Vol. 53 JULY, 1943 No. 1

CHEMICAL INDUSTRIES

The Chemical Business Magazine

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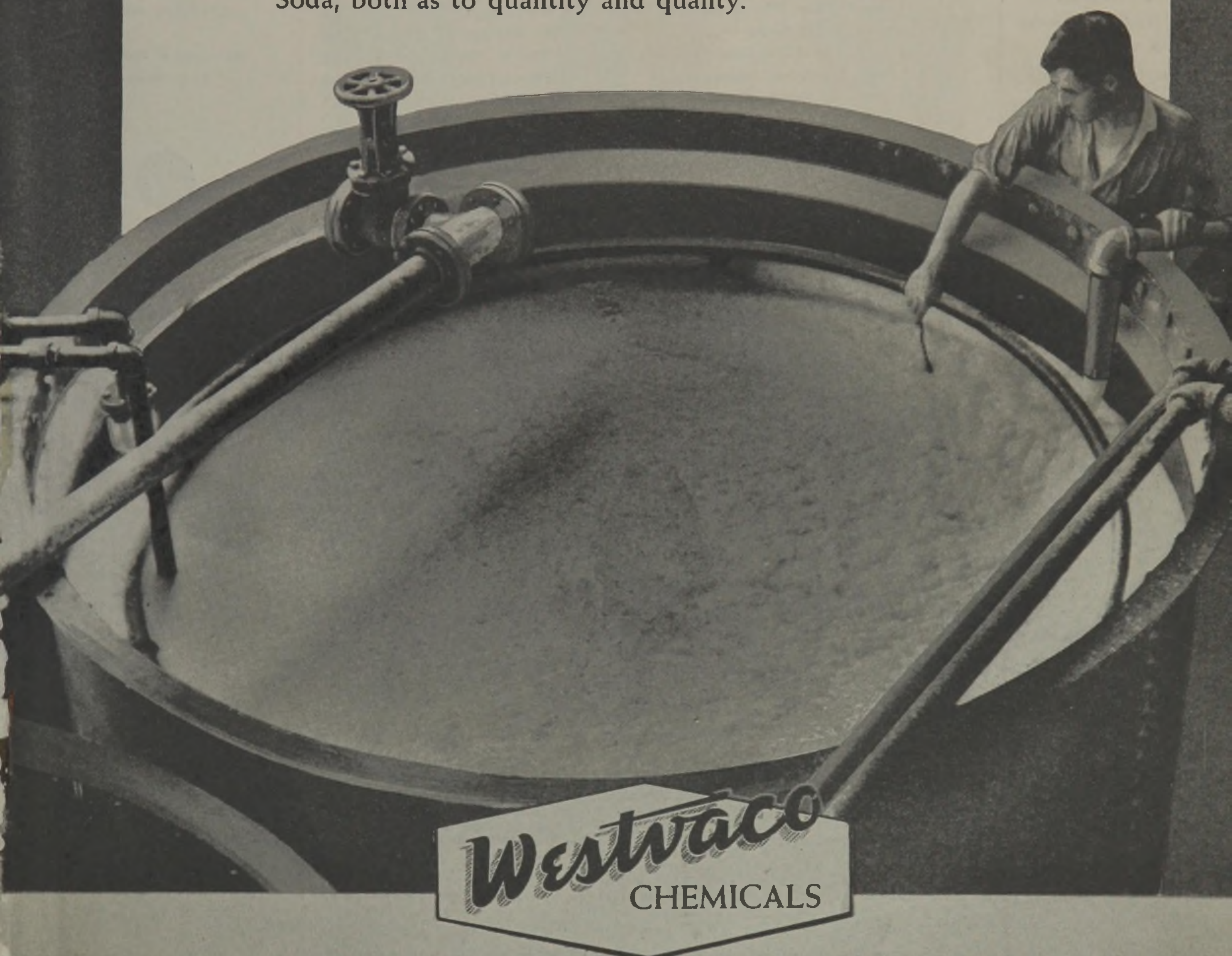

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The Business Magazine for Makers & Users of Chemicals

Management, Research, Production, Marketing

CHEMICAL INDUSTRIES

Contents

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JULY, 1943

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THE READER WRITES

Reciprocal Trade

To the Editor of Chemical Industries:

Your editorial entitled, "Chemicals and Reciprocal Trade," undoubtedly will be read with much interest. As we read, some of us will question your conclusions.

The chemical industry has been reared on protective tariffs, as you say, and it is likewise true that the industry has not on the whole fared badly under the Reciprocal Trade Agreements so far made. Isn't it a far jump, however, to conclude from this that we should be pleased at a further extension of the Trade Agreements Program?

It seems premature, to say the least, to conclude that because the industry has not been badly hurt up to now it will not be hurt in the future. To reach such a conclusion one must ignore the existence of Germany. Most of us in the chemical business feel that we cannot do that with safety. Truly, the development of the chemical industry in the United States has been phenomenal. It is something of which we are all very proud but it is to be hoped that we have not become so egotistical as to think we can ignore the German chemical industry. In other words, duties reduced in trade agreements have not yet been made available to Germany, the country heretofore dominant in world chemical markets.

A little further on you say that the principle on which trade agreements are based is sound and that the pacts have worked in the right direction; that there is no other foundation for profitable world trade and that we can export only if we import or loan money.

Here again several ideas are mixed a little indiscriminately. In the first place, what is the principle which you think is sound? Certainly it isn't the thought that we can only export if we also import, because we all knew that long before the Trade Agreements Act was passed. If, on the other hand, the sound principle to which you refer is in getting reductions from other nations in return for the reductions we make, then most of us will agree that there is value in that. But in so agreeing we cannot overlook the fact that in actual application what we have gained in one way we have thrown away in another through our extension of the same rates to other nations without receiving a *quid pro quo* from them. If you mean that the principle is sound because it aims at materially increasing imports in order to pay for exports, then you will find that many of us cannot go along with you. In the first place, we don't import in order that we may export but we do export in order that we may import the things we need and want. The minute you put it the other way around, as people primarily interested in export habitually do, you run into a problem that perhaps will be very difficult for many years to come. That problem will be brought about by the magnitude of our exports. Presumably the rest of the world will need so much from us that any balancing of the value of imports as against the value of exports will be out of the question. So again when we stop giving or loaning, our exports may run into difficulties.

But then you come to one of the really important things when you say that it would be unfortunate if the renewal of the Trade Agreements Act is regarded as an endorsement by Congress of post-war commitments the Administration may want to make. Hasn't the State Department told us very clearly that the reason they want the authority renewed is so that they can use it in connection with post-war commitments and if they haven't told us this so that we have understood it, isn't it obvious anyway?

There is a growing body of opinion in these United States demanding a return to a government of laws as contrasted with a government of men. It makes no difference whether the particular group of bureaucrats is good or bad. The objection is one of principle; and it is not a good omen that the Congress has again surrendered to the Executive Branch.

Yes, we in the chemical and dye industries do remember how we were aided through tariffs but we do not agree with your blanket statement that these same industries have so matured that they have outgrown the need for protection. We do not agree because that statement is only a half truth and therefore dangerous. There are certain products of which it is wholly true but there are other products of which it is wholly untrue.

The chemical industry is keenly alive to the benefits which will flow from greater collaboration with other nations, including a trade unhampered by discriminations and unnecessary restrictions. What is necessary or unnecessary must be determined in the light of facts. If we are to preserve our social gains and most of our present standards of living, we must be as much on guard against unfair trade practices in international trade as we try to be in the domestic field.

Lower costs, through natural advantage, technological improvement or mass production are legitimate in our view. But these lower costs as a result of lower wage and living standards we would define as an unfair trade practice against which we should protect ourselves.

Approval of a policy on the basis of rather vague generalities is dangerous. How can we defend, much less advocate a policy which denies court review in case of injury to an American producer?

ELVIN H. KILLHEFFER
E. I. du Pont de Nemours & Co.
Wilmington, Del.

Absenteeism

To the Editor of Chemical Industries:

With reference to the problem of absenteeism, here are some of the features of the program being carried out at our Spruance Plant, aside from the usual routine of foreman contacts, posters, meetings, etc.

It is routine procedure for a foreman or forelady to advise First Aid, before 9:00 A. M., on an employee's first day of absence. A visiting nurse plan is used as a follow-up of such information. This, of course, is preceded by an attempt of the foreman or forelady to learn "why" from a fellow worker or rider or by telephone contact with the absentee.

The plant "Health Activity Committee," made up of area supervisors, has made itself very much interested in absenteeism. This committee functions similarly to a Safety Activity Committee and reports to the staff. This particular committee has been functioning for about three years and is now doing its best work.

We believe that all absences except sickness or accident and death, serious illness or injuries in immediate families, can be preplanned and satisfactory arrangements made beforehand if reasons are justified. Cases of unusual circumstances are recognized on their individual merits. The members of the armed forces are receiving our special consideration, when practical, in such cases as: "He (the husband or special boy-friend) is home from camp for a few days." "He (same) leaves for camp Friday and I want to spend Thursday with him."

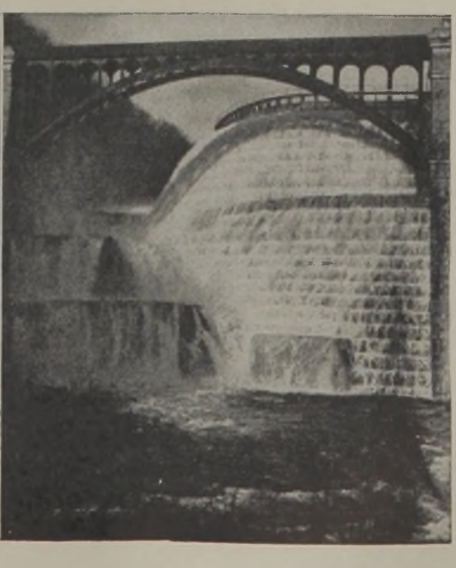
To be specific about our May performance as regards the rayon organization, we recognize our overall absentee factor to be at 4.5% as compared to a 5 to 10% experience of others in the general locality. A break-down of the 4.5% referred to would be charged 66% to illness, 26% to excused absences and 8% A.W.O.L.

W. P. CARLON
Safety Supervisor
Spruance Plant
E. I. du Pont de Nemours & Co.
Richmond, Va.

LIFE On The

(*Below*) **HAPPY LANDINGS BY PARACHUTE** take skill in packing as well as courage in "bailing out." That is why at the Parachute Packer's School of the "University of the Air" at Corpus Christi, Texas, as a final examination each man must make a jump using a parachute he himself has packed. It takes eight $18.75 War Bonds to meet the cost of only one of the latest type parachutes. You can help provide 'chutes for our fighting airmen by your purchases of War Bonds and Stamps. Get and keep up the Bond-and-Stamp buying habit...at least 10% *every* payday.

(*Above*) **STRONG AND TOUGH,** even when soaked through and through, are much sought-after qualities in paper for many uses. As a result of Cyanamid's research and development of a special "wet strength" resin, paper bags, for example, are now able to replace the familiar burlap sacks for the shipment of potatoes and other vegetables from farm to market without the danger of spoilage due to moisture. This "wet strength" resin bonds the fibers together so that liquids will not separate them and also increases the tensile and folding strengths of the paper when dry. The resin may be added to the other ingredients without changing in any other way the established paper making process. Thus, without new equipment, the manufacturer can introduce improved wet strength qualities to paper towels so that they won't come apart in wet hands, provide durable wrappings for meats and frozen foods, and tougher paper for blueprints, maps, tags, and other products for outside use where resistance to the weather is an important factor in their service qualities.

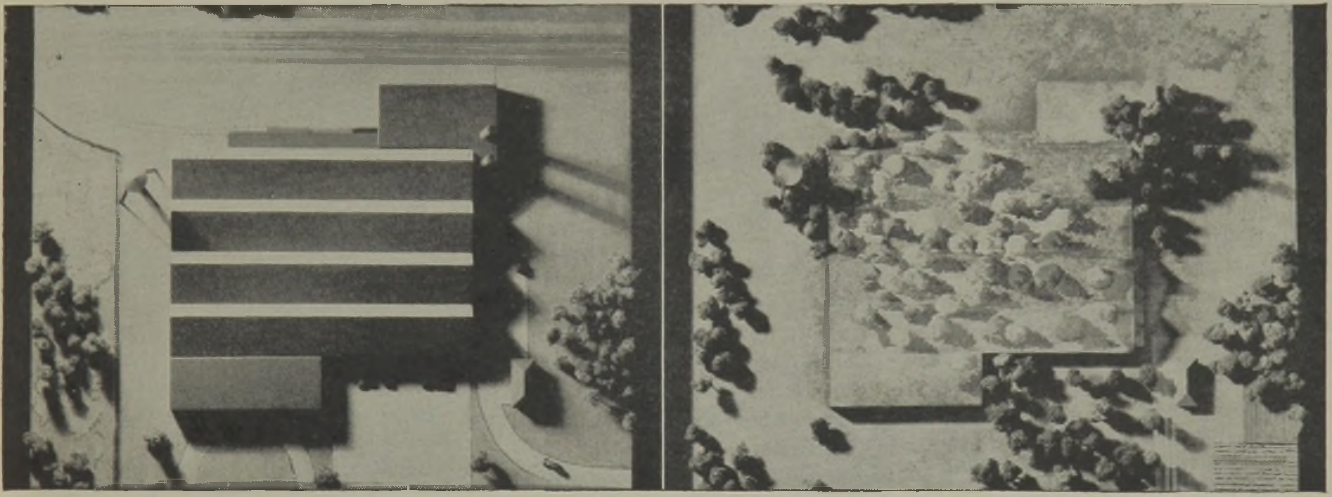


(*Left*) **FROM THE GROUND UP** is how completely Cyanamid controls its production of sulphate of alumina, widely used in water and sewerage purification, sizing paper, tanning, as a mordant in dyeing, and in the manufacture of such products as soap, printing inks and dry colors. At the far left is shown bauxite, basic material used in the manufacture of sulphate of alumina, being mined from Cyanamid's own deposits. Likewise, the sulphuric acid used is produced in Cyanamid's plants. This control of basic material supply, on through succeeding steps in production, assures the high quality and uniformity that provide superior coagulating properties to remove suspended matter from municipal water reservoirs, such as shown at the left—a quality which has led an increasing number of communities to specify American Cyanamid's alum.

Chemical Newsfront

(Left) **CAFETERIA COMPARTMENT TRAYS** should be impervious to moisture, boiling water, and the actions of mild acids and alkalies in foods. This young lady holds a tray made from MELMAC*, a molding material providing all these advantages. Among the many diversified characteristics of this unusual plastic molding material are properties of great dielectric strength, high heat and arc resistance, and high dimensional stability at both high and low temperatures that have made MELMAC widely used for electrical applications such as ignition assemblies and insulation parts. MELMAC adhesives also offer highly efficient bonding for plywood, such as used for aircraft and prefabricated housing or impregnating paper and other fabrics as well as many other special uses. MELMAC is one of the famous "family" of Cyanamid plastics, made from melamine resins developed by the Research Laboratories of the American Cyanamid Company.

(Below) **CONGO GUM** is filling an important breach in resin supplies at the present time since it possesses the properties that make it an effective substitute for many of the currently critical synthetic resins now in great demand for essential war uses. A "native" product of the Congo region in Africa, Cyanamid has imported and built up reserves of this material. These are now being applied in the manufacture of surface coatings such as those used for emulsion type camouflage paints. On the model landscapes below are demonstrated at the left a starkly revealed and undisguised factory building. To the right is shown how camouflage paint can effect a notable reduction in the factory's visibility from the air.



*Reg. U. S. Pat. Off.

American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

30 ROCKEFELLER PLAZA · NEW YORK, N. Y.

WASHINGTON

By T. N. Sandifer

Renegotiation Hearings Held

A SUB-COMMITTEE of the House Naval Affairs Committee is now concluding a series of hearings on the troublesome contract renegotiation problem, and a study of recommended legislation to meet the situation.

Some of the complications involved have been dealt with at length by witnesses from the industries concerned—one startling fact is that some 85,000 companies will need to be investigated and their complex war finances digested, if the program is continued on its present lines. As one member of the committee reacted to this statement, "That might take 10 years —even 20 years, or God knows how much longer."

T. N. Sandifer

Another situation brought into emphasis by the hearings is that as at present conducted, renegotiation proceedings are in many cases an exhaustive duplication of functions now carried out by the Internal Revenue Bureau of the Treasury. Moreover, it also was emphasized and the Committee is now thoroughly aware of the situation, that the renegotiators are in effect trying to get at any "excessive" profits, and force refunds, before the Excess Profits laws and the normal working of the income tax provisions on high earnings have had their bite.

Only a relatively minor number of companies have completed renegotiation proceedings with the government. There is still time therefore, to enact amendments to the contract renegotiation statutes which will clarify and make more efficient their operation, in the opinion of observers here. One problem is to effectively reduce the number of companies liable to such action. The proposed exemption of companies doing business up to $500,000 and under, is one approach.

The sub-committee chairman has indicated his interest in a series of suggested modifications offered by William W. Schneider, secretary of Monsanto Chemical Company, of St. Louis, who was one of those who appeared at the hearings. The suggestions, Mr. Schneider said, were not intended solely for his own class of companies, but all those concerned with renegotiation. The subcommittee chairman has stated that he had been thinking along the same lines, so that the prospect is that these proposals will get careful consideration.

In substance, Mr. Schneider suggested that renegotiation be applied to companies' "excessive" profits, only after the Excess Profits and Income Tax laws have had a chance to operate. On this point he recalled, there should be no "excess" profits left under these already operative laws. In cases where any such profit remained, the renegotiators could then get to work. This would avoid duplication of Internal Revenue functions, and would obviate the need of raising the exemption of companies to those in the $500,000 class. It would also greatly reduce the number of companies subject to the statute and permit the renegotiators to do their work properly.

He also suggested exemption of sales of products for which specific OPA price ceilings had been fixed. Obviously OPA has determined a reasonable price on such products. Another proposal from this witness was for provision to permit special amortization of war facilities erected under Certificate of Necessity. He pointed out also that the statute should either give effect to reasonable post-war reserves or permit re-opening of renegotiation payments, when such post-war expenditures are made, since these are legitimately classifiable as the cost of war business.

The committee has heard much testimony to absolve outstanding war contract companies of high profit-taking. In the chemical field, a spokesman for a top-rank company brought out that his officers were getting progressively less, and not more, salary—a fact on which he contradicted the Price Adjustment Board's figures. Stockholders of this and other companies are faring equally bad, compared with pre-war earnings, it was brought out.

The House Ways and Means Committee, because of the bearing of renegotiation proceedings on tax laws, also is interesting itself in this question. Meanwhile the Price Adjustment Board of the War Department, which is conducting renegotiations, has indicated that it contemplates an aggressive, and in a sense, an even newer policy on the program.

This policy can be summed up by quoting from a public statement by the Board chairman, Maurice Karker, that "sound procurement requires that there be incentive and reward for the production of war materiel in greater quantity from each of the units of manpower and productive facilities available; that this production be at constantly decreased costs; and that the prices to be paid for that production shall be as low as they can be obtained in equity."

Chemical Production Costs Up

Whatever may be the situation or position of other industries, spokesmen for the chemical field have been quick to note an exception in their case, on the point "that this production be at constantly decreased costs." This thesis, so far as chemical industrial production is concerned, is flatly contradicted by facts which these spokesmen have brought forward. There is, instead, a definite upward trend in chemical costs, it is pointed out.

In fact, it is claimed that not only have chemical production costs increased sharply in the past year, but conditions which reach back into fields covered by nearly every Washington official agency, point to even further increases.

Conditions cited to support this argument include many that are becoming increasingly familiar in the industry, among them higher raw material costs. These have followed from such factors as increased transportation costs, incident to rail shipments as compared with water, as in the case of sulfur and phosphate rock; substitution of higher-cost raw materials because of a scarcity of some formerly-used material, such as grain for molasses in alcohol production. Even in the absence of important price rises, it is pointed out, the necessity of using substitutes of varying grades of material raises costs.

(*Turn to page 81*)

TRADITIONS OF NIAGARA

Hub of Trade

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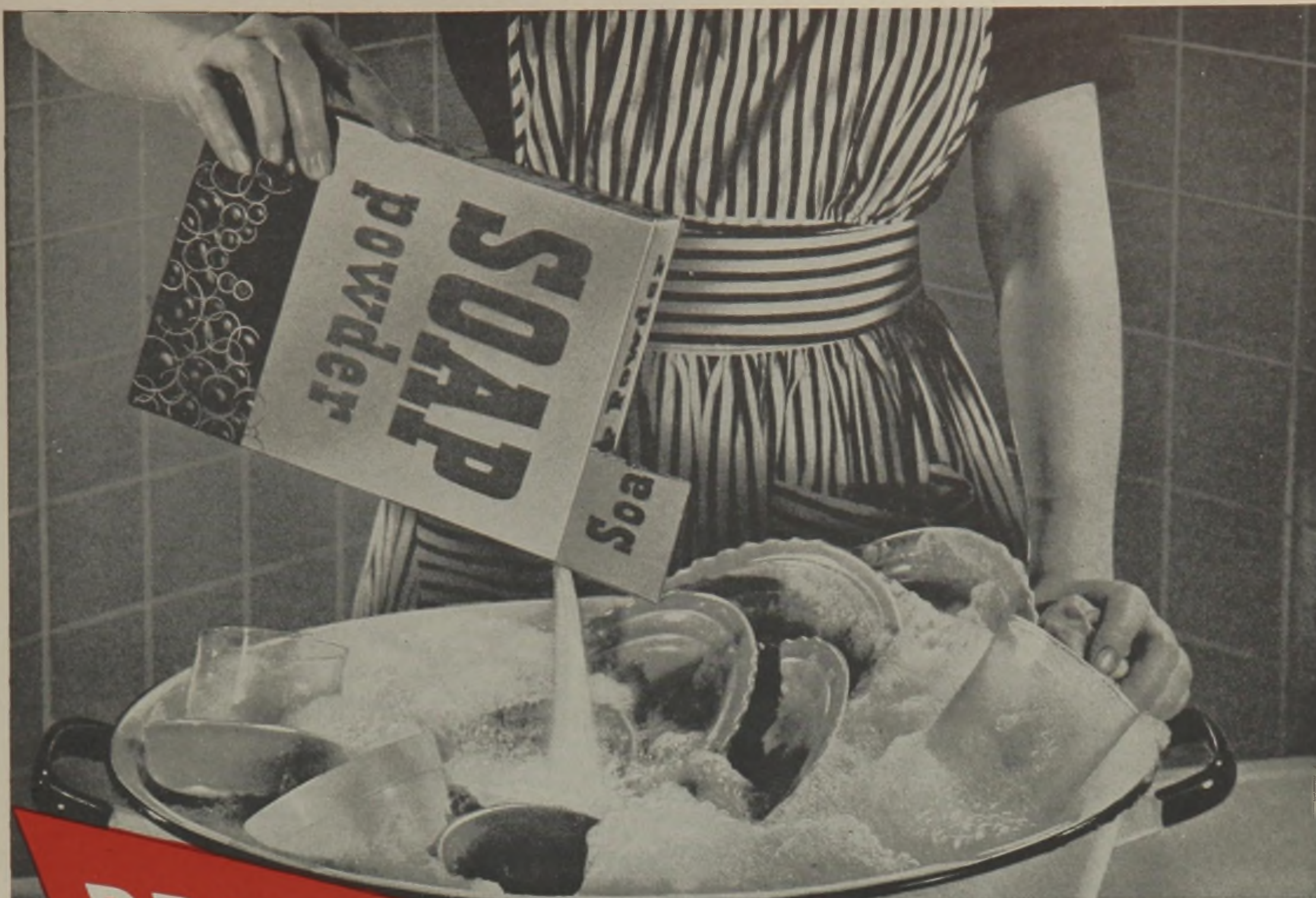

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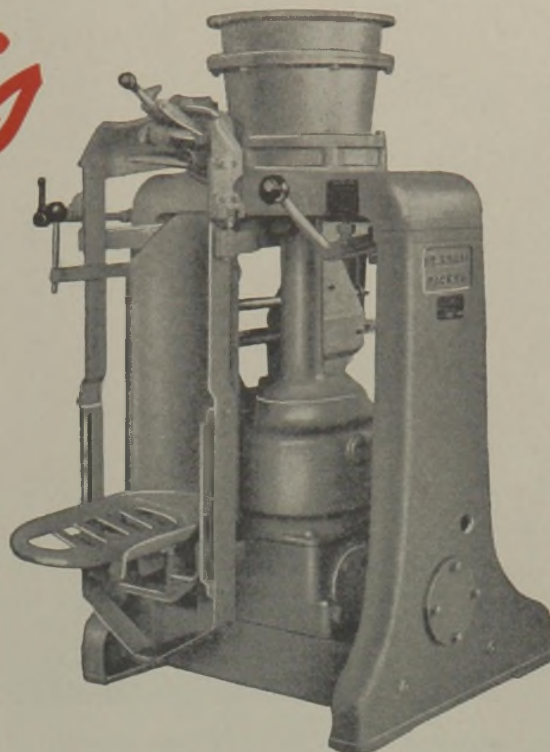

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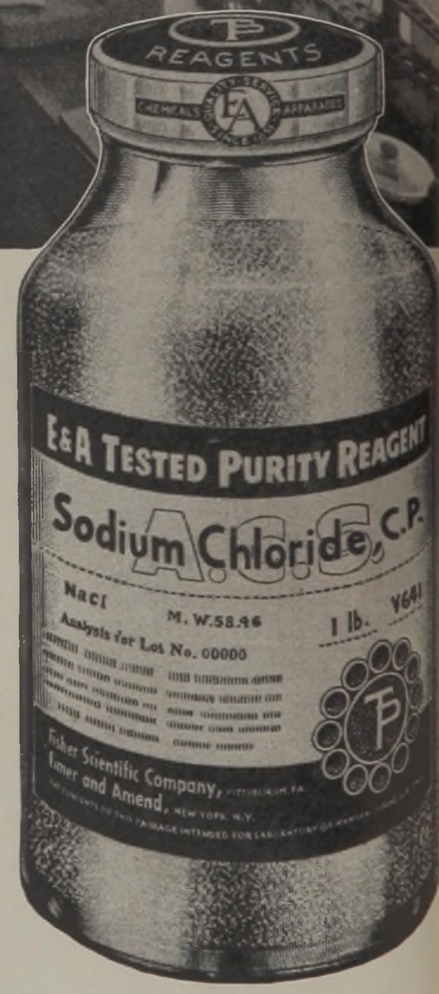

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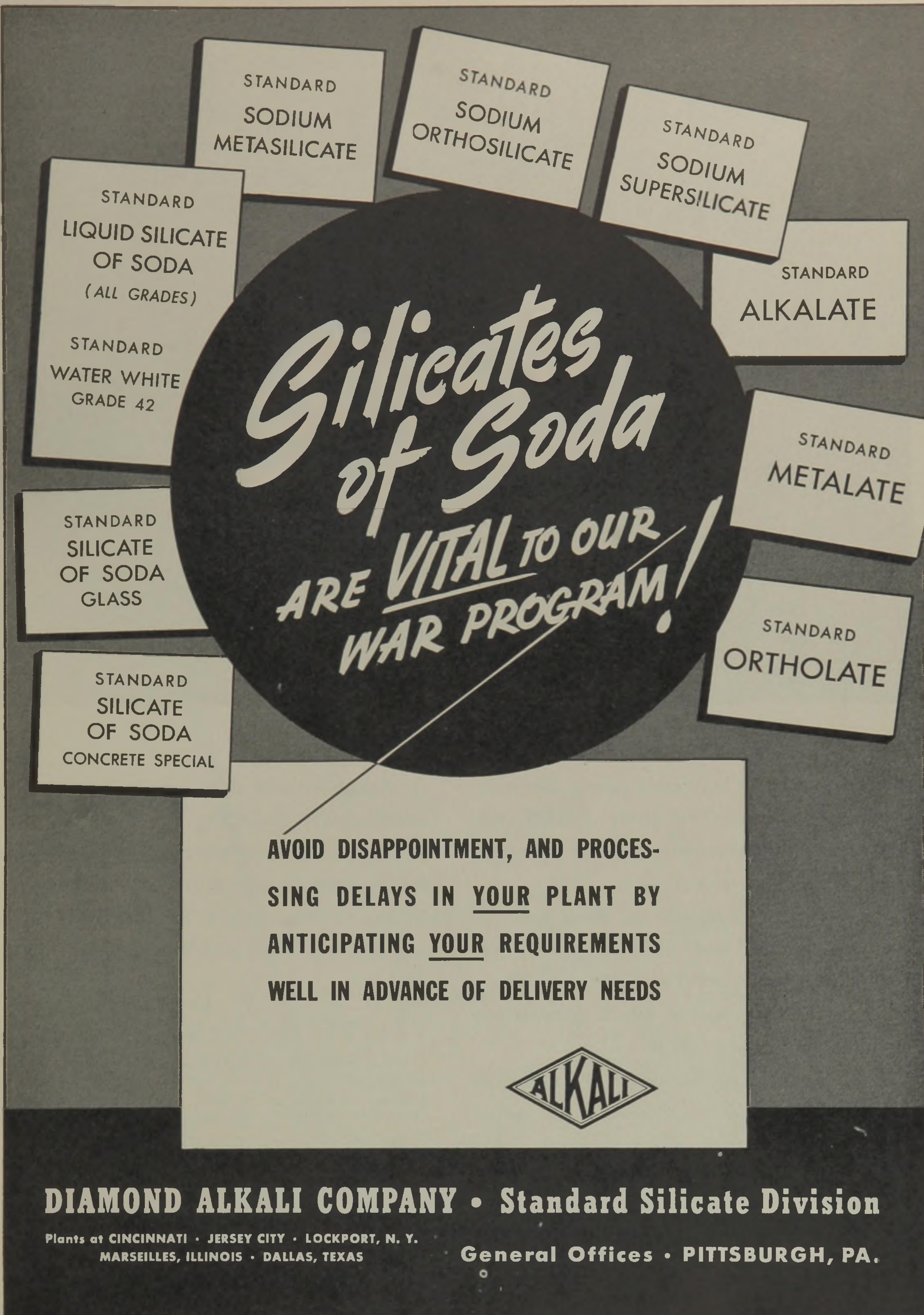
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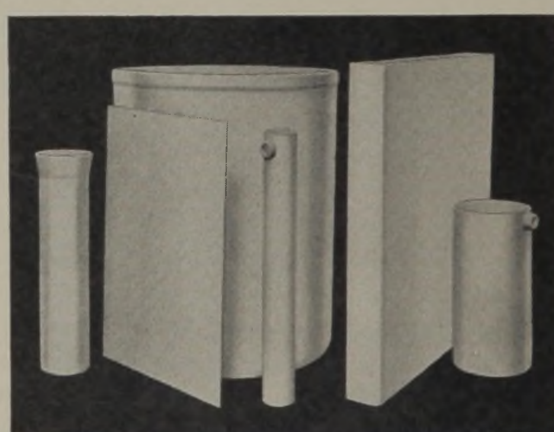
General Ceramics products include acid-proof pipe, valves, fittings, kettles, jars, pots, pumps, exhausters, coolers, condensers, acid elevators, towers, filtering equipment and tourills.



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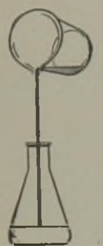

Warplanes are flying faster, higher, making aerial photography more difficult.

But lens designers have solved the problem. Today, United States flyers are equipped with an aerial lens that has twice the speed of the fastest lenses formerly used.

Result—the aerial photographer can fly at higher and safer heights and, with the same size flash bomb, still *get* his pictures.

In this new achievement—which will also serve for the peace-time flyers of tomorrow—Baker is playing an important part. Baker supplies chemicals to exacting specifications for use in the making of optical glass for aerial lenses.

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Baker's Chemicals (purity by the ton) have been supplied to many manufacturing concerns for the manufacture or processing of many products.

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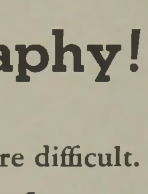

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Although most of our products are shipped in tank-cars and fifty-five gallon drums, many of these research chemicals are so new that they can be supplied only as experimental samples. Some, however, are now in semi-commercial production.

Information about these new chemicals has been given in recent advertisements and is now compiled in a leaflet, *Chemicals Available in "Research" Quantities.* Send for your copy.

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- Methyl Morpholine
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- Ethylbutyl Acetate
- Diglycol Diacetate
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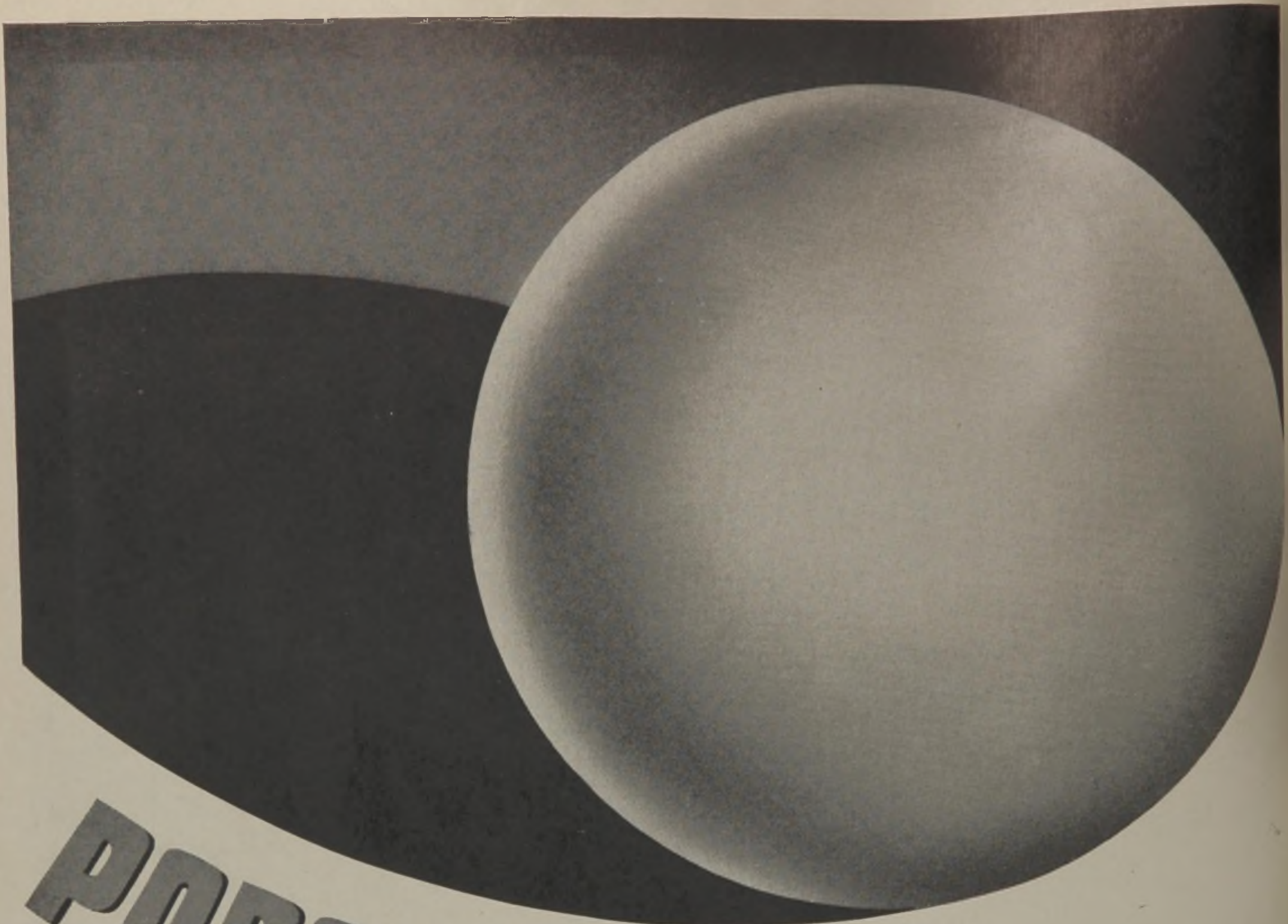

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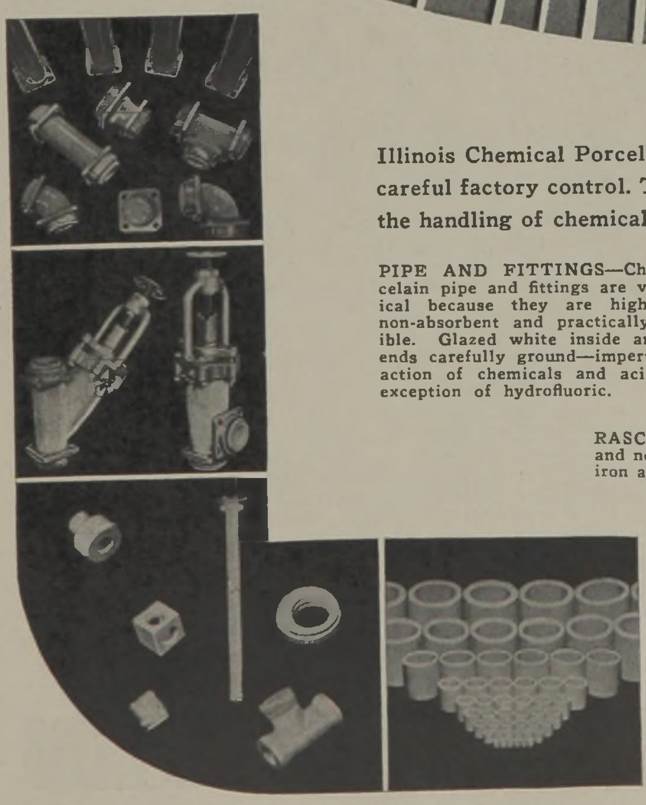

Illinois Chemical Porcelain is the product of years of research and daily careful factory control. The use of high grade Wet Process Porcelain for the handling of chemicals and acids is proving its unequaled value daily.

PIPE AND FITTINGS—Chemical Porcelain pipe and fittings are very economical because they are highly vitrified, non-absorbent and practically indestructible. Glazed white inside and outside—ends carefully ground—impervious to the action of chemicals and acids with the exception of hydrofluoric.

SPACERS—To be used where exact dimensions between fittings are not known at the time of purchase.

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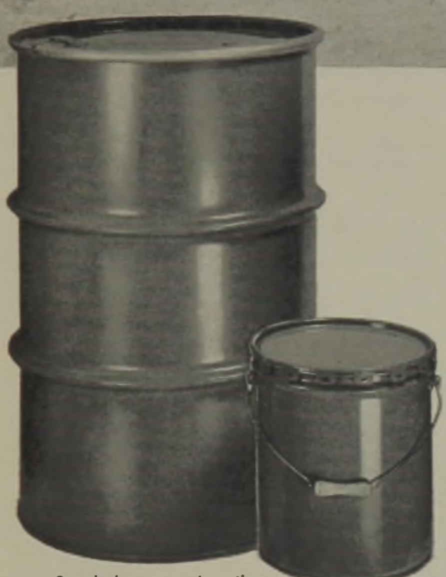
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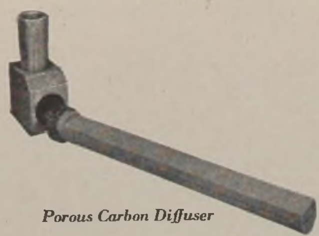

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are extremely versatile and readily adapted to the construction of equipment of conventional design as well as special equipment of new design.

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The illustrations show only a few of the many diversified applications of these products.

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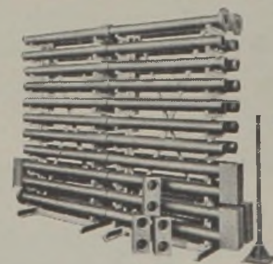

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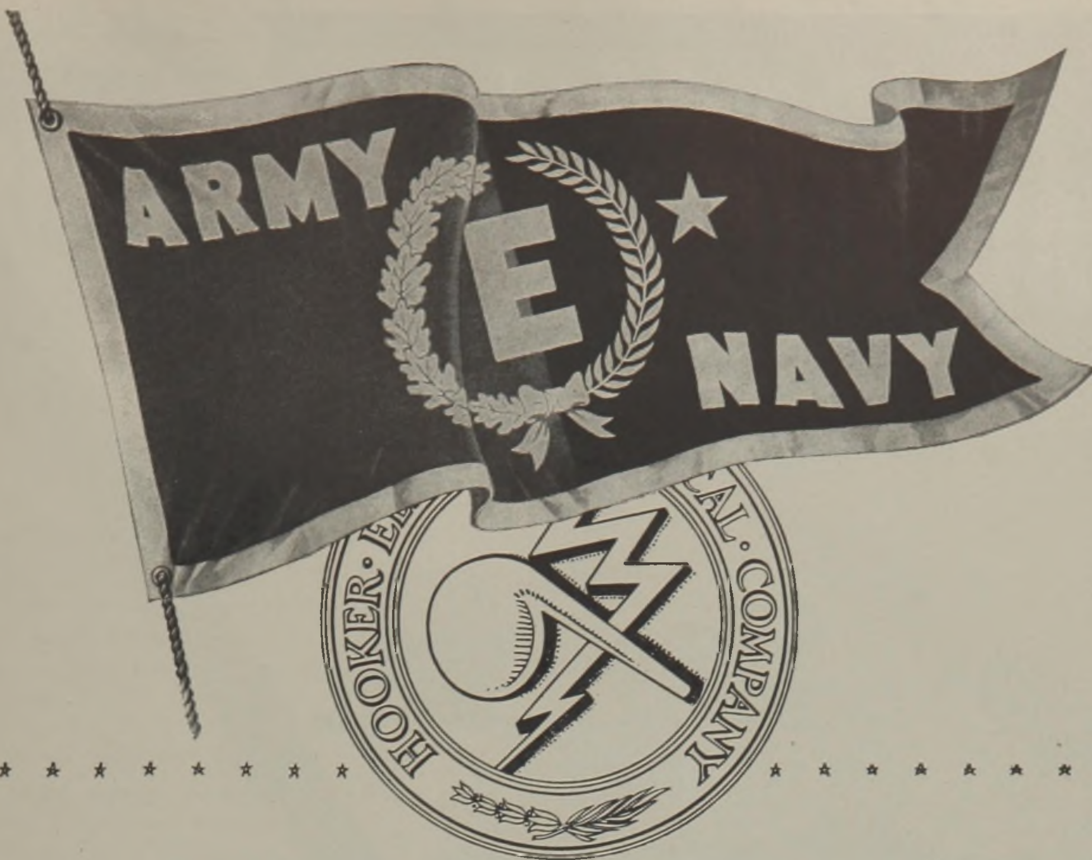

A New Star Shines at Hooker

Under Secretary of War Robert P. Patterson has just informed the men and women employees at Hooker that they have won the privilege of adding a coveted White Star to the Army-Navy "E" Production Award Flag which now flies above their plant.

This White Star is awarded for meritorious services on the production front.

In the words of Secretary Patterson it is:

"The symbol of appreciation from our Armed Forces for your continued and determined effort and patriotism."

It is with great pride and determination that the men and women of this company accept this honor. Pride in the accomplishments already achieved and determination that these accomplishments will be surpassed.

