery of pectin. No. 2,323,483. Philip Myers and Alvin Rouse to Sardik, Inc.
Unsymmetrical methylene bis-u-azoles containing a single hetero-nitrogen atom having a double bond attached thereto. No. 2,323,503. Cyril Wilson to E. I. du Pont de Nemours & Co.
Preparation of omega-acyl-azoles. No. 2,323,504. Cyril Wilson to E. I. du Pont de Nemours & Co.
Preparation of an amino-propanesulfonate. No. 2,323,714. James Kirby and James Werntz to E. I. du Pont de Nemours & Co.
Treatment of pelts and furs by contacting the hair with the vapors of formaldehyde to cause the eventual setting of the hair. No. 2,323,751. Siegfried Gottfried to Pannonia (London) Limited.
Preparing allyl alcohol and its homologues from the corresponding chlorides. No. 2,323,781. Franz Kohler to Rohm & Hass Co.
12-Amino-stearamide. No. 2,323,806. Mark Farlow to E. I. du Pont de Nemours & Co.
Oxidizing hydrocarbons or mixtures consisting of cyclohexene, methyl cyclopentene, and homologues thereof, to produce dibasic acids. No. 2,323,861. Carl Zellner to Tide Water Associated Oil Co.
Preparing guanyl urea formate. No. 2,323,869. David Jayne, Jr. and Harold Day to American Cyanamid Co.

Leather

Tanning of hides to make leather. No. 2,322,959. Herbert West to American Cyanamid Co.

Medicinals

Manufacture of an aetiocholyl-glyoxal. No. 2,321,690. Willy Logemann to Schering Corp.
Polymeric sulfonamide. No. 2,321,891. Gerard Berchet to E. I. du Pont de Nemours & Co.
Treatment of marine oils to remove fish odors and flavors. No. 2,321,913. Douglas Hennessy to Vitamoil Laboratory, Inc.
Recovery of tocopherol (Vitamin E) and valuable by-products from vegetable oils. No. 2,321,928. William McFarlane and William Parker to Ogilvie Flour Mills Co. Ltd.
Producing 2-sulfanilamidopyridine by hydrolysis of its sodium salt. No. 2,322,196. Elmore Northey and Leonard Dhein to American Cyanamid Co.

Carbonyl compounds of the cyclopentano polyhydro phenanthrene series and a method of producing same. No. 2,322,227. Hans Dannenbaum, Hans Inhoffen, and Walter Hohlweg to Schering Corporation.
Carboxylated estrogenic hormones. No. 2,322,311. Joseph Niederl.
Carbaminoyl choline halide therapeutically active. No. 2,322,375. Randolph Major and Howard Bonnett to Merck & Co. Inc.
Enolic derivatives of steroids and method of making the same. No. 2,322,475. Walter Schoeller and Hans-Herloff Inhoffen to Schering Corporation.
Manufacture of cyclopentano-polyhydrophenanthrene compounds. No. 2,322,809. Willy Logemann, Hans Inhoffen and Hans Eysenbach to Schering Corporation.
Isolation of sterols from fats and oils. No. 2,322,906. Lester Yoder to Iowa State College Research Foundation.
Preparing 1-acylamino-phenyl-5-pyrazolones. No. 2,322,907. Paul Zervas to General Aniline & Film Co.
Amino aryl sulfonamides. No. 2,322,974. Arnold Salomon.
Water-soluble neutral and therapeutically valuable double compound consisting of 1 molecule neutral calcium salicylate and 2 molecules of 4 dimethylamino-1-phenyl-2,3-dimethyl-5-pyrazolone. No. 2,323,-193. Heinrich Boie and Karl Wulzinger to E. Bilhuber Inc.
Taeniacide composition comprising a tin salt of stannous maleate, stannous fumarate, and stannous butyrate. No. 2,323,218. James Guthrie to Dr. Hess & Clark, Inc.
Manufacture of saturated and unsaturated pregnane polycarbonyl compounds and their substitution products. No. 2,323,276. Karl Miescher and Albert Wettstein to Ciba Pharmaceutical Products, Inc.
Saturated and unsaturated pregnane compounds and process of making same. No. 2,323,277. Karl Miescher and Albert Wettstein to Ciba Pharmaceutical Products, Inc.
Medicinal agent comprising a product formed by the condensation of 4-arsinoso-2-amino-phenol with sodium formaldehyde sulfoxylate temperature, and some 4-arsinoso-2-amino-phenol as such. No. 2,323,309. Walter Christiansen and Alfred Jurist to E. R. Squibb & Sons.
Copper derivative of a N-meta-carboxy-phenyl-N-allyl thiourea in which copper is in combination with sulfur. No. 2,323,445. Max Bockmuhl and Walter Persch to Winthrop Chemical Co. Inc.
Halogen acyl derivatives of 4,4-diaminodiphenyl sulfone and process of preparing them. No 2,323,573. Horace Shonle and Arthur Van Arendonk to Eli Lilly & Company.
Production of neutral degradation products having a cyclopentano polyhydro phenanthrene nucleous. No. 2,323,584. Walter Schoeller, Arthur Serini, Friedrich Hildebrandt, Lothar Strassberger, Josef Kathol, and Willy Logemann to Schering Corporation.
Therapeutically valuable compounds and a method of producing the same. No. 2,323,651. Max Dohrn and Paul Diedrich to Schering Corporation.