HOOKER ELECTROCHEMICAL CO.
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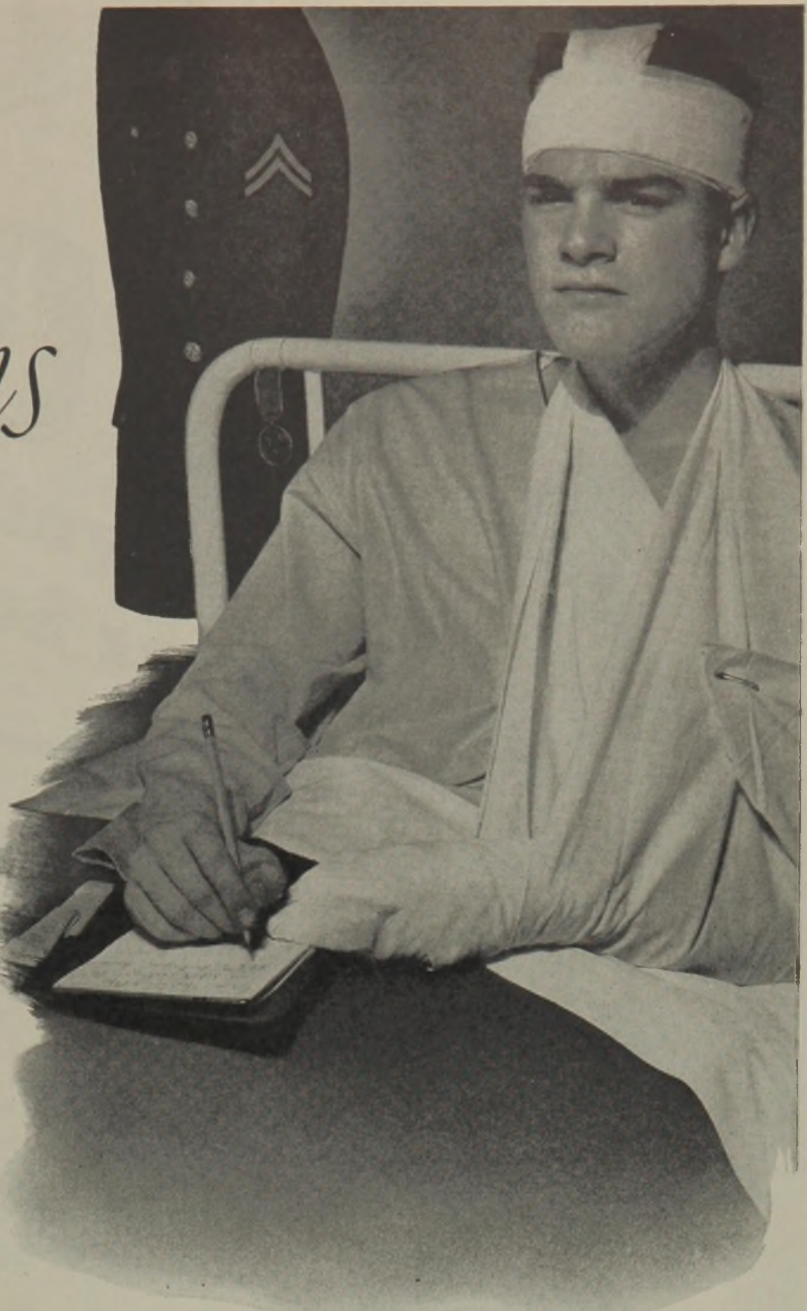

Presentation of Army-Navy "E" Production Award to the employees of Chas. Pfizer & Co., Inc., by Lt. Col. R. R. Patch, Sn. C.

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.

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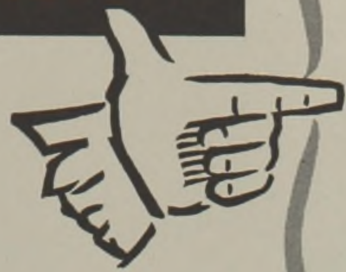

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In this new series of alkyl acid phosphates, the methyl group is a common substituent. Similar esters are available in which the methyl group is replaced by ethyl or butyl. Victor Research suggests that these organic phosphorus compounds may prove helpful in the applications indicated above.

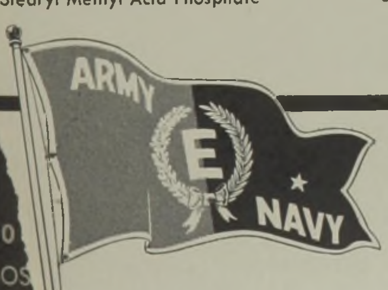
Because of present limitations in the supply of certain critical materials, samples of these and other Victor Research Chemicals announced from time to time, are not always available. Those that are will be sent promptly upon request. Some of the Victor Phosphorus Compounds . . . for which research has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

PECIFICATIONS AND PROPERTIES

COMPOUND	Mol. Wt.	Sp. Gr. at 25°C	Ref. Index ND	SOLUBILITY**						
				A†	B†	C†	D†	E†	F†	G†
Ethyl Methyl Acid Phosphate	140	1.281	1.414	S	S	S	S	I	I	I
n-Butyl Methyl Acid Phosphate	168	1.161	1.421	SS	S	S	S	S	D	I
i-Amyl Methyl Acid Phosphate	182	1.121	1.421	SS	S	S	S	S	D	SS
Octyl Methyl Acid Phosphate	224	1.065	1.435	I	S	S	S	D	D	S
Lauryl Methyl Acid Phosphate	280	1.013	1.447	D	S	S	S	S	S	S
Cetyl Methyl Acid Phosphate	336	.961(58°C)	—	D	S	S	S	S	S	S
Oleyl Methyl Acid Phosphate	362	.980	1.457	D	S	S	S	S	S	S
Stearyl Methyl Acid Phosphate	364	.910(90°C)	—	D	SS	S	S	S	S	S

A† = Water; B† = Alcohol; C† = Acetone; D† = Ether; F† = CCl_4; G† = Naphtha

**S = soluble; SS = sparingly soluble; I = insoluble; D = disperses.



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of increased demand comes a new

WATERPROOF ADHESIVE

RCI—long a leading American source of synthetic resins for surface coatings—is now utilizing its unequalled experience and extensive research and manufacturing facilities in the large-scale production of waterproof adhesives, and bonding and impregnating resins for box manufacturers.

If you are now making waterproofed solid cardboard or corrugated board boxes for suppliers of foodstuffs, small arms and ammunition to the armed forces, write for complete information on this new RCI waterproofing resin. Now available in quantity, it more than meets all government specifications.

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Chemicals
FOR LEATHER
The importance of leather in the prosecution of the war and for civilian use is obvious. Tanners and Leather Processors are working day and night to meet the herculean task of supplying Army, Navy and Marine Corps requirements, plus civilian needs.
Naturally, greater quantities of chemicals are required by the leather industry. Stauffer has the capacity and is meeting these increased demands for chemicals.
Since 1885 Stauffer has been supplying industrial chemicals to every important industry.
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STAUFFER CHEMICALS
Acids *Aluminum Sulphate Copperas Borax Carbon Tetrachloride
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*Copperas
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Liquid Chlorine
Silicon Tetrachloride
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What You Should Know About DU PONT POLYVINYL ACETATE RESIN

REG. U.S. PAT. OFF.

SOLID • SOLUTION • EMULSION

POLYVINYL ACETATE is a colorless, tasteless synthetic resin, insoluble in water but readily soluble in common organic solvents. It is supplied by Du Pont in three forms:

(1) POLYVINYL ACETATE BEADS—This convenient form of the solid resin can be molded, extruded or cast into various shapes. When compounded with suitable materials, rubber-like products are produced. The beads dissolve readily in suitable organic solvents, and the solution can be used in adhesive, textile and paper coating applications.

(2) POLYVINYL ACETATE SOLUTION (50% solids in methanol)—This is a convenient form for using the resin whenever suitable facilities for dissolving the solid are not available.

(3) POLYVINYL ACETATE EMULSION (55% solids in water suspension)—This product is an excellent replacement and modifier for rubber latex in many applications. It can be used without toxic or flammable solvents; only water is required for dilution. The emulsion is used for making adhesives which are unusually strong and permanent under many conditions.

GRADES:

Solid Beads—High, medium and low viscosity.

Solution—Low viscosity.

Water Emulsion—High and low viscosity.

The high viscosity products are higher melting, form harder and more durable coatings, have greater bonding strength, and higher heat-sealing temperatures. The properties of all grades of this resin can be modified by use of different plasticizers.

COMPATABILITY: Compatible with cellulose derivatives, chlorinated rubber, terpene resins, rosin, esters of abietic acid, and small amounts of coumarone and indene resins. Some natural resins such as damar, elemi, kauri, copal, sandarac, etc., are not completely compatible, but may be combined with polyvinyl acetate for use in applications where clarity of the mixture is not required.

APPLICATIONS: Polyvinyl acetate is an effective adhesive for a wide variety of materials, including leather, paper, cork, textiles, wood, ceramics, and even highly polished surfaces of glass, metals, and most plastics. It may be employed as a heat-sealing or wet bond adhesive or as an ingredient of hot melts.

Polyvinyl acetate is an effective binder for leather scrap, paper pulp, wood flour and pigments. It is of particular interest as a vehicle for metallic pigments because of its stability and freedom from tarnishing effects. Felt, straw and fabrics may be stiffened and permanently sized with polyvinyl acetate. Applied to metals, polyvinyl acetate coatings show excellent durability and protection against corrosion.

Solutions of polyvinyl acetate may be applied to paper to form glossy coatings which can be heat-sealed at any desired point, as in the fabrication of containers. Paper treated with polyvinyl acetate also shows improved strength and oil resistance. Coated paper foils or unsupported polyvinyl acetate films may be used as dry mounting foils for application by hot pressing.

AVAILABILITY: Commercial quantities are now being shipped on WPB allocation (Allocation Order M-10) for manufacture of essential wartime products.

FOR MORE INFORMATION, SEND FOR BULLETIN 4-243

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Electrochemicals Dept., Wilmington, Delaware
Please send me your Bulletin 4-243 on Polyvinyl Acetate.

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CI-7

Now Isn't the Time

EDITORIAL

Robert L. Taylor, Editor

The fighting has been going well for the United Nations this year. American war goods are arriving at all of the world's fronts in far more than a trickle, and American block-busters are being delivered over Germany with satisfying regularity. We're doing a good job, and we know it. And therein lies danger.

There is no room for complacency and overconfidence in the war production program that has been laid out for industry for the remainder of this year and 1944. Donald Nelson in his war production report to President Roosevelt last month said that the overall war program the United States will be expected to meet in 1943 will be $106 billion—80 per cent more than the $59 billion total for 1942. And on top of that, War Production Board officials tell us that arms production during 1944 must be increased to a monthly average output 24 per cent above the all-time highs that will be reached in the latter months of this year! Everything clearly suggests that the task posed for the industrial system by these 1943 and 1944 military production requirements is a formidable one.

One of the basic reasons behind the success of our armed forces in recent campaigns has been planning—planning and scheduling that has included industry as well as Army and Navy. Because industry met schedules, our soldiers were able successfully to invade North Africa and retake Attu. Setting up schedules and then keeping them has always been one of the first principles of production success. But now comes the disturbing report that war production schedules are not being met. Production of major items needed by the Army fell off in May to $1,494,158,000 from the April figure of $1,553,809,000 when it was scheduled to increase to $1,600,941,000. The June report is not yet out but it, too, is expected to be behind schedule.

It is impossible to fix the blame for a lag of this kind. Most likely it can be distributed over all of the participating elements—industry, government, management, labor, the Army itself, and circumstances. The important thing is that it must be made up fast. Not only must the lag be made up but production must be increased steadily until deliveries of war goods by the end of the year are *40 to 50 per cent higher* than deliveries in the laggard month of May. Obviously, stepping up overall production will mean a proportionate step-up in chemicals, for chemicals of some sort go into the making of every major supply and equipment item used by the Army and Navy.

Chemical management men must accept full responsibility for carrying out the industry's obligations in meeting these greatly accelerated schedules in the strenuous months to come. In order to do this it will be necessary to banish entirely any feeling of overconfidence and complacency. We cannot afford to be misled, for example, into a feeling that things are easing up simply because there have been a few cut-backs in original war orders. While increases in schedules are old stuff, cut-backs are news and hence tend to be magnified. We have definite assurances that for every cut-back this year there have been more than compensating increases in other fields. When steel was released by the cut-back in tanks, the released as well as additional volumes were immediately gobbled up by increases in locomotives and farm machinery. The Army reports that the decrease in production of small bombs has been more than offset by the rate at which we are now turning out the more destructive block-busters. As these changeovers are made it is true that there will be brief let-downs in individual fields. The demand for one chemical may slacken, but others become tighter. A look at the overall figures should be sufficient to convince anyone that the war production program is far from the tapering-off point.

General Somervell tells a story that illustrates some of the thoughtless and destructive tales of our exaggerated military production that, once started, spread like wildfire throughout the country and undermined the energies and morale of workers and even some managements in industry. Some months ago, train passengers travelling between two large Eastern cities could see what seemed to be acres of tanks, gun carriages and other mechanized fighting equipment standing in storage areas along the railroad. Some of these passersby concluded that since this seemingly vast amount of equipment was standing there, it must be idle and therefore we didn't need it. But we did need it. It was there as part of one of the world's most carefully prepared military missions, and a few weeks later it was carrying our troops behind blazing guns in the invasion of Africa.

The last thing this nation can afford is to let idle tales and false interpretations lull it into a sense of security and self-satisfaction. The chemical industry has always been noted for its reliance on facts and sound, sober judgment. Each of us individually as representatives of this industry can do much to make our own and the industry's job easier and hasten the successful conclusion of the war if we recognize and help others to recognize that the job is getting bigger, not smaller, and the biggest part is still ahead. The increases needed for 1943 and 1944 are before us in black and white. The goals they represent are huge but they are not out of reach. We've got to meet them, and we will, if each of us will sustain his personal part in the overall job and realize that by no stretch of the imagination is this the time for easing up.

War Baby: The Balls-Tucker process for making alcohol and protein from wheat, described on page 53 of this issue of Chemical Industries, shows promise of being one of those peculiar war babies that are born to solve a strictly wartime problem but live on to make a place for themselves in an entirely different peacetime field.

The Balls-Tucker process was developed early this year as a part of the efforts of the Department of Agriculture's Enzyme Research Laboratory to find ways of increasing the efficiency of grain alcohol production in order to conserve grain for food purposes. The process accomplishes this by eliminating barley malt. Diastase formerly supplied by the malt is provided from the wheat itself by means of extraction with sodium sulfite solution before the wheat is cooked. Already in operation at several distilleries, this simple procedure is reducing wheat alcohol costs by about 5 cents a gallon and is conserving barley, a more expensive grain, for other uses.

But the more significant and far reaching possibilities of the process appear not to be in alcohol production but in protein recovery. It was found after the early work was under way that the sodium sulfite solution extracted the protein as well as the diastase from the wheat. Protein came to the top of the extraction vessel as a heavy yellow froth that could easily be skimmed off. Moreover, it was unusually pure and the yield was almost quantitative—8 pounds per bushel of wheat on a dehydrated basis.

The market price today for food-grade dehydrated protein is 26½ cents a pound. Cost of recovery by the Balls-Tucker process is expected to be but a few cents a pound. Wheat cost will of course vary with the market. While it is perhaps still early to make accurate predictions, information thus far available seems to indicate that the process may well be the key to a new source of low cost protein that will open up new fields of application in both the food and chemical process industries. At pre-war wheat prices, rough estimates indicate that the process can profitably produce a high grade protein to sell at 18 cents a pound, perhaps less, regardless of whether the residue is further processed to make alcohol or not.

Eighteen-cent protein opens up some interesting avenues of speculation. It is reported that use of protein concentrates combined with other food materials as extenders for meat is already being given consideration as a wartime food measure. Whether a lower price will lead to anything of post-war value is anybody's guess. Protein fortification of bread and other common foodstuffs is another possibility. Several of the large food producers have recently received experimental samples of protein recovered in distilleries using the Balls-Tucker process. Protein as an industrial raw material is something that is still largely unexplored but which may have tremendous possibilities. The specialty coatings field, for example—such as coatings for paper, textiles, leather and similar products—would seem to offer likely prospects as a consumer of lower-cost protein. The plastics industry might find the material valuable.

Looking at the alcohol part of the process, the long term prospects do not appear so bright, although this phase is doing an important war job. There has been some speculation to the effect that the process may mean stiff competition for molasses alcohol after the war. This is possible, but it does not appear likely. Wheat alcohol, regardless of the process by which it is made, requires equipment and time to convert the wheat starch into fermentable sugars, a step not required when alcohol is made from molasses. With resumption of tanker shipments of blackstrap from the West Indies, raw material costs for molasses alcohol may go as low as 10 cents a gallon. Even if protein-extracted wheat is available for nothing—which is unlikely—wheat alcohol would have to keep its cost of conversion from starch to sugar well within 10 cents per gallon to compete on an even basis. This does not allow much leeway.

Thus it does not seem probable even with the elimination of malt and with recovery of protein to absorb raw material costs, that wheat alcohol will continue as a factor in the alcohol picture after the war. It seems much more likely that Mr. Tucker's and Dr. Balls' process will live as a method of producing protein rather than alcohol. And there, it is just possible that we may find it a war baby that will show the way to a whole new industry based on protein and protein chemistry.

Chemicals for Food: At the recent convention of the National Fertilizer Association in Hot Springs, Virginia, John A. Miller, president of that organization, said that the slogan "Food Will Write the Peace" might well go hand in hand with "Production Will Win the War." The truth of his words becomes more apparent every day as the nation tries to solve its own food problems as well as help out in other parts of the United Nations. As the war progresses it is increasingly apparent that there will be ever greater demands on American agriculture.

The part the fertilizer industry plays in this picture is an important one. As the demand for food for human consumption increases so also does the need for plant food. The use of additional quantities of fertilizer is one of the most important methods we have of obtaining increased agricultural production. We are short of farm labor, and machinery can be used to cover only so many acres of land. High yields per acre are necessary to obtain the maximum output of land, labor and machinery. Greater production can be obtained in many instances by increasing the amount of fertilizer used per acre and by fertilizing a larger percentage of total acreage.

The splendid job the industry has done during the past year in producing and distributing well over 10,000,000 tons of fertilizer in the face of serious material and manpower shortages focuses attention on the fact that the fertilizer industry is becoming more and more a modern job of chemistry and engineering rather than a scavenger or waste products industry. Not so long ago the materials used were largely organic byproducts. The bone, blood, and tankage of the packing house industry, the fleshings and scrap of the leather industry, the slops of the beet sugar industry, and the meal residues of the vegetable oil industry made up the greater part of mixed fertilizers. Buyers were impressed more by dark color and powerful odor than by chemical composition or guarantee of plant food content.

Today the industry is one of the largest units of the heavy chemical industry. Fertilizers today are carefully prepared mixtures of chemical compounds assembled in accordance with definite formulas developed for specific soils and crops.

The growing work of agronomists, chemists and soil experts on mineral nutrition of agricultural crops is bringing out the important part played by many elements such as magnesium, cobalt, manganese, boron, calcium, iodine, copper and iron. It may well be that the fertilizer industry will continue to grow even closer to the chemical industry as these new elements join the classic three—potash, phosphorus and nitrogen—in fertilizer formulation.

WAGE AND HOUR STANDARDS in the Chemical Industry

By W. B. Smith, *Wage & Hour & Public Contracts Division, Department of Labor*

On June 8 a new minimum wage under the Fair Labor Standards Act was proposed for the chemical industry. Provisions of this law and the Walsh-Healey Act, affecting operations in the industry are summarized.

THE chemical industry faced a tremendous task in making this country the Arsenal of Democracy. Besides unheard of demands for explosives, high octane gas, plastics, and the like, our laboratories and chemical plants have had to develop and supply substitutes for vital materials that fell into enemy hands—rubber, hemp, quinine and silk, to mention only a few. In helping to feed armies thousands of miles from home the industry has compressed a dinner into a field ration kit; it has compounded new and life-giving sulfa drugs.

To accomplish all this and much more, the industry has recruited new thousands of men and women for its laboratories and plants, yet these workers are but a small part of the production army this nation has marshalled. Because we are a democracy this country could shift from peace to a war-time economy with a minimum of friction and lost motion. Without coercion millions joined the production front and a new spirit of team-play developed.

Two federal laws, both passed as peace-time regulations, figure prominently in the employment of persons in war industries. One of these is the Fair Labor Standards Act of 1938, better known as the Wage and Hour Law, the other is the Walsh-Healey Act of 1936. Both deal with labor standards, and a majority of employers in the chemical field will find that their operations now are subject to one or both of these statutes.

The Wage and Hour Law applies to employees engaged in interstate commerce or in the production of goods for interstate commerce, which includes some 14,500,000 workers in manufacturing industry. Unless specifically exempted by the act, such employees must be paid at least 30 cents an hour and at least time and a half their regular rates of pay for all hours worked in excess of 40 a week.

The Walsh-Healey Act applies generally to U. S. Government contracts for materials, supplies and equipment in excess of $10,000. This law fixes standards of minimum wages, overtime compensation, child labor and safety and health and forbids the employment of convict labor in fulfillment of contracts subject to the act.

Minimum wages under the Walsh-Healey Act are those which the Secretary of Labor has determined to be the prevailing minimum for specific industries in specific localities. So far such wage determinations have been made for some 58 industries with wage rates ranging up to 70 cents an hour.

Several of these determinations will interest readers of this magazine. Effective April 23, 1942, a minimum rate of 50 cents an hour was established for the manufacture of chemical and related products. This rate is applicable in all States except Maryland, Virginia, North Carolina, South Carolina, Tennessee, Arkansas, Mississippi, Alabama, Georgia, Florida, and the District of Columbia, where the minimum wage is 40 cents an hour.

Commodities included under this determination are:

A (1) Heavy, industrial, and fine chemicals including among others, compressed and liquified gases, and insecticides,
and
(2) The by-products of the foregoing; and

B Such commodities as: bluing, bone black, carbon black, and lampblack; cleaning and polishing preparations (except paint and varnish remover, furniture and floor wax, and polish and soap); mucilage, paste and other adhesives.

A number of commodities omitted from the scope of the definition have been accorded separate treatment. These items and the minimum wage determination for each one are as follows: Small arms ammunition (50 caliber or less)* 42½ cents an hour; blasting caps,* 47½ cents; explosives,* 57½ cents; commercial fireworks, 31¼ cents; fuses, 37½ cents; drug, medicine and toilet preparations, 40 cents; soap in bars, cakes, chips and flakes and in granulated, powdered, paste and liquid form, and glycerin, and cleansers containing soap, scouring powders, and shaving soaps, and creams containing soap, and washing compounds containing soap, 40 cents.

For the fertilizer industry (super phosphates, concentrated phosphate and mixed fertilizers) the minimum hourly rates under the Walsh-Healey Act are: New Mexico, Colorado, Wyoming, Montana, Idaho, Utah, Arizona, Nevada, California, Oregon, and Washington, 50 cents an hour; Virginia, Tennessee, Kentucky, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, Texas, the Eastern Shore of Maryland (consisting of Cecil, Kent, Queen Annes, Talbot, Caroline, Dorchester, Wicomico, Worcester, and Somerset Counties), and Kent and Sussex Counties of Delaware, 30 cents an hour; the District of Columbia and all other States or counties not enumerated above, 40 cents an hour.

For the paint and varnish industry (including pigments or colors, either in dry or paste form and varnishes, lacquers and enamels) the minimum wage determination is: Virginia, North Carolina, South Carolina, Tennessee, Georgia, Florida, Alabama, Mississippi, Louisiana and Arkansas, 40 cents; in all other States and the District of Columbia, 50 cents an hour.

Basic straight-time hours of work under the Walsh-Healey Act are 8 in any one day or 40 in any one week. Overtime is permitted, of course, if time and one-half the basic rate is paid for all hours worked beyond the prescribed limits. For example, an employee whose total workweek consisted of four 10-hour days would be entitled to 8 hours at time and one-half under the Walsh-Healey Act, but under the Wage and Hour Law, which makes the workweek its standard, he would not be entitled to such overtime since his hours of work in that week did not exceed 40.

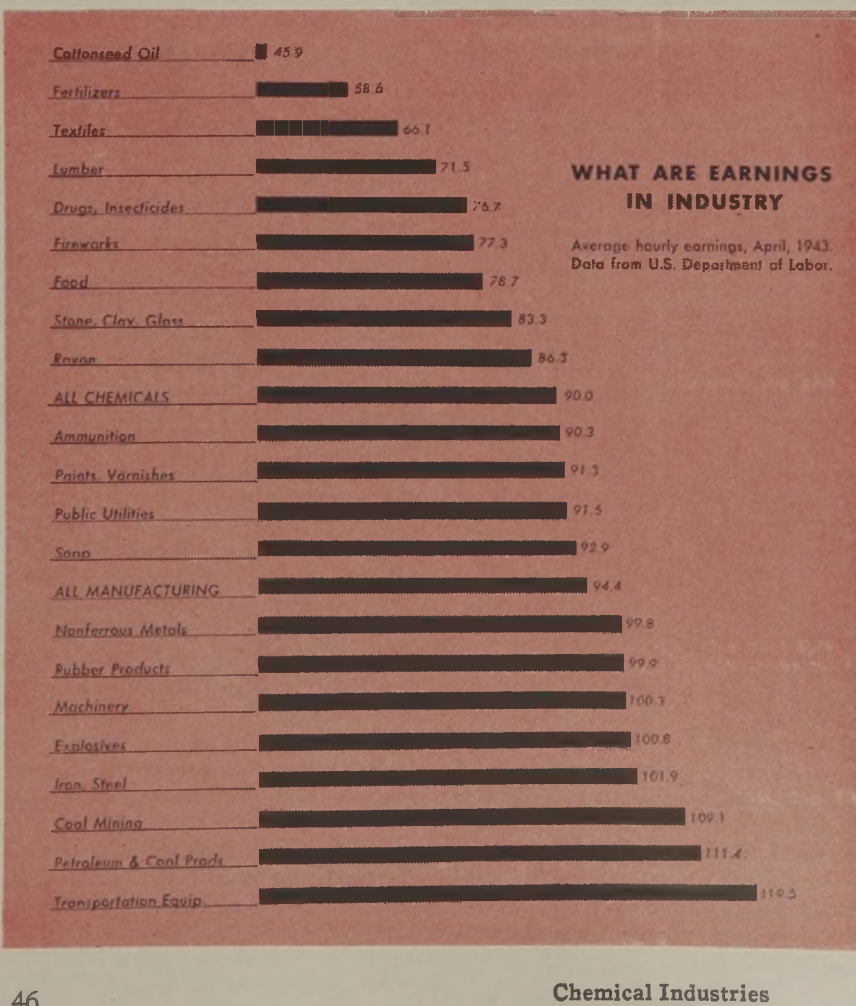
Where an employee worked, let us say, five 10-hour days and one 5-hour day during a week, he would be entitled to 15 hours at time and one-half under either law.*

Heretofore the Walsh-Healey Act generally prohibited the employment of boys under 16 and girls under 18 years of age. In order to facilitate the production of war materials, a recent exemption granted by the Secretary of Labor now permits the employment of girls between the ages of 16 and 18 years of age in any industry. However, these girls may not work more than 8 hours in any one day, nor between the hours of 10 p. m. and 6 a. m. And they are not to engage in dangerous or hazardous occupations.

Nowadays, with the toll of industrial accidents mounting, the safety and health features of the Walsh-Healey Act take on new importance. This act requires that goods supplied on a government contract be manufactured or handled under safe and sanitary working conditions. In locations where state laws establish safety and health standards, observance of such regulations will be taken as *prima facie* evidence that employers are in compliance with these provisions of the Walsh-Healey Act.

The principal hazards which inspectors will look for are these: fire hazards, unguarded cutting machines and unguarded power transmission machinery; faulty ventilation and illumination; unsanitary shop, washroom and other facilities. A pamphlet recently issued by the Public Contracts Division entitled "Basic Safety and Health Requirements," tells employers what safeguards are required.

These safety provisions will offer nothing new to concerns that are carrying out advanced safety programs, but many firms neglect even the most rudimentary precautions. Those employers who have safety problems will be interested in the



* Apprentices may be employed at lower rates, provided their employment conforms to the standards of the Federal Committee on Apprenticeship.

* Employers who enter into certain collective bargaining agreements with their employees pursuant to provisions set forth in the Fair Labor Standards Act, may employ them up to 12 hours a day or 56 hours a week without the payment of time and a half for overtime.

work of the National Committee for the Conservation of Manpower in War Industries.

Created in 1940 by the Secretary of Labor, this committee now includes 550 safety engineers. Employed by private industry and serving the committee on a voluntary basis, these safety experts last year visited more than 10,000 war plants. Their practical suggestions brought accident rates down in two-thirds of the plants contacted. The committee's regional representatives are located in eight strategic industrial areas. Further information may be obtained from them or by writing the Division of Labor Standards, U. S. Department of Labor, Washington, D. C.

Though the basic minimum wage rate under the Fair Labor Standards Act is 30 cents an hour, this act directs the Administrator to appoint special industry committees for various industries to recommend the highest minimum wage up to 40 cents an hour which will not substantially curtail employment. To date wage orders based on such recommendations have fixed rates above 30 cents in some 50 industries, the present minima in nearly every case being 40 cents an hour.

Since July 7, 1941 a 40-cent minimum has applied to the drug, medicine and toilet preparations industry, officially defined as:

"The manufacture or packaging of any one or more of the following products:

(a) Drugs or medicinal preparations (other than food) intended for internal or external use in the diagnosis, treatment, or prevention of disease in, or to affect the structure or any function of, the body of man or other animals; or

(b) Dentifrices, cosmetics, perfume, or other preparations designed or intended for external application to the person for the purpose of cleansing, improving the appearance of, or refreshing the person,

(c) Provided that this definition shall not include the manufacture or packaging of shaving cream, shampoo, essential (volatile) oils, glycerine, and soap, or the milling or packaging without further processing of crude botanical drugs."

June 8, 1943, a committee met in New York City and recommended a minimum wage under the Fair Labor Standards Act of 40 cents an hour for the chemical, petroleum and coal products, and allied manufacturing industries. The following operations are included in the definition:

The manufacture or packaging of basic chemicals, chemical products, and products made from petroleum, coal or natural gases.

(a) It includes, but without limitation, heavy, industrial, and fine chemicals; plastics; explosives and pyrotechnics; rayon and other synthetic fibers; wood distillation and naval stores; fertilizers; soap and glycerin; candles; glue and gelatin; essential oils; nitrated, sulfonated and similarly processed oils; paints, varnishes, pigments, dyes, and printing ink; drug grinding; insecticides and fungicides; manufactured gases; petroleum refining; coke and coke-oven products; asphalt and tar paving and building materials; and allied products.

(b) Provided, however, that the definition shall not include:

(1) Wood preserving, and any mining, quarrying or other extractive operations.

(2) The rendering and refining of marine and animal fats and oils.

(3) Any operations of a public utility.

(4) Any product included in the Metal, Plastics, Machinery, Instrument, and Allied Industries (as defined in Administrative Order No. 173) or in the Drug, Medicine, and Toilet Preparations Industry, the Converted Paper Products Industry, the Cottonseed and Peanut Crushing Industry, or the Vegetable Fats and Oils Industry as defined in the wage orders for such industries.

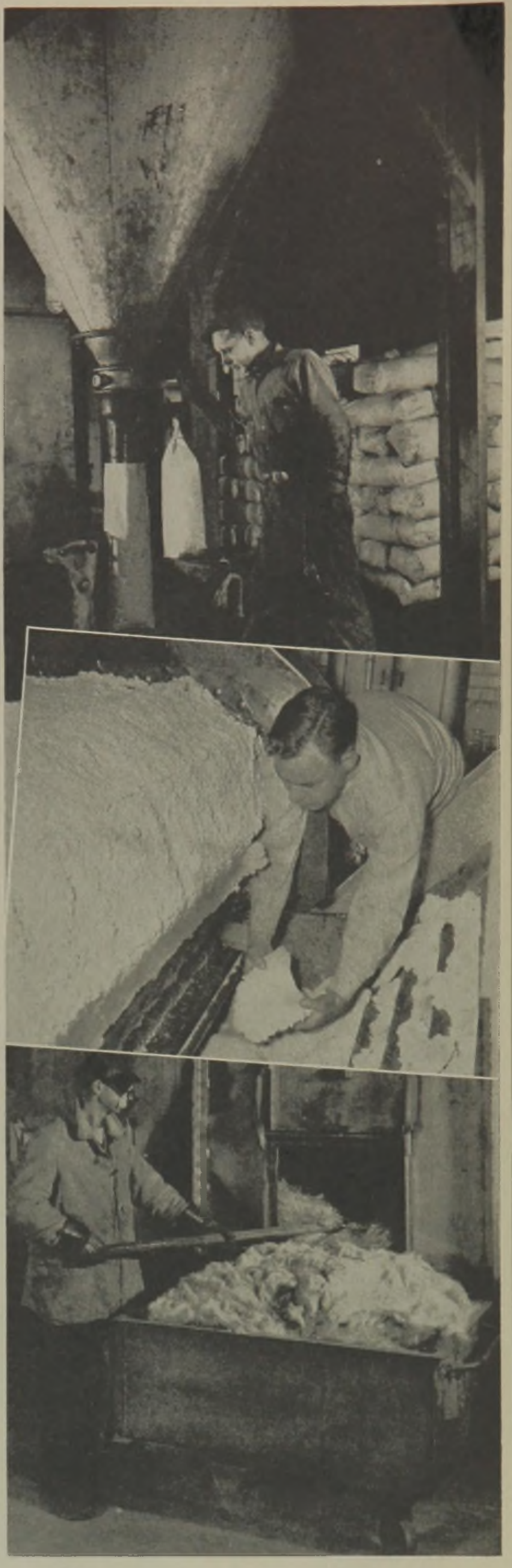
Before acting upon this recommendation the Administrator will hold a public hearing at which any interested person or group may testify or offer evidence for or against the recommendation.

Employers who are subject to either the Walsh-Healey Act or the Wage and Hour Law must keep certain time and payroll records, showing hours worked, rates of pay, overtime compensation, and the like. No special forms or accounting methods are required but the necessary information must be complete, accurate and readily available.

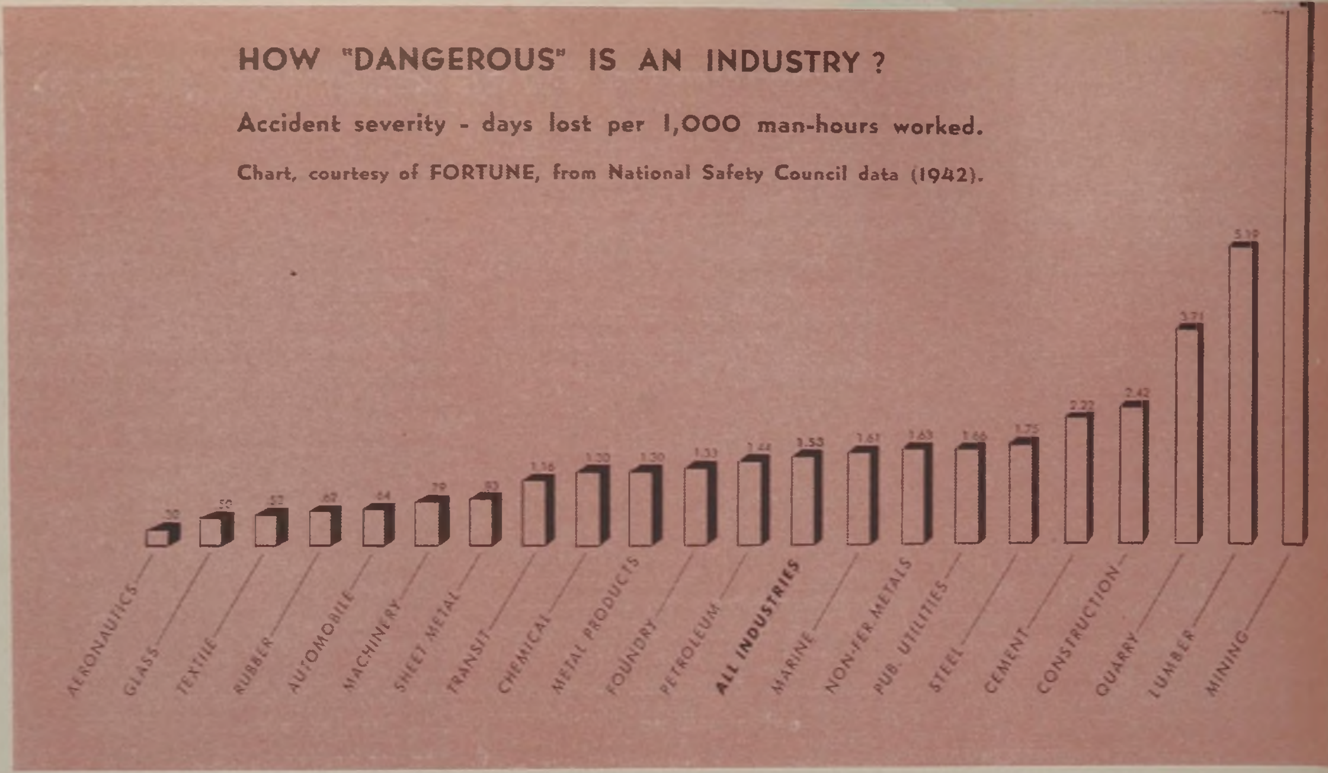
Both the Wage and Hour Law and the Walsh-Healey Act have certain exemptions and exceptions which give these laws added flexibility. Section 13 (a) (1) of the Fair Labor Standards Act exempts from its minimum wage and overtime requirements any person employed in "a bona fide executive, administrative, professional, or local retailing capacity, or in the capacity of outside salesman," as these terms are defined and limited by the Administrator in Title 29, Chapter V, Code of Federal Regulations, Part 541.*

Without discussing all of the requirements for exemption in these categories,

* These regulations and other informative publications concerning the Walsh-Healey Act and Fair Labor Standards Act are available without cost at all offices of the Wage and Hour and Public Contracts Divisions, including the National Office, 165 West 46th Street, New York, New York.



Under the Walsh-Healey Act which applies to U. S. Government contracts, the Secretary of Labor has determined prevailing minimum wage rates ranging up to 70 cents an hour for some 58 industries.



it may be said that executive employees must be paid a salary of at least $30 a week to qualify for exemption; for administrative and professional employees the salary test is $200 monthly, except in the case of lawyers and physicians, for whom there is no salary requirement. There is no salary test for outside salesmen. It should be emphasized that *in addition* to the salary requirements, the duties of these employees must coincide fully with the official definitions given in the regulations.

In general, the Walsh-Healey Act does not apply to office and supervisory employees, to custodial employees or to certain maintenance workers. A foreman who does no manual work and has no direct physical contact with the goods furnished the Government will be exempt even if he occasionally lends a hand in the course of his purely supervisory duties.

This act does apply to employees engaged in occupations connected with the manufacture, fabrication, testing, handling or shipping of goods furnished the government in amounts above $10,000. Thus it will apply to laboratory technicians, draftsmen, (except supervisory draftsmen), tool and die makers and other employees whose work is closely associated with the productive processes involved in the manufacture of products required by the government.

Under the Fair Standards Act of 1938, employees engaged in the production of goods for interstate commerce are paid at least 30 cents per hour. The recommended 10 cents per hour increase will improve wage standards.

Education and voluntary compliance have featured the administration of these two laws, but both acts have strict penalty provisions. These include for wilful violators of the Wage and Hour Law fines up to $10,000, and in the case of a second offense, imprisonment up to six months, a fine or both. Disabilities that may result from failure to comply with the Walsh-Healey Act include cancellation of the contract, and where flagrant violation is found, employers may be denied Federal contracts for a three-year period.

"Like high standards in manufacturing, good labor standards not only promote efficiency, they bring a new element of stability into the industrial picture," Administrator Walling said recently. "Decent labor standards help to remove one speculative factor in business costs and place the competitive emphasis where it belongs—on invention and better production techniques and on sound merchandising. More than almost any other, the chemical industry holds the key to future progress," Mr. Walling added.

"In planning for that future we dare not overlook the importance of good labor standards in providing industry with a mass market which it can measure and plan to serve. No other approach points so surely to peace and plenty."

Ingenuity and Scrap Solve Still Problem

By H. F. Bjork, Chief Chemical Engineer, Sharples Chemicals Inc.

Conservation of materials and equipment became very important to industry soon after the country's huge war production program got into full swing. When one really gives serious thought to the subject of salvage and conservation, it is realized that one of our richest and least exploited national resources, the industrial scrap heaps and used equipment stores, has been given belated recognition.

Because the chemical industry, by nature, is a conversion rather than a fabricating industry, it is well suited actually and psychologically to realize the benefits of utilizing scrap materials and so-called industrial wastes and probably has been ahead of other industries in the re-use of equipment. However, much can still be done along these lines. A particular instance of the use to which salvaged equipment may be put is illustrated in this story of the assembly of two satisfactory distillation units by Sharples Chemicals Inc.

SOME time ago it became necessary for Sharples to increase the distillation capacity for products that were vital to the war effort. At the time equipment deliveries were relatively slow and the company was called upon to meet a demand in such a short time that the thoughts of using newly designed and fabricated equipment were automatically eliminated. Accordingly it was decided to purchase and install such salvage and unused equipment as was available in the company's own plant together with miscellaneous equipment from outside sources.

Fortunately, we were able to purchase from the Pure Oil Company a debutanizing column which was 30 inches in diameter and 54 feet, 6 inches long. This debutanizer contained 30 plates spaced at 18 inches. We did not require a column nearly as tall as this so we decided to build one 30 plate column with 12 inch plate spacing and one 18 plate column with 12 inch plate spacing from this one piece of equipment. In order to do this, it was necessary to make up removable plates from steel circles inasmuch as we were unable to obtain flanged plates. Bubble caps were obtained from the company's own stock and miscellaneous connections were made up in our own shops to meet the needs of each column.

Provision of kettles for the distillation system presented somewhat of a problem, but after scouting around we found that a compartment tank 10 feet in diameter by 20 feet long could be made available by transferring the materials it contained. By cutting this tank in two and adding reinforcing rings to withstand vacuum service it was possible to obtain two vessels of suitable size. After adding to these the necessary openings for heating bundles, manways, vapor outlets, liquid inlet and outlet, gage glass connections, etc., we finally ended up with two kettles, each of 6,000 gallon capacity. While the vessels do not present the most desirable units from an aesthetic sense, they are perfectly satisfactory for the service in which they are used.

For condensers we were forced to use a spare condenser which we had on the lot for another service, and, not having anything even approaching the required design either available in our own inventory or from second-hand dealers, we were forced to buy one new condenser.

Distillation System from Scrap

Heating bundles for the kettle were made up in our own shops from seamless pipe welded to a header. Seamless pipe was obtained from our own storeroom and tube sheet and flanged head were made up from flanged quality steel purchased through our normal channels.

For receivers we used a 3-foot diameter by 15-foot 4-inch long vessel which we cut in two and made into two vessels. These two vessels were then supplied with the necessary openings and served the purpose admirably.

On piping we used salvaged material wherever it could be used safely and only used new material when no salvage stock existed. All pumps used in the process were new pumps which we were fortunate enough to get on time through regular suppliers.

Getting explosion-proof equipment was out of the question during the time that we wanted it so we had to resort to building an outside switchhouse, located away from the hazardous area of the building. This permitted us to use stock items of electrical equipment both new and salvaged.

Inasmuch as the unit is practically hand-controlled, we did not have to purchase many instruments and controls. Those that we absolutely had to have were obtained either from our own old stock, new stock, or salvage.

We were fortunate to have on our lot at the time a considerable amount of structural steel which had been purchased from junk dealers and other sources of supply. We were able to fit these pieces together in such a manner as to provide a substantial steel structure which, while it does not meet the acme of any structural engineer's design, does serve to support the building and equipment admirably.

All in all we were successful in building in somewhat less than two months two complete distillation units from mostly used equipment which, under normal circumstances, would have taken six months to build, and, while the unit is not the most economical system to operate nor the most efficient as far as fractionation is concerned, it is doing its war job along with the rest of the equipment at Sharples.

CHEMISTRY'S FRONT LINE OF FACTS

By *Theodore Marvin*, Advertising Manager, Hercules Powder Co.

Well-integrated units charged with advertising and other sales promotion assignments are needed by chemical companies so that they can properly service users of chemicals with essential facts. Without this help, the best chemical products enter the field under handicap, and the outstanding characteristic of the industry — change — is retarded. And it is this change — in wartime or peace — which affords the industry its maximum opportunity for public service.

LONG before Pearl Harbor, chemical advertising was on the job in overalls meeting the demands of consuming industries for information about chemicals for the production front. This was no lucky coincidence or prescience on the part of management or the advertising profession. It was merely chemical advertising doing what it always has done, namely: to provide processors with basic data about the products they desired to employ in their processes.

This on-the-job status of chemical advertising has existed from the beginning, for the industry has required, and has been provided with, factual data necessary for its growth. Advertising, in its different forms, has supplied those facts with an increasing degree of efficiency. This has been no easy assignment even though advertising staffs "in chemicals" generally are able and capable of ferreting out the truth about the thousands of chemical products which the industry spawns with such prolificacy. The task, nevertheless, is difficult, but it is accomplished daily with an astonishing satisfaction. When you read that a new plastic has a specific gravity of 1.37, or that a certain plasticizer has a refractive index of 1.5158 at 20° C., you are pretty sure that the figures stated are correct. With chemical advertising, there is seldom a question of "true or false."

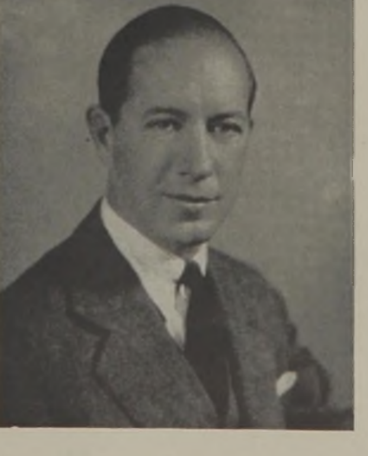
The training which the personnel of the industry's "front line of facts" has received in recent years now is proving invaluable to the war program. These persons are accustomed to being confronted with products of infinite uses. They have handled new materials which were scarce as a new-found element, but which changed in supply practically overnight to mass availability. They have catalogued chemicals possessed of almost unpredictable dynamics with changes in their technology occurring before manuscripts could be printed. In normal conditions, these assignments were sufficient to try the metal of advertising and technical data staffs.