Metals, Alloys

Metallic casting surface from the group consisting of stainless steel, copper and nickel, having a thin coating of dried and baked alkali metal silicate. No. 2,321,732. Gilbert Brant to E. I. du Pont de Nemours & Co.
Method of annealing. No. 2,321,917. Howard Jenkins and Benjamin Jenkins.
Ore concentrating processes utilizing differential surface wettability principles of separating acidic ore materials. No. 2,322,201. David Jayne, Jr., Harold Day, Cos Cob, and Stephen Erickson to American Cyanamid Co.
Treating uncoated articles of magnesium and its alloys. No. 2,322,-205. Herbert DeLong to The Dow Chemical Co.
Production of high-carbon ferro-chromium. No. 2,322,327. Leo Timmins to Chromium Mining & Smelting Corp. Ltd.
Bonding a preformed metallic element to a preformed base member of iron or steel. No. 2,322,507. Norman W. Cole.
Converting high-phosphorus pig iron into high-grade low-phosphorus steel. No. 2,322,618. Baltzar de Mare.
Preparation of activated bauxite from natural bauxite ores containing ferrous iron impurities. No. 2,322,674. Samuel Thomas to Shell Development Co.
Electrolytic parting of silver from doré anodes. No. 2,322,786. Jesse Betterton, Albert Phillips, and Henry Linford to American Smelting & Refining.
Concentration of sylvinite ores. No. 2,322,789. Allen Cole and James Duke and Karl Schilling to Minerals Separation North American Corp.
Electrolytically depositing zinc from an electrolyte bath of zinc salts confined in an electrolytic cell by passing a current through said electrolyte. No. 2,323,042. Werner Honsberg.
Grinding ball alloy, consisting of chromium columbium, carbon, manganese and silicon, balance iron. No. 2,323,120. Hugh Cooper, one-half to Frank Wilson.
Plating a metal body to be welded to reduce corrosion and improve welding. No. 2,323,169. Edward Wagenhals to Radio Corp. of America.
Electrode wire for electron discharge devices comprising an alloy containing about .15 per cent carbon, about 2 per cent tungsten and the balance nickel. No. 2,323,173. Emil Widell to Radio Corp. of America.
Protecting silver from tarnish which comprises exposing the silver in a confined space to the vapor of a volatile amine. No. 2,323,-369. George Briggmann to Carbide & Carbon Chemicals Corp.
Forming insoluble and adherent nonmetallic films on metals. No. 2,323,424. George Schore.
Manufacture of metallic magnesium by thermal reduction of magnesium oxide with calcium carbide. No. 2,323,597. Fritz Hansgirg to Marine Magnesium Products Corp.
Making composite metal slabs. No. 2,323,666. Charles Medsker to William Ulmer.
Controlling the strain-sensitivity of bessemer steel. No. 2,323,695. Richard Webster to Jones & Laughlin Steel Corp.
Electrode for welding cast iron. No. 2,323,711. Raymond Franklin to Chicago Hardware Foundry Co.