Advertising in Uniform

But inject into the picture the equally unpredictable elements of a war-deranged law of supply and demand and all the other currents and cross currents of war, such as priorities, allocations, et cetera, and you have something with which to contend. Through it all, chemical advertising has supplied, and must continue to supply, new facts to every long-time established industrial processor; it is extending both old and new data to thousands of converted manufacturers who, probably for the first time, are dealing with chemicals and chemically-based products. That job is as important as a great many other war assignments in the nation's program to speed the manufacture of war equipment and materiel equal to or better than the enemy's.

During the pre-Pearl Harbor days, standard chemicals were finding their way into channels where they had been used for years. But farsighted manufacturers envisioned substitutes for primary products, i.e., plastics for metal, fillers for plastics. They early laid the essential facts on the line through advertising in trade journals. They issued technical booklets and stood by with "how to use them" instructions. Later, when, as events proved, these substitutes, too, were allocated, the chemical industry had ready a steady flow of substitutes for substitutes. Information about these production-line savers was ready and the data were advertised far and wide, quickly, efficiently, truthfully—a tribute to the power of advertising to perform important, national services.

These points I have been making emphasize the importance of advertising during the war. There is little doubt that chemical advertising of the sort described has proved itself. It was already doing a service; it was ready; it showed the way technically in trade and industry publications, direct mail, and motion pic-



THE AUTHOR

Theodore Marvin is well known in the industrial advertising field, and there is a reason. Last year Hercules Powder Co., of which he is advertising manager, won two of the National Industrial Advertisers Association's awards for wartime advertising. Then at the end of the year, Mr. Marvin himself was named Industrial Advertising's Man-of-the-Year by Industrial Marketing magazine. And finally, Hercules was named winner of the Chicago Business Papers Association's Grand Award for the best use of business paper advertising in 1942.

tures. It is what might be labeled "bread and butter" or "brass tack" copy. It is not glamour copy. It should be noted, too, that the requirements, generally of persons doing technical chemical advertising, are often as high as for those individuals in research and technical service positions.

The next time you receive a technical booklet on a chemical or read a well-prepared, explicit advertisement on a new product, you might reflect on the work which has gone into the preparation of the data. And reflect, too, on the fact that you can accept as "gospel truth" the statements made therein, conceding, of course, a modicum of vanity to the maker.

Interpreting for the Non-Chemical

But chemical advertising doesn't and shouldn't stop with the technical press. In a time like this, especially, it is necessary to tell the story of the services and products of the chemical industry to general business and to a wider audience. All those who should know of the advent of a new chemical for strategic purposes or a substitute for a substitute do not read the technical journals where these products are first reported. That, again, is one of the assignments of advertising in this war: to reach every person in a position to use or influence the use of a chemical material which could fill a strategic place. Obviously, such copy cannot be written and presented in the same form as that directed to technicians, for thousands of businessmen and Army and Navy executives are encountering chemicals for the first time. Therein is the reason for "idea" copy, four-colored illustrations, pointed titles. These chemicals must serve their full usefulness and you can be sure that advertisements such as "Newest in Sea-Going Underwear," herein illustrated, help to do that job.

Of postwar advertising, there is much to be said. As far as the chemical industry is concerned, companies should lead technical and consumer minds ahead to the day when industry reconverts to peacetime business. If there is any value in getting ready for V-Day and postwar planning, then there must be value in telling planners what will be available in chemical materials to help that return.

There are a great many other postwar jobs for chemical advertising. For instance, there is a need to properly define to the public, the position, services, and potential helpfulness of the industry to the public. It is essential to tell how these things are accomplished. As Dr. Willard H. Dow recently said, "The best we can do—indeed the only thing that is worth doing—is, with infinite patience, to work out the laws of nature as they apply to this or that tiny section of matter and then find a way to direct the working of the natural law into a channel where it may serve mankind. That is why the end of every discovery must eventually be a commercial utility."

One of the assignments of advertising in this war is to reach every person in a position to use or influence the use of a chemical material which could fill a strategic need. The appeal above is to non-technical business men.

Dr. Dow pleads for an exposition of the manpower devotion and capital risk which the chemical industry gives to humanity.

Advertising the Chemical World

And John Orr Young, in a recent article in "Printer's Ink," says that chemicals should furnish one of the largest advertising classifications after the war. "It is going to be more of a chemical world than the one which followed the last," he said. "Chemical companies have not yet embraced their opportunity to enlighten the public on how chemistry affects the life of every human being. The average person still thinks of chemistry as a vague business of unpleasant gases, queer smells, and dangerous acids produced in ugly buildings.

"If the public," continued Mr. Young, "also were educated to a greater receptivity to new ideas, to new products to take the place of old, the introductory time and expense of launching those new ideas would be lowered."

For those in the industry who want a dollars-and-cents reason for advertising, Mr. Young's suggestion is an apt one.

What is Hercules' policy in advertising? The answer to that question is that the company, being a producer of chemical materials for the processing industries, must use all the information channels necessary to place data about these products before all who are, or may be, interested. That is our obligation to manufacturers and our duty to our armed forces in wartime. There must not be "too little, too late" in general information and specific technical data to fit our chemicals for their wartime duties.

This is the present mission of Hercules' advertising, albeit our copy has been referred to as postwar in certain instances. The type of advertising we now are employing is fashioned to see us through "x" number of war years into postwar. But its purpose is not postwar. It is true that a great many of our processing chemicals, now being advertised for war service, do have postwar applications—uses which will swing almost immediately into peacetime product employment. But our campaign's password is "on with the war"; the copy themes are factual, and the backdrops either martial or civilian necessity. Incidentally, in all of our copy we endeavor to make no claims to winning the war or even a single skirmish. We hope to continue on that course.

Fortunately for us, we don't worry about postwar timing of our advertisements. A tough, protecting finish on an airplane is a good testimonial for a tough, protecting finish on a truck. A transparent window in a bomber speaks well for its service elsewhere. A smooth concrete runway made resistant to winter pitting with our Vinsol admixture certainly will spell lower maintenance on the highways which our ex-soldiers will surely help to build.

Looking Ahead with Wartime Copy

Let me repeat again that the mission of our advertising, including the series which we designate as "Hercules Land," is to present factual information on products of immediate application. However, many of our advertisements, such as "You Can't Change Tires in Mid-Battle," do suggest happier days. That one promises the unbelievable in tires for your peacetime driving. "Vote of Confidence" suggests future plastic uses to many manufacturers. As we get closer to V-Day, the reader of our copy perhaps will jump the gap between war and peace with greater ease. He probably will "imagineer" with our wartime, low-temperature-resistant plastics; chemicals for water-proof, flameproof tarpaulins; our tung-oil-less varnishes; our speed-dry protective coatings; and all the dozens of new chemical warriors now in service.

What we are trying to do for our customers is summed up in these objectives:

1. *To register* Hercules' chemical materials for industry as tools for the war effort.
2. *To obtain a re-appraisal*, under today's conditions, of the value of certain materials, perhaps not applicable previously.
3. *To introduce new products* specifically designed for war conditions.
4. *To tell of new uses for established products* that help to meet wartime conditions.
5. *To explain the changing supply position* of many of our materials.

In accomplishing these objectives, we attempt to reach them by two media routes—general business and trade paper—with both types of campaigns being declarative. Back of our "Hercules Land" copy in the weekly news magazines and business papers is the story of Hercules' widening field of usefulness to the process industries. This point is made by discussing specific applications of Hercules' chemicals in the war effort. Trade advertisements, as previously discussed, stick to a tighter course, presenting pertinent facts of value to the processor.

This "Hercules Land" campaign was initiated in February, 1942. It is a continuation of the advisory advertisements which had been in business magazines for several years but on a less extensive scale. It widens the reader's conception of Hercules' different types of chemical businesses. It provides explicit examples of product services, and suggests a "let's get together and maybe—if we can't help you in your war program—perhaps you can help us in ours."

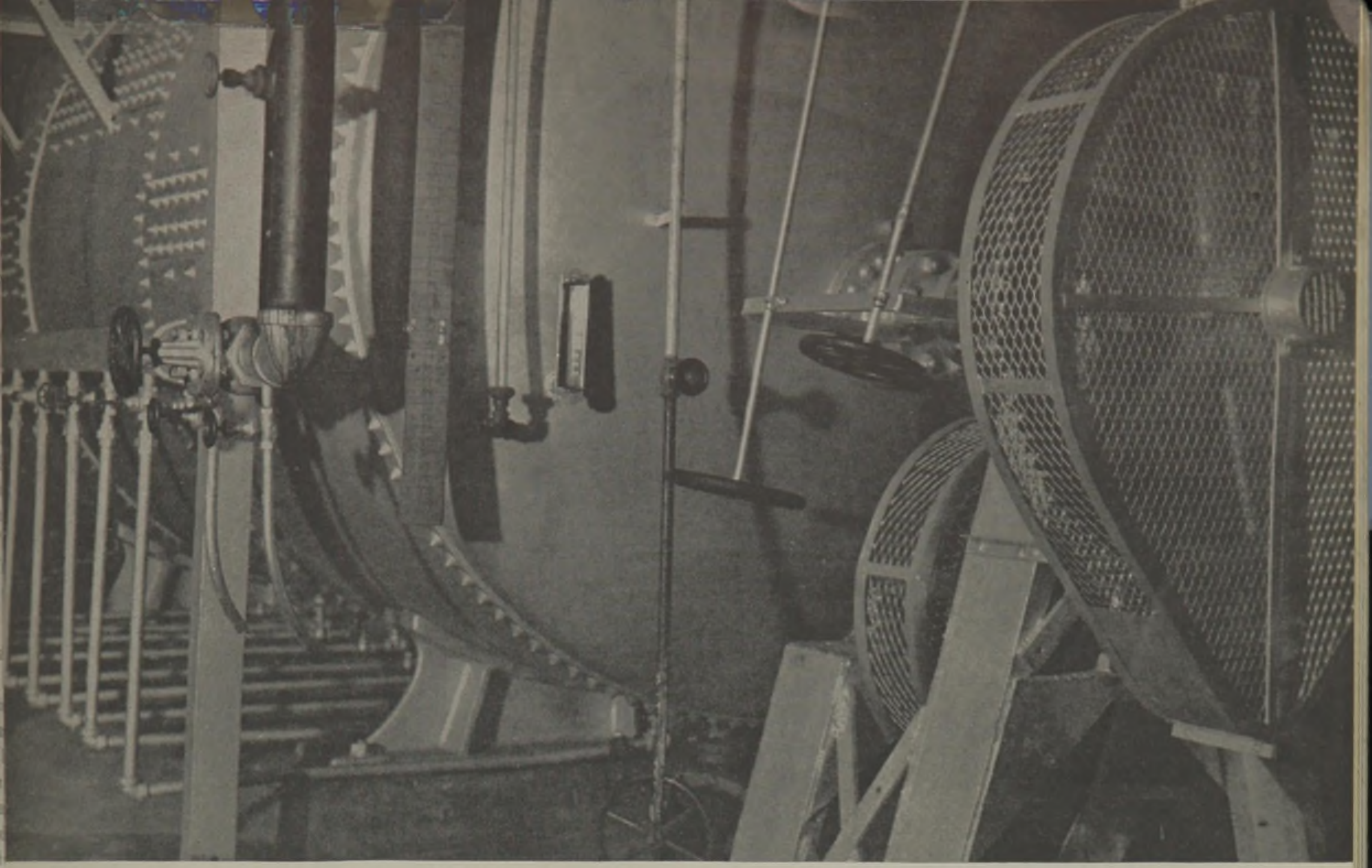
No advertising unit is worth its salt if it isn't on the alert to do the little jobs which help so much to keep the wheels going round and round in an industrial organization. We do lots of them. Most of these are not in line of sales or the promotion of a product, but the assignments do utilize our training in selling by the printed word. One such job was to speed the return of the steel drums used in shipping nitrocellulose. A sticker was devised which proved so popular with others that today dozens of companies are employing its persuasive force. By direct mail and advertising we urged customers to get into war work long before priorities began to close down on civilian goods' production.

The facilities of a balanced department are similarly at the disposal of employment and employe morale-building executives. Advertising can sell jobs and esprit-de-corps as well as the chemical production of a plant. It has started victory gardens, sold bonds, and secured blood donations, all by the same technique.

Advertising techniques offer valuable tools that can be useful in a chemical business outside of strictly product promotion. Hercules is making good use of them in pounding home the importance of conserving drums.

Increase Efficiency Through Advertising

Suffice it to say, well-integrated units charged with advertising and other sales promotion assignments are needed by chemical companies so that they can properly service users of their products with necessary and essential facts. Without such information, the best chemical products enter the field under handicap. Without this help, the outstanding characteristic of the chemical industry—*change*—is retarded. And it is this change—in wartime or postwar—which affords the industry its maximum opportunity of service to the public. Both stories of these services must be told. The job is advertising's—the industry's front line of facts in either peace or war.



One of the 10,000-gallon cookers at the Brownsville, Pa., distillery of Park & Tilford Distillery, Inc.

New Alcohol Process Cuts Costs

By *Robert L. Taylor*
Editor, Chemical Industries

The Balls-Tucker process for direct fermentation of wheat without malt is showing savings of from 4c to 5c per gallon of alcohol at Park & Tilford's Brownsville distillery. Recovery of byproduct food protein may raise this to 10c per gallon, or better.

OUT OF the topsy-turvy war alcohol situation has come one development that appears to be of more than average current—and possibly future—significance to both alcohol producers and those who are charged with maintaining the nation's food supply. Grain alcohol experts who have investigated the new Balls-Tucker process for making wheat alcohol without malt are cautiously enthusiastic. Those who saw it in commercial operation at the Brownsville, Pa., distillery of Park & Tilford Distillery, Inc., last month came away favorably impressed. Results are already showing savings of between 4c and 5c per gallon of alcohol through elimination of malt alone, and recovery of byproduct food protein is expected to bring total savings up to at least 10c per gallon, perhaps much better.

The Balls-Tucker process differs from ordinary wheat fermentation methods in that the diastase required for conversion of the starch into fermentable sugars is supplied from the grain itself rather than from malt added for that purpose. This is accomplished by extracting the diastase from the wheat with a 0.05% sodium sulfite solution and using this solution in place of malt. With wheat considerably cheaper than barley malt, any displacement of malt with wheat in the malt-wheat ratio is obviously an economy. Likewise, since wheat has a higher starch content than barley, elimination of malt results in a higher yield of alcohol per pound of grain.

For present purposes, however, recovery of protein probably outweighs these other advantages of the process. The protein yield is about 8 pounds on a dehydrated basis per bushel of wheat flour and is approximately 85% pure, thus offering definite possibilities for livestock and even human consumption. At the planned rate of use of wheat for the production of alcohol this year, the sulfite process would yield one billion pounds of dehydrated protein, or the equivalent of 25 pounds of meat for each person in the United States. Dehydrated protein is currently quoted at 26½c per pound, which on a basis of 8 pounds of protein and 2.5 gallons of alcohol from a bushel of wheat, would provide a credit per gallon of alcohol equal to 84c less the cost of protein recovery. At 15c a pound for protein, the corresponding figure would be 48c. It is interesting that recovery of 8 pounds of dehydrated protein per bushel of wheat by conventional means would require the evaporation of 300 pounds of water per bushel, as against less than 10 pounds of water by the sulfite process.

Description of Process

The sulfite process was developed early this year by Irwin W. Tucker of the Department of Agriculture under the direction of Dr. Arnold K. Balls, head of the enzyme research laboratory of the Agricultural Research Administration. At the Second Wheat Alcohol Conference at Peoria, Ill., February 25 and 26, Mr. Tucker reported that considerable quantities of diastase can be extracted from granular wheat flour by dilute sodium sulfite, and that the extracted enzyme approximates malt diastase for fermentation purposes. Mr. Tucker concluded, therefore, that unmalted wheat contains more than enough diastase to convert its own starch to fermentable sugars without the addition of any malt or other diastatic preparation. His conclusion proved correct.

Wheat appears to be different from other grains in its high diastase content in the natural state. In the ordinary granular wheat alcohol process (*Chemical Industries*, May 1943, p. 594) where the wheat flour is cooked before malting, the diastase is destroyed. Therefore in order to get the benefit of the natural diastase it is necessary to extract it before cooking. This is accomplished in the Balls-Tucker process with dilute sodium sulfite solution. Wheat flour, water and sulfite (crude grade is satisfactory) are placed in a settling tank at room temperature. Extraction requires one to two hours, with stirring at the start. The clear supernatant liquid is put aside while the sludge of flour is cooked as usual and cooled to the proper temperature for conversion. The extract containing diastase is then added back to the cooked mash. After conversion, the batch is inoculated with yeast and fermented in the manner usual for wheat fermentations.

Protein Recovery

In the extraction operation the protein of the wheat, also liberated by the sodium sulfite, rises to the surface of the liquid as a thick yellow froth. It may be skimmed off and dried or, according to recent advice, it can even be shipped in the wet state. The latter is likely to be of greater interest at present in view of the scarcity of drying equipment. It has been suggested that distillers use idle whiskey aging barrels for shipping the wet protein. According to the Chemicals Division of the Food Production Administration, the trace of sodium sulfite remaining in the protein should not be injurious to cattle or humans but rather should prove beneficial since it will act as a stabilizer to prevent bacterial action on the protein during shipment or storage in the wet state.

Fermenting room at the Brownsville distillery.

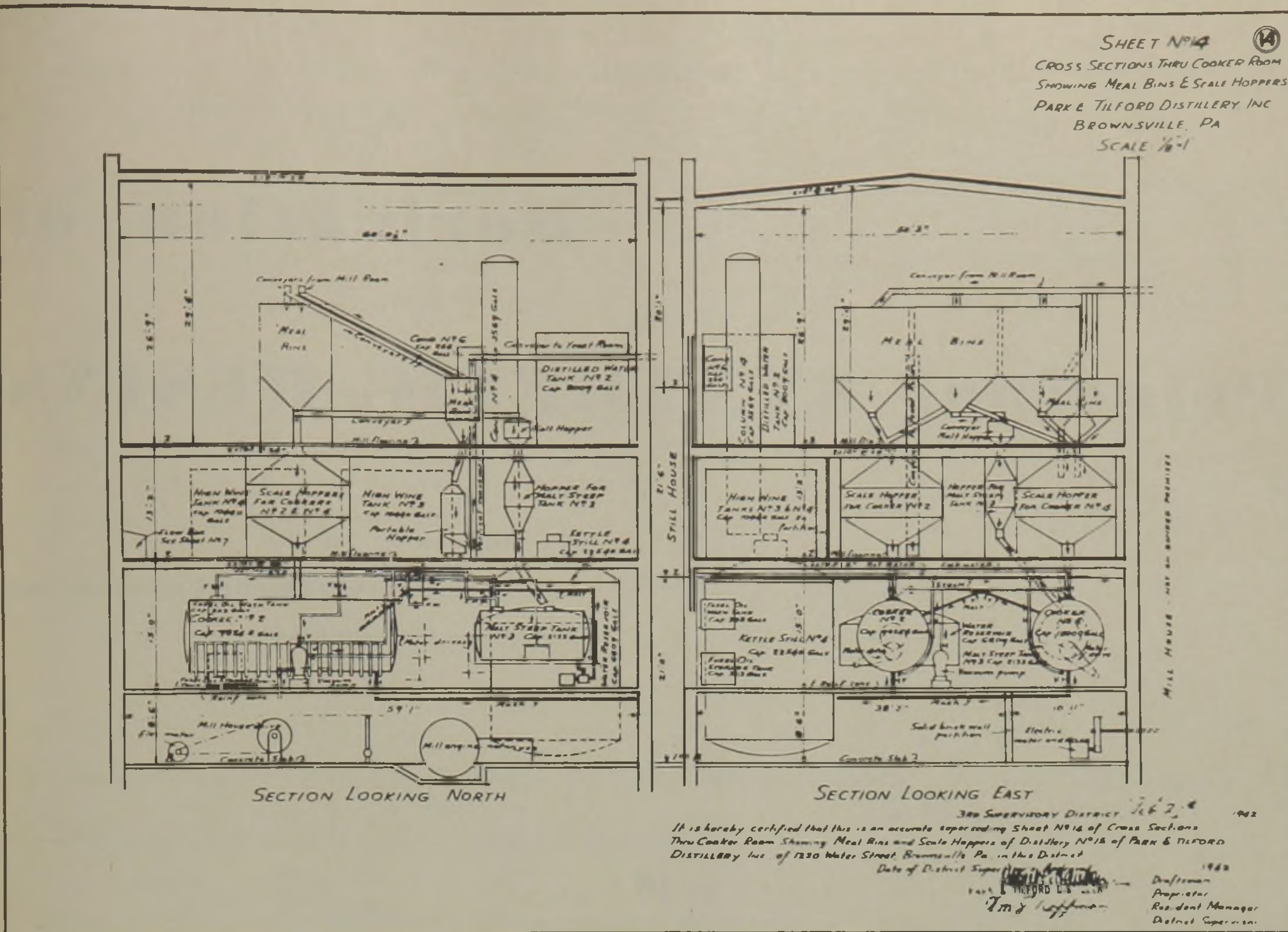
By recovering the protein in this way at the beginning of the process rather than at the end as is ordinarily done when the slop remaining after the alcohol is distilled off is evaporated and dried for stock feed, the bulk of material to be handled throughout the process is reduced. Further, the resultant distillers' slop is so thin that it can easily be disposed of in any flowing stream without danger of contamination, thus overcoming one of the minor objections to the granular wheat flour alcohol program.

The protein recovery aspect of the process, something not anticipated at the time the Agricultural Research Administration set out to find a way of boosting the yield of alcohol from grain, may eventually turn out to be the tail that wags the dog. Whether or not this happens depends on the price and market for concentrated protein. At the moment, however, commercial application of the process is primarily concerned with facilitating the alcohol program, with the result that protein is not yet being recovered in quantity, although discussion of methods of doing so is under way. Another factor of current importance is that where alcohol, and not protein, is the primary objective, it is necessary to extract only about 10 per cent of the total wheat used in order to obtain sufficient diastase for conversion. This of course does not make full use of the benefits of the process, but it has the advantage of requiring virtually no additional equipment over that already available in a grain distillery.

Brownsville Results

The Park & Tilford distillery at Brownsville was the first commercial alcohol producing unit to adopt the Balls-Tucker process. It made the change-over late in May under Mr. Tucker's personal supervision, and results were so encouraging that the Defense Supplies Corporation immediately arranged for Dr. Balls and Mr. Tucker to appear before the Industrial Alcohol Advisory Committee of the War Production Board to insure speedy dissemination of their findings to the alcohol industry as a whole.

The Brownsville plant handles 2,400 bushels of granular wheat flour and pro-



Cross sections through cooker room at Brownsville. Conversion to sulfite process required one tank and one pump.

duces about 13,000 proof gallons of alcohol daily. Two 10,000-gal. cookers handle six 6,000-gal. cooks each. Cooking is done under pressure at approximately 235 deg. F. Six cooks are used in each 10,000-gal. fermenter. Yields have always been above the usual for the industry, averaging 5.4 proof gallons of alcohol per 56-lb. bushel of total grain (including malt and rye used in yeasting).

The only equipment changes necessary for conversion to the sulfite process were installation of one tank, one pump and a few minor piping alterations. The sulfite solution is made up once a day in one of the two 10,000-gal. cookers that is equipped with a mechanical agitator. Since the complete operation takes only about two hours, it is possible to sandwich it in so that it does not conflict with the cooking schedule, thus eliminating the need for installing another agitator-equipped tank. After it is prepared, the solution is pumped to a 5,000-gal. storage tank and drawn off as needed for the 12 cooks during the day. The solution is prepared as follows for a 192-bushel cook:

20 bu. granular wheat flour
4 bu. barley malt
17 lbs. sodium sulfite (hydrated)
600 gal. water
Stir for 45 to 60 minutes at room temperature
Add ½ pint sulfuric acid

About twenty times this amount is made up as a single batch each day at Brownsville. The supernatant liquid containing the diastase and sulfite is pumped to the storage tank. The remaining mash and protein are included in the cooker charges. Consideration is being given to recovery and wet shipping of the protein since drying equipment is not available.

The above solution formula is still in the experimental stage and it is expected that changes will be made even before this article gets into print. It will be noted that the barley malt has been only partially replaced, 2% on the total mash being used now as against 10% before the sulfite process was adopted. It is expected that it will eventually be possible to eliminate malt completely. Work is also being done by Mr. Tucker on the effect of sulfite concentration on protein yield. Indications are that a lesser percentage of sulfite will maintain the protein yield of 8 pounds (dehydrated) per bushel of wheat now obtained.

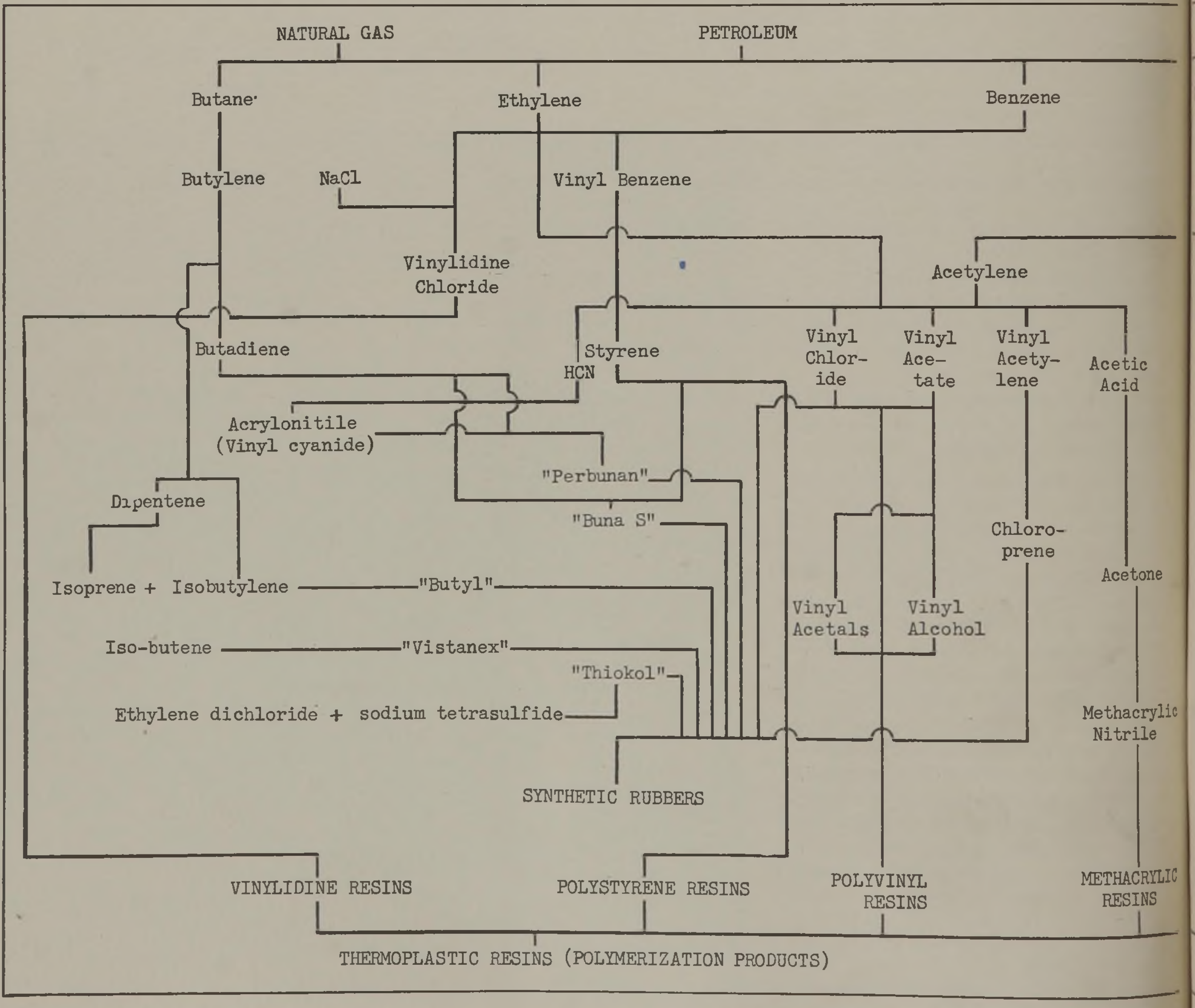
Experience at Brownsville has indicated that the sulfite process is considerably more foolproof than conventional malting. Conversion can be successfully accomplished over a wider temperature range—about 25 degrees as against 5 or 10 degrees previously—and yields are easier to maintain. It has also been found at Brownsville that with the sulfite process the fermenting tubs can be dumped before they are completely "flat," i.e. before fermentation is complete, and still get as good yields as previously obtained. Whereas waiting for completion of the action would result in even higher yields, under the present program the increase would not justify the extra time required.

The Park & Tilford distillery at Midway, Ky., has also been converted to the sulfite process, and plans are currently going ahead for conversion of the company's distilleries at Louisville, Ky., Tell City, Ind., and Owings Mills, Md. Frankfort Distilleries, Inc., National Distillers Products Corp., Schenley Distillers Corp., Seagram Distillers Corp. and Commercial Solvents Corp. are reported to be considering similar plans as this is written on July 1, and Midwest Solvents is already making the change.

The next few months will provide a good proving ground for the Balls-Tucker process. If the indicated economies in processing and through sale of recovered proteins are fully realized, the process will close an appreciable part of the gap between production costs of alcohol from wheat and from molasses.

Derivation of Principal SYNTHETIC RESINS

By ***Robert J. Moore***
Manager, Development Laboratories
Bakelite Corporation

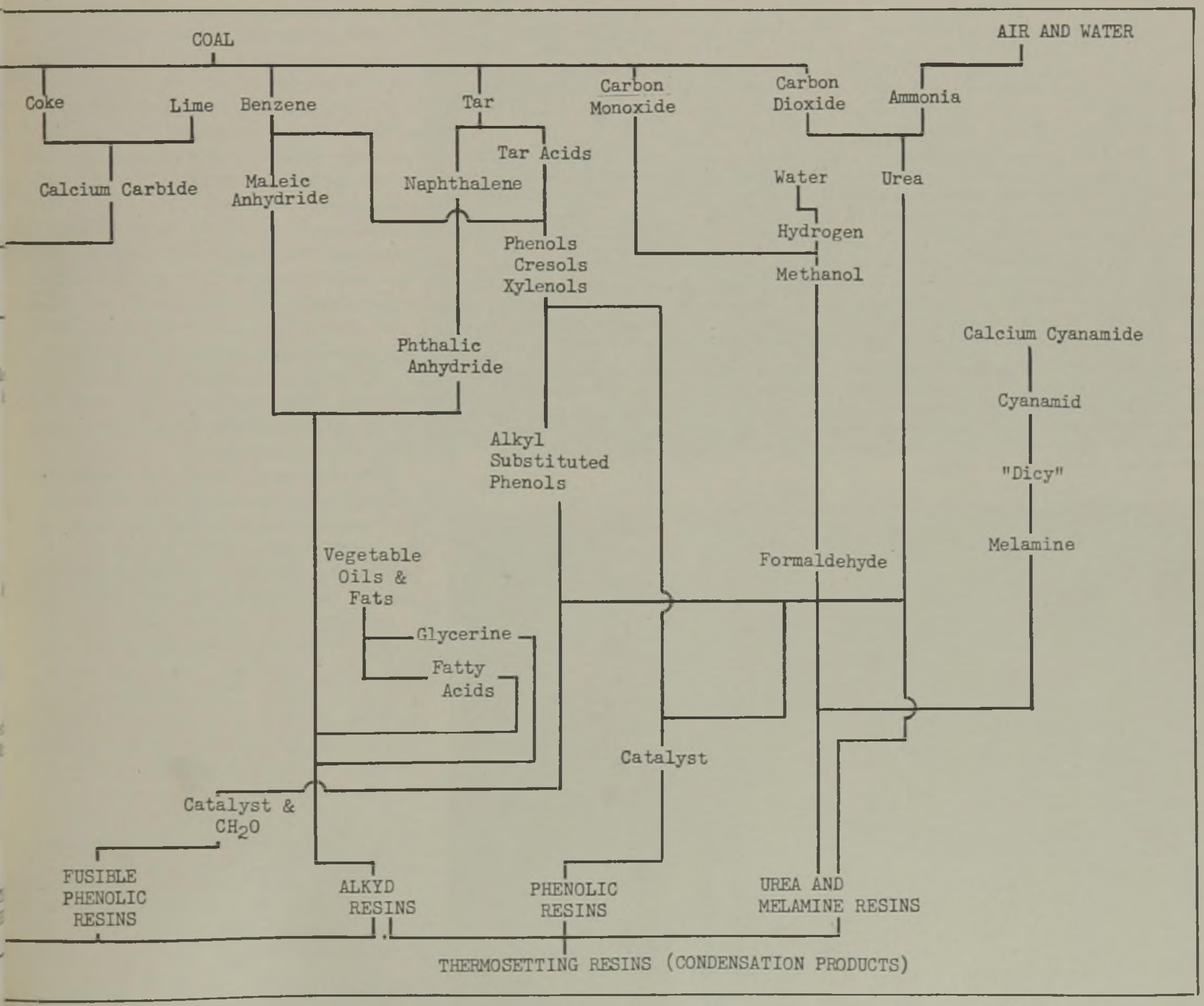


PLASTICS may be defined as those substances capable of being molded into a desired solid form. In this sense, clay used for pottery was probably the earliest example. In more recent years, the word "plastics" has come to mean those synthetic resins that can be molded under heat and pressure.

Today, however, the plastics industry embraces much more than merely molding materials. It has come to include all the many products based on synthetic resins. From these synthetic resins are produced laminating and impregnating materials, cements and adhesives, protective and decorative coatings, electrical insulating materials, cable compounds, coatings and modifiers for textiles, paper and leather. The industry has in reality outgrown the name "plastics."

The chart reproduced here has been prepared to show the raw materials, derivations and inter-relationships of those synthetic resins which comprise the greatest volume of so-called "plastics" production today. The chart is based on generally accepted procedures and does not attempt to cover additional or auxiliary derivatives. The cellulose derivatives are not included because they are not generally considered as synthetic resinous materials.

This chart is a part of the paper "Synthetic Resin Plastics" presented by Dr. Moore before the 21st annual meeting of the American Institute of Chemists, Chicago, May 15, 1943.



Maintenance of Electronic Controls

One of the greatest incidents along the road of research happened in 1883 when Edison observed a troublesome phenomenon in some of his electric lamps when they were first lighted. It was a glow between the filament terminals, accompanied by a rapid disintegration of the filament. Investigating, he found the glow was due to current passing between the terminals, and that a higher vacuum eliminated the glow. There Edison, and the rest of the world, paused for several years, unimpressed by the fact that the phenomena of electronics had been recorded for the first time.

It was not very long however, before men like Thomson, Fleming, DeForest, Langmuir, Richardson, Hull, Armstrong and many others built this incident into a whole new science.

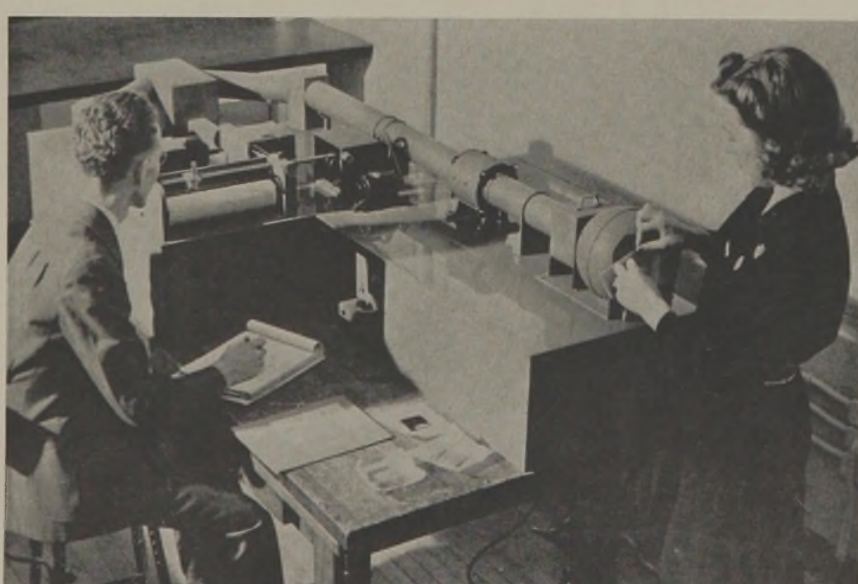
Many of us, until recently have closely linked electronics and radio. But radio is but one room in the mansion of electronics. This was becoming apparent several years before the present war began. Since then revolutionary development has been made. Secrecy shrouds many of the details but it is apparent that the use of electronic devices will have far reaching results in the chemical industry.

Already electron tubes may be substituted for conventional devices with saving in first cost and maintenance, or to obtain greater accuracy or reliability. These include the large ignitron rectifiers for electrolytic processes, and the smaller thyratron rectifiers for general d. c. use, electronic timers and electronic sequence timing controls, photoelectric relays and contact amplifiers for control from light beams or extremely small contact pressures or liquid levels, and motor controls to hold processes at accurate speeds.

In the instrument field there are the various electronic measuring devices such as the photoelectric pyrometer, the spectrophotometer, the reflection meter, the light transmission photometer and the luximeters for the determination of light transmission, reflection and analysis of light. There are also the dewpoint potentiometer, pH controls, titrimeters, and vacuum gauges.

Finally there are the electronic means for supplying power for the process itself. These include furnace controls for accurate temperatures by means of thermocouples, high voltage precipitation equipment for gathering of dust or recovery of catalyst, the generation of supersonic frequencies for processing, and the ever-increasing use of high frequency induction heating.

On the whole electronic equipment is being used widely in industry today, and plants, large and small have the problem of maintaining this equipment under high production demands. This article tells what to look for in maintaining and trouble-shooting electronic control equipment. It contains many tips that will help in keeping electronic equipment "on the line" in top-notch operating condition.



Photoelectric recording spectrophotometer being used to measure color.

ELECTRONIC control devices are being worked hard in today's production battle. Electronic equipment, generally, requires less maintenance than other electric equipment since it has no moving or wearing parts. Nevertheless, to keep it in top-notch operating condition and to prevent production interruptions, it is essential that certain maintenance procedures and checks be followed and that troubles be located and remedied as quickly as possible.

This article is not intended to be an exhaustive step-by-step treatment of the maintenance of particular electronic controls but rather a "high-light" discussion of good maintenance, trouble-finding, and trouble-correcting practices on electronic controls generally.

Most of the components of electronic controls—resistors, reactors, transformers, and capacitors—are of a semipermanent nature and are conservatively rated to give many years of service with very little maintenance. Even the electron tubes themselves, while replaceable, require inspection and test only at comparatively long intervals.

In view of these facts and the fact that electronic control sometimes will continue to function under extreme conditions of moisture, temperature, and dirt, there is frequently a tendency to neglect the simple rules of good maintenance.

First, it must be remembered that many parts of electronic controls are similar to those used in magnetic controls. Enclosing cases, bases, terminals, and wiring and conduit devices are frequently identical. Standard magnetic control devices —such as fuses, switches, and overload relays of both the instantaneous and the time-delay types—are found on many electronic panels. These devices usually perform starting or protective functions and operate infrequently. As in the case of standard magnetic control panels, this infrequent operation itself sometimes results in special maintenance problems. Detailed instructions as to the inspection and maintenance of these standard devices

By *W. D. Cockrell*, General Electric Co.

may be found in maintenance manuals covering this equipment.

Preventive Maintenance

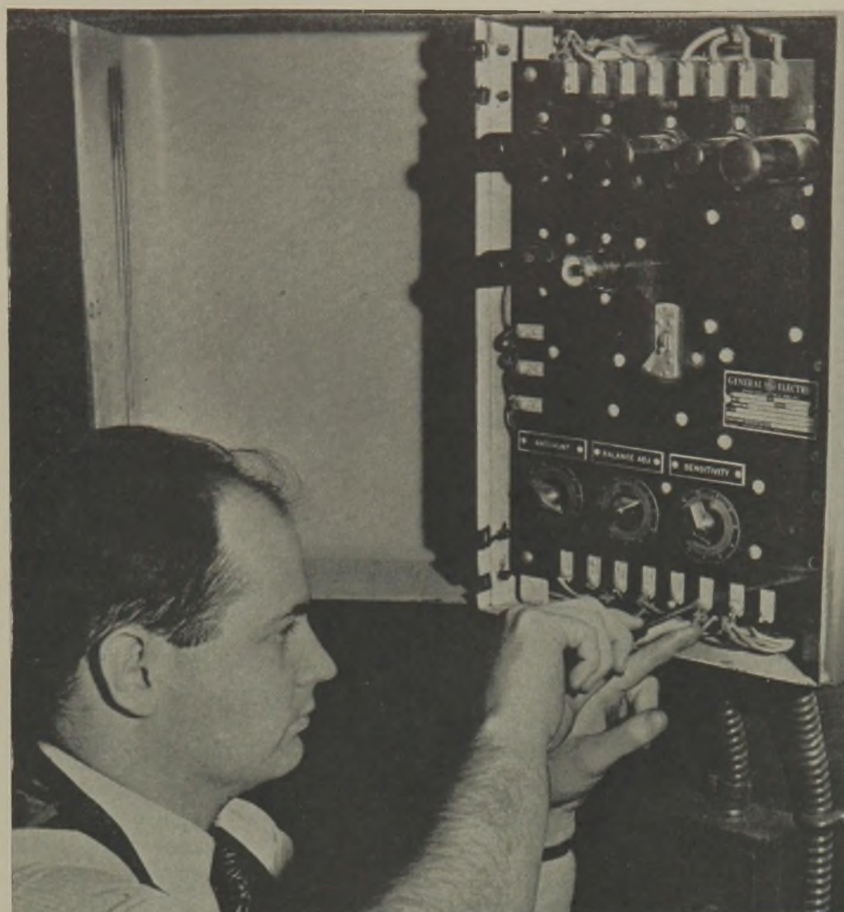
Particular emphasis should be placed on inspection for *cleanliness* and the *effects of vibration*. Because of the high impedances used in some electronic circuits, an excessive accumulation of dust or processed material will, particularly when damp, provide parasite circuits which may interfere with proper operation. Lenses and other parts of optical systems should be wiped off frequently with a clean, soft rag.

Since many electronic panels are interconnected extensively with other apparatus, the loosening of connections or the breakage of leads through the effects of vibration may cause serious shutdowns, entailing intensive (and sometimes aggravating) "trouble shooting" before the fault is located. Vibration also tends to shorten tube life. If severe vibration is found to exist at the installation location, shock mounting of the control panels, as well as the use of stranded or extraflexible leads, may be justified.

Photoelectric and other electronic controls involving mechanical components should be checked frequently to assure that the mechanical adjustments have not been disturbed. Common causes of such disturbances are bolts loosening under vibration or chain hoists and other shop equipment hitting against the equipment.

Very rarely does a modern electronic tube fail suddenly. Usually the failure is the result of a gradual loss of emission that takes place as the active cathode material is used up or flakes off. Overloading, mechanical abuse, operation at high or low filament or cathode heater voltage, and operation outside of required temperature limits all tend to shorten tube life.

Among the most prevalent causes of poor operation and short tube life are the operation of electronic panels on line voltages differing too greatly from the panel nameplate voltage, and the use of the wrong tap when a tapped-input transformer is provided. Panels are usually designed to operate satisfactorily on line voltages varying plus or minus five per cent of the panel rating. If the voltage at the installation point is consistently high or low, a small auto- or booster-transformer may be used. If the line voltage fluctuates widely, a special voltage-regulating transformer may be required. Faulty heater transformers, loose connections, and corroded socket connections also may limit the low-voltage, high-current power required for the tube cathode heater.



Electronic control panel subject to slight vibrations (not sufficient to require shock mounting) should be checked periodically to assure that screws and bolts are tight.

High-vacuum tubes and tubes filled with true gases, such as argon and xenon, may be operated without difficulty over a wide ambient temperature range, but tubes using mercury vapor operate best in a more restricted ambient range. Enclosing case ventilation and other temperature-regulating means are provided for the usual industrial indoor ambient temperatures of 60 to 100 F. For low ambient temperatures, manually or thermostatically controlled strip heaters may be mounted in the case. For temperatures from 100 to 120 F., fan or forced-air cooling may be sufficient. Above this temperature, components other than the tubes may be affected also and it may be that standard equipment will be unsuitable for the installation.

Panels which use gas- or mercury-filled tubes are normally equipped with a cathode protective timer. This timer should be set for the heating period designated

Above. Lenses and other parts of photoelectric optical systems should be cleaned regularly with soft cloth.