Paints, Pigments

Manufacturing paint product in which the pigment is in a very finely divided state in a liquid paint vehicle. No. 2,323,877. Forrest Turbett to The Eagle-Picher Lead Co.

Paper, Pulp

Treating a paper web with an aqueous starch dispersion and containing a water-soluble methylol-melamine polyvinyl alcohol and an ammonium salt of a mineral acid. No. 2,322,887. George Schwartz and Joseph Walker to E. I. du Pont de Nemours & Co.
Producing high wet strength paper. No. 2,322,888. George Schwartz and Joseph Walker to E. I. du Pont de Nemours & Co.

Petroleum Chemicals

Hydrocarbon oil containing a metal salt of an organic acid in an amount sufficient substantially to increase the corrosivity of said oil, and a corrosion inhibitor. No. 2,321,575. James Clayton and Bruce Farrington to Standard Oil Co. of Calif.
Production of high quality high octane number motor fuels. No. 2,321,914. Amiot Hewlett and Gerald Phillips to Standard Oil Development Co.
Dewaxing solvent. No. 2,321,967. Erving Arundale to Standard Oil Development Co.
Wax modifying agent and method for making same. No. 2,322,012. Per Frolich to Standard Oil Development Co.
Preparing an isobutylene interpolymer. No. 2,322,073. Robert Thomas and William Sparks to Jasco, Inc.
Production of motor fuels by alkylation. No. 2,322,482. Eldon Stahly and Erwin Hattox to Standard Oil Development Co.
Preparing an internal combustion engine fuel of high octane number. No. 2,322,622. Herbert Fischer and Robert Russell to Standard Catalytic Co.
Asphalt saturant for fibrous material comprising an asphalt and sulfonated tallow. No. 2,322,629. Henry Goodwin to Standard Catalytic Co.
Alkylation of isoparaffin with mono-olefin under alkylation reaction conditions in the presence of a mineral acid catalyst of alkylating strength. No. 2,322,664. Robert Russell to Standard Oil Development Co.
Making carbon black and mixtures of carbon monoxide and hydrogen from hydrocarbon gases. No. 2,322,989. William Wilcox, Mary Palmer Wilcox, executrix to Oil and Gas Research, Inc.
Alkylating normally gaseous iso-paraffins with normally gaseous olefins. No. 2,323,616. Almer McAfee and Edward Dunlay to Gulf Oil Corporation.

Petroleum Refining

Conversion of petroleum hydrocarbons. No. 2,321,604. Vladimir Kalichevsky and George Hornaday to Socony-Vacuum Oil Co. Inc.
Method of fractionating hydrocarbon oils. No. 2,321,826. Wheaton Kraft and Walter Bass to The Lummus Company.
Converting heavy hydrocarbons boiling above the range of gas oil into a hydrocarbon mixture from which a maximum amount of lighter hydrocarbons boiling within the range of gasoline may be obtained. No. 2,321,841. Valentine Mekler and James Howard Curtis to The Lummus Company.
Hydrocarbon oil conversion process which comprises fractionating the charging on to separate therefrom a heavy cracking stock and a light cracking stock. No. 2,321,972. Wayne Benedict to Universal Oil Products Co.
Conditioning preformed gum-containing gasoline. Herbert Fischer to Standard Oil Development Co.
Vapor phase catalytic treatment of hydrocarbons. No. 2,322,019. Charles Hemminger to Standard Oil Development Co.
Conversion of hydrocarbons. No. 2,322,025. Vladimir Ipatieff and Aristid Grosse to Universal Oil Products Co.
Saturating asphalt. No. 2,322,059. Joseph Roediger to Standard Oil Development Co.
Method for converting hydrocarbon oils. No. 2,322,070. Reginald Stratford and Roy Smith to Standard Oil Development Co.
Manufacture of refined products from a mixture consisting essentially of non-aromatic hydrocarbons and a substance selected from the group consisting of aromatic, oxy and sulfur hydrocarbons. No. 2,322,083. Franciscus van der Plas to Shell Development Co.
Separating a relatively light gaseous fraction rich in hydrogen and a relatively heavy normally gaseous fraction rich in readily polymerizable olefins from a stream of such materials. No. 2,322,354. Clarence Gerhold and Bernard Flock to Universal Oil Products Co.
Hydrocarbon conversion process. No. 2,322,366. Louis Kassel to Universal Oil Products Co.
Dewaxing lubricant stocks. No. 2,322,438. Robert Henry and James Montgomery and Shelby Lawson to Phillips Petroleum Co.
Breaking petroleum emulsions. No. 2,322,494. Arthur Wirtel and Charles Blair, Jr., to Petrolite Corporation, Ltd.
Oil refining. No. 2,322,554. Charles Winding to Tide Water Associated Oil Co.
Oil-refining agent formed by calcining a magnesium carbonate at a temperature below 450° C. but above 300° C. No. 2,322,555. Charles Winding to Tide Water Associated Oil Co.
Stabilizing crude petroleum by removal of propane and lighter hydrocarbons at relatively low temperatures and pressures for the minimization of corrosion and without excessive loss of butane. No. 2,322,635. Percival Keith, Jr., to The M. W. Kellogg Co.
Refining mineral oils. No 2,322,652. John McClintock to Standard Oil Development Co.
Producing a low boiling hydrocarbon material suitable for use as a solvent from a hydrocarbon oil stock. No. 2,322,673. William J. Sweeney to Standard Oil Development Co.
Production of high anti-knock gasoline. No. 2,322,794. Gustav Egloff to Universal Products Co.

Additional patents on petroleum refining, photographic chemicals, resins, plastics, rubber, textiles, water, sewage and sanitation from the above volumes will be given next month.

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those making use of this summary should keep in mind the following facts:

Belgian and Canadian patents are not printed. Photostats of the former and certified typewritten copies of the latter may be obtained from the respective Patent Offices.

English *Complete Specifications Accepted* and French patents are printed, and copies may be obtained from the respective Patent Offices.

In spite of present conditions, copies of all patents reported are obtainable, and will be supplied at reasonable cost.

This digest presents the latest available data, but reflects the usual delays in transportation and printing. Your comments and criticisms will be appreciated.

CANADIAN PATENTS.

Granted and Published January 12, 1943 (Cont'd).

Recovery of gold from its ores by a cyanidation process in which grinding and classification of the original ore is carried out in two stages by means of primary and secondary grinders and primary and secondary classifiers. No. 409,997. Pioneer Gold Mines of B. C. Limited. (Paul Schutz).

Method of sealing a glass with a predetermined coefficient of expansion to a preformed metal body of an alloy of iron, nickel, and cobalt. No. 410,001. Radio Corporation of America. (Stanton Umbreit).

Rustless iron composed essentially of 9-13% chromium, 0.005-0.035% nitrogen, 0.02% to 0.07% carbon and the balance substantially iron. No. 410,004. Rustless Iron and Steel Corporation. (William B. Arness).

Method of manufacturing a hydraulic cement in which an available natural material containing calcium carbonate in an amount in excess of that essential to produce the cement is utilized as the source of at least the principal proportion of the raw material mixture. No. 410,005. Separation Process Company. (Charles H. Breerwood).