Below. Equipment should be checked to see that line voltage corresponds to panel nameplate rating, or within variation of 5% of marked value.

by the instructions accompanying each new tube. This time has been found by experience to be the minimum time permissible for reasonable tube life and must not be decreased for any reason.

During the shipment or handling of mercury-vapor-type tubes, the liquid mercury may be splashed on the elements. Therefore, when the tube is first placed in service, it is necessary to heat the tube cathode for a time with the anode lead disconnected, distilling off the splashed mercury before the anode power is applied. This requires a longer period than the usual cathode heating time; the tube instructions give the proper time.

Some electronic panels are designed to use tubes on external loads. It is essential that these loads not be greater than either the average or peak rating of the tubes. Sometimes an operator will increase the anode voltage, replace coils, or alter motor pulleys or gearing to obtain a greater output, thus overloading the tubes. Since they seriously reduce tube life, such practices should be avoided.

The effects of vibration on tube life have already been considered but shocks and jars in handling tubes, particularly when they are old, can be quite detrimental. Sharp shocks, such as caused by dropping or striking the tube, if they do not actually rupture the envelope, may jar the elements out of position or even break welds or leads.

Mercury-vapor tubes must be kept upright as much as possible to keep the mercury off the elements.

Trouble-Shooting

The best trouble-shooting tool is a clear knowledge of the operation of the panel and each part of it. If partial operation is obtained but other actions fail to occur, the trouble may be isolated to a part of the circuit.

Since many circuits on electronic panels have a very high impedance, meters having high impedances are very desirable in servicing the equipment. A useful tool is the radio service multimeter which has a resistance of 1000 ohms per volt or higher. For some circuits, however, an electronic meter, such as a vacuum-tube voltmeter of the d-c reading type or a cathode-ray oscilloscope, is essential. The cathode-ray oscilloscope, particularly when modified to read direct-current potentials, is an extremely useful device since it combines a very high impedance voltmeter with a time axis, thus making visible voltage changes much too rapid for the ordinary meter to follow. Instantaneous thyratron grid and plate potentials and other voltage waveforms may be observed easily on the oscilloscope and any incorrect operation quickly detected.

In trouble-shooting on electronic control, one should first make sure that the trouble lies in the electronic equipment. Is power available at the control panel terminals? Can the motor or other device be operated by alternate means (such as from a d-c bus by drum switch or magnetic control) if provided? Are all protective devices and interlocks outside of the panel operating properly? Has the cathode protective timer relay completed its timing cycle and applied anode power? Have mechanical adjustments been disturbed where items such as scanning heads or other mechanical components are used?

The times at which the failure occurs may be divided roughly into three: (1) when first starting a new equipment; (2) when starting after a normal shutdown; and (3) during operation.

New Equipment Fails to Start

When new electronic equipment fails to start, the cause may be a lack of correct power, incorrect or missing connections, tubes in wrong sockets, use of wrong or defective tubes, no fuses or wrong size fuse, or damage done to panel leads or parts in shipment.

Incoming power should be checked against panel nameplate. The remedy for no power, missing wires, and fuses is obvious. The position and type of tubes can be checked by referring to the wiring diagram and the panel stamping. Defective tubes and (sometimes) tubes in the wrong socket may not heat up. The glow of the hot cathode may usually be seen in glass tubes; in metal tubes the envelope becomes hot to the touch. (The envelope of metal thyratrons and ignitrons is at cathode potential. *Do not touch while power is on the panel.*)

Failure caused by breakage of leads or parts on panel is covered below under "Equipment Fails During Operation."

Equipment Fails to Operate After Shutdown

When electronic equipment does not operate after a normal shutdown, first check power, interlocks, and safety switches. The cathode heating timer relay may have failed or the anode contactor may be defective. An old tube often fails due to expansion and contraction as power is switched OFF or ON. Filament or heater burnouts may be detected quickly by inspecting glass tubes or by feeling metal tubes for heating. *Power should be removed before touching metal thyratrons and ignitrons.* Sometimes an overloaded transformer or reactor will fail due to the expansion cycle as power is removed and applied. Here, however, warning of failure is usually given by excessive heating, the odor of the hot material, melting of the sealing compound, or smoking or charring of the insulating paper.

Failures caused by leads or parts going bad during shutdown are covered below.

Equipment Fails During Operation

If after a period of satisfactory operation, the equipment's operation quickly becomes unsatisfactory or ceases altogether it is often possible to isolate the trouble to a specific cause by noting the exact symptoms of the failure. Power failure or a blown fuse result in an instantaneous change in the equipment's operation. An overloaded transformer, resistor, or wire is usually indicated by heat and smoke before total failure occurs. The cause of overload—whether short-circuit, load coil burnout, or motor-bearing failure—must be found and corrected before the equipment is again placed in service.

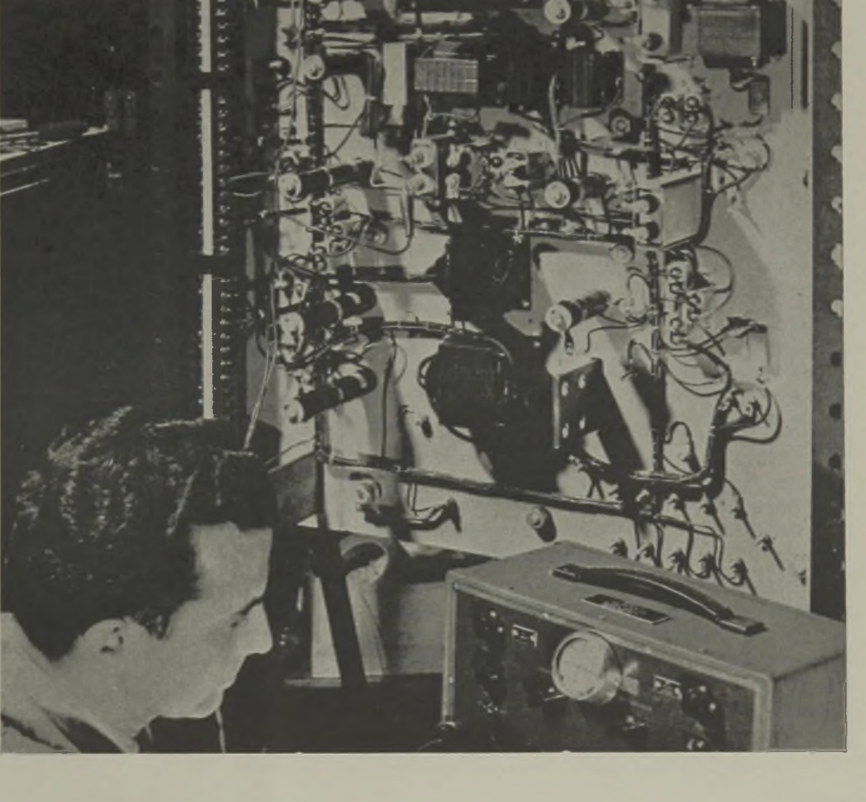
A failure in a tube cathode circuit permits the cathode to cool gradually over a period of seconds or even minutes. Therefore, the loss of operation may be gradual rather than sudden as in the case of power failure. However, small rectifier- and battery-operated tubes cool quickly.

If none of the above causes for failure are evident it will be necessary to go carefully through the operation of the circuit and to analyze each step. An instruction book for the particular panel or at least an elementary diagram of the circuit should be available. If the circuit is at all extensive, it is usually possible to divide it into two parts, for example, the control and power circuits of a welding control. Then it may be possible to use a meter, electronic voltmeter, cathode ray oscilloscope, or some other means to determine whether or not the control section is operating correctly as the input is varied over the normal range. Likewise, a simulated control signal may be applied to the power circuit to test that half.

In a similar manner, each part of the circuit can be further subdivided until the faulty circuit or part is found. With a clear knowledge of each part of the circuit, this procedure can be carried out quite rapidly. It is a good idea to check the operation of panels while they are operating correctly and to record voltages found and cathode ray traces seen between specific points. In this way, the differences found in a defective panel will be immediately evident, and the trouble-shooting will take much less time.

If trouble is recurring in certain parts of the circuit, the manufacturer should be notified. Quite often a more permanent solution may be offered or the assistance of the manufacturer's design engineers may be obtained to suggest a cure. Sometimes, slight modifications in the equipment may be proposed to provide more desirable characteristics for the particular installation. In every case, complete information from the panel nameplate as well as a description of the part and the trouble found should be given to the manufacturer so that assistance may be rendered quickly and effectively.

Control panel being checked with cathode-ray oscilloscope, a most useful instrument for checking wave shapes when searching for faults.



N.A.I.D.M. Discusses Shortages

Editorial Staff Report

THE use of insecticides and disinfectants after the war is bound to increase, J. N. Curlett, president of the National Association of Insecticide and Disinfectant Manufacturers, said in his keynote address before the 29th mid-year meeting of the Association in Cleveland, June 7 and 8. Mr. Curlett, who is associated with McCormick & Co., attached post-war significance to the fact that American armed forces are introducing insecticides and disinfectants to people all over the world who have never used them before. We can expect an increased demand for both of these classes of products from all quarters, he said. At present, virtually our entire production of insecticides and disinfectants is going to the army and navy, essential civilian uses, and lend-lease.

Representing the pest control operators, one of the major outlets for insecticides, W. O. Buettner, secretary of the National Pest Control Association, said that members of his industry are as much concerned about sprayers as they are about insecticide materials. Although it was expected that there would be some small size sprayers for resale by this time, these have not materialized and there is not a sufficient quantity of sprayers available immediately even for service work, he said. The outlook for metal sprayers is not good, according to Mr. Buettner, and the possibilities of obtaining some made of non-critical materials is not much better. However, Melvin Goldberg of the Insecticides and Fungicides Unit of WPB said his agency had a program mapped out earlier in the year to make metal available for sprayers but got no response from the industry. He suggested that those interested in getting sprayers should put pressure on the manufacturers.

Aside from the sprayer situation, Mr. Buettner said the number one problem of members of his association was how to get pyrethrum, which brought a show of appreciation from the many sympathizers in the audience. Asking suppliers to indicate the minimum priority rating required when they are unable to fill an insecticide order, he said that some pest control operators had been experiencing delay in delivery of insecticides due to misunderstandings regarding priorities.

Dr. R. B. Trusler of the Davies-Young Soap Co. led discussion on the new floor wax specifications drawn up by the Association as a result of the scarcity of carnauba wax which has required extensive use of substitutes for this material. The new specifications are based on performance standards rather than chemical composition. Dr. G. A. Bowden of the A. S. Boyle Co. also contributed to the symposium on waxes.

Containers

The situation with respect to glass containers is serious, W. E. Braithwaite, National Bureau of Standards, said in recommending voluntary standardization of sizes by the industry. In reply, the Association passed a motion requesting that the Bureau of Standards and Department of Commerce set up a recommended program of simplification and standardization and submit it to the industry. Eugene Bertram of the Owens-Illinois Glass Co. said that the limiting factor in glass containers is the paper boxes for shipping rather than the glass itself. He asked shippers of glass-packaged products to eliminate top and bottom pads in the shipping cartons wherever possible. Reviewing the drum situation, J. L. Brenn of Huntington Laboratories said second hand drums are available for certain products under Order L-197. Wooden barrels are still reasonably easy to obtain, he said.

Agricultural Insecticides

"If we didn't have insecticides and fungicides we would have to expand farm acreage and labor 40 or 50 per cent in order to meet food requirements," P. A. Groggins, chief of the Chemicals Division, U. S. Department of Agriculture, said in addressing the meeting on agricultural insecticides. He pointed out that those in charge of running the war consider food just as important as munitions and that one high government official has made the statement that we can take just as many prisoners through judicious use of food as through force of arms. Mr. Groggins said there would be sufficient insecticides for commercial crops and home gardens. His remarks relative to the supply of insecticide and fungicide raw materials for 1943 and 1944 were based on the two Department of Agriculture reports that are briefed on page 71 of this issue of *Chemical Industries*. He emphasized that although we are getting about as much pyrethrum into the country this year as in 1941, most of it is being taken by the armed forces and lend-lease. Because the United States has neither the type of territory nor labor required to grow pyrethrum, the Department of Agriculture is working to develop increased production elsewhere, such as South America, and it is expected that the effects of some of the new growing areas may be felt before the end of the war. As possibly an important factor in the household insecticide field in 1944, Mr. Groggins mentioned a new synthetic insecticide reported in British Patents 547,871 and 547,874. It has been produced here and tried out by the Department of Agriculture and is reported to have been used successfully by the Axis in North Africa.

There will be no pyrethrum for cattle sprays or fly sprays this year, according to Mr. Goldberg of WPB, and none for civilian use with the exception of public health work, which will be allocated about 5 per cent of that which comes into the country. OPA is working toward pricing of all insecticides by dollars and cents ceilings, C. G. Gran, head of the Agricultural Chemical Section of that agency, told the meeting.

Disinfectants

Plastics for direct war uses have taken much of the phenol, cresol and cresylic acid that would normally have been available for disinfectants, with the result that disinfectant manufacturers have had to turn elsewhere to supplement these raw materials. Some of the newer synthetic phenols, because of their extremely high germicidal value, are now being used to extend the supply of disinfectants, according to Jack C. Varley, vice-president of Baird-McGuire, Inc. Greater use of readily available pine oil disinfectants was suggested by Friar Thompson of Hercules Powder Co. Government specifications and other aspects of disinfectants were discussed by Dr. E. G. Klarmann, Lehn & Fink Products Corp., and Dr. G. F. Reddish, Lambert Pharmacal Co.

A symposium on insecticide problems included talks by Dr. A. E. Badertscher, McCormick & Co.; J. J. T. Graham, U. S. Department of Agriculture; Friar Thompson; Harold Noble, S. B. Penick & Co.; and John Powell, John Powell & Co.

W. J. Zick, Stanco, Inc., introduced J. D. Conner, new Washington representative of N.A.I.D.M., who reviewed the Washington situation. H. W. Hamilton, Koppers Co., N.A.I.D.M. secretary, reported that the Association's official test insecticide has been sent to all parts of the world.

A Directory of

SYNTHETIC RUBBERS

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COMMERCIAL production of synthetic rubber in the United States became a reality in 1931 when E. I. du Pont de Nemours, Inc., announced the manufacture of Duprene, a synthetic rubber made by polymerizing chloroprene. Duprene was later improved and reintroduced as neoprene. Since 1931 other synthetic rubbers and rubberlike materials have been announced and are now produced commercially or are in the pilot-plant stage in the United States. These include Thiokol, Buna S, Perbunan, Koroseal, Vistanex, Flamenol, Ameripol or Hycar, Chemigum, Butyl rubber, and Flexon. None of these is synthetic rubber in the strict chemical meaning of the word synthetic, as none is identical in chemical structure with natural rubber. However, all possess some of the physical properties of natural rubber, and in addition usually have some outstanding property not found in natural rubber that makes them superior for certain uses. Because of these superior qualities, a considerable demand had arisen for synthetic rubbers before the present emergency, although the price was several times that of natural rubber.

The purpose of this paper is to catalogue for quick reference general information taken from technical journals regarding the chemistry and physical properties of the synthetic rubbers produced commercially in the United States and other countries.

These rubbers are listed here according to their trade names, together with abstracts of general information regarding their structure, manufacture, and physical properties. There are, of course, other possible synthetic rubbers not yet made commercially such as piperylene rubber, which has been made in the laboratory. Rubberlike materials also have been made from such primary materials as soybean oil or lactic acid, but little information is available regarding their chemistry or manufacture. Commercial production of one such material, Agripol, has been announced recently, and its description is included in the abstracts below.

Systematic research doubtless will reveal many other materials that may be superior to and involve less complicated manufacturing procedure than those synthetic rubbers now known.

Condensed from Bureau of Mines Inf. Circ. 7242. May 1943.

Buna 85

Type: Polymerized butadiene.

Structure: $[-CH_2-CH=CH-CH_2-]_x$.

Manufacturer: I. G. Farbenindustrie, Germany.

Date announced (first available reference): 1935.

Present status of manufacture: In 1940, Buna 85 was listed as being made only on a small scale for use in making hard rubber.

Method of synthesis: Polymerization of butadiene in the presence of sodium metal.

Raw materials: Butadiene.

Source of raw materials: Coke and lime.

Method of vulcanizing: Same as natural rubber.

Method of processing: Soft, plastic, and easily workable on regular rubber machinery.

Summary of properties:

- Relatively low molecular weight.
- Lower than natural rubber in tensile strength and elasticity.
- Behaves like natural rubber in organic swelling agents.
- Abrasion resistance about the same as natural rubber.
- Electrical properties superior to natural rubber.
- Aging properties better than natural rubber.
- Heat resistance equal or superior to natural rubber.

Especially adapted to manufacture of hard rubber because of high thermal softening point and extraordinary chemical resistance of its hard-rubber vulcanizates, which, however, are more brittle than hard, natural rubber.

Buna 115

Type: Polymerized butadiene.

Structure: Same as Buna 85, except for higher molecular weight or degree of polymerization.

Manufacturer: I. G. Farbenindustrie, Germany.

Date announced (first available reference): 1935.

Present status of manufacture: In the 1940 article by Koch (see bibliography) relating to synthetic rubbers made by I. G. Farbenindustrie, Buna 115 is not listed.

Raw materials and source: Same as Buna 85.

Method of vulcanizing and compounding: Same as natural rubber; plastic and easily processed.

Discussion of properties: Properties of Buna 115 are generally similar to those of Buna 85, except that the difference in molecular weight alters them somewhat, as, for example, abrasion resistance is listed as slightly better than in natural rubber or Buna 85, although poorer than in Buna S or Buna N.

Buna S

Type: Copolymerized butadiene and styrene.

Structure: $[(-CH_2-CH=CH-CH_2)_x-CH_2-\underset{|}{C}HC_6H_5]_y$.

Manufacturer: I. G. Farbenindustrie, Germany. Standard Oil Co. of New Jersey, and other companies operating under Standard Oil Co. patent licenses and under the direction of the War Production Board.

Date announced (first available reference): 1935.

Method of synthesis: Copolymerization in aqueous emulsion.

Present status of manufacture: Buna S has been made in large quantities in Germany since 1936 as a general substitute for rubber, particularly in automobile tires. Standard Oil Co. and Firestone Tire & Rubber Co. already have been manufacturing it in the United States, although only 4,000 long tons of Buna types were made here in 1941. Under present plans it is now to be manufactured by a number of companies on a large scale for use in tires and as a general substitute for natural rubber. Under the present program an annual production of 705,000 tons is planned, and the Baruch Committee has recommended that this be increased to 845.000 tons.

Raw materials: Butadiene and styrene.

Source of raw materials: See Butadiene and Styrene.

Method of vulcanizing: Same as natural rubber.

Method of processing: Plasticized by carefully controlled hot-air treatment.

Discussion of properties and uses: In literature inspired by I. G. Farbenindustrie, it is stated that Buna S is by no means to be considered a mere substitute for natural rubber as it constitutes such an improvement in heat resistance and abrasion resistance, and it is claimed that automobile tires made of it show 35 percent better wear than natural-rubber tires.

In general, the properties of Buna S are very similar to those of natural rubber, and the swelling characteristics in gasoline and mineral oil are but little better than those of natural rubber. Water absorption is only 65 percent that of natural rubber, and aging qualities are considered superior. It is useful for coverings in the cable industry because of the last-named qualities.

Buna S is now made in larger quantities than any other synthetic rubber for use in automobile tires and general replacement for natural rubber.

Buna SS (formerly Levulkan)

Type: Copolymerized butadiene and styrene.

Structure: Same as Buna S, except that the proportion of styrene is greater.

Manufacturer: I. G. Farbenindustrie, Germany.

Date of first available reference: 1935.

Present status of manufacture: Buna SS is not mentioned in the April 1940 article by Koch but is mentioned in article of September 1940 by Gartner (see bibliography).

Method of synthesis: Same as Buna S.

Raw materials and source: Same as Buna S.

Method of processing and vulcanizing: Same as Buna S.

Discussion of properties: Buna SS differs from Buna S in the proportion of styrene used. Some data showing the effect of this difference on the properties applied particularly to the manufacture of hard rubber linings are given in the article by Gartner mentioned above. Buna SS is said to possess qualities that make it especially favorable as an insulation for cable.

Perbunan (formerly Buna N)

Type: Copolymerized butadiene and acrylonitrile.

Structure: [—(CH_2—CH=CH—CH_2)
                        |
—CH_2—CHC≡N—]$_y$.

Manufacturers: I. G. Farbenindustrie, Germany; Standard Oil Co. of New Jersey, Firestone Tire & Rubber Co., and other companies licensed by Standard.

Date announced: About 1935.

Date of first available reference: 1936.

Present status of manufacture: First made in Germany. Patent rights in America held by Standard Oil Co. of New Jersey. Present production figures not available.

Method of synthesis: Copolymerization of butadiene and acrylonitrile in aqueous emulsion.

Raw materials: Butadiene and acrylonitrile.

Source of raw materials: See Butadiene and Acrylonitrile.

Method of vulcanizing: Like natural rubber.

Method of processing: Perbunan cannot be plasticized like Buna S with hot air and does not break down completely on long mastication. Softeners are necessary to increase elasticity, tack, and assist in extruding. Addition of natural rubber, up to 20 percent, improves working qualities without noticeably changing swelling characteristics. Perbunan is much tougher and more difficult to process than natural rubber. It generates more heat in milling, is less thermoplastic, but has a tendency to harden at higher temperatures, and its plasticity is less pronounced during mastication than is natural rubber.

Discussion of physical properties: A primary property of Perbunan is its resistance to gasoline, petroleum, and aliphatic hydrocarbons. However, it is soluble in aromatic and chlorinated hydrocarbons such as benzol, toluol, solvent naphtha, di- and tri-chlorethylene, and in certain ketones.

Aging qualities and resistance to ozone are said to be superior to those of natural rubber, but elasticity, rebound, and electrical properties are poorer. Because of its poor electrical properties, Perbunan is not used as electrical insulation. In heat resistance and abrasion resistance it surpasses natural rubber and is less than half as permeable to air and gases. Hard compounds made from Perbunan have high softening points and superior solvent resistance. The specific gravity of Perbunan is 0.96, and the nitrogen content is about 7 percent. Like natural rubber, Perbunan will burn, but it can be made non-inflammable by adding suitable chlorine-containing materials.

Perbunan finds greatest use where its oil-resistant qualities are needed—oil-resistant packing rings, gaskets, printing rolls, gasoline hose, hose for spraying paint, cable covers, conveyor belts, and the like. Although Perbunan tread compounds are said to be equal or superior to the best rubber tread compounds, its use in tires is not of commercial importance, as other synthetics easier to process and fabricate are considered economically more suitable for that purpose.

Perbunan Extra

Type: Copolymerized butadiene and acrylonitrile.

Structure: Same as Perbunan, except that the acrylonitrile content is greater.

Manufacturers: I. G. Farbenindustrie, Germany; Standard Oil Co. of New Jersey, Firestone Tire and Rubber Co., and other companies licensed by Standard.

Date announced (first available reference): 1939.

Present status of manufacture: Patent rights in America held by Standard Oil Co. Present production figures not available.

Method of synthesis: Copolymerization of butadiene and acrylonitrile in aqueous emulsion.

Raw materials and source: Same as Perbunan.

Method of vulcanizing: Like natural rubber.

Method of processing: Perbunan and Perbunan Extra are both more difficult to mill, as described under Perbunan. However, Perbunan Extra is said to break down more readily and mill more easily than Perbunan.

Discussion of properties: Perbunan Extra is more resistant to oil than Perbunan because of the extra acrylonitrile. However, the general properties are like those of Perbunan, except that the vulcanizates are less elastic, and higher tensile values are obtained without carbon black. The specific gravity is 0.97, and the nitrogen content is 9 to 10 percent.

SKA and SKB (Russian Sodium Divinyl Rubber)

Type: Butadiene polymer.

Structure: [—CH_2—CH=CH—CH_2—]$_x$.

Manufacturer: Made in U. S. S. R.

Date announced: Manufacture of SK synthetic rubber using butadiene made from alcohol was begun in 1931.

Method of synthesis: Previous to 1935, polymerization of liquid butadiene was effected under pressure at 50° C. in enclosed vessels containing sodium-covered steel rods. A rodless method was introduced in 1935 in which the polymerization takes place in a gaseous instead of a liquid state.

Raw materials and source: Butadiene for the synthetic rubber SKA is obtained from petroleum, and for SKB from alcohol made from potatoes and other agricultural products. Because of Russian economic conditions, the principal production is from alcohol.

Present status of production: Production of more than 20,000 tons of SK synthetic rubber in 1935 was claimed, and a planned annual production of 90,000 tons by the end of 1937 was said to have been exceeded. An expanded program was included in the "third five-year plan," 1938 through 1942, but because of the war the results of this program have not been disclosed.

Discussion: The Russian sodium divinyl, or SK, synthetic rubber is similar in chemical structure to the German numbered Buna rubbers. The designations "A" and "B" refer to the source of the butadiene used for polymerization rather than to differences in the rubber produced.

SK rubber is made in several grades by varying the conditions of polymerization. Some grades are more easily processed than natural rubber. Mechanical properties of pure-gum stocks are developed, as with other synthetic rubbers, by compounding with fillers and vulcanization and compare favorably with Perbunan and Buna S. SK is not oil- or solvent-resistant but resists oxidation to a great extent. It is said to be lacking in building tack, although several successful methods of overcoming this have been developed. It finds considerable use in rubber footwear as well as in tires. When used in tires, it is said to give wear in actual road service only 15 percent less than similarly compounded tires of natural rubber.

Ker

Discussion: Ker is listed by Wood (see bibliography) as a butadiene polymer made by Stomil Co. in Poland.

Hycar O R (Ameripol)

Type: Butadiene copolymer.

Structure: Not announced. Said to be a copolymer of butadiene and acrylonitrile similar to Perbunan. Two distinct types made.

Manufacturer: Hydrocarbon Chemical & Research Co. (Hycar Chemical Co.), a firm owned jointly by Phillips Petroleum Co. and B. F. Goodrich Co.

Date announced: 1940.

Present status of manufacture: Pilot plant completed in 1939 with capacity of 100 pounds per day. A plant having a capacity of 2,000 long tons a year was constructed in 1940. Present production figures not available.

Raw materials and source: Butadiene is made from petroleum. See Butadiene. Source or nature of copolymer not announced.

Method of polymerization: Polymerized under pressure in emulsion with soap and water.

Method of vulcanization: Like natural rubber, except less sulfur and more accelerator required.

Method of processing and compounding: Hycar is tough and does not break down on a mill to the extent natural rubber does, and more softener is required. Pigments have the same relative effect as with rubber.

Discussion of properties: Two distinct types of butadiene copolymer synthetic rubber are said to be made by the Hycar Chemical Co., both of which are marketed under the trade name Ameripol. One is a rubber suitable for tire manufacture, and the other is a special oil-resistant rubber.

Properties of Ameripol, such as tensile strength and elasticity, are said to vary over a wide range according to the method of compounding. Maximum tensile strength is obtained with channel black loading. A tensile strength up to 4,000 pounds and 600 percent elongation may be obtained. Good heat and abrasion resistance are claimed, and superior resistance to mineral, animal, and vegetable oils and fats, to oxidizing effects of metallic soaps used as driers in paints and inks, to all petroleum products, and to benzene, alcohol, water, and carbon tetrachloride, although it is badly swollen by acetone. Its age resistance is superior to that of natural rubber, and its resistance to acids and alkalies is about the same. Elasticity, tear resistance, and rebound are lower than for similarly compounded natural rubber. Hardness may be varied over a wide range. It becomes stiffer than natural rubber at subfreezing temperatures but is reported to be still flexible at —50° C. Resistance to oxidation and decomposition when exposed to heat is said to be excellent, and it is less permeable to air and gases than is natural rubber.

Oil-resistant products made from it include gasoline hose, automobile and aeroplane parts, packing joints and valves, lining for bullet-proof gasoline tanks, printing rollers, and the like. Tires of Ameripol are said to be slightly superior to tires made of natural rubber compounds in abrasive resistance, and are far superior in the presence of oils and high temperatures.

The synthetic is used to produce a hard rubber compound, "Ebonar," which is said to have an outstanding advantage over hard natural rubber as a softening point 100° F. higher is obtainable.

Chemigum

Type: Butadiene copolymer.

Structure: Not announced, but said to be a copolymer of butadiene and acrylonitrile similar to Perbunan.

Manufacturer: Goodyear Tire & Rubber Co.

Date announced: 1940.

Present status of manufacture: When announced in 1940, it was stated that Chemigum had been developed and produced in laboratory and pilot plant for 3 years and that a new plant with an initial capacity of 10,000 pounds per day was being erected. No recent figures on its production are available.

Method of production: Not disclosed.

Raw materials and source: Said to be made of butadiene and acrylonitrile. As announced, Chemigum is derived from petroleum through a cracking process.

Method of vulcanization: Like natural rubber.

Method of processing: Said to process more easily than Buna on equipment and by methods used for natural rubber. Tends to be soft and plastic when warm. Mixes well with natural rubber.

Discussion of properties: Specific gravity, 1.06. A Buna-type synthetic rubber. In physical appearance it resembles the grade of rubber known as brown crepe. It has a distinctive, faintly aromatic odor, is tough, and is equal or superior to natural rubber in strength, aging resistance, and resistance to sunlight. It is much less soluble in conventional rubber solvents than natural rubber, and its oil resistance makes it suitable for use in gasoline hose and the like. Tires made of Chemigum are said to give performance equal to or exceeding natural rubber tires.

Neoprene (formerly Duprene)

Type: Polymerized chloroprene.

Structure: $[—CH_2—C\ Cl{=}CH—CH_2—]_x$.

Manufacturer: E. I. du Pont de Nemours & Co.

Date announced: 1931.

Present status of manufacture: 6,500 long tons produced in 1941. Annual production of 60,000 tons recommended by Baruch committee.

Method of synthesis: Made by polymerization of chloroprene in emulsion under carefully controlled conditions.

Raw materials: Chloroprene.

Method of vulcanizing and processing: Vulcanized by heat alone, but quality of vulcanized products is improved by the use of metallic oxides as vulcanization aids. Processed like natural rubber.

Discussion of properties and uses: The physical qualities of Neoprene may be modified over a wide range by the proper choice of pigments, accelerators, antioxidants, etc. As with rubber, it is usually necessary to sacrifice some properties to develop others.

Neoprene is made in several types. Neoprene type G is a new, improved, relatively odor-free type made by the polymerization of chloroprene in emulsion under carefully controlled conditions. The unvulcanized neoprene is a plastic with considerable elasticity, like unvulcanized rubber. It is thermoplastic and formed, like rubber, by calendering, extruding, and molding at high temperatures.

The vulcanized product is resistant to oils, and although virtually all animal, vegetable, or mineral oils cause it to swell somewhat, it usually retains its properties better than rubber. The pure product will not contaminate or alter the properties of solvents or refrigerants with which it comes in contact. However, the compounding ingredients in compounded products may, so it is advisable to manufacture the product according to service requirements. It is slightly less elastic than rubber but is more heat-resistant and resists sunlight better. Its loss of properties on freezing is greater than with rubber unless oil-soaked or specially compounded. Type FR was introduced recently and is said to be exceptionally immune to the effect of subzero temperatures.

The specific heat (0.52) of Neoprene is the same as that of rubber. It has approximately the same tensile strength as has similarly compounded rubber. The abrasion resistance of Neoprene tire treads is said to be about equal to that of the best rubber tire-tread compounds. Neoprene and rubber show about equal abrasion resistance when dry, but Neoprene is many times more resistant to abrasion after having been soaked in oil.

Neoprene is used for tank linings, reaction vessels, conveyor belts, gaskets, hose for oils, solvents, and gases such as chlorine, clothing for acid protection, laboratory tubing, and for similar purposes.

Sovprene

Type: Polymerized chloroprene.

Structure: Same as Neoprene.

Manufacturer: Made in U. S. S. R.

Discussion: In a discussion of the chemistry of Sovprene, in an article by Klebanskii and others translated from the Russian in Rubber Chemistry and Technology of July 1936, it is shown that Sovprene is a polymer of chloroprene. This chloroprene is made by adding hydrogen chloride to monovinylacetylene produced from a continuous polymerization of acetylene. It was stated that the successful production of Sovprene was reported in November 1932.

The writer was unable to find articles dealing with the physical properties of Sovprene. In reviews in which it is mentioned it is assumed to be generally like Neoprene.

Mustone

Type: Polymerized chloroprene.

Discussion: Mustone is listed by Wood (see bibliography) as a chloroprene polymer made by Umeno Institute in Japan. He refers to an article by W. J. S. Nauton, Synthetic Rubber, in Annual Report on Progress of Rubber Technology, vol. 1, 1937, p. 35; vol. 2, 1938, p. 31; and vol. 3, 1939, p. 39.

Methyl rubber

Type: Substituted butadiene polymer.

Structure: $[—CH_2—C\ CH_3{=}C\ CH_3—CH_2—]_x$.

Manufacturers: Bayer & Co., Germany (H and W); Badische Anilin und Soda Fabrik, Germany (B).

Period of Manufacture: Made in Germany during first World War, 1914-18; 2,350 tons produced.

Method of synthesis: Polymerization of 2,3 dimethylbutadiene conducted at room temperature to give methyl rubber H or at a higher temperature to give methyl rubber W.

Methyl rubber B was polymerized by means of metallic sodium in an atmosphere of carbon dioxide.

Present status of production: Production was discontinued at the close of the war (1918) because of the cost of the product (30 marks a kilogram).

Raw materials: 2,3 dimethylbutadiene.

Source of raw materials: Dimethylbutadiene was produced from acetone, which was made from calcium carbide.

Method of vulcanizing: Like natural rubber.

Method of processing and compounding: In general, methods of processing were similar to those used at the time with natural rubber, except that it was necessary to add swelling agents or elasticators to increase plasticity. At that time, however, modern methods of compounding natural rubber with carbon black and the like were not known.

Discussion of properties and uses: Methyl rubber H was insoluble in rubber solvents and was used chiefly in the manufacture of hard rubber for accumulator boxes, battery separators, magneto disks, and the like. It had low plasticity and poor adhesive qualities and was not easily milled, although it was used also for insulating wire, and by the spring of 1918 was used in manufacturing tires to some extent. Its use in tires was somewhat unsatisfactory as it was hard and inelastic at ordinary temperatures, and flattened under pressure in cold weather, so that it was necessary to jack trucks equipped with tires made of it. Wear on methyl-rubber tires was found to be different from that on natural-rubber tires, in that pieces of them were ripped or broken off.

Methyl rubber B was more suitable for wire insulation than either H or W, and was more easily milled than H but did not give stronger vulcanized products. W was soluble in rubber solvents and was used successfully in high-pressure packing, in other rubber-asbestos goods, in balloon fabric, and as insulation for submarine cables and ordinary wire.

As mentioned above, failure of methyl rubber as a substitute for natural rubber is attributed to lack of understanding of compounding as much as to the character of the rubber itself.

Vistanex

Type: Polymerized isobutylene.

Structure: $[—CH_2—C(CH_3)_2—]_x$.

Manufacturer: Standard Oil Co. of N. J.; Advance Solvents & Chemical Corporation.

Date announced: 1937.

Present status of manufacture: Data not available.

Method of synthesis: Isobutylene polymerized at low temperatures with catalysts of an acidic nature, such as titanium tetrachloride, boron fluoride, and aluminum chloride.

Raw materials and source: Isobutylene from cracking of petroleum.

Method of vulcanizing: Cannot be vulcanized.

Discussion of properties and uses: Vistanex (and Oppanol) possesses unique qualities owing to its lack of unsaturation. It exhibits extreme resistance to ozone, acids, alkalies, and corrosive salts and has excellent aging properties, especially at high temperatures. Its water-absorption and vapor-permeability properties are extremely low. It is resistant to most vegetable and animal fats, oils, and greases, and is insoluble in alcohols, esters, ketones, and most organic solvents containing oxygen; but it is soluble in petroleum and coal-tar solvents and in some chlorinated solvents. It has excellent electrical properties. It is less thermoplastic, and the degradation or breakdown by mechanical milling or mixing is less than for natural rubber.

Vistanex is used in the manufacture of cable sheathing, acid-resistant linings, electrical insulation, adhesives, artificial leather, and the like. It may be compounded with natural rubber in certain proportions to give a curable product useful in steam hose, conveyor-belt covers, cable coverings, and other products resistant to aging or chemical action.

Isobutylene polymers are made in a wide range of molecular weights for use in oils and greases for increasing viscosity.

Oppanol

Type: Polymerized isobutylene.

Structure: Same as Vistanex.

Manufacturer: I. G. Farbenindustrie, Germany.

Date announced: 1937.

Discussion: Oppanol was developed by I. G. Farbenindustrie in cooperation with Standard Oil Co. of N. J. and is the same as Vistanex, which is made in the United States. For properties, uses, and discussion, see Vistanex.

Butyl Rubber

Type: Copolymer of a butene and a diolefin.

Structure: $[[—CH_2—C(CH_3)_2—]_x—CH_2—CH{=}CH—CH_2—]_y$.

Manufacturer: Standard Oil Co. of New Jersey.

Date announced: 1940.

Method of synthesis: Produced by low-temperature copolymerization of isobutylene and a small amount of butadiene or other diolefin.

Present status of production: Annual production of 132,000 tons is planned under the present program of the War Production Board.

Raw materials: Isobutylene and butadiene or isoprene.

Source of raw materials: Isobutylene procured from petroleum by cracking. See also Butadiene. Isoprene from petroleum or turpentine.

Method of vulcanizing: Like natural rubber. Chemical unsaturation just sufficient for vulcanization.

Method of processing and compounding: May be processed like natural rubber on conventional rubber machinery. No breakdown period is necessary. Its curing temperature is above 300° F.

Discussion of properties and uses: Butyl rubber is outstanding in that it possesses only 1 or 2 percent of the available unsaturation of natural rubber, which is just enough for vulcanization. This lack of unsaturation gives butyl rubber unusual properties in aging resistance and in stability in the presence of ozone. It swells like natural rubber in petroleum and coal-tar solvents but does not swell in most vegetable and animal fats and oils. It is resistant to acids, including sulfuric and nitric, has low water absorption, high heat resistance, and excellent flex resistance, and is highly impermeable to air and gases such as hydrogen, helium, and carbon dioxide. Its rebound is low at room temperature but high at high temperatures. The general range of molecular weight is between 40,000 and 80,000, and the specific gravity is 0.91. It is colorless, odorless, and tasteless. Electric properties are said to be such as to make it outstanding for cable insulation.

Butyl rubber is said to be satisfactory for inner tubes, as it holds air longer than does natural rubber and is considered superior to certain other synthetic rubbers for this purpose, although some difficulties have been experienced. So far, automobile tires made of butyl rubber have shown a life about 50 percent as long as that of natural-rubber tires if used at a speed under 40 miles an hour. Besides its use in tires and tubes, it is recommended for use in fire and steam hose, molded goods, proofed goods, tank linings, conveyor belts, and in general replacement of natural rubber.

Flexon

Type: Copolymer of a butene and a diolefin.

Structure: Similar to butyl rubber.

Manufacturer: Standard Oil Co. of New Jersey.

Date announced: 1942.

Method of synthesis: Produced by copolymerization of isobutylene and butadiene or other diolefin using dry ice in an open vessel.

Present status of production: Still in the experimental stage.

Raw materials and source: Same as butyl rubber.

Method of vulcanizing and processing: Same as butyl rubber.

Discussion of properties: Flexon is an inferior grade of butyl rubber produced at the temperature of dry ice. In producing butyl rubber, a temperature of —153° F. is used, whereas Flexon is made at a temperature of —103° F. Results are said to be not too satisfactory as yet, owing to a lack of uniformity in the product, but it is offered as a rubber producible by a quick method, which may be suitable for retreads.

Thiokol

Type: Organic polysulfide.

Structure: $(-R-\underset{\underset{S}{\|}}{S}-\underset{\underset{S}{\|}}{S}-)_x$, where R is an organic radical such as $(-CH_2-CH_2-)$ or $(-CH_2-CH_2-O-CH_2-CH_2-)$, depending on aliphatic dihalide used.

Manufacturer: Thiokol Corporation, Yardville, N. J. (Dow Chemical Co.)

Date announced: 1932.

Date first available references: 1932.

Patent: U. S. 1854423, April 19, 1932, Patrick.

Present status of manufacture: Made in several grades and types. Annual production of 24,000 tons under present program; 60,000 tons recommended by Baruch committee.

Method of synthesis: Reaction between organic dihalide and alkali polysulfide.

Raw materials: Dependent on type. Ethylene dichloride and sodium tetrasulfide give Thiokol A; dichloroethyl ether and sodium tetrasulfide give Thiokol B.

Source of raw material: The organic compounds, which may be obtained from petroleum products, are chlorinated by chlorine obtained from salt. The sulfides are made from sulfur and alkali.

Method of processing and vulcanizing: Processed on regular rubber machinery by special methods. Lacks tack and adaptability. Is frequently mixed with natural rubber. Reinforcing pigments and modifying agents are added, as with natural rubber. Vulcanizes with metallic oxides, sulfur being used as an accelerator.

Discussion of properties, types, and uses: Thiokol has been made in several types and from several primary materials. A variety of products, some of which are rubberlike and some of which are not, can be made by varying the kind of polysulfide and hydrocarbon. Some of the products are used in the plastic industry and some as a rubber substitute. The rubberlike types are soft and plastic and can be worked on a rubber mill and reinforced and modified by the addition of compounding agents just as with natural rubber. They are particularly resistant to organic solvents. The ethylene polysulfides are virtually inert to all organic solvents, including benzol, toluol, xylol, carbon tetrachloride, lacquers and lacquer thinners, acetone, water, salt solutions, dilute phenol, sulfuric acid, hydrochloric acid, and acetic acid, whereas other types are resistant to petroleum but swell to varying degrees in certain chlorinated and aromatic hydrocarbons. They are not recommended for use with strong nitric or chromic acid nor for caustic soda or ammonia. They show excellent resistance to ozone, oxygen, and sunlight, but are low in tensile strength, heat resistance, and abrasion resistance. They burn slowly and have relatively poor electrical properties, but good enough for low-voltage insulation. They are not recommended for use at extreme temperatures, as they harden at subzero temperatures and are subject to plastic flow at temperatures slightly above atmospheric. They are nontoxic but possess a disagreeable odor. They are highly impermeable and are apparently the most resistant of any of the synthetic rubbers to gasoline, benzene, and oil.

Thiokol A, the first to be manufactured, is a reaction product of ethylene dichloride and sodium tetrasulfide. It is insoluble in all organic solvents, and does not swell to any extent even in the most acid solvents, but is attacked by strong oxidizing agents and alkalies. It is highly impermeable to liquids and gases. In general, the rubberlike properties do not equal natural rubber. Thiokol A is unaffected by ozone, sunlight, weathering, or natural aging, but hardens at low temperatures and is not recommended above 160° F. Its greatest use in the cable industry is as a noninsulating flexible jacket that offers protection nearly equal to lead. It is also used on cables in contact with oil or solvents, on underground cables exposed to moisture and corrosion, and to replace lead where vibration is severe, as on bridges. It is also used in the preparation of sulfur-sand acid-resisting cement and for certain special jobs, such as mouldings, where extreme resistance to solvents is necessary.

Type D, made from a different hydrocarbon, is similar to A but has higher physical properties and abrasion resistance, lower moisture resistance, less odor, and can be used over a wider range of temperatures (—40° to 212° F.).

The latter type, F (and FA), is more rubberlike than its predecessors and combines the qualities of both A and D, is resistant to petroleum and other solvents, has a tensile strength up to 1,500 pounds per square inch, high resilience, and abrasion resistance two thirds that of natural rubber.

Thiokol is not suitable for tire treads, although a new type (N) is said to be suitable for recapping tires. In general, Thiokol may be used where high resilience, tensile strength, and resistance to heat are not important, but where good aging characteristics, resistance to ozone and solvents, and flexibility are required. It is used in the automotive industry for coating paper gaskets, where it flows under heat and pressure into tool marks and imperfections to make a perfect oil seal. It is used, also, in the manufacture of gasoline and paint-spray hose, printers' blankets, rubber printing plates, and cable coverings.

Thiokol R D

Type: Not announced. Not a polysulfide rubber.

Structure: Not given.

Manufacturer: Thiokol Corporation, Trenton, N. J.

Date announced: 1942.

Date first available article: 1942.

Present status of manufacture: Not stated.

Raw materials: Not listed.

Method of vulcanizing: Much like natural rubber. Sulfur acts as a vulcanizing agent. Does not cure to the hard-rubber state with sulfur.

Processing: Much like natural rubber. Plasticized through use of a plasticizer. Shows wide variation of properties according to method of compounding.

Discussion of properties: In the only article available on Thiokol R D, the following properties are listed:

In the raw state it is a tough, resilient, amber-colored, solid.

Sp. gr., 1.03.

Odor mild and not objectionable.

Excellent resistance to gasoline, oil, and other solvents. Does not have all solvent-resistant properties of Thiokol FA.

High tensile strength, up to 3,000 pounds per square inch.

Good abrasion resistance, comparable to natural rubber.

Low compression set.

Elongation at break, 400 percent.

Good resistance to flex cracking.

Low permeability to air and gases.

Good aging characteristics.

Ethanite

Type: Organic polysulfide.

Structure: See Thiokol.

Date of first reference: 1934.

Manufacturer: Belgian Cracking Co., Belgium.

Method of synthesis: Polymerization of ethylene dichloride in the presence of a sodium polysulfide solution.

Source of raw materials: Olefins in cracked gas are chlorinated to produce ethylene dichloride.

Discussion of properties: Apparently like Thiokol.

Perduren

Type: Organic polysulfide.

Structure: See Thiokol.

Date of first available reference: 1937.

Manufacturer: I. G. Farbenindustrie, Germany.

Method of synthesis: Reaction product of dichloroethyl ether or di (chloroethyl) formaldehyde acetal with sodium tetrasulfide.

Source of raw material: No reference.

Methods of processing: Like Thiokol. Sometimes mixed with Perbunan.

Discussion of properties: From scant available references it appears that the types of Perduren have properties in common with the American-made Thiokols.

Thionite and Thionoc

Type: Organic polysulfide.

Discussion: The only available reference to Thionite was the paper by Wood (see bibliography), which listed an article not available to the writer. Wood states that Thionite is a Japanese product obtained from the reaction of ethylene diglycoside with sodium tetrasulfide. Thionoc A is referred to in the abstract of a Japanese article as a polysulfide rubber, presumably made in Japan.

Vulcaplas

Type: Organic polysulfide.

Structure: See Thiokol.

Date of first available reference: 1940 (refers to British patent 453,850, issued Sept. 18, 1936.)

Manufacturer: Imperial Chemical Industries, England. No references available as to status of manufacture.

Method of synthesis: Reaction product of glycerol dichloro- (or dibromo-) hydrin with ammonium or alkali di- or polysulfide.

Source of raw materials: No reference.

Methods of processing and vulcanizing: Like Thiokol.

Discussion of properties: Very few references were found dealing with Vulcaplas by name. However, such references as are available indicate that the properties of Vulcaplas are common with Thiokols and include complete immunity to swelling in rubber solvents, lower tensile strength and less rubberlike character than other synthetic rubbers, strong objectionable odor, and cold flow or thermoplasticity.

Koroseal and Korogel

Type: Plasticized polymerized vinyl chloride.

Structure: $[-CH\ Cl-CH_2-]_x$.

Manufacturer: B. F. Goodrich Co.

Date announced: 1935.

Raw materials: Vinyl chloride and plasticizer.

Method of vulcanizing: Not vulcanizable.

Method of processing: Plasticized with any of a number of plasticizers according to qualities desired. Processed on standard rubber processing equipment. May be milled, molded, extruded, calendered, or coated on fabric or paper, and solutions may be applied by spreading, dipping, or printing.

Discussion of properties and uses: The term "Koroseal" is said to refer to a broad class of compositions having properties varying from those of hard rubber to those of a jellied cement. Korogel is highly plasticized Koroseal, and Korolac is a solution of Koroseal in specially selected solvents.

The physical and chemical properties of Koroseal may be varied over a wide range by the choice of plasticizer. With proper plasticizer it can be made transparent. The tensile strength is varied from 1,000 to 9,000 pounds per square inch; elongation may be varied from 2 to 500 percent; flexing life, if used alone, is ten times that of natural rubber; tearing strength is equal to or slightly exceeds that of the best rubber compounds; and at atmospheric temperature resistance to abrasion is better than that of rubber. However, Koroseal is unsuitable for the manufacture of automobile tires, as it undergoes plastic flow at high temperatures. Its impact strength and volume compressibility are similar to those of natural rubber, and compression set is in general greater than that of rubber.

The harder types of Koroseal are resistant to virtually all materials except organic compounds containing the nitro or chlorine groups, aliphatic or aromatic ketones, aromatic amino compounds, lacquer solvents, or acetic anhydride. In addition, the plasticizer of the softer grades may be partly extracted by certain oils, gasoline, or benzene. Koroseal is resistant to corrosive chemicals, acids, alkalies, and water; it is not affected by sunlight, aging, oxygen, or ozone, and is very superior to rubber in resistance to gas diffusion. It can be made odorless, is tasteless, and nontoxic with proper choice of plasticizer.

Koroseal is used in the manufacture of process equipment for chemical and allied industries, in pipe-line coating materials, balloon cloth, chemical tubing, vacuum and gas materials, electrical insulation, protective paints, belting, gaskets and packing, clothing and waterproof cloth such as wraps and shower curtains, upholstery, and for special uses in the cable and textile industries.

Korogel, a highly plasticized form of Koroseal, is especially useful as a matrix material for plaster of Paris, portland cement, and ceramics molding.

Flamenol

Type: Plasticized polymerized vinyl chloride.
Structure: [—CH Cl—CH_2—]$_x$.
Manufacturer: General Electric Co.
Date of first reference: 1937.
Discussion: Flamenol is described as a synthetic compound resembling rubber, which serves both as an insulation and a finish for wire and cable. Its properties are said to include high dielectric strength, toughness, strength, stability in sunlight and oxygen, stability to ozone and oxidizing chemicals and to oils, solvents, acids, and alkalies, and resistance to flame and moisture.

Agripol

Type: A chemurgic product made from soybean oil. Insufficient information available for classification.
Manufacturer: Reichhold Chemicals, Inc., Detroit, Mich.
Date announced: November 30, 1942.
Present status of manufacture: 125 tons a month, to be increased to 1,000 tons a month by February 1943. Contemplated annual production of 25,000 tons in 1943.
Method of synthesis: Polymerization of fatty acids and ethylene glycol.
Raw materials and source: Fatty acids extracted from soybean oil. Ethylene glycol made by dehydration of ethyl alcohol.
Method of vulcanizing: About the same as for natural rubber.
Method of processing: Can be worked and formed in existing rubber equipment and compounded with customary fillers used with natural rubber.
Discussion: Agripol was announced late in 1942 as being a product inferior to natural rubber in tensile strength and resistance to severe abrasion. Hence, it is not claimed to be suitable for tires but is expected to prove useful in the field of static rubber, where tensile strength and elongation are not essential. It is said to be equivalent to natural rubber in flexibility at low temperatures and superior to natural rubber in aging and resistance to oxidation. Suggested uses for Agripol are in gaskets for food containers, industrial gaskets, belting, insulating mats, hose linings, and the like, as well as in numerous gadgets and parts for military supplies and equipment.

Raw Materials For Synthetic Rubber

Crude synthetic rubber is produced in two steps—first, the raw material for polymerization, and second, the actual polymerization operation. The principal raw materials for polymerization, in the case of butadiene polymers and copolymers, consist of butadiene, styrene, and acrylonitrile. The unpolymerized unit of Neoprene and Sovprene is chloroprene or 2-chloro-1, 3-butadiene; of methyl rubber is dimethylbutadiene, and of natural rubber the unpolymerized unit is isoprene. The butene polymers, Vistanex and Oppanol, require isobutylene for manufacture, whereas the copolymers, Butyl rubber and Flexon, require isobutylene, together with a diolefin such as butadiene or isoprene. The organic polysulfides are reaction products between an alkali polysulfide and an organic dihalide, whereas the plasticized vinyl chloride polymers require vinyl chloride and a plasticizing agent such as tricresyl phosphate.

Butadiene ($H_2C{=}CH{-}CH{=}CH_2$)

Butadiene is the most important of the raw materials for synthetic rubber under the present production program. It may be made by many methods from a number of basic materials. A series of articles by Egloff and Hulla, presenting a complete summary of known butadiene sources, appeared in the Oil and Gas Journal of November 5, 1942 and subsequent issues. The present commercial sources of butadiene are petroleum and petroleum gases, coal or coke and limestone, ethyl alcohol, and butylene glycol made by special fermentation of grain.

Butadiene from petroleum or petroleum products or gases may be obtained in several ways, among which are the following:

1. Thermal cracking of petroleum fractions at a high temperature.
2. Direct catalytic dehydrogenation of normal butane or of butanes and butenes produced by cracking.
3. From acetylene formed by pyrolysis of natural gas.
4. From alcohol manufactured from ethylene obtained as a byproduct in cracking petroleum or by dehydrogenation of ethane.

In Germany, butadiene is made from coke and limestone in the following steps: Coke and lime → calcium carbide → acetylene → acetaldehyde → aldol → butylene glycol → butadiene. Butadiene may also be made from acetylene by conversion to vinylacetylene and hydrogenation to butadiene.

Butadiene production from grain or vegetable products involves preliminary fermentation to obtain alcohol, which is converted to butadiene in one of several ways involving dehydration and dehydrogenation. In Russia, this is accomplished in one step by use of a special catalyst, whereas the process used in the United States has two steps and that used by the Germans has four steps.

Butadiene can also be made from grain by a special fermentation process that produces butylene glycol, which is dehydrated to give butadiene.

Styrene ($C_6H_5CH{=}CH_2$)

Styrene has been manufactured for some time for use in the plastics industry; hence, the principles involved in its production are well known. The most common method consists of catalytically dehydrogenating ethyl benzene produced from benzene and ethylene or ethyl alcohol. Styrene may also be produced by high-temperature cracking of petroleum, but subsequent separation is difficult.

Acrylonitrile ($H_2C{=}CHC{\equiv}N$)

Acrylonitrile is made by treating ethylene with hypochlorous acid to give ethylene chlorohydrin, which reacts with sodium cyanide to give hydracrylic nitrile, from which acrylonitrile is obtained by dehydration.

Chloroprene ($H_2C{=}CH{-}CCl{=}CH_2$)

Calcium carbide, made from lime and coke in a high-temperature electric furnace, gives acetylene when treated with water. Vinylacetylene, formed by polymerization of two molecules of acetylene, is treated with hydrochloric acid to give chloroprene.

Isoprene ($H_2C{=}CH{-}C(CH_3){=}CH_2$)

Except for possible use in Butyl rubber as the diolefin to furnish the required unsaturation, production of isoprene has at present no significance in the synthetic-rubber industry.

Isoprene is a product of destructive distillation of natural rubber, and is also formed synthetically in small amounts in petroleum cracking. Processes have been developed that use coal tar, starch, turpentine, calcium carbide, or petroleum products as starting materials.

Dimethylbutadiene ($H_2C{=}C(CH_3){-}C(CH_3){=}CH_2$)

Dimethylbutadiene is the basic material for methyl rubber and is now of historic interest only. It was made by the Germans during World War I from acetone obtained from calcium carbide.

Isobutylene ($H_2C{=}C(CH_3){-}CH_3$)

Isobutylene is the principal ingredient in the manufacture of Butyl rubber and also is an important material in the manufacture of high-octane gasoline. This hydrocarbon is present in large quantities in gases from refinery cracking operations, and it may be made by dehydrogenation of isobutane, which is obtained from natural gases or from isomerization of normal butane.

Alkali Polysulfides and Organic Dihalides

The alkali polysulfides used in Thiokol and the like are made from sulfur and alkali. The organic dihalides are made by halogenation of organic products usually obtained from petroleum. For example, ethylene dichloride is made by chlorination of the olefin from cracked gas with chlorine obtained from salt.

Vinyl chloride ($H_2C{=}CHCl$)

Vinyl chloride is produced commercially by any of three methods—(1) catalytic combination of acetylene and hydrogen chloride (2) chlorination of ethylene to ethylene dichloride and partial dehydrohalogenation by treatment with alcoholic caustic, or (3) by vapor-cracking ethylene dichloride.

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A Forecast of Insecticide and Fungicide Raw Material Supplies For 1943 and 1944

Increased use of alternates and extenders should make it possible to fill military and essential civilian needs, says the Food Production Administration. Here, based on two reports recently issued by the Administration, is the outlook for the next eighteen months on some specific raw materials.

THERE are adequate facilities in the United States to produce all the insecticides and fungicides we need. The big problem is raw materials. The chemicals going into the production of insecticides and fungicides are also needed in other phases of the war effort, some of which are extremely vital, with the result that a good many of these raw materials are now under strict allocation.

We will not have enough of certain preferred insecticides this year, such as rotenone and pyrethrum, to meet all demands, but through the appropriate use of extenders and substitutes, we should be able to protect crops from serious insect infestation.

The supply situation in 1944 will in all probability be at least as good as in 1943. There will be slight changes in the available quantities of materials depending on the vicissitudes of war and availability of shipping.

Briefly, the outlook for some of the more important chemical raw materials is as follows:

Rotenone—Before our entry into the war about 60 per cent of the supply of rotenone roots came from the East Indies. Immediately after Pearl Harbor, trade agreements were negotiated with Peru and Brazil to encourage the production, collection and exportation to us of rotenone-bearing roots such as timbo, cube and barbasco. As a result of these agreements we have witnessed a steady flow of material from the other Americas but the supply has been inadequate. In 1941 we used about 8,500,000 pounds of rotenone roots. In 1942, restricted by Conservation Order M-133, we used about 6,500,000 pounds.

This year it is estimated that close to 3,500,000 pounds will be distributed to meet the requirements of the crops and uses set forth in amended M-133. Present indications point to an available supply of 4 to 5,000,000 pounds during 1944. The improved outlook is largely the result of work being done by the Commodity Credit Corporation in purchasing and importing all available materials.

Pyrethrum—This material also comes from distant sources, particularly from Kenya Colony, Africa. Supplies have not fallen off appreciably, but the War Department has drastically increased its requirements for the Armed Forces. Pyrethrum is indispensable to our soldiers in controlling malaria and typhus.

There are ample grinding and processing facilities for all of the pyrethrum that can be imported. Inasmuch as we have to share our total production with the United Kingdom, it is unlikely that the pyrethrum available for the United States in 1944 will exceed the quantity available in 1943. Although we may anticipate the importation of from 13 to 15 million pounds, the Armed Forces will requisition from 9 to 10 million pounds. This leaves a relatively small amount for agricultural and essential civilian uses.

Nicotine Sulfate—Our supplies of nicotine insecticides are ample. The De-

Synthetics are playing an important role in stretching limited supplies of natural insecticides such as pyrethrum and rotenone. One of these is Lethane, here undergoing a test for sticking qualities in Rohm & Haas' "rain maker."

partment of Agriculture during the fiscal year 1941-43, arranged for the production of about 1,800,000 pounds of nicotine sulfate through a tobacco diversion program. This, added to the quantity ordinarily obtained from tobacco waste, will result in an overall production of close to 4 million pounds of nicotine sulfate this year.

Nicotine sulfate is a satisfactory partial substitute for pyrethrum and rotenone. It is reported that nicotine compounds will be used in conjunction with other economic poisons in the manufacture of mixed dusts which may find wide acceptance for home gardens.

Organic Thiocyanates—Certain organic thiocyanates have come into general use in sprays of the household and cattle spray type where they are used alone or to extend or increase the toxicity of pyrethrum or rotenone. They have also been used to combat insect pests of vegetable crops. Within the last 2 or 3 years tests have been made to determine their value in increasing the toxicity of pyrethrum or rotenone dusts in the control of certain insects, principally the pea aphid, cabbage worm and Mexican bean beetle. The evidence as to the value of adding organic thiocyanates to dusts is conflicting, some investigators obtaining increased toxicity while others indicate no increase in toxicity of the mixed dusts, but rather a definite loss of toxicity in mixtures prepared for several months. They have also obtained injury to some plants from the thiocyanate-rotenone dust mixtures. Unquestionably, there will be a tremendous increase in the production and use of organic thiocyanates to control insects.

Arsenic—The supply of arsenicals will be limited by the amount of arsenic that can be made available. Every effort is being made to (1) bring in marginal production, (2) utilize wastes, and (3) import crude material. It is believed that the supply of arsenicals for insecticides will be at least as great as any previous year despite the requirements of the Chemical Warfare Service. In order to provide the necessary insurance, the sale of arsenical insecticides for use on lawns, trees and ornaments is being controlled so that enough will be available for the control of insects on foods and fibers.

The supply of calcium arsenate will be the greatest ever. Although it is ordinarily difficult to predict the demand for this insecticide, it is reasonably certain that increased cotton acreage, coupled with the requirements of crop insurance, will make the demand heavy.

It is believed that existing facilities are capable of producing 100 million pounds of calcium arsenate plus 75 million pounds of lead arsenate. It is unlikely that we shall need such quantities to protect our crops. It is also extremely unlikely that we will have more arsenic than will permit the production of 100 million pounds of calcium arsenate and 65 million pounds of lead arsenate. It is expected that 90 million pounds of calcium arsenate and 62 million pounds of lead arsenate will be produced this year and also in 1944. These quantities should take care of all essential needs.

Cryolite—Cryolite has been used extensively in the past for the control of the sugar cane borer, the tomato pin worm, the lima bean pod borer, and for the control of caterpillars on lima beans and snap beans. It is also used as a partial substitute for rotenone on a number of crops.

During 1942 we produced and used approximately 6 million pounds of agricultural quality cryolite. This year we have witnessed an expansion of facilities which will result in the output of 15 million pounds of cryolite. It is unlikely that 1944 will witness any further increase because American agriculture has not yet learned how to use the quantity that will be produced this year.

Barium Fluosilicate—The supply of barium fluosilicate for insecticides and sodium fluosilicate for poison bait will be greater than ever. Facilities are available for any demand in 1943 or any increase in demand for 1944. This favorable situation is the result of steps taken to recover these fluosilicates during the course of the production of superphosphate.

Copper Sulfate—The capacity of the copper sulfate industry is in excess of 200 million pounds. It is unlikely that the war agencies will approve of any increase in such facilities. Agriculture consumes about 80 million pounds but has requested 100 million pounds for 1943 and will make a similar request for 1944. The requirements of the Armed Forces, industry and essential civilian uses aggregate 75 million pounds, thus indicating that our production facilities are ample.

Sulfur—The supply of dusting quality sulfur is ample to take care of all demands. There is a plentiful supply of raw material and the facilities for producing the desired types appear adequate.

Petroleum Derivatives — Notwithstanding the tremendous demand of the Armed Forces for petroleum derivatives, it has been possible this year to obtain all needed petroleum fractions which are used in the manufacture of spray materials. It appears probable that the favorable situation will continue. In 1943 we will be confronted with a tight situation on petroleum sulfonates which are employed in the manufacture of certain oil soluble sprays. The War Department needs these sulfonates for incorporation into lubricating oils of all kinds, particularly in airplanes and Diesel engines. However, plans are underway for a moderate expansion in the production of petroleum sulfonates and it appears that in 1944 there should be a supply of off-grade material which is entirely satisfactory for insecticide use.

Copper Fungicides—Copper fungicides should be available in quantities to meet the genuine needs of both commercial crops and home gardens. Copper is one of our most important strategic materials and allocations for the production of fungicides are made only after agriculture's requirements are carefully scrutinized. It is to be emphasized, therefore, that although the supply of copper compounds will be the largest in history, every effort must be made to conserve supplies.

Distribution Problems

With respect to a number of insecticides, detailed production schedules for each plant have been worked out so as to insure adequate supplies of each of certain types of insecticides. Furthermore, plans for distribution are based on maintaining considerable flexibility in order to meet critical insect infestations wherever they may occur. In the case of calcium arsenate about 50% of anticipated requirements is being delivered in advance of season according to the usual pattern of distribution; 25% is being held by producers in their own warehouses; and the final 25% which represents projected current production will be delivered in accordance with needs as reported by field representatives of the Bureau of Entomology and Plant Quarantine in order to provide maximum protection for the cotton crop.

A problem which is giving the Department of Agriculture some concern is the distribution of rotenone and pyrethrum to those areas where they are needed and permitted in accordance with existing conservation orders. A substantial part of available supplies may be located in areas where restricted crops are grown and it will be necessary for the transfer of such supplies to the areas where permitted crops are grown. These problems are complicated because of advance purchases for use on crops which recently have been considered as less essential and are not included in the list of permitted crops. Finally, there is the difficulty in arranging for a nationwide transfer of materials in accordance with provisions of maximum price regulations.

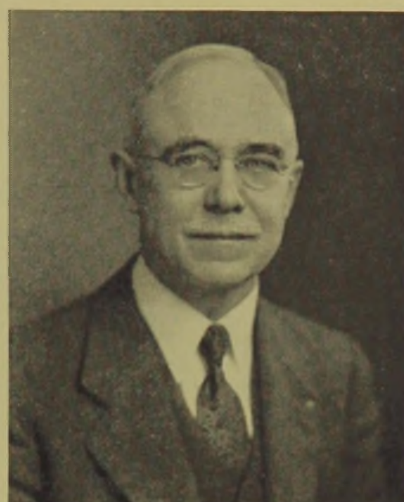
Thus far, however, because of elaborate and detailed plans made by FPA, war offices and industry, farmers have been able to get the necessary chemicals to protect their crops, according to the Agriculture Department.

Headliners in the News

Frank H. Shaw, president of Shaw Insulator Company, was recently honored with the John Wesley Hyatt Award for 1942 for outstanding achievement in the plastics industry.

Francis C. Frary, director of research of the Aluminum Company of America, has been appointed honorary chairman of A.C.S. convention to be held in Pittsburgh, Sept. 6 to 10.

Dr. John J. Grebe, Director, Physical Research Laboratory, Dow Chemical Co., Midland, Michigan, has been elected to receive the Chemical Industry Medal for 1943.



Dean Harvey, Materials Engineer, Westinghouse Electric and Mfg. Co., new president of the American Society for Testing Materials for term of one year.

J. R. Townsend, Materials Standards Engineer, Bell Telephone Laboratories, Inc., has been elected vice-president of A.S.T.M. for term of two years.

Julian M. Avery has been elected vice-president in charge of research and development of Diamond Alkali Co. Mr. Avery has been director of the research and development laboratory at Diamond's main plant in Painesville, Ohio.

Dr. A. E. Sherndal, plant superintendent of Winthrop Chemical Company, has been elected vice-president. He is known for his research work on the synthesis and manufacture of Atabrine.

Edward Dawson Davy, dean of the School of Pharmacy, Western Reserve University, has been appointed director of the Pharmaceutical Division of the Winthrop Chemical Company.

H. B. Baylor of International Minerals & Chemical Corp., new president.

Personalities at Fertilizer Convention

Leaders of the fertilizer industry from all over the country gathered at Hot Springs, Virginia, last month to discuss various phases of the industry's problems and prepare for the increasing demands for its products during the coming year of all-out agricultural production. Snapshots of some of those present are shown on these two pages. **For a report of the meeting and digests of speeches turn to page 78.**

Above, left to right. M. C. Morton, Central Chemical Corp. of Maryland; H. A. Spangler, Central Chemical Corp. of Virginia; J. W. Hansen, Weaver Tankage Corp.; Walter Reus, Baugh & Sons Co.; V. H. Kadish, Milwaukee Sewerage Commission and Philip W. Lowery, Chief Counsel, Legal Food Price Division, Office of Price Administration.

Below, left to right. N. E. Harmon, Meridian Fertilizer Factory; Norman L. George, Louisiana Agricultural Supply Co.; J. E Totman, Summers Fertilizer Co.; J. M. Coppinger, International Minerals & Chemical Corp.; A. N. Into, International Minerals & Chemicals Corp. and R. J. Quinn, Mathieson Alkali Works.

The Homestead, beautiful setting for the convention in Virginia's mountains.

Weller Noble, Pacific Guano Co., read Memorial Record.

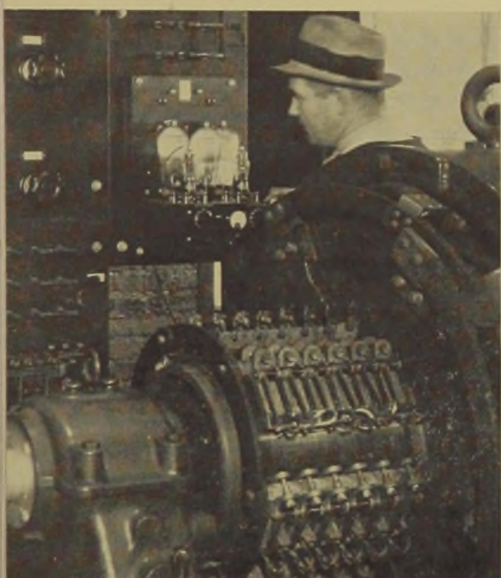
Some of those who got in a game of golf after the business sessions were finished were: above, left to right, J. W. Hansen, Weaver Tankage Corp.; Boyd Daugherty, Bemis Brothers Bag Co.; James MacBeth, Jr., Jones & Loughlin Steel Co.; J. M. Coppinger, International Minerals & Chemicals Corp.; T. L Wilkinson, American Cyanamid Co.; F. F. McGinley, Raymond Bag Co.; C. E. Lightfoot, The Barrett Div., Allied Chemical & Dye Corp.; J. E. Totman, Summers Fertilizer Co.; Western Logan, Producers Sales Co.; and J. P. Brinton, Hydrocarbon Products Co.

Below. Walter Crady, North American Fertilizer Co.; John E. Powell, The Smith Agricultural Chemical Co.; Ray King, Georgia Fertilizer Co.; T. M. Murphy, Union Special Machine Co.; William Stark, Atlantic Fertilizer Co.; S. Y. Priddy, Priddy Fertilizer Co.; A. N. Myers, Chilean Nitrate Sales; and Joe C. Jett, Norfolk, Va.

Electronics in Industry

Electronics is a much used and much abused term. In the strict sense of the word, "electronics" is that which has to do with the action of electrons—such a general definition sweeps into its arms heat, light, magnetism, and electricity. The control of the electron has been the job of the electrical industry since its inception. When radio came along with the vacuum tube in which electrons are not confined inside copper wires but pass out into confined space, we had a new and more restricted definition of electronics. Gradually, the term "electronics" was generally applied to all devices in which electrons do their work in space and not within solid matter like copper.

The heart of electronics is the electronic tube shown at left. In its modifications it has become an important tool of industry. Probably $500,000,000 worth of business has been done in the industrial field in the last three years, excluding radio and Radar. For a story on the maintenance of electronic equipment for the chemical industry, see page 58.

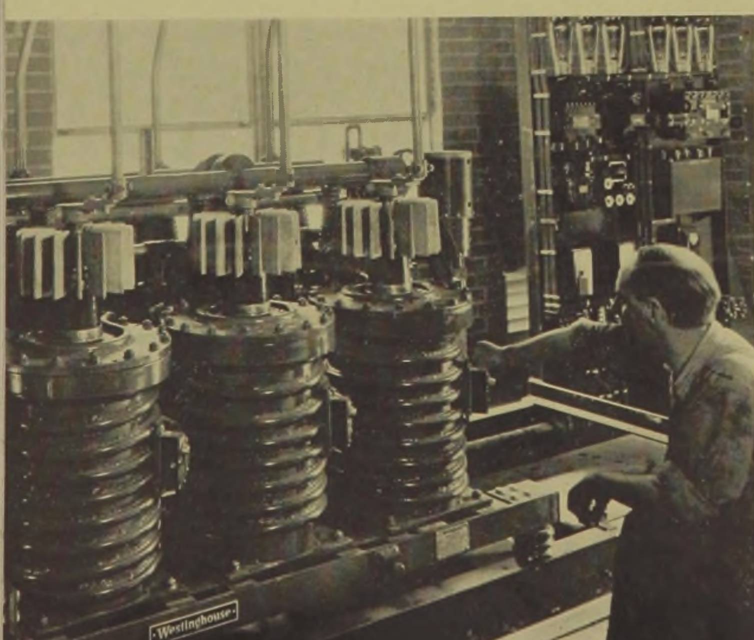


A typical electronic control job in industry is holding motor speeds constant at any present value.

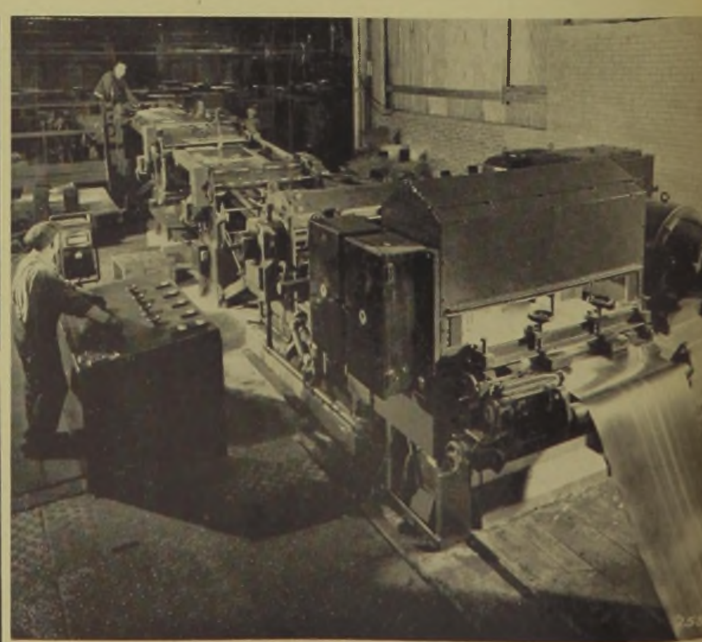
Mass spectrograph segregates gas molecules and their constituent atoms according to their masses.

Cathode bombardment being studied during the investigation of fluorescent minerals at a Westinghouse Laboratory.

Many industries are using ignitrons for converting alternating current into direct current. The picture below shows an installation in a large mine. Electro-chemical, magnesium and aluminum industries are large users of this equipment.



The photo electric cells or "electric eyes" are used in many devices. Here a pin hole detector spots, classifies and marks minute holes smaller than 1/64 of an inch in tin plate, racing through a shearing line at one thousand feet per minute.



Fertilizer Industry Studies Problems at Hot Springs Convention

THE problems of producing and distributing fertilizers to aid agriculture in reaching food production goals brought more than 150 persons to the 19th annual convention of the National Fertilizer Association at Hot Springs, Virginia, June 21-23.

In spite of the fact that the demand and maximum requirements for all fertilizer materials during 1943-44 is expected to be greater than the supplies that can be made available, members of the industry seemed to be facing the coming year with much more confidence and hope than they did at the convention a year ago.

At that time the industry was worried about the supply of nitrogen and the major task of equitably distributing fertilizer materials in order to avoid direct rationing and its subsequent headaches. Since then the nitrogen situation has become less acute, rationing was avoided and the industry was able to produce and distribute over 10,000,000 tons of fertilizer.

With this year of organization experience and accomplishment behind them the members of the industry feel that probably the worst is over. This is not to say, however, that there are no problems. The fact is that as the industry looks forward into the next fertilizer year 1943-44, the demand and maximum requirements for all fertilizer materials are in excess of the maximum supplies that can be made available. Some estimates have placed the supply five to ten percent less than the total amount farmers would like to buy. This does not mean that the industry will be short in terms of what has been used in the past. There will be more nitrogen and phosphorous than have been used in any previous year, and more potash than has been used in any year except during the last fertilizer year.

At the first general session on Tuesday morning, John A. Miller, president of Price Chemical Co., and president of the association gave the annual convention address entitled "Wartime Work of the N.F.A.". He said in part: "We feel that our industry and our Association have assisted in every possible way the Government's war effort. We have produced and distributed well over 10,000,000 tons of fertilizer in the face of serious man-power and material shortages. In each of our last two conventions we pledged our cooperation to the Government in furthering the war effort. In carrying out these pledges the Association has tried to protect the industry's interests when they did not conflict with the Nation's over-all efforts to win the war. We are pleased to say that governmental agencies have called upon us freely for such assistance as we have been able to render and have consulted often with members of our staff. They have accepted and used without question data furnished by the Association."

John A. Miller

Mr. Miller described the major activities of the Association in some detail, registered a strong objection to the distribution of large quantities of fertilizer by governmental agencies, and in closing emphasized "the fact that the understanding of mutual problems between the Government and the fertilizer industry is increasing, that the cooperative spirit is working towards the more harmonious accomplishment of our common goal".

The second speaker on the program was Edmund Rowland, chief, .Nitrogen Unit, War Production Board. In his talk on "Nitrogen Supplies and Their Allocation", he reported that the picture of nitrogen supply for 1943-44 has changed sharply from that which prevailed in the 1942-43 fertilizer year. Broadly, the changes are an increase in the supply of ammonia and ammonium nitrate from synthetic sources, and a probable decrease in nitrate of soda to conserve shipping.

Mr. Rowland pointed out that in order to keep nitrogen plants operating at maximum capacity it will be necessary that the products flow evenly into use, as neither ammonia nor ammonium nitrate can be stored in quantity at points of production. "For those manufacturers equipped to use them," he said, "solutions should be the nitrogen material used to the greatest possible extent in mixed goods. For the dry mixer, solid ammonium nitrate must take the place of solutions. In no case should ammonium sulfate be used as the primary source of nitrogen; it should only be used to attain the desired analysis after the maximum amount of solutions or of grained ammonium nitrate has been used."

E. Rowland

In his address on "Potash and Superphosphate Supplies and Problems", Dale C. Kieffer, chief of the Fertilizer Materials Unit, WPB, said in part: "The 1943-44 program envisions a minimum requirement of 6,600,000 tons of ordinary superphosphate (basis 18 percent). That is 13 percent more than this country has ever produced before in any fertilizer year. The 1942-43 year established a record and we expect to better that record by at least 800,000 tons. It has developed that something better than 6,600,000 tons can be produced if approximately 500,000 tons of 50 to 55° sulfuric acid can be supplied to acidulators. We are anticipating a total production of about 275,000 tons of concentrated superphosphate during 1943-44. The United States is committed to deliver 152,000 tons to the United Kingdom, all of which because of

D. C. Kieffer

The Homestead, beautiful setting for convention

transportation and other difficulties must come from eastern production, leaving only a small amount for the fertilizer industry in the eastern part of the United States."

Speaking of the potash situation, Mr. Kieffer stated that "in 1943-44 we anticipated a production of primary potash equivalent to 700,000 tons of K_2O. During the fertilizer year just prior to the start of the war in Europe, total deliveries of potash in North America, Puerto Rico, Hawaii, and Cuba amounted to 412,000 tons of K_2O, 206,724 tons or 50 percent of which came from domestic plants. From an analysis of the requirements for Lend-Lease, for export to Canada and Latin America, for industrial and chemical uses, it appears that there will be 540,000 tons of K_2O for domestic agriculture including Hawaii and Puerto Rico." He stated that the potash allocated for delivery during Period 2 to each fertilizer plant is approximately 81 percent of the average total purchased during the same period of the two base years (1941-42 and 1942-43). It is expected that 90 percent of the annual delivery will be provided during the discount period and that 10 percent can be delivered in the spot season.

In the last talk of the Tuesday morning session "The 1943-44 Fertilizer Distribution Program" was discussed by William F. Watkins, chief, Requirements Section, Fertilizer Division, War Food Administration. Mr. Watkins reviewed the 1942-43 program and outlined the provisions of the revised Food Production Order Number 5. In general, the regulations have been simplified, the requirements liberalized, and the program is being announced at a much earlier date than last year. Grades for the various States have been selected, the supply situation is more positive, and the experience of the past year will be helpful. While the program last year was concerned almost entirely with nitrogen conservation, the program for the coming year and which will be embodied in the new order will be concerned with all three of the principal plantfoods—nitrogen, phosphoric acid, and potash. The grade substitution program has been entirely eliminated, but a simplified application form will be required, crops will be classified into A and B groups in much the same manner as last year, and a similar method of determining crop requirements will be included but the method for determining the requirements of Group B crops will be modified to make new users eligible to buy fertilizer.

W. F. Watkins

On Wednesday morning the program opened with an address on "Fertilizer Pricing Problems," by Cedric G. Gran, head of the Agricultural Chemicals Section, OPA. Mr. Gran said in part: "Remembering in particular the write-off of inventory that took place following the first World War, I am sure you will all agree that the dose of price control, bitter as it seems, is much more preferable than the inflationary binge. First of all," he said, "we cannot see any valid reason as yet for any general increase in prices anywhere along the line. However, certain problems do merit serious consideration." He then discussed in some detail various factors of cost as they relate to nitrate of soda, sulfate of ammonia, nitrogen solutions, organic nitrogen carriers, phosphate rock and superphosphate, potash materials, and mixed fertilizers.

C. G. Gran

At the last session of the convention, Dr. F. W. Parker, chief, Division of Soil and Fertilizers Investigations, U. S. Department of Agriculture, discussed "Problems in Formulating Fertilizers for 1943-44." Dr. Parker stated that the formulation problems confronting the industry involve (1) the use of greater quantities of ammonia solutions without excessive reversion of phosphoric acid, (2) storage and handling of solid ammonium nitrate in the plants, and (3) formulation of fertilizers that are not too hygroscopic. He said that: "The problems involved in using ammonium nitrate are neither new nor temporary. Fertilizers in which 40 percent of the nitrogen was derived from ammonium nitrate have been on the market and were used successfully in large tonnage before war shut off the supply of ammonia solutions and Cal-nitro."

F. W. Parker

Methods of improving the physical condition of ammonium nitrate have received much attention in recent weeks, and as the result of exchange of information between various producers and the U. S. Department of Agriculture rapid progress in improvement of the product has been made.

Officers Elected

At the Board meeting held immediately after adjournment of the convention, the following officers were elected: President, H. B. Baylor, International Minerals & Chemical Corp., Chicago; Vice-President, Weller Noble, Pacific Guano Co., Berkeley, Calif.; Executive Secretary and Treasurer, Charles J. Brand, Washington, D. C.

BETWEEN THE LINES

New Fats and Oils Sources Developing

The war has forced exploitation of hitherto undeveloped sources of vegetable fats and oils in Central and South America and some of the African countries. Castor seeds and cacahuananche nuts from Mexico, and oiticica and babassu oils from Brazil, can be expected to come into the United States in increasing quantities as dollar balances in these countries are put to work.

UNDER the stimulus of war, new foreign sources of fats and oils are being developed which may be an important post-war factor in this nation's consuming industries. Raw materials for coatings, soaps, industrial processes, paints and other compounds were lost when Japan overran the Far East. This loss has been felt by consuming industries in the United States and associated nations. Steps now under way are intended first of all to meet the current critical situation. If successful, however, a new factor in the world supply of fats and oils will be present after the war.

Briefly, potentially valuable supplies are in sight in Latin America, whereas heretofore, this country obtained a major part of its requirements from the South Pacific and Far East. The latter sources of supplies may be recovered intact when the war ends—again, they may not. In any case, it appears reasonably assured that new supplies will be available in Latin American countries.

In the past these raw material sources were not drawn against to any extent by major world markets because inland transportation was lacking in certain areas, quantities were spotty, equipment necessary in certain cases was not available—such as cracking apparatus for obtaining oil from babassu nuts—and there were other obstacles. The war made it imperative for the United States to get various raw materials found in Latin America, and this demand has resulted in the acquisition of dollar balances by some countries to the South, with which to get equipment and set up the industries now coming into operation with American markets in view.

In a number of cases, the United States lost no time after getting into the war, in making agreements with producing or potentially producing, countries of the Western Hemisphere, looking to filling the gaps caused by loss of normal supply areas. In others, negotiations are under way or informal approaches are being made to the same end.

Mexico already has contracted for sale of 50,000 to 75,000 tons of castor seeds to the United States this crop year. In addition, that country is reported to be planning for very extensive production of peanuts, castor beans, sesame, and other oil-bearing crops, on a scale to make them important on the world markets of the near future as well as in the post-war period. Substantial proportions of such expanded production are destined for American war industry uses, it is known.

Oiticica from Brazil

Oiticica has been used widely in place of tung oil, since China's supply of tung oil was curtailed or cut off by war. Brazilian oiticica rightly is highly valued as a dryer. But Mexico has the cacahuananche nut, growing wild along its rivers, and its value is indicated by the fact that it is sometimes called Mexican oiticica, and is regarded as equally good. Production of a good many thousand tons of cacahuananche oil seed per year is now a prospect in Mexico.

The Brazilian supply of oiticica from current production is not too promising, according to current reports from that country's eastern producing areas, where for the second consecutive year drought has prevailed. Nevertheless, this is a prospective crop for the future, from much closer at hand than the sources of similar-purpose oils in the past. The United States plans this year to acquire the bulk of Brazil's supply meeting standard trade specifications.

Brazil has had an agreement with the United States to furnish babassu kernels and oil since about a year ago. The results of that step are only just now beginning to be felt. In addition, Brazil has an undertaking to furnish castor seed, and has stepped up production of this crop.

Cuba and Santo Domingo likewise are developing into potential suppliers of the North American market for fats and oils. At the same time, other countries which have been opened up as a result of war developments are being approached; Portuguese West Africa, while not involved in the war, comes to mind as one such area offering potential supplies to this country.

The United States, through its appropriate agencies, is working closely with those of other nations, including the United Kingdom, in obtaining supplies and in apportioning them under an agreement which has been in operation for some time. This is intended to assure that there shall be no conflict of interests in a given area, and to assure an equitable distribution of materials obtainable.

In a normal year the United States' requirement of vegetable oils aggregates more than a billion dollars. Consuming industries now include food, soap, explosives, war lubricants, paints, plasticizers, and synthetic rubber. Curiously, both the U. S. and many of the Latin American nations which are now beginning to supply themselves and this country, formerly relied on supplies lost in the current war.

The Mexican program means, in the case of that country, not only that it will be on the way to self-sufficiency, possibly with a good market in the United States besides, but that currently, new lands are being opened, rail and other transportation facilities are being installed or improved.

The major part, if not all of the imports involved are being handled or will be, by government subsidiaries. A number of the commodities are so scarce in this country as to require allocation or priority in their distribution. This means that supplies are being ladled out according to essential needs first. Shipping is a factor in the present situation. In the case of supplies from South America, the present outlook is encouraging. In other instances, as in Liberia, other considerations are involved. In that country an accumulation of palm kernels is reported, and more can be brought out if "trade goods" are made available.

BEW in Charge of Development

The general responsibility for obtaining such imports at present rests on the Board of Economic Warfare, in charge of all foreign procurement except rubber. This agency not only directs purchases, but is also in charge of the development programs, such as those for fats and oils mentioned here.

Recently under a shift of various administrative orders, allocation of fats and oils was placed under the Food Distribution Administration. Thus WPB Order M-71 has become FDO-42, and places restrictions on total consumption of fats and oils in various use classifications, including protective coatings. The continually worsening supply of fats and oils late in June led to a further restricting order, M-332, which became effective July 1, limiting the amount of oil, in pounds per gallons, that can be used in a list of ten protective coatings, and otherwise hedging the use of oils, except mineral oil and tall oil (by-product of paper pulp production).

The new sources opened up or being developed under the BEW program also hold the promise of ready accessibility as time progresses. Overland highways, new rail lines, new air routes, all are making these and other supplies readily obtainable by faster transportation than the long ocean hauls necessary to bring them in from the older sources. In addition to fats and oils, for illustration, rubber, quinine, minerals, and forest products are being reached by this development of new transportation routes.

Washington

(*Continued from page 8*)

The labor situation is mounting in seriousness for many plants. A large percentage of the most efficient and experienced workers have gone into the services, or have been loaned to other industries. Upwards of a quarter of the industry's peacetime labor force has been displaced in these ways.

Replacement workers tend constantly toward poorer quality, it is pointed out, due to such factors as higher average age, lower physical condition, which incidentally boosts the accident rate, poor work habits and inferior abilities. Normal training periods have necessarily been shortened and new employees are being put on regular jobs without the thorough pre-training period that would prevail in normal times.

Labor Costs Up

A further source of higher production costs is found in the necessary doubling-up of personnel as new workers are broken in while the old employee is still on the job. This situation is aggravated by the growing rate of worker turn-over.

The shortage of properly qualified supervisors is another item. It is impossible to keep all operations running at their most efficient capacities, while raw material shortages cause other operations to be run below their efficiency levels. Still further, it has been found, substitution of women for men, in jobs customarily handled by men, has required additional numbers of workers. As one spokesman put it, experience has shown that under these conditions women perform only about two-thirds or three-quarters of the work that was done by men of the caliber formerly available.

An increasing proportion of work must be done at overtime rates, it has been found, resulting in higher direct labor costs or higher overhead costs. There is a scarcity of new equipment, resulting in more frequent interruptions of manufacturing operations for repairs. This situation is aggravated by the necessity of operating in many instances, 24 hours per day, 7 days per week.

Other interruptions are occasioned by uneven delivery of raw materials and supplies, and also from uneven scheduling of demand, which last is charged particularly to government agencies.

All of these conditions are found in the top producing units, but, it is emphasized, they apply equally to subcontracting and other second-line suppliers, so that when a government agency in Washington begins to argue for renegotiation of contracts on the ground that lower costs have followed a levelling off of operations, it must contend with the factors enumerated. Spokesmen for the industry indicate they will be hard to convince that their costs are declining.