Process for effecting chlorination of ethylene to ethylene dichloride by reacting gaseous ethylene with gaseous chlorine in the substantial absence of a diluent material. No. 410,007. Shell Development Company. (Herbert P. A. Groll, George Hearne and Donald S. LaFrance).

Continuous process for the halogenation of ethane to produce ethyl chloride. No. 410,008. Shell Development Company. (William E. Vaughan and Frederick F. Rust).

Process of halogenation of propylene to obtain substantial quantities of allyl halide. No. 410,009. Shell Development Company. (Frederick F. Rust and William E. Vaughan).

Production of sulfur monochloride by reacting nitrosyl chloride with sulfur dissolved in sulfur monochloride. No. 410,012. The Solvay Process Company. (William C. Klingelhoefer).

Method of treating hydrocarbon oils to produce a stable lubricating oil which comprises treating the lubricating oil distillate with a gas containing free oxygen of about 5 to 7 cubic feet of said gas for every 300 grams of the oil per hour at a temperature of about 400-450° F. for a period of about 3 to 4 hours, treating the said oxidized oil with 1 to 30% sulfuric acid and separating the sludge that is formed. No. 410,013. Standard Oil Development Company. (Constantin Skrepinsky).

Process for refining and improving the quality of a lubricating oil and to raise its viscosity index. No. 410,014. Standard Oil Development Company. (Roger W. Richardson).

A substantially non-hardenable and non-oxidizing composition having good waterproofing, electrical insulating, and other preserving properties. No. 410,015. Standard Oil Development Company. (William H. Smyers).

Process for the solvent treatment of petroleum oil fractions boiling in the range from about 600° F. to 850° F. at atmospheric pressure and containing aromatic and paraffinic type constituents of relatively high and relatively low boiling points. No. 410,016. Standard Oil Development Company. (Garland H. B. Davis).

Method of preparing a secondary alkyl nitrate which comprises reacting a secondary aliphatic alcohol with a mixture of nitric and sulfuric acid at a temperature not higher than —10° C. No. 410,-017. Standard Oil Development Company. (Byron M. Vanderbilt).

Mineral oil composition comprising an oil and a relatively small amount of a tertiary alkyl aromatic mono-ether having at least two alkyl groups attached directly to the aromatic nucleus and being characterized in that said groups have a hydrogen atom attached directly to the carbon atom which is attached to the aromatic nucleus. No. 410,018. Standard Oil Development Company. (Warren M. Smith and Jones I. Wasson).

Wax composition comprising a petroleum wax and a small amount of tertiary butyl ether of ortho tertiary butyl para cresol. No. 410,-019. Standard Oil Development Company. (Jones I. Wasson and James Prophet, Jr.).

Method of surface prospecting for subterranean petroleum deposits by determining the oxidation-reduction characteristics of surface soil at spaced intervals over an area to be explored. No. 410,020. Standard Oil Development Company. (Millard S. Taggard, Jr.).

Method of geochemical prospecting for deposits the leakage components of which are of a reducing nature comprising collecting earth samples at spaced points in a region to be explored, and analyzing such samples for those ions of polyvalent elements present in lower states of valence. No. 410,021. Standard Oil Development Company. (Leo Harvitz).

Oil-base drilling fluid comprising a petroleum hydrocarbon oil, a finely divided oil-wettable solid, and dispersed oil-insoluble bitumen. No. 410,024. Texaco Development Corporation. (Allen D. Garrison).

Process of making a therapeutic product for the treatment of diseased tissue, which consists in condensing in an acid solution an aqueous solution of metacresolsulfonic acid, substantially free from sulfuric acid, with an aldehyde. No. 410,026. Eli Lilly and Company. (Urbain J. Thuau).

Process for preparing acetylenic acid which comprises reacting carbon dioxide under superatmospheric pressure with a suspension of finely-divided sodium acetylide in a volatile liquid diluent less reactive with each reactant than is the other reactant. No. 410,-028. Union Carbide and Carbon Research Laboratories, Inc. (Donald R. Jackson and Thomas H. Vaughn).