As a sidelight on the renegotiation matter, the Army is at present tangled with the Federal Power Commission on a renegotiation program affecting contracts for power to war plants. A recent Army regulation expressly exempted contracts for gas and electric service for war supply, from liability to renegotiation. FPC decided that its own authority overrode this ruling. Army has a further rejoinder that payments on contracts for procurement of military supplies will be made with the funds voted to the Army and according to the regulations made by Army.

The Securities and Exchange Commission has taken note of the whole situation in a ruling which relates to companies having war contracts subject to renegotiation; the amended rule requires a report upon the settlement of any such renegotiation proceedings, but no report is required if effect is given to any settlement in the most recently filed financial statements, or if such statements have not been filed yet, for the period affected.

War Materials Requirements for 1943

DONALD M. NELSON, chairman of the War Production Board, last month submitted a formal report to the President on war production progress for 1942 and prospects for 1943. A portion of the report covering critical materials is of special interest to the chemical industry.

Compared with 1942, and based on programs envisaged in December, 1942, needs of military production during 1943 call for substantially greater quantities of almost all critical materials. Direct military requirements for steel are up 31 per cent. Aluminum mainly for airplane

manufacture, and nitrogen for explosives production, are up over 100 per cent. Phenol and toluene, also essential for the production of explosives, are likewise up over 100 per cent. Magnesium is up considerably over 200 per cent.

An even larger increase—450 per cent—is expected in the direct military use of ethyl alcohol, principally for the synthetic rubber program and for making smokeless powder. Copper, almost alone among the leading industrial materials, shows less than a 10 per cent increase from 1942 to 1943, reflecting the great difficulty of increasing supplies of that metal.

Exports were also scheduled to advance substantially for most materials, copper again constituting an important exception. Outstanding is a sevenfold expansion in magnesium shipments, principally for the United Kingdom airplane and incendiary bomb programs. Exports of toluene, for the production of explosives abroad, are expected to rise about 70 per cent. On the other hand, a sharp drop in the scheduled shipments of manila fiber reflects the impossibility of replenishing supplies since the loss of the Philippines.

With few exceptions, these increased requirements for materials for military use and for export during 1943 must be met through corresponding increases in new supply during the year, that is, from added domestic production and higher imports.

The scarcity of vital materials will remain a critical limiting factor on war production during 1943. The tightness of steel, copper and aluminum, especially, necessitates prompt and decisive shifts if we are to avoid cutbacks in projected programs, attain balanced output, keep stocks at a level adequate to insure continued production, and prevent impairment of essential supporting services, the report said.

CANADIAN REVIEW

Chemical Production Up

The summary of 1942 production of chemicals and allied products, released recently by the Dominion Bureau of Statistics, reveals that Canadian chemical industry reached a level 3¼ times that of the full pre-war year of 1938.

The gross selling value at works last year totalled $471,797,000 as compared with the $146,139,000 for 1938. This latest valuation is a 55 per cent increase over 1941's $304,400,000, and 1940's $193,890,000 was exceeded by 143 per cent.

In comparison with 1941 the past year's output showed percentage gains for coal tar distillation, 32; heavy chemicals, 24; compressed gases, 27; fertilizers, 32; medicinals, 16; paints, 13; soaps, 14; toilet preparations, 16; inks, 0.5; adhesives, 23; polishes, 13; miscellaneous, 130. The miscellaenous category includes a number of strategic materials not reported individually for reasons of security.

The Bureau records precentage increases over 1939 for chemical and allied products of, capital employed, 138; employees, 254; salaries and wages, 264; cost of materials, 222; value of products, 196.

Canadian imports of chemicals and allied products from the U. S. A. in 1942 totalled $56,672,000 compared with $30,668,000 in 1939, and $41,493,000 and $53,845,000 for 1940 and 1941 respectively.

Synthetic Rubber Progressing

The first synthetic rubber plant in the British Empire was placed in full scale operation by Naugatuck Chemicals Ltd., a Dominion Rubber Co. affiliate, in mid-June. This Canadian plant is producing Thiokol.

Two other synthetic rubber plants are under construction in Canada at present, and will manufacture Buna S and Butyl rubber. The Buna S plant will be operated for the Government by Canadian Synthetic Rubber Ltd., shares of which are owned by Goodrich, Goodyear, Firestone, and Dominion. The Butyl unit will be operated for the Government by St. Clair Processing Corp. Ltd., an Imperial Oil subsidiary. Both companies will be under the supervision of the Government's Polymer Corp. Ltd.

It is anticipated that annual Buna S production will be 34,000 tons, and Butyl 8,000 tons. Full operation is scheduled for November.

The present bottleneck is butadiene. A styrene unit should be operating this month, and if butadiene is available from the U. S. A., some 25% of the rated co-polymer production may be realized by late August. Canadian petroleum-base butadiene will not be available until September or October.

Canadian Mercury

Canada is now producing twenty per cent of the United Nations' mercury requirements, according to C. D. Howe, Minister of Munitions. Sufficient mercury is being mined to cover Canadian consumption and substantial quantities are being exported to the U. S. A.

Prior to the war Canada had no commercial production of mercury, and in 1939 imported some 112,000 pounds. No statistics have been published since the outbreak of war.

The major Canadian mercury operation is conducted by Consolidated Mining and Smelting Co. in Western Canada.

Glycol from Wheat

The aerobacillus fermentation process for the production of *laevo* 2,-3-butylene glycol, under development by the National Research Council for the past year, is now in the pilot plant stage. It is reported that yields are eight to nine pounds of the glycol, and five to six pounds of ethyl alcohol per bushel of wheat.

The Council has concentrated on the development of laevo glycol production, rather than meso or dextro. In addition to possessing equal suitability for the manufacture of butadiene, the laevo type also shows promise as an antifreeze, solvent, and plasticizer base.

Sulfite Alcohol Plant in Operation

The new half million dollar plant of the Ontario Paper Co. at Thorold, Ont., for production of some 600,000 gallons of commercial alcohol annually from waste sulfite liquor (CHEM. IND. June '43, p. 284) came into production in late June. This is reported to be the only plant in the Western Hemisphere utilizing the sugars of sulfite liquor for the production of alcohol. Such refinements as have been made in the European process by the Ontario company will be made available to all wood pulp manufacturers.

It is understood that a number of other pulp and paper manufacturers have been engaged in research on waste sulfite liquor. It is estimated that the waste liquor from Canadian mills contains a theoretically available 500,000 tons of wood sugars annually.

One project under discussion is the possible utilization of this nutrient material for the production of a special high protein edible yeast for both human and livestock consumption.

Silica Gel Plant Completed

The first plant for the production of activated silica gel in Canada was completed by G. F. Sterne & Sons Ltd. recently.

The limited availability of certain equipment prevented the immediate erection of a unit capable of fully meeting Canadian market demand, and substantial tonnages of dehydrating agent are still being imported from the U. S. A. by Canadian industry.

Industrial Activity at Record Level

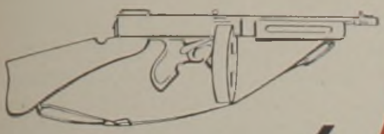
Industrial activity in Canada continues at record level with the Bureau of Statistics index for physical volume of business, based on the 1935-1939 unit of 100, standing over 230. This index has risen steadily since 1939 and passed the 200 mark last July. The rate of increase has been less pronounced of late due to the gradual exhaustion of unemployed productive resources.

Although general consumption of chemicals by industry proceeds at a high level, curtailment of gold mining and the pulp and paper situation have affected some items. The latter industry is in a condition of flux at present, for although the Shipshaw development has alleviated the power shortage experienced by the industry in the Quebec area, the labor situation remains acute.

In a compensatory sense, Canada's base metal production is at the highest level in history and establishes the Dominion as the largest exporter in the world in this respect. This record has been achieved primarily by the enormous expansion of the aluminum industry, which is operating at six times the 1939 level to produce 40 per cent of the United Nations' aluminum. Magnesium production, the extension of recovery of large base metal mines, and exploitation of new properties also contribute to the recorded increase.

The Government has announced that Canadian war industry has produced 800,000 tons of chemicals, and explosives since the outbreak of war, and current operations yield 10,000 tons weekly. Since 1939 the Government has invested $86,500,000 in chemical and explosives plants, and advanced $2,500,000 to assist similar projects. This does not include some $45,000,000 dollars invested in the synthetic rubber program.

It is reported that a plant for the production of synthetic butanol will soon be functioning, and an isomerization unit for manufacture of high octane aviation fuel is under construction. This unit is the first of its type to be erected in North America.



NEW PRODUCTS AND PROCESSES

By James M. Crowe

High Vacuum Technology

The dolomite ferro-silicon process for the production of metallic magnesium now being successfully used to augment our existing supplies of this strategic metal represents the first large industrial application of high vacuum. Unlike electrolytic processes it involves the direct thermal reduction of dolomitic limestone under low pressure. Although with the aid of conventional mechanical vacuum pumps relatively low pressures may be attained, the extremely large volumes of gas and vapors encountered with this process on a plant scale have made many improvements in high vacuum technique necessary.

Diffusion pumps of tremendous capacity and unique operating characteristics have now been developed by the physicists of National Research Corporation of Boston. Such equipment previously reserved for the laboratory was designed for industrial application on the basis of pilot plant experience and it is now in use in magnesium plants which are successfully producing metal in the lowest range of pressures.

Many of the vacuum problems previously considered so difficult in this process have been eliminated through the use of these new industrial type pumps capable of operating against high fore-pressures. Pressures as low as 0.001 to 0.025 m.m. are now being attained throughout entire plants. Pump-down cycles have been substantially decreased, thus increasing the quantity and quality of resulting magnesium metal. Because of the large gas handling capacities now available the need of large numbers of relatively expensive precision mechanical pumps has also been materially reduced.

In what other fields this new technology may be applied remains to be seen. Through the use of this newly developed equipment, however, the possibility of operating chemical processes on a commercial scale at pressures less than 0.01 m.m. has been established.

New Color

Geigy Co., Inc., has recently added Solophenyl Olive GL Extra to its growing line of Solophenyl colors.

This product produces a true olive shade of extreme excellent fastness to light, common with all Solophenyl Colors.

When applied to cottons and viscose rayons, Solophenyl Olive GL Extra is also said to possess unusually good resistance to washing and water bleeding. This is particularly true with rayons.

Solophenyl Olive GL Extra should prove a most desirable dyestuff not only as a self shade, but also in combination with other Solophenyl Colors for producing a variety of fashion shades on fabrics such as draperies, and automobile and upholstery materials where fastness of high quality is required.

Glycol Esters

Hercules Powder Co. has recently issued introductory information on two new esters of Poly-pale Resin. These two new products, known as No. 1 and No. 2, are respectively the ethylene and diethylene glycol esters of Poly-pale Resin and generally similar in their properties to Flexalyn and Flexalyn C and to the Staybelite esters No. 1 and No. 2, other Hercules products. They are widely soluble and compatible, show a low rate of oxygen absorption, and are harder and higher melting than the corresponding glycol esters of rosin or Staybelite.

TYPICAL ANALYSES

	Poly-pale Ester No. 1	*Poly-pale Ester No. 2*
Melting Point (Hercules Drop Method	80-85° C.	61° C.
Color (Lovibond)	40-45A	60A
Acid Number	8-10	10-12

Poly-pale Esters No. 1 and 2 are insoluble in the lower alcohols, but are soluble in most of the other commonly used solvents, such as acetone, benzene, Varsol, and ethyl acetate.

In broad terms, the Poly-pale glycol esters are similar in their compatibilities to Staybelite Esters No. 1 and 2, and to the Flexalyns. Specifically, they are compatible with nitrocellulose, ethyl cellulose, Parlon (chlorinated rubber), Vinylite VYLF (polyvinyl acetate chloride), and butyl methacrylate. With methacrylate, the esters are partially compatible.

Like most rosin derivatives, the Poly-pale Esters may be used with water-dispersible film-formers such as casein, starch, animal glue, methyl cellulose, gelatin, etc., to give increased adhesion, toughness, resistance to shock, water sensitivity, etc.

Poly-pale Esters No. 1 and 2 are compatible with drying oils on being heated with them. This is of special interest to varnish makers in respect to Poly-pale Ester No. 1, which, with a melting point only slightly under that of ester gum, may find application as a substitute for the glycerin ester.

The Poly-pale Esters may be applied in molten form, from solvent solution, or from aqueous dispersion. The following formulation is suggested for water dispersion:

Poly-pale Ester No. 1 or 2, dissolved to 80 per cent solids in Solvent 50D, Varsol, HF naphtha, Solvesso No. 2, tollac, toluene, xylene, etc.....	100 parts
Duponol ME	0.8
Sulfated castor oil (75 per cent)..	0.8
Water to bring to desired per cent solids.	

This emulsion is prepared as follows: The Duponol ME and sulfated castor oil are added with stirring to the quantity of water (warmed to 40-50° C.) necessary for the desired per cent solids. When solution is complete, the Poly-pale Ester solution is added with continued stirring. The spontaneous semi-emulsion thus formed is passed through a suitable colloid mill.

Because of the increased hardness of the Poly-pale Esters over the Staybelite Esters and the Flexalyns, the Poly-pale Ester of a specific glycol can serve to replace the Staybelite or rosin ester of the next lower glycol, (e.g. Poly-pale Ester No. 2 can replace Staybelite Ester No. 1), or, in the case of Poly-pale Ester No. 1, to replace the glycerin ester, (Staybelite Ester No. 10 or ester gum).

The Poly-pale Esters No. 1 and 2 will find wide use as tackifiers in adhesives based on the common film-forming materials (rubber, ethyl cellulose), and seem indicated for nitrocellulose or ethyl cellulose lacquers, where their low rate of oxygen absorption, essentially neutral character, and inherent adhesiveness are of great importance.

Poly-pale Ester No. 1 has been cooked with drying oils into varnishes. These varnishes run somewhat lower in viscosity, slightly slower in dry to touch and tack free dry, than analogous ester gum varnishes. Final hardness, adhesion, water resistance and color, however, are comparable. Thus many applications may be found for Polypale Ester No. 1 to substitute for ester gum in various varnish formulations.

With the water-soluble film-formers, Poly-pale Esters No. 1 and 2 may find wide application for coatings, sizes, adhesives, plastics, etc. These esters may also serve in numerous other formulations and applications where moderately hard, oxidation resistant resins are needed.

Seed Disinfectant

A new seed disinfectant and protectant has recently been put on the market by the Bayer-Semesan Co., Inc., a DuPont affiliate. The active ingredient of "Arasan" is an organic sulfur compound. Experimental results are said to show that it effectively reduces losses in stands of peanuts from seed decay and that seed and soil-borne diseases of vegetables may be generally controlled by an inexpensive dust treatment.

Antiseptic Compounds

The Mallinckrodt Chemical Works has recently issued information on two antiseptic compounds which it is now producing. These two chemicals which are not new, but in which there is renewed interest, are Proflavine Sulfate and Proflavine Dihydrochloride. Both of these compounds have been given attention in recent medical journals and their potential importance is becoming evident.

Both of these chemicals are acridine derivatives whose failure in the past is ascribed to wrong choice of compounds and misapplication. Recent research is said to show that Proflavine is an efficient and satisfactory wound antiseptic which is claimed by some to be superior to the sulfa compounds in the presence of gas gangrene.

The undesirable affinity for fabrics, a property common to all acridines, is said to have been overcome by the use of Proflavine in powder form in treatment of wounds. The term Proflavine usually refers to the sulfate of 3,6-diaminoacridine monohydrogensulfate monohydrate.

New Sulfa Drug

A new sulfa drug, sulfamerazine, developed by Sharpe & Dohme was recently announced in *The Journal of Pharmacology and Experimental Therapeutics* and *The American Journal of Medical Sciences.* It is related to sulfadiazine, one of the most widely used sulfa compounds.

Sulfamerazine is said to be less expensive than sulfadiazine and equally efficient in smaller doses. Thus, in diseases which require four to six doses of sulfadiazine daily the same results may be obtained by only one, two or three doses of sulfamerazine and at proportionately lower cost to the patient.

Advantages claimed for the new product are explained by rapid and complete absorption. Once in the blood stream, sulfamerazine is more slowly excreted than sulfadiazine. Hence less of it is needed for the first dose of a treatment and fewer doses are required thereafter.

Increase Yield of Wells

In many oil and gas deposits large portions are often isolated from the main deposits so that they can not be brought to the surface without additional borings. An interesting process for getting around this trouble and increasing the yields for wells was patented sometime ago by W. H. Dow and J. J. Grebe of the Dow Chemical Co.

A method that has been developed in recent years has utilized a solution of a strong acid which dissolves enough of the rock formation to permit the "lost" deposits to flow into the main ones. Unfortunately, as the inventors point out, brine deposits frequently are located near oil deposits, so that the acid treatment is quite likely to open up the former as well, producing an economically undesirable mixture of brine and petroleum.

To prevent such occurrences, a concentrated soap solution is first pumped down the well and forced to all parts of the deposits. The far-travelling soap manages to squeeze through the rock pores and reach the brine, where it reacts with the calcium and magnesium present in the liquors to form an insoluble precipitate in the pores of the rock. Now, the operators withdraw the remaining soap solution and pump down the acid for the usual rejuvenating treatment. The insoluble precipitates prevent the acid from reaching the brine deposits.

Cork Substitute

According to a recent note in *Soap, Perfumery & Cosmetics*, a cork substitute has been produced from soap, cement, glue and water in Capetown, South Africa. The material is formed by dissolving soap and glue in water. After this material is agitated to form many fine bubbles cement is mixed with it and the resulting mass allowed to set in molds. On hardening, a block resembling pumice stone is obtained. It floats in water, has the heat insulating qualities of cork, and has the added advantage of being strong enough to permit construction, with cement and plaster, of an inside wall by itself.

Sodium Cellulose Glycolate

A recent report from the *Foreign Commerce Weekly*, published by the U. S. Department of Commerce, tells of a "sodium cellulose glycolate" product which is finding wide application in Germany to replace the scarce, usually imported, natural raw materials such as: agar-agar, gum arabic, caragheen or Irish moss, gum tragacanth, cherry gum, carob gum, and gluten.

Reports from Germany say that cellulose chemistry research, especially in connection with cellulose for producing synthetic fibers, wood sugar, and plywood plastics, has helped to provide a basis for the improved sodium cellulose glycolate now being used to supplant natural products in the manufacture of adhesives, textile finishing and sizing agents, thickeners, and emulsifiers, even including those employed in the photographic field.

In addition to the previously mentioned industrial applications the recent discovery of the physiological inertness of sodium cellulose glycolate opens up new fields for its use, particularly as a stabilizer in the foodstuffs industry. Through slight variations in the highly complex molecular structure of this cellulose ether, which is now better understood than it was a decade ago, more than 40 different preparations are now said to be manufactured by six German concerns. Commercial-scale production of them, however, began only around the outbreak of the present war.

The formerly imported natural substances, obtained from seaweed or gummy exudations of certain plants and trees, although not used in large amounts, are indispensable in many specialized manufacturing processes. Generally, their value lies in their mucilaginous nature, and their ability to gelatinize even when considerably diluted.

Toward the end of World War I when Germany was similarly cut off, a sodium cellulose glycolate, soluble in cold water, was produced through the action of monachloracetic acid on alkali cellulose in alcohol solution, by the Deutsche Celluloid Fabrik, Eilenburg, near Leipzig (German patent No. 332,203). This old firm, now a subsidiary of I. G. Farbenindustrie, is one of the larger producers of raw celluloid for film and nitrocellulose for explosives, and in making sodium cellulose glycolate drew on its long experience in treating cellulose materials. The output was sold on a small scale in Germany as a gelatin substitute after World War I, but did not become important because it was not entirely satisfactory and could not compete with the natural products imported largely from the Orient and tropical areas.

In 1924 an improved process was developed by J. K. Chowdhury (described in "Biochemische Zeitschrift" 1924, vol. 148, p. 85), avoiding the use of alcoholic solutions. Production on a commercial scale was delayed, however, by the small margin of profit and by technical difficulties. One of these is that the size of the apparatus required is large in relation to the output of the product (about 50 kilograms per cubic meter) and the process must be carried out in special alloy steel equipment.

Details of the process developed by F. Hoeppler in 1938 and applied on a large scale in the plant of the Gebrueder Haake in Medingen-Dresden, a center of German cosmetic production, are not available, since only parts of the process have been patented and others remain trade secrets. However, it is known that the process is basically similar to that developed by Chowdhury in 1924.

In the earlier laboratory method, about 1,100 grams of 40 per cent caustic-soda solution are allowed to act on 100 grams of ground-up cellulose for 3 hours at ordinary temperatures. Then 400 grams of monochloracetic acid are added, and the mixture is allowed to stand for 24 hours. The clear viscose solution is then precipitated with 2,000 cubic centimeters of alcohol and extracted for 16 hours with 80 per cent alcohol in a Soxhlet apparatus with reflux condenser. Further purification yields about 140 grams of sodium cellulose glycolate with a constant sodium content of about 6.3 per cent. The basic reaction occurs as follows:

$$C_6H_9O_4ONa+Cl.CH_2.COOH+NaOH= C_6H_9O_4O.CH_2.COONa+NaCl+H_2O.$$

The resulting product is a water soluble ether, although it has sometimes erroneously been called a cellulose ester.

For comparative purposes the 40 variations of sodium cellulose glycolate are tested in a Hoeppler viscosimeter, with viscosity of a 2 per cent solution at 20°C. in centipoise (the viscosity of water at 20° C. is taken as 1.00) being considered as a standard. Tests of various sodium-glycolate products on the market show viscosities ranging from 10 to 1,000 units centipoise. The viscosities of the non-homogeneous, colloidal solutions depend very largely on the state of degradation of the cellulose used in their preparation.

Whatever commercial value the new series of products has is based on the high viscosity of the solutions and on their power to gelatinize when diluted. Low-viscosity preparations are being used as textile dressing and finishing agents, while the medium- and high-viscosity products are used in making sizing, wall-paper paste, thickening agents, and employed in the preparation of emulsions.

In Germany the versatility and adaptability of these products is claimed to assure their continued use even after natural products such as agar-agar, gum arabic, and gum tragacanth are again available.

Heat-Resistant Plastic

A new formulation of Lucite molding powder to make plastic articles which will withstand much higher temperatures than those now made from thermoplastic powder, was announced a few weeks ago by Dr. G. M. Kuettel of the Plastics Department, E. I. du Pont de Nemours & Co.

Many articles molded from this new powder, Dr. Kuettel said, will not soften appreciably or distort when exposed to a temperature of 212° F., the boiling point of water. This is 30° to 40° F. above the useful temperatures for similar articles made from other commercial thermoplastic molding powders.

Airplane flying light lenses, dial and meter faces, medical and dental instruments, and airport and railroad signal light lenses are among the applications for which the plastic molding powder has been developed.

The high heat-resistant formula has approximately the same mechanical, optical, electrical and molding properties as the general-purpose Lucite molding powders, now used.

The new formula was developed for use in existing compression, injection and extrusion equipment. Best technique for molding this powder is said to require injection temperatures 30-50° F. higher than are used for regular 'Lucite.' However, it is advisable to employ the lowest temperature at which the die cavities will fill.

The new powder will be available in granular form for compression molding, and has all the temperature characteristics of the injection or extrusion powder. Most satisfactory compression results are obtained by using 20-50° F. higher mold temperatures than are required for general purpose 'Lucite.'

According to Dr. Kuettel good extrusion results are obtained by using a short screw and a low screw speed, preferably 5 rpm. or less. Stocks must be thoroughly dried. A moisture content not exceeding .02% is necessary for best extrusion results. Machine cylinder temperatures are from 30-50° F. higher than for general purpose 'Lucite.'

Another industrial use of Lucite, methyl methacrylate resin, was described in a recent release from E. I. du Pont de Nemours & Co., Inc. Electroplaters have found that Lucite is a durable and efficient material for the insulation of positive and negative anodes in chronic acid baths. It is claimed that this plastic stands up indefinitely in the acid, retains its shape and does not contaminate the plating solutions.

Plastic insulators are now used in the electrodeposition of chromium on steel, brass and bronze for military equipment. One aircraft manufacturer uses a five and one-half inch diameter tube of Lucite to protect struts in electroplating.

Flexible Rubber at Low Temperature

A new synthetic rubber material made from Ameripol which will retain its flexibility at very low temperatures has been announced by the B. F. Goodrich Co. It is claimed that the material is so flexible that it can be bent at an angle of 90 degrees at a temperature of minus 70 degrees Fahrenheit.

The new compound is being used in the construction of bolted tanks for storage of the high octane gas and aromatic fuels used in military aircraft.

In the construction of these tanks, made from sheet metal, sealing strips of the synthetic rubber 1¾ inches wide and 3/32 inch thick are placed at the points where the sheets are bolted together. Half-inch bolts are used to squeeze the synthetic rubber tightly between the plates, assuring a perfect fuel-tight seal.

Synthetic rubber of the highest solvent resistant type must be used in the construction of these seals, since the solvenizing attack on ordinary rubber compounds by the fuels is so severe.

Soap Extender

The Burkart-Schier Chemical Co. has developed a soap extender of interest to the textile industry. The new product is said to show excellent results when used in the fulling and scouring formulas of woolen and worsted mills. It is claimed by the company that the addition of this product wetting is faster and dirt, soil and grease are readily removed and held in suspension for quick rinsing.

A suggested formula for building soap stock with Burk-Schier PWT is as follows:

SUGGESTED BASIS

1 gallon	400 gallons
3 oz. Burk-Schier PWT	75# Burk-Schier PWT
3 oz. Soda Ash	75# Soda Ash
5 oz. Soap	125# Soap

Example—using 400 gallon tank.
Run in 100 gallons water
Turn on steam
Add 75# Soda Ash—stir until dissolved
Add 125# Soap—stir until dissolved
Turn off steam
Add 75# Burk-Schier PWT
Turn on cold water valve
Stir until tank is filled.

The above is merely a suggested formula and procedure. The amount of soap and alkali used depends on plant equipment, type of fabric and other conditions.

New Finish

A new type one-coat finish, called Silco, is being manufactured by the Mitchell-Bradford Chemical Co. The new product, formulated on an inorganic base is claimed by the company to be "remarkably resistant to abrasion, heat, and corrosion." It is offered as a protective coating for steel, brass, and chrome plate. It is applied by spray, dried for 5 minutes at 210°F. and baked 45 minutes at 350°F., after which it is said to withstand temperatures up to 1000° F.

Surface Active Agents

Two new surface-active agents have recently been placed in production by Commercial Solvents Corporation. Known as Aciterge-OL and Alkaterge-O, these substances are said to be unique in that they are stable in moderately acid solutions.

Aciterge-OL is designed to function as a penetrating, emulsifying, wetting and foaming agent and appears to be of particular value in the textile and leather industries.

Alkaterge-O is an oil-soluble material which is an effective emulsifying agent either as such or in the form of its fatty acid soaps. It is an oil-soluble dispersing and spreading agent and has found uses as a penetrating assistant for lubricants and oils used in the leather and textile industries. Since it has an alkaline reaction its use as an anti-corrosion agent is indicated.

NEW EQUIPMENT

Drop-Bottom Truck QC264

Engineers of The Union Metal Manufacturing Company, have developed a skid box that can be dumped satisfactorily with standard fork or high-life power trucks.

This new unit consists of an all-steel box, attached to a skid platform with a continuous hinge at one end. Steel plates are welded to the skid at a point equal to the length of the forks or platform on the power trucks to hold the skid in position at the end of the forks and prevent it from sliding back as the forks are lowered. Attached to the top rear of the box are latch rings which are hooked over a plate welded to the truck mast when the unit is being used.

In operation, the skid portion is entered with forks or platform of trucks, the box elevated and the latch rings attached. As the forks are lowered, the skid portion goes down while the box portion goes up, and the contents of the box are dumped in front of the unit. Spot dumping of materials is accomplished by the side plates which form a chute to keep the contents from spilling out the sides during the dumping cycle. These side plates may be extended up to the box top and a crane loop welded to each plate, allowing the unit to be handled by crane for transporting or tiering.

Line of D-C Vertical Motors QC265

A new line of direct-current vertical motors ranging from 40 to 200 h.p. at 1750 r.p.m., and in equivalent ratings at other speeds, has been announced by the General Electric Company. The new motors, which are furnished for both constant and adjustable speeds, are designed for low-thrust, solid-shaft applications on pumps, machine tools, and marine underdeck auxiliaries. They are also desirable in cases where valuable floor space must be saved or the expense of gearing avoided.

The motors are of dripproof, protected construction, providing protection from dripping liquids and falling objects. Convenient fittings on both the upper and lower bearings simplify lubrication, and provision for the escape of excessive grease reduces the possibility of overlubrication. A special bearing housing prevents grease from entering the motor and damaging the commutator and the windings.

The cast-iron conduit box can be arranged for bringing the leads in at the top, bottom, or either side. Two handhole covers, removable without the use of tools, permit inspection of the commutator end brushes. The ring-type base has an accurately machined rabbet and jig-drilled mounting holes, thus assuring permanent alignment with the driven machine.

Asbestos-Cement Pipe QC266

Easier and more economical installation, smooth walls which assure high carrying capacity by reducing friction to a minimum, and the elimination of electrolysis and tuberculation are among the advantages claimed for a specially fabricated form of asbestos-cement pressure pipe recently introduced by The Ruberoid Co., New York, for use in waterworks, drainage and irrigation systems and in many branches of industry such as chemical plants and pulp and paper mills.

The new product, called "Eternit" A/C pressure pipe, is created, according to the manufacturers, by a patented extrusion process which, in addition to providing density and strength, insures uniform measurements and extremely smooth surfaces, both inside and out, without machining. For this reason, it is claimed, the pipe can, when necessary, be cut in the field with a hack saw and be coupled immediately without the machine preparation ordinarily required at such joints.

Made from a mixture of asbestos fiber and Portland cement the pipe is not subject to rust. Being a non-conductor of electricity, it is unaffected by stray ground currents and may be safely laid contiguous to electric light and power lines without danger of galvanic corrosion, regardless of the type of soil or the extent of moisture present. Immune to tuberculation and other forms of internal corrosion frequently caused by various ingredients of the liquid carried, the pipe is said to maintain a full-sized smooth passage. It is made in standard lengths of 13 feet and in diameters up to and including 6 inches. For the present, the manufacturers state, it is available only in the Eastern seaboard states.

For a quick, convenient method of requesting additional information on these new equipment items, use the handy market data coupon on next page.

Steam Jacketed Strainer QC267

A new strainer for handling highly viscous liquids or liquids that are solid at room temperatures has recently been announced by the Blackmer Pump Company. Steam-jacketed strainers are used to maintain the liquid in the strainer at the same temperature as in the piping and were developed primarily to speed the handling of difficult liquids in war production plants. This new strainer has wide application in many of the process industries.

Standard capacities are 20, 50, 100 and 200 GPM. Pipe sizes 1, 2 and 3 inches. The 1" and 2" (50 GPM.) units have threaded pipe connections. The 2" (100 GPM.) and 3" units have flanged connections. Maximum operating pressure is 50 lbs. per sq. in. at temperature of 600° F. The jacket is suitable for 125 lbs. steam pressure.

The bottom and sides of the unit are completely enclosed in a steam jacket. Two inlet and two outlet ports are provided for steam line connection.

Magnetic Separator QC268

Stearns Magnetic Mfg. Co. has built a new Type "M" magnetic separator designed to operate on the principle of the Ball-Norton underfeed lift method.

This Type "M" separator is partially enclosed in a welded steel housing for the purpose of excluding any foreign materials from entering the separation process and can be furnished in various sizes and belt widths to suit customers' capacity and the separation desired.

In this magnetic separator a unique patented magnetic field is mounted above the lower surface of the separating belt. In operation the mixed material is distributed in an even layer by an automatic feeder to the feeder belt which carries the ore or other material into the magnetic field where the magnetic portion is lifted by the power of the magnet to the surface of the separating belt.

The alternating polarity characteristic of the magnetic field subjects the magnetically attracted portion of the material to a violent zigzag rolling movement which releases the entrained non-magnetic particles which drop back onto the feeder belt and move along to final delivery.

Since the separating belt runs faster than the feeder belt, the magnetic material spreads out over a greater area and by the active agitation the impurities or non-magnetic particles are sifted out, dropping onto the feeder belt and are discharged with the non-magnetic material.

Fire Extinguisher Valve — QC269

A new type of valve for carbon-dioxide fire extinguishers, known as the "Squeez-Grip," has been developed by engineers of the C-O-Two Fire Equipment Company.

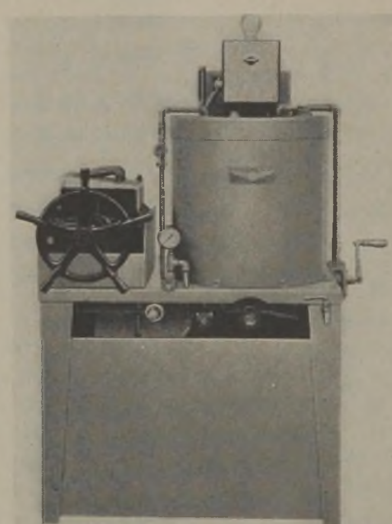
The new valve operates by a lever directly over the carrying handle of the extinguisher. By merely applying pressure, or squeezing, with one hand, the valve is opened and the gas discharged. On releasing the pressure, the valve closes and the gas discharge is cut off.

The valve can be opened and closed without setting down the extinguisher, which must be done when a handwheel type of valve is used. As the operator, carrying the extinguisher with one hand and holding the discharge horn in the other, can easily start or stop the discharge while in motion, there is no loss of time or gas while maneuvering around a fire.

On closing, the valve is forced tightly against its seat by the tremendous gas pressure in its own cylinder. There are no replacement parts, such as sealing discs, etc., and the valve does not have to be taken apart for recharging and reassembling after filling.

Oil Reclaimer — QC270

A small capacity lubricating oil reclaimer, designed for small plants and organizations having their own fleet of trucks and motor cars, is now being manufactured by the Youngstown Miller Company. In addition to reclaiming lubricating oils of a motor fleet, this reclaimer can usually handle a limited quantity of waste lubricating oils drained from equipment used in the plant or manufacturing processes of these companies.



With a capacity for purifying eight gallons of dirty oil in 70 to 90 minutes, this will handle 2500 gallons of waste lubricating oil per year when operated only once a day. It is pointed out that based on average prices for the new oil, the reclamation of this quantity will generally enable the machine to pay for itself in six to twelve months.

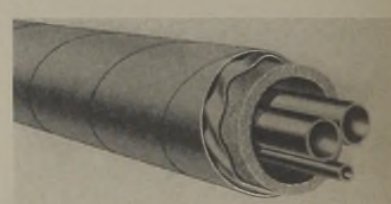
This machine has a two-stage filter press, is semi-automatic, operating under thermostatic control, and utilizes common refinery earths available on the open market. It has a capacity for purifying eight gallons of dirty oil in 70 to 90 minutes.

Close Clearance Pump — QC271

The McGowan Pump Division of the Leyman Manufacturing Corp. has designed a close clearance pump said to incorporate certain advantages. The Fluid End is designed for 400 lb. Suction Pressure and 600 lb. Discharge Pressure. It incorporates also, especially deep stuffing boxes and ample studding. Optional equipment includes water jacket stuffing boxes and priming valves. The steam end has been designed for 250 lbs. pressure. A bypass arrangement permits low throttling.

Insulated Conduit — QC272

With this new system, process liquids can be piped comparatively long distances with desired temperatures maintained. Any specified combination of pipes can be furnished in a pre-fabricated conduit, with insulation so arranged that pipes are insulated from the exterior, but not from each other. Conduit is helical corrugated, coated and wrapped with asphalt saturated asbestos felt. Assembled units come in 21 foot lengths. Prefabricated connecting bands, expansion devices and all accessories required for a complete system are included.



This new system is adaptable to underground or overhead installations, and equally efficient for hot or refrigerated process liquids of all kinds. A steam or hot water line may be used to heat liquids in other lines.

A tile system, based on the same principle is also available—with a diatomaceous earth lining molded and keyed to the inside of the tile. The tile is adaptable to underground installation only.

Dust Collector — QC273

A new portable dust collector known as the Bargar "Safe-Aire" has been developed by the Bargar Sheet Metal Company to provide a simple, flexible and inexpensive dust-collection system for plants where dust control is needed. It can be used either to supplement larger, permanent dust-control systems, or to serve in place of such systems when necessary.

Its basic use is to collect dust from a single grinder or other dust-making ma-

CHEMICAL INDUSTRIES MARKET DATA SERVICE

Chemical Industries, 522 Fifth Ave., New York, N. Y. (7-3)
Please send me more detailed information on the following new equipment.

QC264	QC267	QC270	QC273	QC276
QC265	QC268	QC271	QC274	
QC266	QC269	QC272	QC275	

Name .... **(Position)** ....

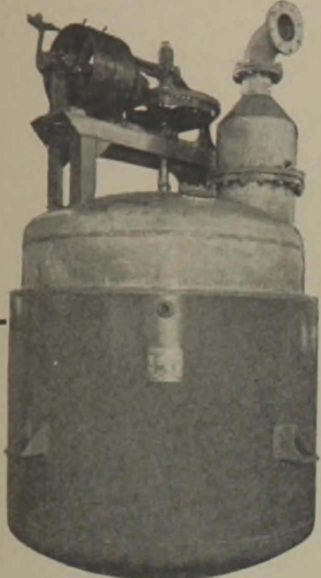
Company ....

Street ....

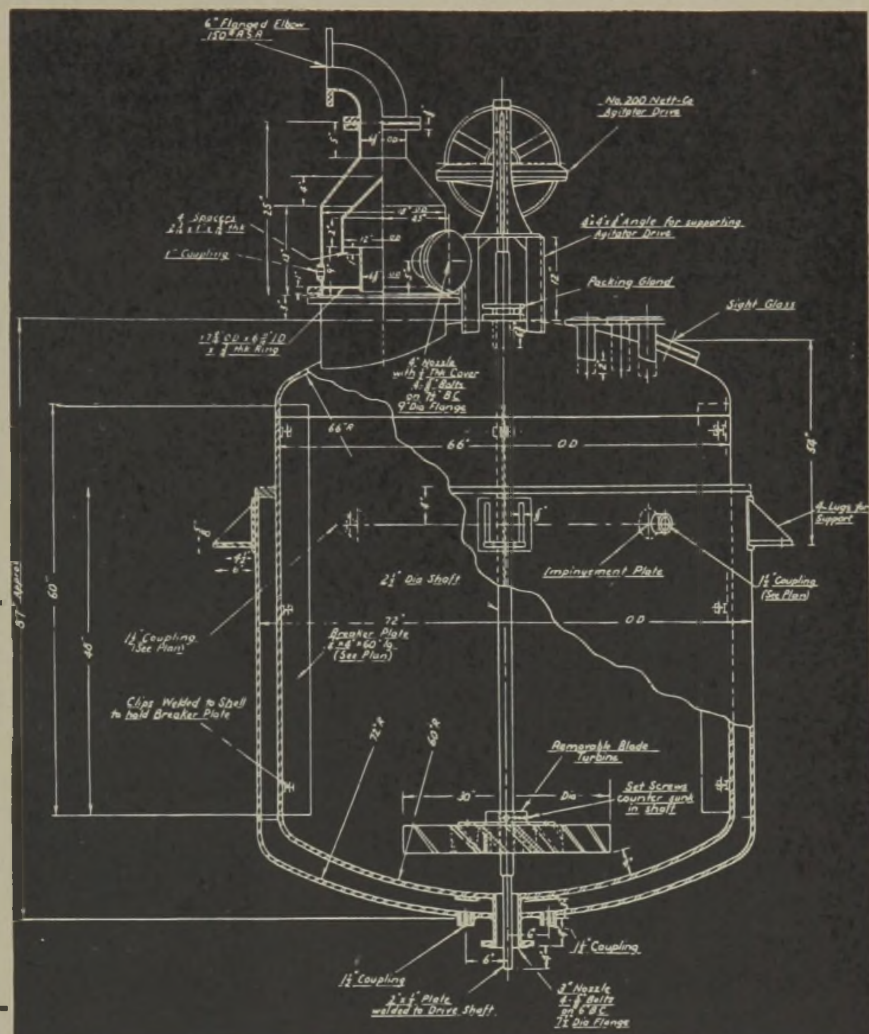
City & State ....

FABRICATED OF STAINLESS STEEL

—to withstand the destructive action of corrosive chemicals



PATTERSON STEAM-JACKETED MIXING KETTLE—A special type jacketed kettle fitted with a turbine-type mixer, constructed throughout of No. 316 stainless steel — including all metal in contact with contents of the kettle. Shell and heads constructed of stainless steel ⅝" thick. Steam jackets of carbon steel. Built for a working pressure of 75 lbs.



A. S. M. E. APPROVED DRAWING OF KETTLE ILLUSTRATED ABOVE—This type of kettle may be adapted to straight mixing, or to a combined mixing and simple distillation problem. The vapor-dome is ideal for separating entrained moisture from a distillate vapor.

EST. 1880

PATTERSON-KELLEY · HEAT EXCHANGE ENGINEERS

THE *Patterson-Kelley* CO., INC.

113 WARREN ST., EAST STROUDSBURG, PA.

MANUFACTURERS FOR THE REFINING AND PROCESS INDUSTRIES chine, separate the dust from the air, and blow the clean air directly back into the shop. It will normally handle the dust from two 9" grinding wheels, whether they are mounted together or separately, and it can be attached to two separate machines.

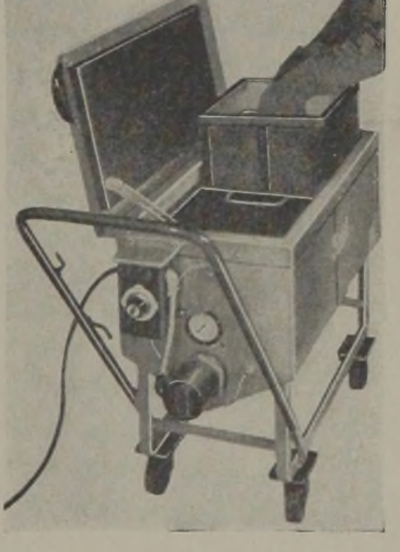
It has a capacity of 600 c.f.m., and one of its most important advantages is that it does not exhaust any air from the shop, but returns it approximately 97 per cent clean and slightly warmer than before.

The unit is simply designed. It sucks the dust-laden air from a grinding wheel, buffing wheel, or other dust-making tool, and forces it at high speed into a miniature cyclone which precipitates the heavier dust into a hopper and throws the lighter dust into a filter chamber. The air is then forced through a spun glass filter directly back into the shop. The filters, which are standard size, are the only parts of the machine which require periodic replacement.

Tests are said to have shown that this dust collector will efficiently pick up such light dusts as flour and finely powdered soap, as well as heavy ones like steel filings or coarsely granulated rubber.

Degreasing Tank QC274

Cleaning and degreasing of metal parts and products is readily accomplished with the Dipmaster, Jr., a portable, insulated, electrically heated dipping tank, according to its manufacturer, Aeroil Burner Company, Inc.



Holding 12 gallons of solution, which is its normal capacity or 15 gallons maximum, the tank is equipped with a heating element located inside on the bottom of the tank where it is completely submerged. Thus, there is no gap to jump between the heating element and the liquid itself. Average heating time from a cold start to boiling point (212° F.) is 1¼ hours.

Standard equipment furnished with the Dipmaster includes two dipping baskets, in which the parts are placed, each measuring 11¾" long x 11¾" wide x 8" deep; a bi-metal type thermometer registering a temperature range of 100–600° F. and a thermostatic control of the rigid, shockproof type, equipped with a dial and knob to shut off the heating element manually and to maintain automatically any desired temperature between 100–550° F.; also a drawoff cock for emptying the tank.

Polymerization Control QC275

This new instrument, shown in the drawing below, incorporates in a single instrument all the equipment needed to automatically control the temperature in polymerizers used for polymerization of butadiene and copolymers such as styrene or acrylonitrile.

The instrument automatically controls the complete polymerization process, including the heating and cooling cycles and is designed to eliminate overshooting of the control point as the temperature reaches the control setting as well as control the temperature at the desired value during the reaction cycle.