Composition comprising cellulose acetate and a product obtained by acidylating with a substance selected from the group consisting of acetic anhydride, phthalic anhydride, phenyl acetic acid and phenoxy acetic acid, a condensation product of paratoluene sulfonamide and symmetrical glycerine dichlorhydrin. No. 410,044. Henry Dreyfus. (William H. Moss).

Production of protective coatings on magnesium and magnesium alloys by a method comprising treating a workpiece with an aqueous solution of a salt of an aliphatic carboxylic acid containing at least eight carbon atoms at a temperature of at least so high as to be in the vicinity of the boiling point of said solution. No. 410,045. Adolf Beck, Gustav Siebel and Eduard Nachtigall.

Process for catalytic reaction involving hydrocarbons at an elevated temperature in the presence of a porous catalyst which comprises employing a catalyst of which the active pore volume spreads, at least about 30% of the pores, over diameters of between 0 and 2 $\mu\mu$. No. 410,046. I. G. Farbenindustrie A. G. (Fritz Stoewener, Emil Keunecke and Friedrich Becke).

Granted and Published January 19, 1943.

Producing phospho-gluconate of iron consisting in producing a reaction between combining weights of phosphoric and gluconic acids or salts thereof with elemental or combined iron. No. 410,049. Sarto Desnoyers.

Extracting liquid egg material from the severed half of an egg shell by the method comprising causing an air current to pass inwardly at the open end of the shell along the inner wall to the closed end of the shell, and thence centrally out of the shell, carrying with it under control the liquid egg material. No. 410,052. John C. Irish.

Apparatus for extracting liquid egg material from shell halves according to the method of Patent No. 410,052 described above. No. 410,053. John C. Irish.

Slicer Device for explosive powder. No. 410,054. Michel William Kroyder.

Clinch-nut element adapted for use with a standard shaped nut. No. 410,055. Charles T. Langmaid.

Stabilizing glyceride oil products prepared from oils having fatty acid radicals containing more than two double bonds by adding to said product a vegetable phosphatidic material of which the fatty acid radicals of the phosphatides contained therein have no more than two double bonds. No. 410,065. Benjamin H. Thurman.

Air purifier of the adsorbent type for circulating and deodoring air. No. 410,088. William B. Connor. (George S. Sauphinee).

Coated abrasive sheet of the sand-paper type. No. 410,093. The Durex Corporation. (Nicholas E. Oglesby).

Curing dry sausage by the method comprising enveloping the uncured sausage with a wax-like substance substantially impervious to moisture and maintaining such coated sausages at drying temperatures. No. 410,098. Industrial Patents Corporation. (August Kellermann).

Preparation of an ol-3one-20 compound of the pregnane and allo-pregnane series by protecting the 3-hydroxyl group of a diol-3,20 compound of the pregnane and allo-pregnane series by esterification, oxidizing the hydroxyl in the 20-position to a ketone group, and hydrolizing the latter, No. 410,111. Parke, Davis & Company. (Russell E. Marker).

Process for the preparation of stigmastenone which comprises partially oxidizing, by selenious acid oxidation, a compound of the group consisting of stigmasterol and derivatives of stigmasterol wherein its 3-hydroxyl group is replaced by a carboxylic acid group, to form a dihydroxy derivative of stigmasterol, and treating the dihydroxy derivative with mineral acid to rearrange it into stigmastenone. No. 410,112. Parke, Davis & Company. (Russell E. Marker).

Method for obtaining a derivative of an organic amine which comprises reacting a hydroxy aldehyde, and alkali metal bisulfide and said amine. No. 410,113. Parke, Davis & Company. (Edward W. Tillitson).

Additional Canadian Patents granted and published Jan. 19, 1943, will be given next month.

SEED-AID 402,143
SPEED-SPRAYER 402,366
S & D 431,025
PAROID 450,609
SULFAFILM 454,788
FLEXOR 457,404

DIAMOND 457,476
Selflex PROCESS 458,619
Raypol 458,743
LAMINAC 459,038
MELURAC 459,039
URAC 459,040
COTTOLITE 459,146
BORZIN 459,322
PALADIN 459,440

INCO MONEL 459,519
NODAN 459,556
459,630
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CAMELWITE 460,085
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TENERA OIL 460,435
DESICCITE 460,471
Percol 460,472

CAL-A-SAL 460,492
CORDO 460,496
FULDICIDE 460,522
460,535
Akro 460,660
PYCAL 460,783

Trade Mark Descriptions

402.143. Agricultural Labs. Inc., Columbus, O.; filed Apr. 24, 1942; Serial No. 452,551; for germinating and promoting growth in plants; since Mar. 10, 1942.

402,366. Stauffer Chemical Co., San Francisco. Calif.; filed Feb. 4, 1942; Serial No. 450,750; for insecticides and fungicides; since Nov. 1941.

431,025. Sharp & Dohme, Inc., Phila., Pa.; filed Apr. 20, 1940; for pharmaceutical and medicinal products; claims use since Apr. 2, 1930, on antiseptic solutions, antiseptic lozenges and took paste; since on or about Nov. 4, 1931, on a preparation of essential dietary factors, dietary supplement, tonics; and since on or about Oct. 15, 1938, on all the other goods.

450,609. George R. Parr, Pompton Plains. N. J.; filed Jan. 30, 1942; for colloidal plastic; since Feb. 1940.

454,788. Wallace & Tiernan Products, Inc., Belleville, N. J.; filed Aug. 7, 1942; for germicidan compositions; since July 19, 1942.

457,404. Standard Oil Co. of N. J., Wilmington, Del.; filed Dec. 14, 1942; for synthetic rubber; since Nov. 9, 1942.

457,476. Spiros C. Markators, as Diamond Products Mfg. Co., N. Y.; filed Dec. 17, 1942; for bleach; since Mar. 1, 1910.

458,619. August F. Schramm, Jr., N. Y.; filed Feb. 18, 1943; for adhesive sizing and resin; since Dec. 23, 1942.

458,743. Raybestos - Manhattan, Inc.. Stratford, Conn.; filed Feb. 24, 1943; for synthetic rubber-like material; since Jan. 8, 1943.

459,038. American Cyanamid Co., N. Y.; filed Mar. 12, 1943; for synthetic resins; since Nov. 6, 1942.

459,039. American Cyanamid Co., N. Y.; filed Mar. 12, 1943; for synthetic resins; since July 2, 1942.

459,040. American Cyanamid Co., N. Y.; filed Mar. 12, 1942; for condensation products of aldehydes; since July 2, 1942.

459,146. Celanese Corp. of America. N. Y.; filed Mar. 16, 1943; for substitute for glass; since Mar. 11, 1943.

459,322. Turco Products, Inc., Los Angeles, Calif.; filed Mar. 24, 1943; for cleaning compound for metals; since August 1939.

459,440. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.; filed Mar. 27, 1943; for paint materials; since Mar. 11, 1943.

459,519. The International Nickel Co. Inc., N. Y.; filed Mar. 30, 1943; for nickel containing alloys; since Apr. 29, 1919.

459,556. Stoner-Mudge, Inc., Pittsburgh, Pa.; filed Mar. 31, 1943; for metal coating; since Mar. 19, 1943.

459,630. Morris Morris as United Chemical Works, Chicago, Ill.; filed Apr. 5, 1943. for fur chemicals; since Oct. 12, 1943.

459,631. Morris Morris as United Chemical Works, Chicago, Ill.; filed Apr. 5, 1943; for fur chemicals; since Oct. 12, 1934.