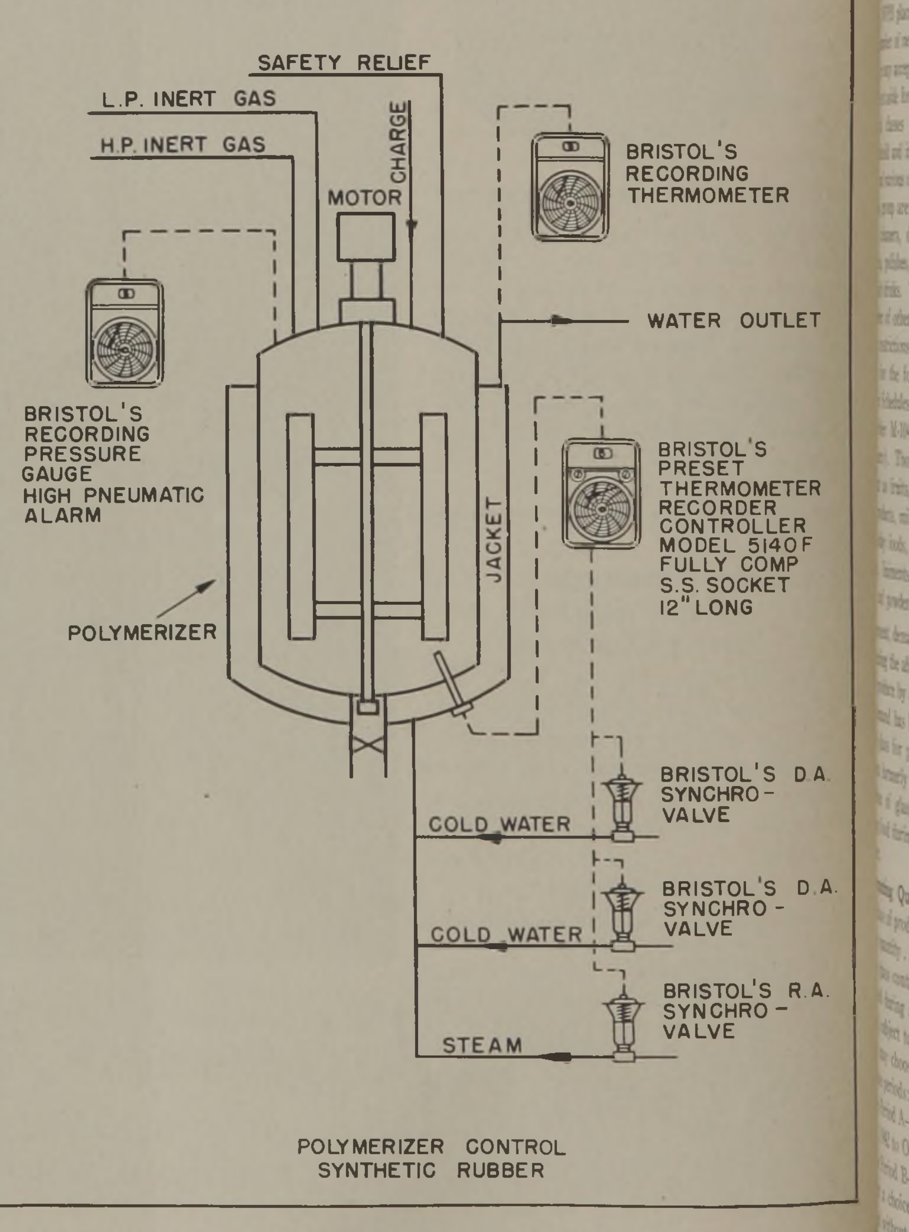
The instrument is a recording air-operated controller designed particularly for polymerizer reactors.

Fire Protection Pump QC276

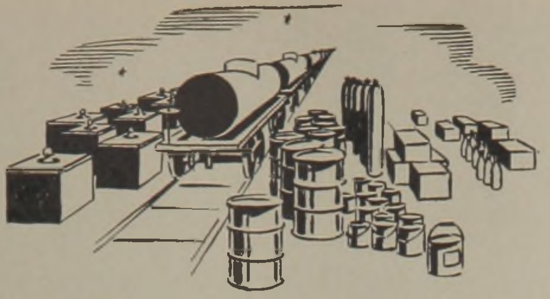
In order to achieve a hand-operated pump of greater capacity and higher pressure than the so-called "stirrup pump," engineers of the Blackmer Pump Co. have developed an adaptation of the standard barrel-mounted rotary hand pump for use as an auxiliary fire pump.

The pumps are self-priming and are made in capacities from 7 to 25 GPM. These units will develop adequate pressure for a 25 to 30 ft. stream of water.

Installation of these pumps has, according to present information, been confined to plant roofs, since it is assumed that standard chemical fire extinguishing equipment is adequate for inside fires.



POLYMERIZER CONTROL
SYNTHETIC RUBBER



PACKAGING & CONTAINER FORUM

Quota System for Glass Containers Set Up

Steps were taken by the War Production Board recently to restrict certain demands for new glass containers to assure an adequate supply of containers for foods and drugs during the peak packing season this summer.

Under Order L-103-b, effective July 1, 1943, WPB places a four-month quota on the number of new glass containers which a user may accept, have manufactured, or have set aside for his account for packing several classes of specified chemicals (household and industrial supply), beverages and various other products. Included in this group are such products as adhesives, cleaners, dyes, ink, photographic supplies, polishes, beer, distilled spirits, and soft drinks. The quota is subject to a number of other related restrictions.

The restrictions do not apply to containers for the food and drug products listed in Schedules I and II of Conservation Order M-104 (Closures for Glass Containers). Those listings include such products as fruits, vegetables, meat and meat products, milk and dairy products, soups, baby foods, rubbing alcohol, blood plasma, liniments, lotions, ointments, soaps, and powders.

At present, demand for glass containers is exceeding the ability of the glass industry to produce by more than 20 per cent. This demand has been stimulated by the use of glass for packing the number of products formerly packed in tin. Large quantities of glass will be needed for packing food during the peak season, this summer.

Computing Quotas: The quota for each class of product is a percentage of a base quantity . . . the number of new empty glass containers and metal cans accepted during a previous 1942 base period, subject to certain adjustments. Users may choose one of two following base periods:

Base Period A—The four-month period July 1, 1942 to October 31, 1942.

Base Period B—The full year 1942.

After a choice is made, it cannot be changed without WPB authorization. If a user chooses the full 1942 year, he then divides his 1942 acceptances by 3 to convert the quantity to an average four-month quantity.

Brewers and bottlers who accepted non-returnable bottles (single-trippers) during the base period may include only 5 per cent of the number of such bottles in computing their base quantities. The quota for any class of products may be used for any or all products in that class.

The product classes and quota percentages are as follows:

Class No.	Class of Product	Quota 1/ Percent of Base Quantity 2/
I	Chemicals, Household and Industrial Supply (Listed on Schedule II of Order M-104)	80
II	Beverages (Defined on Schedule IV of Order M-104)	65
III	All other products (except those listed in Schedules I and II of Order M-104, and those designated under class IV below)	65
IV	Products designated by WPB	3/

1/ Permitted acceptances during four-month period from July 1 through October 31, 1943, inclusive.

2/ The number of empty new glass containers and metal cans accepted during Base Period A (July 1, 1942-October 31, 1942), or one-third of the number accepted during Base Period B (January 1-December 31, 1942). Brewers and bottlers may include only 5 per cent of the single-trippers accepted.

3/ To be designated by WPB.

$1,000 Minimum Quota: Any user may accept a minimum quota of $1,000 worth (cost price) of empty new glass containers for all classes of specified products for the entire quota period. This provision is for the benefit of the small user.

Special July-August Restrictions: During July, a user may not accept more than 35 per cent of his quota for any class of specified products. During August, he may not accept more than 60 per cent of his quota, minus the number of containers he accepted against his quota during July. During September and October, he may accept the remainder of his quota. If the amounts permitted for acceptance during either July or August are less than a carload, he may accept up to a carload during that month, provided that it is within his quota. This provision does not increase the total quota in any way.

Special Quotas for Beverages: A special quota may be assigned by WPB to any brewer who has an unduly small quota, because the new containers he accepted during his base period were principally non-returnable bottles. In computing quotas, only a 5 per cent allowance is made for non-returnable bottles, because a returnable bottle will be used a number of times. WPB has made a conservative allowance of 20 trips to the life of a returnable bottle. Therefore, a returnable bottle does the work of at least 20 single trippers. This special quota is designed to take care of approximately 20 brewers who, during 1942, purchased chiefly non-returnable bottles, but who now are purchasing returnable bottles. Under Order L-103, single-trip bottles may be used only for export shipment.

Quota Exemptions: The following quota exemptions are provided:

1. Exemption, except for beverages: A user may accept, quota free, any containers used for delivering any class of products, except beverages, for delivery to the armed forces, Lend-Lease, American Red Cross, post exchanges, or other specified agencies.

2. Exceptions for beverages: A user may accept, quota free, the following portion of the number of new or used bottles used, or to be used, during the quota period for delivering beverages to these agencies:

(a) Full amount for export.

(b) 5 per cent of the full amount for use or distribution within the continental United States.

Use of Large Sizes: A user may not accept delivery of more than one-half gallon or larger class containers for packing any class of products than he accepted during the period, July 1, 1942 to October 31, 1942; or one-third of the number he accepted during the period January 1, 1942 to December 31, 1942, if he has chosen that period as his base period.

In addition the total capacity of new glass containers accepted by a user for packing any class of product may not exceed 140 per cent of the total capacity of containers accepted for that product in his base period. Capacity must be computed in terms of gallons or pounds, whichever is the customary measure for the particular class of products.

Other Provisions: A user having more than one plant has the option of computing and applying a separate quota for each plant.

The order does not apply to any empty new containers placed in transit to the user prior to July 1, 1943, even though they are received by him on or after July 1.

Acceptances under this order are also subject to the 60-day inventory restrictions of Order L-103-a.

Container Price Adjustment

A change in OPA pricing provisions designed to permit producers of wooden container materials, particularly those used in the manufacture of cooperage products, to increase their prices under certain limited circumstances, was announced recently by the Office of Price Administration.

The producer of any wooden material subject to the General Maximum Price Regulation which is to be used in manufacture of a container principally of wood and also subject to the General Maximum Price Regulation, may apply to OPA for an adjustment of prices under the following conditions:

1. When the unit cost of producing the material is higher than the maximum price permitted by the General Maximum Price Regulation.

2. When the War Production Board has designated as essential both the container for which the material is to be used, and the product to be packaged.

3. When the buyer of the material has stated he will not use the increased cost as the basis for making an increase in the maximum price of his own products, or for resisting otherwise justifiable decreases in his maximum prices.

To permit such adjustments, OPA has issued Amendment No. 7 to Supplementary Regulation No. 15 to the General Maximum Price Regulation. The Amendment became effective July 6, 1943.

Under the amendment, OPA will issue orders authorizing price adjustments to producers of wooden materials going into container manufacture, such as veneer used in the manufacture of staves for kegs and barrels, where justified.

Can Restriction Eased

An amendment to Conservation Order M-81 announced June 7 by the War Production Board increased the varieties and quantities of products other than food that may be packed in cans during 1943.

Extension of the order applies to twelve non-food products as shown in the table below.

Product	1943 packing quota Percent of 1942	Sizes	Can materials: Body	Can materials: Ends
Anilin	100	5-lb.	1.25 tin	1.25 tin
Chromium trioxide	100	25-lb.	Blackplate[1]	Blackplate
Creosote	100	1-gal.	SCMT[2]	Blackplate
Cyanides, calcium, potassium, sodium, and mixtures[3]	100	1 lb. / 2½ lb.	SCMT	Blackplate
Ink, spirit anilin and rotogravure	100	5 gal.	SCMT	SCMT
Phenol	100	5-gal.	1.25 tin or frozen	charcoal tinplate
Phosphoric acid, meta, sticks	100	25-lb.	Blackplate	Blackplate
Potassium hydroxide	100	25-lb.	Blackplate	Blackplate
Potassium permanganate	100	5-lb.	1.25 tin	1.25 tin
Potassium sulfide	100	25-lb.	Blackplate	Blackplate
Sodium sulfide	100	25-lb.	Blackplate	Blackplate
Zinc chloride	100	25-lb.	Blackplate	Blackplate

[1] Includes chemically treated blackplate (CTB).
[2] Special coated manufacturers' terneplate.
[3] Includes cyanide-chloride mixtures.

Burlap Situation Eased

The number and quantity of products which can be packed in new burlap bags is increased under the terms of Conservation Order M-221, as amended recently by the War Production Board. This reflects an improvement in the supply of burlap and, in addition, the availability of heavy-weight burlap. Heretofore, only light-weight burlap has been available for bag making.

Under the amendment, flour, petroleum waxes, and stearic acid (cakes or slabs) are permitted, for the first time, to be packed in new burlap bags. At the same time, more new burlap bags are allowed for packing processed feed and seed and grain.

Alternate Prices for Glass Containers

The Office of Price Administration has set up an alternate series of dollars and cents maximum prices for manufacturers of wide mouth glass containers.

The alternative ceilings, set up for Eastern and Western areas, reflect maximum prices prevailing in the industry before the effective date, May 27, 1943, of the rollback brought about in manufacturer's prices by the regulation. The alternative ceilings are about 5 percent higher for Eastern sales, and 7½ percent higher for Western sales—which is identical to the amount of the rollback.

Only plants which can prove hardship under existing maximum prices established in maximum price regulation No. 382 may qualify for the higher ceilings.

Anti-Freeze Containers

Limitation order L-307, issued June 26 prohibits the use of any new containers of less than five gallon capacity for packaging any anti-freeze other than glycol anti-freeze. The order also states that "No person shall manufacture, sell or deliver any new container having a capacity of less than five gallons which he knows, or has reason to believe will be used for commercially packing any anti-freeze other than glycol anti-freeze."

The order does not prevent any person from completing the sale or delivery of any containers which were in transit to the user on June 26, nor shall it prevent any person from accepting or using any container which was in his hands or in transit to him on that date for the packaging of anti-freeze other than glycol anti-freeze.

The order shall not prevent any person from manufacturing, selling, purchasing, delivering, accepting delivery of, or using any container for packing any anti-freeze to be delivered to or for the account of the Army, Navy, Marine Corps, Maritime Commission, or War Shipping Administration of the United States.

Paper Sacks Order Issued

Paper shipping sacks for packing foods, plaster, seeds and other specified products now are controlled by Limitation Order L-279, issued June 11 by the War Production Board, instead of Order M-221.

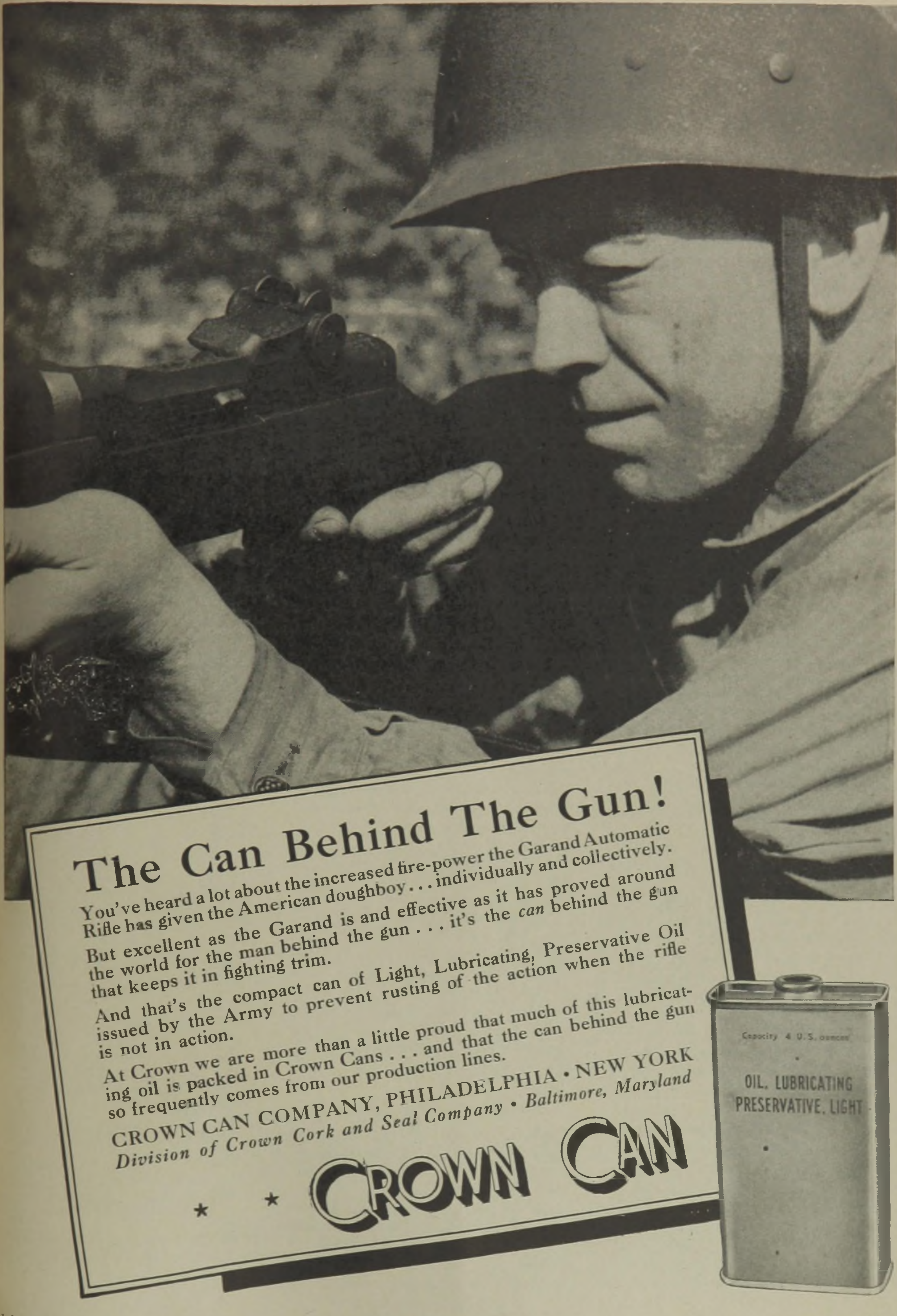
The restrictions under L-279 are the same as those previously imposed by M-221, except that the 3-pound sack for sugar is no longer permitted. M-221, also amended recently, previously covered these restrictions in both textile and on paper shipping sacks. Corresponding restrictions on textile bags are still retained in M-221, except that the 3-pound textile bag for sugar is no longer permitted.

This move was taken to separate the paper shipping sacks from the textile bags in anticipation of the establishment of specifications and other restrictions for paper shipping sacks. A study of paper quality requirements was recently completed by a group of technicians from the paper sack industry collaborating with the U. S. Bureau of Standards. The results of the study are being considered by the Containers Division, WPB.

Tung Oil Restricted

The quantity of tung oil to be made available during the next twelve months for the manufacture of metal food containers has been reduced by the War Food Administration and the War Production Board. Castor and treated linseed oils will be used as replacements. For the current quarter—July, August and September—the new tung oil quota is 85 percent of that used in food container enamels and lacquer during the same quarter of 1942.

The quota for October, November and December, will be 70 percent; and that for the first and second quarters of 1944 will be 50 percent. A full 100 percent of pre-war use previously has been allowed. WFA said replacement possibilities will be considered in all future allocations, with due allowances for necessary adjustments, and urged tung oil substitutes as extensively as possible in any use where practical.


The Can Behind The Gun!
You've heard a lot about the increased fire-power the Garand Automatic Rifle has given the American doughboy . . . individually and collectively.
But excellent as the Garand is and effective as it has proved around the world for the man behind the gun . . . it's the *can* behind the gun that keeps it in fighting trim.
And that's the compact can of Light, Lubricating, Preservative Oil issued by the Army to prevent rusting of the action when the rifle is not in action.
At Crown we are more than a little proud that much of this lubricating oil is packed in Crown Cans . . . and that the can behind the gun so frequently comes from our production lines.
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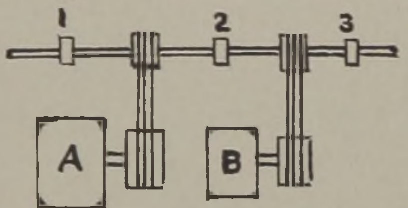
PLANT OPERATIONS NOTEBOOK

By W. F. Schaphorst

Motor Shafting Arrangement

The sketch below shows how a more efficient method of power transmission to a miscellaneous assortment of driven machines was worked out for a New England concern. Power is transmitted through a main shaft which is cut close to its center in three places and equipped with friction clutches at each cut. The cuts are about 4 ft. apart. For convenience call the couplings, or cuts, 1, 2, and 3, as indicated in the sketch.



The shaft is driven by two electric motors, motor A having twice the capacity of motor B. Motor A is connected through multi-V-belts between couplings 1 and 2 to a clutch-equipped sheave. Motor B is likewise connected between couplings 2 and 3. Both motors are used when all machines are operated simultaneously, all friction clutches being "thrown in." But when only a few of the machines are needed, the shafts are connected and disconnected in the manner most suitable to highest efficiency. The unused machines, which are operated through countershafts, are disconnected or "thrown out."

Highest efficiency is therefore attainable nearly all the time with three different combinations: Motor B alone when minimum power is required; Motor A alone when twice as much power is required; and A and B together when three times as much power is required. Should only one section of the shaft be needed when requirements are slack, either motor can do the driving regardless of the location of the load.

Flow From Open Pipe

One of our readers on the Pacific Coast has written to us as follows:

"The method for quickly computing the volume of flow from an open horizontal pipe, as published on page 480 of the April 1943 issue of Chemical Industries, was especially interesting to me because of its applicability to certain oil field problems with which I have been concerned.

"In the item just referred to I believe there is a typographical error in that the volume of water in the example given should be 40.96 gallons per minute instead of 44.96 gallons per minute. Also I have gone through the derivation of your formula and consistently obtain a value of 2.83 for the constant, for which you show a value of 2.56. I wonder if you would be so good as to jot down roughly your derivation of this value so that I may find my error. Results calculated by your formula run approximately 10% below those calculated using the constant 2.83, and I fear that I have made some error larger than the error that might be introduced by rounding off figures."

The reader is right. 40.96 gallons is correct. Just how the figure 44.96 crept in we do not know as the writer's copy shows 40.96, so it must be typographical.

Our reader's constant, 2.83, is correct for "perfect" water flow. In the June 1942 issue of *Power Plant Engineering*, page 79, there is a short item on this same subject in which the author of that item gives the constant as 2.84. But flow of water is not perfect, and for that reason the theoretical formula should be multiplied by a constant for general service and this writer has found through experimentation that multiplying by 0.90 gives a figure that seems to be best for general service.

In this writer's derivation he, too, obtained the figure 2.84 which, when multiplied by 0.90, gave him 2.56.

Inasmuch as the above experiments were with water it is safe to say that 2.56 will not be strictly correct when applied to oil. For rough work it will probably serve the purpose, but where considerable accuracy is wanted it is suggested that some tests be made for the determination of a coefficient that will be unquestionably applicable.

Locating Pipe Leaks

When a concealed pipe leaks steam, air, water, etc., and you want to locate the leak at minimum expense, here is an excellent method:

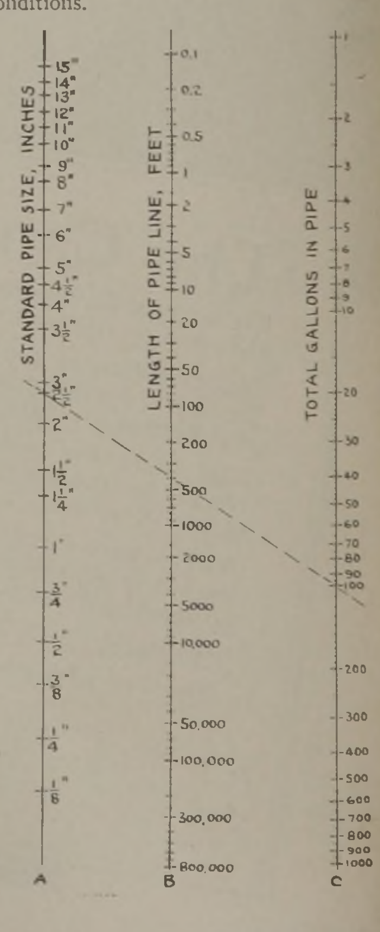
Fill the pipe with water—until it overflows. Close all of the halves which hold the water against gravity. Then do nothing for a number of hours, possibly over night, depending upon the size of the leak and the rate at which the water level in the pipe drops. In other words, allow as much water to leak out as *can* leak out.

Then, next morning, or at a suitable interval, using a calibrated can, fill the can with water and pour it rapidly into the pipe. One can full may not be enough. Two cans full may not be enough. Pour until the pipe is filled flush with the top, without allowing any overflow. Make note of the exact amount of water poured into the pipe, which is very important.

Multiply the inside diameter of any pipe in inches by itself, then multiply by 0.7854, and divide the result into the number of cubic inches of water poured into the pipe. The quotient is the distance to the "trouble spot" in inches. One can easily determine the number of cubic inches of water poured into a pipe from the fact that one U. S. gallon contains 231 cubic inches.

By this means leaks can be located with amazing accuracy resulting in minimum cost for repair work where the piping is concealed. And the same method is often applicable to pipes that are stopped up. You can readily calculate the "point of stoppage."

To assist in determining the number of gallons in any pipe, here is a handy chart. This writer does not know of any table that gives such values and where volumes are to be found they are usually given in cubic feet. Besides the range of a table is seldom great enough to cover all conditions.



The chart includes more than average conditions. It takes care of all of the standard pipe sizes from ⅛ inch to 15 inches in Column A, and any length of pipe from 0.1 foot to 800,000 feet in Column B. Column C shows volumes from 1 to 1,000 gallons. This is great enough to take care of nearly any condition.

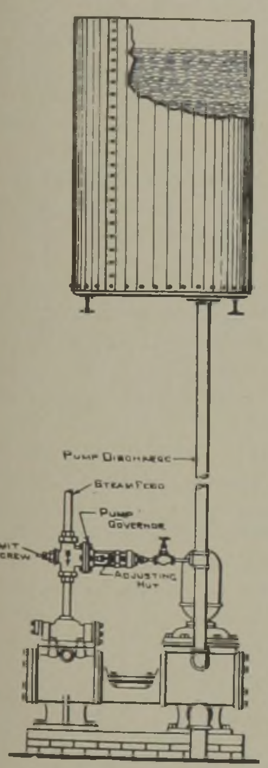
To use the chart simply run a straight line through the pipe size (Column A) and the gallons of water poured into the pipe, Column C, and the intersection in Column B immediately gives the location of the trouble spot.

For example, the dotted line drawn across this chart shows that if the pipe size is 2½ inches (Column A), and if 100 gallons of water are poured into the pipe (Column C), the trouble spot is 400 feet away, Column B.

Inversely if it is desired to know the number of gallons in any length of pipe line, or the size of the pipe necessary to hold a given number of gallons within certain limitations of length, the chart may be conveniently applied. In other words, knowing two factors in any two of the three columns, the unknown in the third column is quickly found.

Water Level Without Floats

Regulating devices are now being made so sensitive that floats, float valves, indicators, etc., may be dispensed with in maintaining water level in a tank. The accompanying sketch shows how it is done. A pump governor controlled by the



water pressure in the pump discharge pipe opens and closes the steam line to the steam end of the pump as the water in the tank rises and falls. After the pump governor is once adjusted to close the steam line at a given pressure it automatically maintains the desired water level in the tank.

Removing Boiler Slag

Steam is commonly used for removing hot slag which forms and bakes into the lower row of tubes of water tube boilers. Steam is *safe*, but careful experimentation has demonstrated that cold water is more effective for the removal of hot slag. The reason for the breaking up of the hot slag with cold water is the same as the reason for the breaking up of hot dishes and glassware when suddenly cooled. The cold water causes the slag to crack and fall off in large pieces.

In these tests it was also found that freeing of the tubes of slag increases the chimney draft, helps maintain higher efficiency, and saves much money due to the time previously required for laying up and cleaning boilers. Now the cleaning is done while the boilers are in operation. During the cleaning process the temperature of the flue gases was reduced approximately 15 degrees F. The cold water was introduced into the boiler by means of an old-fashioned hand lance.

To be sure it is important to exercise care in the handling of the cold water so that it will not touch the furnace walls. Cold water on a hot wall will crack the wall as readily as it will crack the slag. Be sure to confine the water to the slag only.

How To Maintain Oil Circuit Breakers

By N. P. Wilson

Engineering and Service Department
Westinghouse Electric and Manufacturing Company

TO prevent costly failures and delays in operation, it is important for the starting breaker to function properly when an emergency arises. To accomplish this reliability, it is necessary that the breaker receive periodical thorough inspection and maintenance.

Motor starting, oil circuit breakers are designed for general starting service. When properly applied they protect the motor from overloads, short-circuits and guard against the sudden application of full voltage to the motor after it has come to rest.

Frequency of Inspection Varies with Duty

The frequency of inspection and maintenance depends upon the severity of the duty which the breaker must perform and the condition of operation. Usually a light monthly inspection with a thorough inspection and maintenance semi-annually should be satisfactory. However, in some cases breakers operating under very active and severe service may require more frequent attention. Other breakers that operate infrequently, and under less severe duty, will naturally require less attention. The frequency of inspection will be largely determined by experience.

Ten Points to Check for Proper Maintenance

1. Before making any adjustment to an oil circuit breaker, make sure that all lines leading to it are electrically dead.
2. Be sure the breaker frame is grounded.
3. Do not operate the breaker excessively by the electrical operating mechanism when the oil tank is removed.
4. Examine all contacts frequently, especially after severe short circuits, to see that contacts are properly aligned. Dress or replace contacts that are burned.
5. After making adjustments, test the breaker by hand to make sure that it operates smoothly and correctly.
6. Inspect the oil regularly and after severe short-circuits. If it shows signs of moisture, carbonization or dirt, filter and retest it before replacing it in service. See that the oil level in the tanks is maintained at the proper height.
7. Remove all oil and thoroughly clean the tanks, tank liners, lift rods, and terminal bushings at least once a year.
8. Thoroughly inspect all bolts and nuts; tighten if necessary. Inspect all pins, links and bearings for excessive wear. Check all cotter pins.
9. Dielectric tests of the oil should be made every three months, to show if it is reasonably good for circuit breaker work. Samples should not be taken until the oil has remained undisturbed for at least four hours. If testing for indication of water, take the sample from the bottom of the tank. For indication of carbon and after a heavy short-circuit, take the sample from the surface of the oil.
10. Arrange for regular inspection to see that the circuit breaker is in adjustment, the oil of good quality, and the complete breaker functions as required.

THE LABORATORY NOTEBOOK

Glass-Covered Immersion Heater

Faced with the problem of keeping large amounts of acid under constant temperature and without a jacketed thermo-regulable kettle being available, J. H. Burrows and M. Reiss, according to their account in *Chemistry & Industry*, decided that the only possibility was to use immersion heaters. A suitable instrument was almost unobtainable, partly due to war conditions, partly because of the fact that heaters, claimed to be completely acid-resistant, are not entirely so when metal-covered and will thus contaminate the solution and deteriorate in time. Therefore, an immersion heater was constructed with a glass-covered heating element, which proved most satisfactory for a variety of purposes. It has been continually used during the last three years in the Endocrinological Laboratory of the Burden Neurological Institute. A detailed description is given below (see Fig. 1).

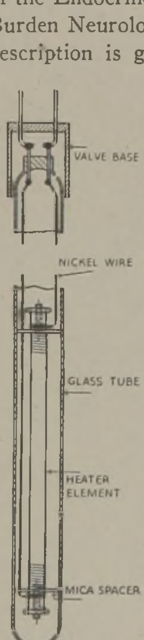


Fig. 1

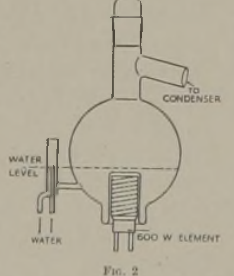


Fig. 2

An ordinary 1-kw. bar type fire element was supported centrally in a Hysil glass tube about 50 cm. long and 35 mm. outside diameter, by means of mica spacers attached to each end of the element by the terminal nuts which are usual on this type of heater bar. These nuts also secured the two input leads, which were of 1.5-mm. nickel wire straightened by stretching. The mica spacers were shaped like a safety-razor blade with a single central hole, in order to allow the lead to the bottom of the element to pass its points of support. Small porcelain beads were threaded on each lead to prevent possible electrical short circuits. The leads were taken through the glass by means of a tungsten wire pinch seal, the tungsten being brazed to the nickel and copper wires brazed on the outside. It was found advantageous to attach these copper leads to two pins of an ordinary four-pin valve base which was joined to the glass by a bakelite cement such as is used by valve manufacturers. A small hole was made near the pinch seal to prevent any rise in pressure inside the glass tube during use. It was found that providing the element was kept completely immersed in the liquid during use and allowed to cool somewhat before removing from the liquid a reasonable life was obtained.

Experiences with this immersion heater led to construction of an electrically heated distillation apparatus for glass-distilled water which has proved very useful. The still (Fig. 2) was made with Hysil glass using a 2-litre flask as the boiler. Into the bottom was sealed a piece of wide tubing closed at one end, into which the heater element fitted loosely. This was a 600-watt fire element such as is supplied for bowl type fires. The feed water was introduced through a constant-level device, sealed on to the side of the flask, and the water level (shown by dotted line in the diagram) was arranged to cover the tube carrying the heater element. A condenser (not shown) was attached to the side arm on the neck of the flask.

Detection of Phenolic Resins

Test which will differentiate between straight and modified phenol resins is described in current issue of *The Chemist Analyst*. According to Paul Von Stein, rosin, ester gums, natural or nonphenolic resins do not interfere as they do not give any reaction with the reagents employed.

Small quantity of the resin under investigation is dissolved in carbon tetrachloride, and a small portion of this solution is placed on a spot plate. An equal volume of a saturated ethereal solution of uranium nitrate is added and the solutions are thoroughly mixed. After standing for several seconds, a few drops of concentrated NH_4OH are added. The color develops instantaneously if phenolic resins are present. Straight phenolic resins give deep colored reactions with a smooth unbroken appearance, while modified resins give colors ranging from yellow to coffee brown with a curdy appearance. Nonphenolic resins develop pale straw colors. Investigation shows that the intensity of the color produced is dependent upon the concentration of the resin. Listed below are several resins with their characteristic colors.

Bakelite	deep reddish brown, smooth surface
Kessler	deep reddish brown, smooth surface
Beckacite	deep reddish brown, smooth surface
Paranol	coffee colored, smooth surface
Amberol	medium yellow to coffee colored, curdy
Glyptal	pale straw

Continuous Nitric Oxide Test Board

H. Emmons, chief chemist, reports that in the manufacturing plant of Boston Consolidated Gas Co. it was found necessary to have a nitric oxide test board in operation from 8 to 72 hours. This was done using the Shaw test board with special absorbing tubes. Three types of absorbers were selected for this work. A Widmer spiral absorber, a common glass column filled with glass helices, and a modified Shaw absorber.

The modified Shaw absorber is similar to the design of the standard Shaw absorber except that the capacity has been increased from 20 ml. of solution to 80 ml. of solution. This absorber can be used for as long as seventy-two hours on a gas having a nitric oxide content of from 0.01 to 0.5 g./MMCF. The higher the concentration of nitric oxide, the shorter the period that the test can be made.

The Widmer spiral and column using glass helices is used on gas of high nitric oxide concentrations. Concentrations range from 0.5 to 50 g. of nitric oxide per MMCF. These absorbers are connected to the Shaw test board in the following manner:

A two liter aspirator bottle having an Elliot seal so as to maintain a constant head, is used to store the absorbing reagent which may be either Greiss reagent or metaphenylene diamine. This reservoir is mounted above the test board. Connected to the outlet of the bottle is an orifice, calibrated to yield 40 ml. of solution per hour. This is connected to a side arm open tube which is joined by a stopper to the absorber. The side arm on the tube serves as a gas outlet. On the lower end of the absorber, a side arm tube having an overflow seal is attached. The side arm of this tube is attached to the reaction or delay bottle on the Shaw test board. A flask is located below the overflow seal to collect the reagent passing through the absorber.

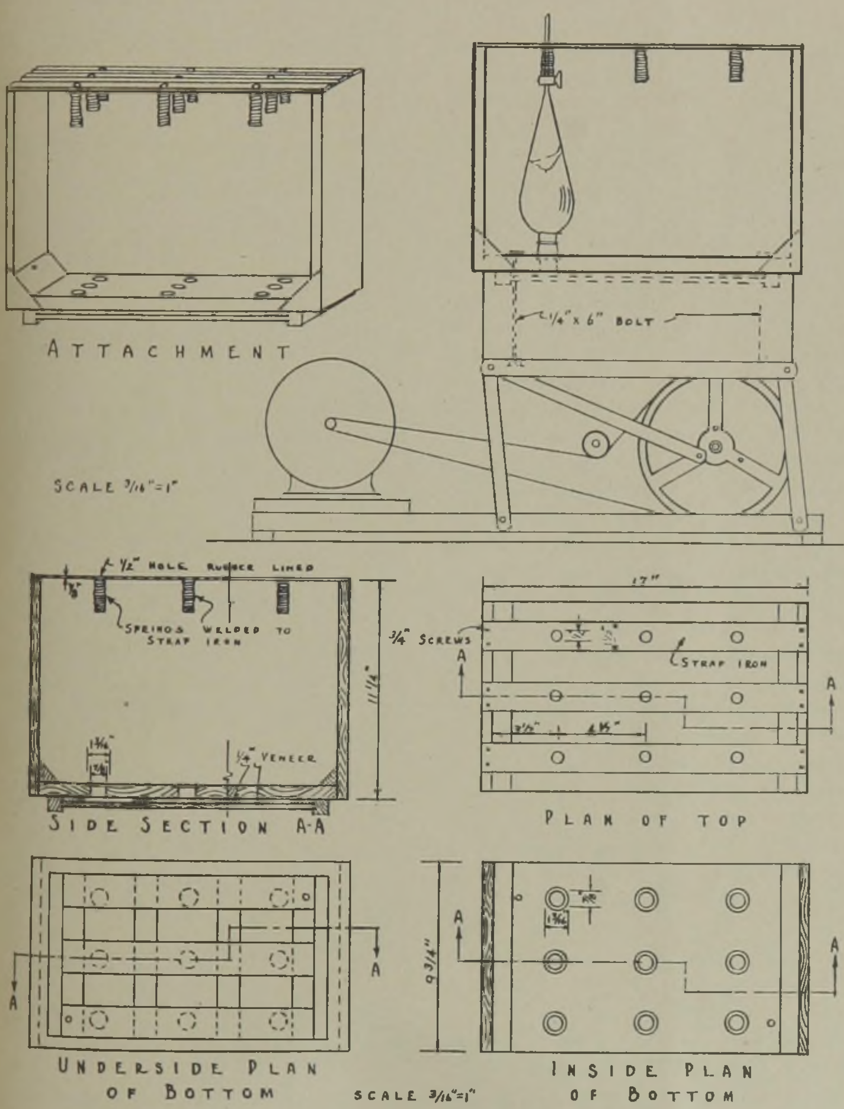
These absorbers have been used in this plant for over three years with excellent results.

Speeding the "Shake-Out" Step

If you are tired of shaking out separatory funnels for hours on end, you might try this device. According to the synergists, G. M. Horn, K. L. Kaufman, and S. G. Mittelstaedt in *J. Am. Pharm. Assoc.*, it will shake relatively large numbers of samples in comparatively short time.

The first of the drawings shows the attachment when bolted in position on the shaking machine. The second gives the dimensions which have been found convenient for the accommodation of 250 ml. separatory funnels.

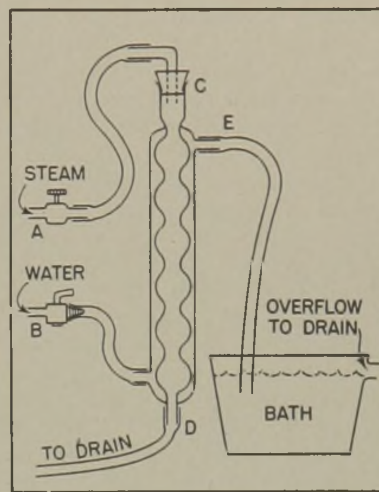
The shaking machine here illustrated was operated by a single speed motor. In order to avoid emulsification of the immiscible layers, the shaker was slowed simply by an adjustment of the pulley controlling the tension of the belt.



Constant Temperature Bath

The constant temperature bath apparatus described in the current issue of Eastman Kodak's *Synthetic Organic Chemicals* is composed of materials commonly found in most laboratories and is said to be fairly simple to assemble. It will maintain a temperature constant to within about 1° C. over a period of several days.

Although the ordinary steam valves used in the laboratory permit considerable fluctuation in the flow of steam, the usual type of petcock used for water is capable of a fairly fine adjustment and permits a substantially constant flow over considerable periods of time. In the apparatus illustrated, an excess of steam is run from the steam valve (A) into the top (C) of the condenser, which is set up as a heat interchanger. At the same time a closely adjusted stream of water from the petcock (B) is circulated through the condenser, emerging at (E). The excess steam, together with the hot condensate, escapes at (D) and may be run directly to the drain; or it may be run through a second condenser having a separate cooling system, in order to keep the steam out of the air. The constant-temperature



water emerging from (E) may be run to a vessel with an overflow to serve as a bath, as shown in the sketch; or, if it is desired to use this warm water in the jacket of a condenser or for some similar purpose, it may be used directly without any necessity for a circulating pump. It is well to check the temperature occasionally, say once a day, and, if necessary, to adjust the flow of tap water to compensate minor variations in the water temperature.

An ordinary glass-bulb condenser, as shown in the sketch, is quite suitable for maintaining temperatures in the range of about 40°-70° C. If temperatures much lower than this range are desired, a smaller or less efficient condenser would be preferable; for much higher temperatures, or for a greater volume of water, a larger or a more efficient condenser, such as one built of metal, would be required. With any given condenser, the temperature of the bath is inversely dependent upon the rate of flow of the water. An excess of steam emerging from the heat interchanger is essential at all times; otherwise, the temperature will fluctuate to some extent, depending upon the amount of steam present.

This type of constant-temperature bath is quite useful when it is desired to heat individual reactions to different temperatures.

INDUSTRY'S BOOKSHELF

World Minerals and World Peace, by C. K. Leith, J. W. Furness, and Cleona Lewis. The Brookings Institution, Washington, D. C., 1943; 253 pp., $2.50.

CURRENT PUBLIC INTEREST in "geopolitics" should make this factual study of trends in world minerals and their relationship to world peace of particular value to those professionally concerned as well as to the layman.

The physical, economic and political trends are presented by the authors, who offer an analysis of the possibilities of controlling minerals to prevent preparation for war in the future.

It is shown through detailed tables that mineral resources are very unequally distributed among the nations, both in volume and variety—that no nation is fully endowed. Industrial self-sufficiency for any nation would require that it have free access to minerals in nearly all parts of the world.

The geopolitical thesis of the study is that potential world control is not necessarily afforded by control of any of the great land masses, but rather that it lies in the control of mineral resources, wherever they are, backed up by control of the air and the sea. Because the United States and Great Britain control mineral sources far outweighing those of the German-envisioned World Island, the English-speaking nations present a much broader and more powerful base for world control—both for peace and war.

Through the text, supported by well selected maps and tables, the authors trace the growth of world mineral production, "new" minerals for industry introduced during the past twenty years, the present mineral position of nations and of present belligerent groups, international control schemes such as monopolies and cartels, the commercial policies involved in world mineral trade, nationalization measures taken by certain nations to control their mineral sources, etc.

Looking toward the future, the authors see the need for new and more drastic measures to avoid international friction caused by national needs and ambitions.

The question is raised as to whether or not the Atlantic Charter, which promises all nations, "great or small, victor or vanquished," equality of access to the world's raw materials, will actually provide a solution to the problem of proper distribution. The Charter implies that equality of access is to be accomplished by the removal of trade barriers, but the authors point out that the antagonisms aroused over trade barriers are not mainly between the "have" and "have not" nations. The friction has more frequently been between producers and consumers within a nation, and between all possible combinations of producers and consumers in all countries, than between the "have" and "have not" nations as such.

It is concluded from this study that the Atlantic Charter foreshadows the adoption of a mineral control policy as a means of bringing about world peace, but does not provide a plan for putting it into effect; that any mineral control plan that is to be effective involves the use of force, but that the Charter calls for the abandonment of the use of force. While the Atlantic Charter may be a step toward a solution of the problem, a satisfactory solution is yet to be found.

F. N. Williams,
Production Manager,
Phosphate Division,
Monsanto Chemical Co.

Organic Syntheses, Collective Volume II, edited by A. H. Blatt. John Wiley & Sons, Inc., N. Y., 1943; 654 pp., $6.50.

THIS VOLUME, which contains the material appearing in annual Volumes X-XIX of "Organic Syntheses," is one which should be in every laboratory engaged in synthetic organic research and which does not have the original annual volumes. It includes detailed methods of preparation of 288 organic compounds. The indexing is the same as that used in collective Volume I. The table of contents and the sequence in which the preparations appear in the text are in alphabetical order. A Reaction Index lists the preparations according to the type of reaction, and a Compound Index lists them according to the group introduced by the reaction. A Formula Index and a General Index are also included. The Chemical Abstracts indexing name is given for each compound, for the purpose of aiding those who wish to pursue the literature further. The notes accompanying each preparation are especially valuable.