460,085. Harry T. Campbell Sons' Corp., Towson, Md.; filed Apr. 22, 1943; for fine calcium carbonate; since Nov. 1, 1942.

460,108. General Aniline & Film Corp., N. Y.; filed Apr. 23, 1943; for resin polymers; since Mar. 31, 1943.

460,144. General Dyestuff Corp., N. Y.; filed April 24, 1943; for dyes and dyestuffs; since Sept. 17, 1892.

460,145. General Dyestuff Corp., N. Y.; filed Apr. 24, 1943; for dyes and dyestuffs; since Aug. 16, 1905.

460,146. General Dyestuff Corp., N. Y.; filed Apr. 24, 1943; for dyes and dyestuffs; since June 17, 1912.

460,147. General Dyestuff Corp., N. Y.; filed Apr. 24, 1943; for dyes and dyestuffs; since June 14, 1912.

460,148. General Dyestuff Corp., N. Y.; filed Apr. 24, 1943; for dyes and dyestuffs; since Apr. 28, 1943.

460,159. The Penn. Salt Mfg. Co., Phila., Pa.; filed Apr. 24, 1943; for lye; since July 1934.

460,234. Chemical Process Co., San Francisco, Calif.; filed Apr. 28, 1943; for zeolitic materials; since April 20, 1943.

460,294. Hart Products Corp., N. Y.; filed Apr. 30, 1943; for textile chemical; since Jan. 1, 1943.

460,312. Standard Oil Co., East Baton Rouge, La.; filed Apr. 30, 1943; for synthetic rubber; since Jan. 29, 1943.

460,316. Eldie A. Van Winkle, Wash., Iowa; filed Apr. 30, 1943; for anti-freeze composition; since Mar. 1. 1943.

460,318. West Disinfecting Co., Long Island City, N. Y.; filed Apr. 30, 1943; for disinfectant and fungicide; since Nov. 11, 1942.

460,319. Wisconsin Pharmacal Co., Milwaukee, Wis.; filed Apr. 30 1943; for blueprinting solutions; since Mar. 6. 1943.

460,323. Eastman Kodak Co., Jersey City, N. J., and Rochester, N. Y.; filed May 1, 1943; for synthetic staple fiber; since July 31, 1937.

460,435. Shell Oil Co., Inc.; San Francisco, Calif.; filed May 5, 1943; for lubricating oil; since Mar. 16, 1943.

460,471. Filtrol Corp., Los Angeles, Calif.; filed May 7, 1943; for adsorbents; since Apr. 17, 1943.

460,472. Filtrol Corp., Los Angeles, Calif.; filed May 7, 1943; for colloidal clay; since Apr. 13, 1943.

460,492. Geo. Callahan & Co., Inc., Closter, N. J.; filed May 8, 1943; for solid salomoniac; since Feb. 19, 1943.

460,496. Corrosion Control Corp., Norwalk, Conn.; filed May 8, 1943; for lacquer coatings; since Feb. 27, 1943.

460,522. Fuld Bros., Baltimore, Md.; filed May 10, 1943; for germicides; since Apr. 14, 1943.

460,535. The Permanente Metals Corp. Oakland, Calif.; filed May 10, 1943; for ferrosilicon; since Mar. 29, 1943.

460,660. Hugh S. Stoller, as Stoller Chemical Co., Akron, O.; filed May 15, 1943; for core compound for foundry use; since Apr. 1, 1943.

460,783. Atlas Powder Co., Wilmington, Del.; filed May 21, 1943; for plasticizing, dispersing, and wetting agents; since Oct. 14, 1941.

†Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, June 29, to July 20, 1943.

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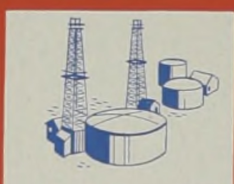

IN THE MANUFACTURE OF VITAL CATALYSTS FOR THE OIL INDUSTRY

FOR THE FLOTATION OF ORE IN MINING OPERATIONS