Whenever a compound can be purchased for $5 or less per kilogram, its preparation has been marked with an asterisk. Actually, there are only six such compounds out of a total of 288, so that the value of this feature is more or less academic. It is our opinion, however, that at least 30% of the compounds are available from Eastman Kodak Company, or, perhaps, from some other commercial source, at prices in excess of $5 per kilogram. It would be of greater value to the majority of research laboratories if the source and the approximate price of any compounds that are available at any price were given.

Another suggestion is that the possible recovery of excess starting materials, unreacted products, or by-products should be given where available, along with the yield of the principal reaction product. This would be of commercial advantage, particularly where the starting materials are expensive.

The value of the volume for any one engaged in organic synthesis is beyond question. It should save many hours otherwise spent in searching the literature or in laboratory experimentation.

Albert F. Guiteras,
Research Director,
Foster D. Snell, Inc.

Government Publications

"Contact potential in electrostatic separation," by Foster Fraas and Oliver C. Ralston. Describes apparatus that separates particles of minerals electrostatically after charging by intimate contact or horizontal vibrating plates. Separations included benzoic acid-pre-treated ulexite-bentonite on plates of CuS and celluloid, H_2F_2-pretreated gypsum-siliceous gangue on celluloid, brucite-calcite on magnesium and phosphate-pebble quartz on aluminum. R. I. 3667. Bureau of Mines.

"Extinguishing magnesium fires with hard pitch derived from coal tar," by H. R. Brown, Irving Hartmann, and John Nagy. Describes small-scale magnesium fire and other laboratory tests; classifies extinguishing material; describes large-scale tests with pitch on factory-type fires, tests of pitch on magnesium incendiary bombs, and characteristics and sources of pitch suitable for extinguishing magnesium fires, and gives list of producers of pitch. R. I. 3672. Bureau of Mines.

"Puerto Rico Experiment Station, 1940 Report." Includes investigations of vanilla production, drug plants, coffee, essential-oils, bamboo propagation, insecticidal plants, sugarcane, biological-control and entomological activities, chemical and agricultural engineering. U. S. Department of Agriculture, Washington, D. C.

Synthetic Rubber. Its production from petroleum, coal, and other materials. By W. C. Holliman. I. C. 7242.

Annual Report of the Tobacco Institute of Puerto Rico—for fiscal years of 1939 to 1941. Points out those problems besetting the local tobacco industry for which the Tobacco Institute cannot offer an adequate solution. By Carlos Esteva, Jr. Published by Tobacco Institute.

"Help Wanted." Sound film presenting basic first-aid information in graphic form. In 16-millimeter sound and runs 31 minutes. Portrays typical mishaps causing bleeding wounds, shock, burns, asphyxiation, fractures, and other injuries and methods of treating them. Graphic Services Section.

"Aluminum: Mine to Metal" and "Aluminum: Fabricating Processes" are two motion pictures in 16-millimeter sound produced to facilitate the training of war workers and technical personnel of the armed forces.

Storage of Coal. Pointers on the storage of coal. Revised and expanded edition of Information Circular 7211. By J. F. Barkley. I. C. 7235.

Monazite Sand, only commercial source of cerium, other rare-earth metals and thorium. I. C. 7233 by Lawrence G. Houk.

Thermoelectric Tester for Checking the Composition of Metals. R. I. 3690 by B. A. Rogers, K. Wentzel, J. P. Riott, and R. B. Corbett.

(*Turn to page 110*)

BOOKLETS & CATALOGS

A527. Absenteeism. Guide for plant Labor-Management Production Committees contains ways of dealing with absenteeism as part of the war production drive. War Production Board.

A528. Adhesives for can and bottle labeling, carton and case sealing, and wrapping are catalogued with descriptions in folder. Paisley Products, Inc.

A529. Battelle Memorial Institute has issued its 1941-1942 supplement of books, publications, and patents describing the results of research done at the Institute. This list is intended to supplement the list of publications and patents for the years 1929 to 1940 which was published in 1941. Battelle Memorial Institute.

A530. Carbon Blacks. How various carbon blacks behave in natural, synthetic and reclaim rubber stocks is subject of new report. With tables and charts, the physical properties and general behavior of four grades of channel black in typical formulations of natural rubber, Buna S, Reclaim, and Neoprene are briefly summarized. Wishnick-Tumpeer, Inc.

A531. Chemicals, Industrial and Pharmaceuticals are listed and described in booklet. R. W. Greeff & Co., Inc.

A532. Chlorinated Paraffin. Said to be the first printed literature on this company's chlorinated paraffin, Booklet 500-14-A describes its stability, viscosity, solubility, compatibility, stability in presence of pigments, and uses —particularly for fireproof, waterproof, and mildewproof coatings. Tables list the details of both general and specific properties. Hercules Powder Co.

A533. Coatings to prevent corrosion, that are electrical resistant, and/or abrasion resistant; tank linings; and a treatment for metals whereby they are colored blue-black are described in booklet. Protective Coatings, Inc.

A534. Detergents. Current issue of **Dyestuffs** contains an interesting, informal description of the varied applications of cleaning agents beginning with bubble baths and ending with vitamins. Also reprints a general discussion on rayon substitutes for wool. National Aniline Div., Allied Chemical & Dye Corp.

A535. Esters of Abietic Acid. General properties of Hercolyn and Abalyn, liquid esters of abietic acid detailed in 15-page technical bulletin. Among the uses to which they may be put are in organic coatings, adhesive masses, plastic masses, printing inks, polishes, artificial leathers, etc. Tables and graphs of the properties of these low volatile, solvating liquid resins are included. Hercules Powder Co., Inc.

A536. Fire-Fighting. April issue of **High Pressure** describes safety methods and use of carbon dioxide for fighting fires. Walter Kidde & Co.

A537. Hydroabietyl Alcohol, its chemical and physical properties, and its applications to the production of protective coatings, adhesive masses, plastic masses, and the synthesis of resins are reported. Viscosity and vapor pressure curves illustrate this technical bulletin. Hercules Powder Co.

A538. Indium. Annotated bibliography of Indium for 1941-1942 lists its abstracted articles under occurrence and extraction of the element, physical properties, qualitative and quantitative analysis, alloys, chemical properties, compounds, properties of compounds, and miscellaneous information; cost commercial production, uses, physicological action, bibliographies, bulletins, general references. The Indium Corp. of America.

A539. "Ion Exchangers for Industrial Processes" summarizes the history of these exchangers and describes the chemistry of their operation. Schematic and flow diagrams further clarify the details of the process. The Permutit Co.

A540. Koroseal Linings for tanks are described and illustrated in Catalog Section 9028. Tables list the chemical resistance of Koroseal within specified limits of concentrations and temperatures to inorganic acids, solutions of inorganic salts and alkalis, plating solutions, and organic materials. The B. F. Goodrich Co.

A541. Merck Report, The. April issue contains articles on vinyl ether for the dental profession, effects of temperature changes on biologic processes, and women in pharmacy. Merck & Co., Inc.

A542. Photographic Chemicals. New descriptive price list of these chemicals in 21-page booklet. Eastman Kodak Co.

A543. "Polyvinyl Acetate, Solid Solution & Emulsion Forms" is described in Bulletin No. 4-243. This thermoplastic resin is said to adhere to glass, ceramics, metals, wood, leather, paper and other surfaces; is capable of heat sealing and is stable to light and heat. It is non-toxic, colorless, odorless, tasteless, insoluble in H_2O but readily soluble in organic solvents. It is being used as a rubber latex substitute in adhesive compositions. It is also compatible with some types of nitrocellulose, phenolic resins, chlorinated rubber and some natural resins. Electrochemical Dept., Du Pont Co.

A544. "Polyvinyl Alcohol for Greaseproof and Grease-Resistant Papers" is new bulletin, No. 1-1043, describing equipment, coating formulas and methods of application for greaseproof and grease-resistant coatings. Polyvinyl alcohol coatings are said to be highly resistant to all common oils and greases, and they can be applied from hot or cold water solutions using conventional paper-coating equipment. Electrochemicals Department, E. I. du Pont & Co., Inc.

A545. Softeners for Buna S. Report summarizes tests on Buna S formulations incorporating 5, 10, and 15 parts of three types of softeners: asphaltic, coal tar, and natural tar. Data were obtained on the properties of plasticizing action, hardness, modulus, tensile strength before and after ageing, resilience, elongation, tear resistance, and abrasion resistance. Results are reported in tabular and graphic form. Wishnick-Tumpeer, Inc.

A546. Synthetic Rubber. Booklet on the five commercial types of synthetic elastomers traces their developments from laboratory beginnings and then describes their properties individually. Of especial interest is a chart said to be compiled from plant and laboratory experience which compares natural rubber and the five types of synthetic rubber as to properties important in processing and application. Particularly adapted for the layman who wishes to understand what is a hydrocarbon, substitution, saturation, polymerization, vulcanization, etc. Excellent photographs of rubber manufacture and a glossary complete this 40-page publication which will repay study by technical men in the industry as well as students. U. S. Rubber Co.

A547. Varnishes. Suitability of Pentalyn resin varnishes for maritime finishes is studied in 8-page technical booklet. Features include analysis of special requirements for maritime varnishes, tests of Pentalyn varnishes against Maritime Commission specifications, and tables of tests in primers and paints and of the properties and uses of these resins. Hercules Powder Co.

A548. Wood Preservation. Booklet describes methods of treatment for protecting wood from moisture and fungi decay. Chart shows methods of application and needs for different types of preservatives, including water-repellent, toxic and toxic water-repellent solutions. I. F. Laucks, Inc.

A549. Wood Preservatives that repel water and act as fungicide or toxicant upon many wood products are reported in 8-page illustrated bulletin. Includes chart which lists preservatives, primary use, method of application, dipping time, etc. I. F. Laucks, Inc.

Equipment — Containers

E915. Air Compressors and compressed-air-operated tools. New series of industrial posters whose purpose is to wage war on leaky hose couplings, valves, and other pipe fittings. Illustrate the right and wrong way to mend hose, treatment of air hose, and use of air that is needed but which should not be wasted. Ingersoll-Rand Co.

E916. Apprentice Training Program of B. F. Goodrich Co. is outlined in a 26-page manual. Topics discussed are school's purpose, method of selecting students, administration of the program, cooperative plant with local board of education, ratio of apprentices to journeymen and length of time required in each of the courses.

E917. Coating and Roofing Materials are described and illustrated in folders. Paint-Point Corp.

E918. Coatings. Insl-X, claimed to be a 15-minute air drying insulating and sealing coat with high dielectric strength and resistant to corrosion produced by acids, alkalis, petroleum products, etc., is described in technical booklet. Includes table on specifications and characteristics, recommended for bus bars, for wire, tool insulating, coils, and resister coatings. The Insl-X Co., Inc.

E919. "Coke Oven Plant Construction and Development in 1942" a new pamphlet, summarizes recent developments in field of coke plant construction, list of improvements in design, cites certain new processes and gives construction figures for the year. Illustrated with photographs and line drawings. Engineering and Construction Div., Koppers Co.

E920. Extractors to remove stub ends of pipe, nipples, tubes, bolts or screws are described and illustrated in 4-page folder. These extractors are of forged steel, with heavy square shank followed by a sharply tapered, short reverse thread ending in a square reaming end. Reps Tool Co., Inc.

E921. Fluorescent Lighting. Catalog No. 400 illustrates and explains features of these fluorescent fixtures. Tables gives details that help in selecting equipment for a particular situation. Mitchell Mfg. Co.

E922. Heaters, Storage Water of the horizontal and vertical types with U-tube heating elements are described in Bulletin No. 35-75C. Tables list details of construction, standard sizes, capacities and dimensions, etc. Illustrated with photographs and schematic diagrams. American District Steam Co.

E923. Indicating and Recording Controllers, of the on-off, throttling, and automatic reset types, are presented in new 40-page bulletin. According to the manufacturer, the adjustable on-off model is used where time lag is small and heat capacity is large. Full range throttling model is recommended for applications of considerable process lag or of small heat capacities. Where large load changes over long periods are encountered, the automatic reset should be added. C. J. Tagliabue Mfg. Co.

E924. Joints, Flexible. Problems of remote controls, universal joints, shaft joints, shaft couplings, shaft hangers, shaft assemblies, hinged joints, universal joint covers, shaft expansion couplings, operating gears, engine controls, steering, valve, and ventilation controls are covered in new catalog and handbook. Describes two new joints, one with positive and effective operating range from 0° to 92° in any one given plane, and the other with operating range from 0° to 360° in any plane. Data sheets and blueprints are included. Brooks Equipment Corp.

E925. Manganese Steel Equipment for the chemical process industries, used in continuous abrasion machines, electric furnaces, electrode holders, kilns, pulverizer hammers, etc., are described and illustrated in Bulletin No. 543-G. Includes discussion of "What is Manganese Steel?" American Brake Shoe Co.

E926. Oxy-Acetylene Welding and Cutting. Convenient, 20-page pocket-size booklet written in easy-to-understand style contains list of concise do's and don't's for blowpipe welders and other information and suggestions on care and maintenance of blowpipes, regulators, and welding and cutting accessories. International Acetylene Association.

E927. Rivets that are internally threaded and counterbored and which can be headed blind are catalogued in 12-page manual. Contains description of Rivnut in standard countersunk and flat head types with grip range given, instructions for applying rivets, charts listing essential data, description of tools for applying, tables on typical ultimate strength, strength in double shear, torque resistance, thread strength, and shear and tension tests. The B. F. Goodrich Co.

E928. Stainless Steel Valves are briefly described in April quarterly of **Electromet Review**. Electro Metallurgical Co., Union Carbide & Carbon Corp.

E929. Steel Data. Technical Data Card No. 107-B lists standard specifications for seamless and welded tubes and pipes, including specification numbers, materials covered, and sizes. Technical Data Card No. 119A combines the standard steel lists of American Iron and Steel Institute and Soc. of Automotive Engineers, Inc. Describes basic open-hearth, acid bessemer carbon steels, sulfurized carbon steels, open-hearth alloy and electric furnace alloy steels. The Babcock & Wilcox Tube Co.

E930. Temperature Control Instruments are listed in Condensed Catalog No. 26200. Describes features of indicating pyrometers, potentiometer controllers, resistance thermometer controllers, capacitrols, limitrols, chronotrols, thermotrols, potentiometers, thermocouples and lead wire, remote controllers, and flame-otrols. Wheelco Instruments Co.

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

U.S.I. CHEMICAL NEWS

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

Vitamin B_6 Synthesis Requires the Use of Ethyl Acetone-Oxalate

Production of Pyridoxin Aided by U.S.I. Compound

A new synthesis of Vitamin B_6 (pyridoxin) that has just been published requires the use of ethyl acetone-oxalate (ethyl acetyl-pyruvate — $CH_3COCH_2COCOOC_2H_5$), a compound which offers many interesting possibilities for experimental work.

The ammonium derivative is first prepared according to the method of Mumm and Bergell [*Berichte* **45**, 3041 (1912)] and this is then combined with cyanoacetamide according to the method of Bardhan (Journal of the Chemical Society, page 2227 (1929)) to give ethyl 2-methyl-5-cyano-6-hydroxy-pyridine-4-carboxylate. Ammonia in methanol gives the amide which is reacted with phosphorus oxychloride to give 2-methyl-4, 5-dicyano-6-hydroxy-pyridine. By means of nitric acid, the 3-nitro derivative is obtained which is reacted with phosphorus pentachloride to give 2-methyl-3-nitro-4, 5-dicyano-6-chloro-pyridine. Hydrogen reduction converts the 3-nitro compound to the 3-amino from which is obtained, by reacting hydrochloric acid in methanol, 2-methyl-3-amino-4,5-diaminomethyl-pyridine-trihydrochloride. Sodium nitrite with hydrochloric acid gives the hydrochloride of Vitamin B_6.

Sample quantities of ethyl sodium acetone-oxalate may be obtained by writing U.S.I.

Emulsifying, Foaming Agents Produced from Soybean Oil

A new method for producing emulsifying and foaming agents, together with phosphatides, from soybean oil was described in a recent patent.

The inventor suggests that compounds containing phosphorous be removed from the soybean oil by passage through an absorbent such as silica gel. The absorbent may then be (a) extracted with acetone and evaporated, the sterols removed, and the residual oil again passed through the absorbent, or (b) the absorbent extracted with acetone and then with diethyl ether, giving a good grade of phosphatide. The residue is next extracted with 99-99.5% ethanol, giving a sterol glucoside, and the remainder extracted with 20-70% ethanol to produce a foaming agent soluble in dilute aqueous alkali and precipitated by aqueous hydrochloric acid or aqueous sulfuric acid. Phosphatide-rich material (an oil-free viscous liquid soluble in diethyl ether, ethanol and acetone and insoluble in water-ethanol) is obtained from this last step by evaporating the water-ethanol extract to quarter bulk and skimming off the floating gum.

Ethyl Chloride Recovery

According to a new method recently patented, ethyl chloride can be recovered from the eutectic mixture of ethyl chloride-butane obtained in the manufacture of tetraethyl lead upon treatment under pressure at —10° to 30° with an aqueous solution of an alcohol such as 70% ethanol.

Ethyl Formate Used in Synthesis Of Sulfadiazine and Thiamin

Highly Reactive Ester Produced by U.S.I. Employed In Condensation Step of Two War-Important Products

Ethyl formate, a very reactive ester which heretofore has been used chiefly in the production of fumigants, is now being employed in substantial quantities for the synthesis of thiamin (Vitamin B_1) and sulfadiazine, one of the newer sulfa drugs. Both of these products, now filling vital war needs, will undoubtedly play an increasingly important part in the advancement of peacetime medicine.

The extensive use of thiamin in supplying certain body deficiencies is well known and its importance is becoming more apparent each day. It is, for example, an ingredient of the concentrated chocolate bars issued to soldiers as part of their emergency rations.

Sulfadiazine, while exhibiting the same bacteria-killing action of the other sulfa drugs, has been found to cause less reaction than some of the others. Tablets of sulfadiazine are included in soldiers' first aid packets.

Synthesis Is Similar

The synthesis of thiamin and sulfadiazine follows a similar pattern. In the synthesis of the pyrimidine part of thiamin, ethyl formate is condensed with ethyl beta-ethoxy propionate. This is a typical Claisen condensation with sodium which gives ethyl beta-ethoxy sodium formylpropionate. This product on condensation with acetamidine hydrochloride, yields 2-methyl-4-hydroxy-5-ethoxy-methyl-pyrimidine. The hydroxyl group in the 4-position is converted to the chloride by phosphorus oxychloride, and finally into the amino group by ammonia in alcohol. After replacement of the ethoxy group with bromine by action of hydrobromic acid, the pyrimidine part is condensed with the thiazole part to give thiamin.

The synthesis of sulfadiazine actually requires another U.S.I. product, ethyl acetate, as well as ethyl formate. The first step here again involves a Claisen condensation. The ethyl formate is condensed with ethyl acetate in the presence of sodium ethoxide to produce ethyl sodium formylacetate. The remainder of this synthesis consists of condensing the ethyl sodium formylacetate with guanidine to the hydroxypyrimidine, which is then treated with phosphorus oxychloride and hydrogen in order to substitute hydrogen for the hydroxyl group. In the last step, the pyrimidine is

(*Continued on next page*)

Reducing Compounds Detected Rapidly with Spot Tests

A test for the rapid detection of reducing compounds which can be carried out with small amounts of material in the form of spot reactions was described in a recent issue of "The Chemist Analyst."

The following procedure is recommended: place one drop of the solution, or several granules of the solid substance, in one of the cavities of a spot plate and add one drop of an approximately 5% solution of phosphomolybdic acid in water or ethanol. In the case of difficult soluble compounds, a drop of dilute sulfuric acid can be added if necessary. In the presence of reducing compounds there is formed, in proportion to their amount, a blue or green coloration. A blank test is required only when very small amounts of the reducing substance are present.

New Process Patented for Paper, Cloth Coating Material

EAST ORANGE, N. J.— A patent has been awarded to an inventor here for a method of preparing paper and cloth coating materials from cashew nut shell liquid said to produce resistant, infusible and insoluble films. A suggested use is for coating paper to be used as liners for the caps and covers of containers for food, cosmetics and paints.

A typical coating is prepared by heating together about three parts by weight of cashew nut shell liquid and one part of hexamethylene tetramine to about 250° F. After holding at that temperature for about thirty minutes, two parts of a fifty per cent solution of an organic solvent soluble urea-formaldehyde resin in equal parts of butanol and xylol, and four parts of a petroleum spirits are added.

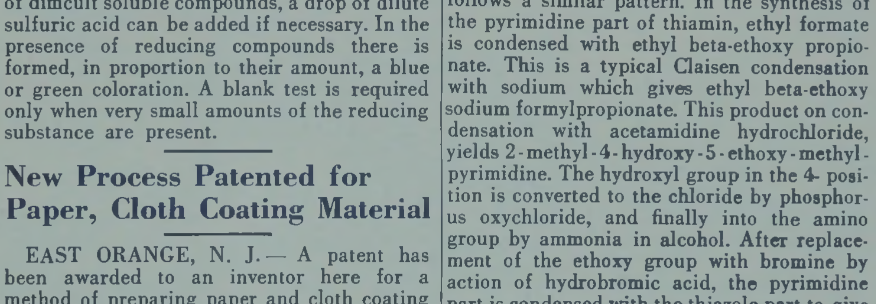


Photo by U. S. Army Signal Corps

Thiamin and sulfadiazine, which are being synthesized with U.S.I.'s ethyl formate, guard the health of soldiers at the front. Shown at left are emergency field rations for the Army, included among which is a concentrated chocolate bar (Ration D) containing thiamin. At right is a front line first aid station where sulfadiazine is administered to prevent infection.

July ★ **U.S.I. CHEMICAL NEWS** ★ 1943

Ethyl Formate Uses

(Continued from preceding page)

combined with sulfanilyl chloride to give 2-sulfanilamido-pyridine (sulfadiazine).

These uses of ethyl formate again show the diversified applications for such organic chemicals, and the typical reactions in which they are used. The impetus of war needs is resulting in many new synthetic chemicals, especially for medicinal purposes. As illustrated here, the Claisen condensation reaction is extremely important in many of these syntheses. U.S.I. has had years of experience with this reaction in the production of ethyl acetoacetate and ethyl sodium oxalacetate. This company is undertaking the development of other chemicals for similar syntheses which will undoubtedly find a role in the manufacture of hormones, amino acids, vitamins, insecticides and new chemo-therapeutics. U.S.I.'s technical staff will collaborate with any organization whose products call for intermediates obtained by the Claisen type reaction.

Describe Method for Making Air-Drying Ink Vehicle

DOVER, Del. — A patent has been awarded to a company here for a non-oily air-drying vehicle to be used in the formulation of vitrifiable inks that is claimed to offer many advantages over oil vehicles.

The following mixture is recommended:

	Parts
Copaiba resin	32
Venice turpentine	16
Molasses	4
Dammar (crystal dammar varnish)	4
Dibutyl phthalate	1/32

The vehicle is prepared by mixing together and stirring slowly the copaiba resin, Venice turpentine and dibutyl phthalate. To this mixture is added the molasses and dammar. The powdered solids are then added and mixed to produce a finished ink or color.

New Formula Devised For Topical Anesthetic

The following formula has been suggested for a topical anesthetic:

Benzocaine	7.5
Oil of peppermint	6.0
Phenol crystals	3.5
Ethylene glycol, q.a.	50.0

The inventor suggests that the benzocaine, oil of peppermint and phenol crystals be mixed in a flask and heated until the benzocaine dissolves, and sufficient ethylene glycol be added to make 50 cc.

Butanol, Glycerine Mixture Declared Best Soap Solvent

A mixture of 56% of glycerine and 44% of butanol was found to be the most effective solvent for soap, following recent tests in which the solubility of sodium stearate was determined at 25° C. in various mixtures of ethylene glycol with different monohydric alcohols; of butanol with different glycols and glycerine; of chloroform with glycols, and of acetone with ethylene glycol.

It was discovered that for the same glycol, the percentage of different alcohols required to produce maximum solubility is between 40 and 45, except for methanol which was 60%. For a single solvent or mixture to be a good soap solvent, the experimenters say it must have two adjacent hydroxy groups and a hydrocarbon-dissolving portion.

Purification Advised for Use Of Fibrous Sodium Pectate

Recently developed as a substitute for agar in bacteriological gels, fibrous sodium pectate is claimed to be more satisfactory for such use when purified. To achieve purification, it is suggested that the material be suspended in 60% ethanol and pH adjusted to 7.5. The pectate is then filtered and dried in a vacuum at 60° C.

Transparent Sheet Materials Made With Aid of Acetone

A new method has been patented for the manufacture of transparent or translucent sheet materials. An open-work fabric — wire netting, woven-wire fabric, knitted or leno fabric of organic derivatives of cellulose — is wetted with a mobile, volatile liquid such as acetone. It is then treated with a dope compatible with acetone and containing a lacquer base. The solvent is removed by evaporation and the product calendered.

Chloroformic Esters Used To Treat Cellulosic Fabrics

A process for permanently imparting water repellency to cellulosic fabrics was recently patented which comprises reacting a chloroformic ester of ten carbon atoms or more with hexamethylenetetramine directly on the fabric in the presence of heat and an inert solvent. A number of chloroformic esters have been produced by U.S.I.

TECHNICAL DEVELOPMENTS

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

An organic alkyl peroxide is offered for use as a catalytic agent in one or two phase polymerizations, as an oxidation agent for laboratory use, as a drying accelerator, and as a bleaching agent. Described as comparatively stable, it is standardized at concentration of 50 to 60% with more than 10% available oxygen. **(No. 710)**

U S I

A grinding, mixing or compounding mill has been developed for relatively small or moderate size batches of wet or dry material. **(No. 711)**

U S I

A photoelectric gloss meter has been developed for measuring the reflecting ability of a finished surface in terms of per cent of an arbitrary standard such as a mirror. It consists of a galvanometer with connection switches and adjusting controls and a photoelectric search unit. **(No. 712)**

U S I

Deodorant oils are offered which the maker says can be readily mixed with formaldehyde and water in proved proportions. It is claimed that deodorants so made will kill all tobacco, cooking, theatre and tavern odors. **(No. 713)**

U S I

A line of paints for machinery and building interiors is offered that can be applied by brush or spray on wood, brick, plaster and metal surfaces. Included are a mill white flat, a mill white gloss enamel, commercial interior gloss and semi-gloss enamel, commercial interior flat, dado enamel, machine enamel, a primer, an undercoat and a thinner. **(No. 714)**

U S I

Direct current resistance decades have been developed with ranges of 0.9 to 999,999 ohms total and accuracy of plus or minus 1% and 0.1% respectively. Switches are described as having self-cleaning, multi-bladed phosphor bronze spring wipers. **(No. 715)**

U S I

Tempered glass tubing is offered which is said to be suitable for handling all types of corrosive fluids except hydrofluoric acid and strong, hot caustic soda solution. **(No. 716)**

U S I

A strainer for handling highly viscous liquids or liquids that are solid at room temperatures has been announced. Maximum operating pressure is 50 psi at temperature of 600°F. The bottom and sides are completely enclosed in a steam jacket suitable for 125 pounds pressure. **(No. 717)**

U S I

Two water and stain-repellent materials are available to treat clothes by dipping after washing or dry cleaning. One is an emulsion that is diluted with water, the other a solvent type. **(No. 718)**

U S I

Skin-protecting creams are offered which are described as non-clogging, non-toxic, and non-irritating. One is recommended for protection against skin absorption of paints, lacquers, tars, resins, glues, graphite and other materials. The second is insoluble in cutting oils or soluble oil emulsions. It is said to afford protection against strong or dilute acids and alkalis, metallic salts, dyes and coal tar distillates. **(No. 719)**

NEWS OF THE MONTH

Alcohol Subsidies Extended

DSC to make up difference between 48¢ ceiling and producers' cost-plus. Little effect on availability seen.

With Commodity Credit Corporation's discontinuance of subsidized wheat the first of this month, OPA, WPB and Defense Supplies Corporation have taken joint action to extend alcohol subsidies to all producers in order to keep selling prices within the OPA ceiling of 48 cents a gallon. Wheat was formerly available to distillers through CCC at $1.10 a bushel. At the open market price of about $1.65 a bushel, it will raise alcohol costs such that subsidy payments may run as high as 50 cents a gallon. According to government officials, DSC has insisted that WPB restrict use of this alcohol to essential needs, but under terms of M-30 virtually all industrial users except the perfume and cosmetic trade can obtain alcohol upon WPB certification of essentiality.

Subsidy payments under the new arrangement are based on a formula which includes costs and a scale of fixed profit margins which decreases with increased volume. A profit of 4 cents per gallon is allowed on the first 750,000 gallons produced in any one quarter, 3 cents for the next 750,000 gallons, and 2 cents for all above that. Since October, 1942, converted beverage distilleries had been permitted to sell to DSC under a cost-plus formula which allowed a profit of 4 cents a gallon, but they are now included under the new formula.

According to the OPA announcement: "Under the plan, WPB will allocate for purchase by the Defense Supplies Corporation all alcohol produced from grain by industrial alcohol plants in addition to that presently being purchased by DSC from converted distilleries. DSC will purchase the alcohol from industrial alcohol plants at prices which will assure the producers a fixed profit over actual production costs.

"DSC will then resell to the industrial plants at the present base ceiling price of 48 cents per gallon that portion of the alcohol which WPB determines is necessary for essential commercial requirements. DSC sales of alcohol to Government plants and agencies will be made at prices based on its average costs of acquisition of all alcohol."

It is estimated that the cost of subsidy payments will approximate $8,000,000 annually, although OPA claims that this will save alcohol users about $16,000,000 a year by assuring continuance of the 48-cent ceiling.

The cost-plus pricing formula that will be used by OPA to determine individual payments to producers is based substantially on the replaced formula that had been used for converted beverage distilleries. Aside from the profit margin scale mentioned above, it differs only in that a fixed allowance of 3 cents per gallon is made for selling and general and administrative expenses, and in that it is based on actual costs during the current quarterly period rather than costs of the preceding quarter.

Studies made by OPA show that the average profit on industrial alcohol was approximately 2 cents a gallon during the pre-war years 1936 to 1939 and that the weighted average expense for selling and administration was about 2½ cents a gallon during 1941.

Alien Property Disposal

According to a release from OWI, three methods of sale are provided for vested enemy properties held by Alien Property Custodian Office.

Properties valued at less than $10,000 ordinarily may be sold at either public or private sale; larger business properties will be disposed of through public sales, ordinarily through the method of sealed, competitive bids; some properties will be disposed of in government-regulated securities markets. General Order 26 anticipates that many properties will be sold to other departments or agencies of the United States Government, or at their request, under regulations fully protecting the interests of the United States.

Real Estate will be disposed of through recognized brokers, while perishable or expendable commodities ordinarily will be sold privately at prevailing market prices. As yet no properties are up for sale. Each public sale will be advertised at least 15 days in advance in a newspaper on general circulation in the place where the property is located and in trade papers and other appropriate publications.

Another announcement liberalized terms for issuance of licenses under patents seized from enemy owners. Beginning August 1, 1943, the fee for obtaining a license to use enemy owned patents held by APC will be a flat $15 for each patent. Hitherto, licenses have been issued for a fee of $50 for a single patent plus $5 for each related patent included in the same license.

The new arrangement will make it easier for small manufacturers to put single patents promptly to work. It also will more equitably compensate the APC for work involved in searching out contractual agreements that already exist on specific patents. Main effect of the change will be to streamline procedures necessary to put seized patents to work in American industry. In the past considerable time has had to be devoted to determining whether several patents covered by a single application were in a 'related' field. Under the new system the class similarity of patents covered by an application will not have to be considered.

Potash Ban Lifted

An increased supply of potash, important fertilizer ingredient, to help meet war-time demands for agricultural and manufacturing purposes, was assured by Secretary of the Interior in the issuance of an order lifting an 8-year-old limitation on the development of new sources of the mineral. Restrictions against the granting of potash development leases were placed in 1935 to maintain the industry in the face of importations from abroad.

Recently, investigations by a special departmental committee showed that the market situation which led to the issuance of the original order does not now exist, since practically no potash now is imported. At the same time, the current production now maintained from deposits in New Mexico, California, and Utah is inadequate to meet augmented demands, with the result that no reserve capacity is available to care for any emergency conditions.

Because of this situation, Secretary Ickes has revoked the original restrictive order and authorized the issuance of additional prospecting permits and leases for new potash development on the public domain when consistent with sound conservation policies and prevailing market conditions.

General Aniline Gets New Board

Third board of directors since control of General Aniline and Film Corp. was taken in hand by Federal authorities more than a year ago, was elected at an adjourned meeting of stockholders.

The new board includes Neal Dow Becker, president of Intertype Corp.;

George W. Burpee, executive vice president, American Export Airlines; Colvin Brown, general manager, Quigley Publishing Co.; William F. Carey, Commissioner of Sanitation of New York City; Robert F. Carr, president, Dearborn Chemical Co.; William H. Coverdale of Coverdale & Colpitts, engineers.

Also Herbert R. Gallagher, former president, Consolidated Oil Co.; John D. Hertz, partner in Lehman Brothers; Matthew J. Hickey Jr., vice president, General Dyestuffs Corp.; William F. Humphrey, president, Tide Water Associated Oil Co.; Col. Louis Johnson, president, General Dyestuffs Corp.; Thomas O'Hara, president, Colonial Ice Co.; Dr. E. C. Williams, vice president, research and development, General Aniline and Film Corp.; A. N. Williams, president, Western Union Telegraph Co., and Dr. R. E. Wilson, president, Pan American Petroleum and Transport Co.

Election of the new board, with 97 per cent of the company's shares vested in Leo T. Crowley as Alien Property Custodian, brought with it the resignation of Robert E. McConnell, president and chairman of the second all-American board of directors to be placed in charge of the former German-controlled property.

Container Survey

At the request of War Production Board the Department of Commerce has undertaken a comprehensive survey of container manufacture and use, as the shortage of materials is causing serious problems in the packaging and shipment of commodities.

The survey will cover metal, glass plastic, and paper containers, closures (caps, etc.), shipping cartons, wooden barrels, steel drums, wooden boxes, collapsible tubes, and other containers in common use. Inquiries will be sent to some 3,000 container manufacturers, in order to obtain necessary information on packaging uses, raw materials, productive capacity, and other important factors, as well as on products for which different types of containers are used, and other pertinent facts.

Information obtained will be used as the basis for formulating policies. Present lack of data makes it difficult to determine the most efficient use of materials available or to ease the problems arising from restrictive orders—such as the recent tin can order of WPB which has caused considerable disturbance in the industries concerned.

Quinine Research

Quinine and its importance to the Allies in fighting malaria on widespread fronts today led to special grants to three American universities and a research institute to undertake special investigations of the drug and other alkaloids of cinchona. Cornell University Medical College and New York University, both of New York; Johns Hopkins University, Baltimore, and Battelle Memorial Institute, Columbus, O., are the four institutions granted special funds by Cinchona Products Institute to carry on exhaustive tests. Two research fellowships for accredited workers in cinchona alkaloids also were announced by the Institute.

Titanium Companies Indicted

Federal grand jury has indicted the National Lead Co. and a subsidiary, the Titan Co., Inc., as well as E. I. du Pont & Co. and four individuals, on charges of participating in a world-wide conspiracy to control the production and marketing of titanium compounds. Violation of the Sherman Anti-Trust Act was alleged.

Tom C. Clark, assistant attorney general in charge of the Department of Justice's anti-trust division, said the indictment was a major blow against world cartels. Cartels, he declared, were in effect "private economic supergovernments, ruling over whole segments of our economy." He denounced pre-war agreements among international industrial concerns as having a hampering effect on present war work here.

F. W. Rockwell, president of National Lead, took a bluntly opposite view in a statement that he issued following return of the indictment. The practices complained of, he said, generally were viewed as legal and proper at the time that they were inaugurated, and some of the contracts concerned dated back to 1920.

Named as co-conspirators but not defendants were virtually all the largest foreign chemical companies of the world, including Germany's I. G. Farbenindustrie, Great Britain's Imperial Chemical Industries, Ltd.; Italy's Montecatini and Japan's Kokusan Kogyo Kabushiki Kaisha.

To support the monopoly here, the Government averred, the cartel employed patent agreements. This interchange, it was said, included an arrangement for the transfer of the respective patents of National Lead and Titangesellschaft between the two concerns, to preclude the seizure of such patents as property of alien enemies in the event of war between this country and Germany.

Mg Production Increases

Output of crude magnesite, a mineral used in making magnesium metal and other products essential to the war program, established a new record in 1942, increasing 33% in quantity over 1941, according to the Bureau of Mines, U. S. Department of the Interior. The production of magnesium compounds from mag-

Twenty-Five Years with R. W. Greeff & Co.

Robert H. de Greeff, president of R. W. Greeff & Co. (left) making presentation of gold clock to Ira Vandewater, Vice-President (right) in celebration of his twenty-fifth anniversary with the company. Later in the evening, Mr. Ira Vandewater was the guest of honor at a cocktail party and dinner at the Pillement Suite in the Waldorf Astoria attended by all of the employees of R. W. Greeff & Co.

nesite, brucite, dolomite, sea water, well brines, and lake brines also increased in 1942 compared with 1941. Such compounds, principally the oxide, chloride, carbonate, and sulfate of magnesium have a number of industrial applications, including use in refractories, in making magnesium metal, magnesia insulation for boiler pipes, and medicinals. Dead-burned dolomite, employed chiefly as a steel-furnace refractory, increased 15% in quantity output in 1942 compared with 1941, setting a new record which reflects the intense activity of steel furnaces throughout the year.

Sulfite Liquor Processed for Alcohol

Successful production of alcohol for synthetic rubber and explosives from sulfite liquor, formerly a waste by-product in manufacture of newsprint and other papers, was announced June 17 by Ontario Paper Co., a subsidiary of *The Chicago Tribune*.

Keen government interest has been whetted over the possibilities of the new alcohol project by forecasts that other alcohol sources may decline as food and petroleum shortages become more acute.

Company officials said that this source of alcohol might be tapped as a supplemental automobile fuel in addition to its other wartime uses.

Scientists estimate that if all the sulfite liquor now dumped in lakes and streams by woodpulp mills in United States and Canada were utilized, the annual yield would be some 86,000,000 gallons of alcohol, or enough for 94,600 long tons of synthetic rubber, or the equivalent of 36,766,000 bushels of corn or wheat.

The government's alcohol program is using 10,000,000 bushels of grain monthly, while additional production comes from petroleum.

Processing sulfite liquor alcohol consists, briefly, of fermenting and then distilling the traces of natural sugars that are washed from the wood in the course of making sulfite pulp.

By this treatment, experts say, alcohol to the potential volume of 4,000,000,000 gallons a year could be reclaimed from sawdust and other logging mill wastes without felling an additional tree.

Gas Technology

"Gas Technology Review," published by Institute of Gas Technology, made its first public appearance early in July. Its purpose, as expressed in the introduction, is to review the current literature and patents (American and foreign) on all aspects of gas technology. By saving time for readers the new publication seeks to help them "derive more benefit from other men's experience and have more time to enrich it with their own."

The new publication is solely an abstract journal and is not copyrighted. Interested persons may obtain copies from Technical Librarian, Institute of Gas Technology, 3300 Federal St., Chicago 16, Ill.

Appointed to New Positions

Dr. J. J. Pyle has been appointed chemist in charge of the General Electric Company's plastic laboratories, succeeding Dr. G. Frank D'Alelio, who has resigned, it was announced recently. Dr. Pyle formerly was group leader in charge of research and chemical development of the company.

Mr. J. T. Richards, president of Diamond Alkali Company has announced the appointment of Fred W. Fraley as vice-president and director of sales. Mr. Fraley will be in charge of all sales operations, a graduate chemical engineer, he has been with Diamond Alkali for the past fifteen years.

Sugar Research

Sugar Research Foundation, Inc., 99 Wall Street, was founded June 10 as a non-profit organization to conduct research and distribute factual information about sugar in the human diet. Joseph F. Abbott, head of American Sugar Refining Co., is president of the group. Support is from raw sugar producers, cane sugar refineries and beet sugar processors.

A comprehensive research and public educational program intended to clarify the place in the diet of sugar and of foods and beverages containing sugar will be initiated. New uses also will be aimed at by the foundation.

Natural Gas Pipe Line

Disclosure July 7 that the Hope Natural Gas Co., a subsidiary of Standard Oil Co. of N. J., had applied to the Federal Power Commission for approval to build a 1,100-mile natural gas pipe line from the Houghton gas field in Southwestern Kansas to its properties in West Virginia again highlighted the seriousness of the natural gas situation in the Appalachian area.

There are many important war industries in the so-called Appalachian region utilizing natural gas from the Appalachian pool, but the drain on gas reserves has been so heavy in the last few years that storage pools are expected to be virtually exhausted by next summer. Gas reserves in Texas, Oklahoma and Kansas are said to be plentiful, however.

Foreign Periodicals

Microfilms, Inc., of Ann Arbor, Mich., recently released their third list of foreign periodicals available on microfilm. This list is cumulative from the beginning of the project to date and lists all the issues on hand including thirty-nine new titles.

Copper Recovery Totals 197 Million Pounds

Extent to which WPB's copper recovery program is aiding nation's war industries is shown by the fact that to date 197,000,000 pounds of "idle and excessive" copper, both in primary and fabricated forms, have been allocated for war use.

The amount, WPB announced, represents two-thirds of the total amount of copper thus far reported under the program. Of the remaining 100,000,000 pounds, approximately 36,000,000 pounds consist of assembled products contaminated with materials not suitable for copper scrap. Arrangements for the movement of the balance are currently being made at Copper Recovery Corp.

New and Rare Instruments

Committee on Location of New and Rare Instruments has the following requests and offers:

Instruments Offered

L. & N. thermionic amplifier
Ammeters—Whitney and Jewel
Various balances
Schmidt & Haensch colorimeter
Platinum calorimeter
Weston D. C. electric meters—voltmeters, ammeters, galvanometers
Spindler and Hoyer electroscope
Two-circle goniometer (to loan for war use)
Microscopes—Bausch & Lomb centrifuge, Zeiss binocular, Leitz (suitable for photomicrography), Poeller
Optical wedge pyrometer
4 L. & N. portable potentiometers
L. & N. type K potentiometers
Polarizer and analyzer for microscope
Abbe refractometer
R. Fuess reflectometer
Spectrographs, spectroscopes, spectrophotometers
Saccharimeters
Saybolt Universal viscosimeter

Instruments Requested

Western electric electrometer
Flexaform set
Amsler #4 intergrater
Micromanipulators

Information concerning these offers and requests for rare instruments that can be sold, loaned or leased for essential war research work can be obtained from D. H. Killeffer, chairman of committee, 60 East 42nd St., New York 17, N. Y.

Kenvil Blast Kills Man

One man was killed and three others slightly injured June 22 in an explosion at the nitroglycerine neutralizing house of the Hercules Powder Co. plant in Kenvil, N. J. The dead man was identified as Foster E. Cramer of Port Morris, N. J. The three injured men suffered minor cuts from flying glass.

Coal Strike Effect

An indication of the extent of the recovery of the steel industry from the effects of the coal strike is provided by reports placing current operations of U. S. Steel Corp., largest producer, at between 95 and 96% of capacity, comparing with between 98 and 99% just before the strike. The latter rate is virtually perfect so far as sustained steel production by so large an organization goes.

During the worst strike week, the rate was slightly below 80%, but production shot up to 93% July 3. All figures reflect a situation that appeared to have been worst in the Pittsburgh area, for less-affected areas helped to support the averages during the strike.

COMPANIES

Largest Butadiene Unit Opens

First of four 20,000-ton butadiene units at the new Koppers United Co. plant at Kobuta, largest in the government's synthetic rubber program, is now in preliminary operation. The 200-acre plant will produce butadiene and styrene. The other three butadiene units and the styrene plant at Kobuta are scheduled to go into operation during the summer, with the plant in full production by fall.

The plant is being built by Koppers and is owned and being financed by the government. The full capacity of the plant will be 37,500 net tons of styrene and 80,000 net tons of butadiene annually—enough to make more than 20,000,000 average size passenger car tires every year if used for that purpose. Styrene at Kobuta will be produced by combining ethylene with benzene, a chemical obtained from coke plants. Butadiene will be manufactured from ethyl alcohol, a fermented and distilled product of wheat, corn or molasses.

Allied Opens Central Research Laboratory

Allied Chemical & Dye Corp. is establishing a new research laboratory at Morristown, N. J. which will be headed by Dr. Dwight C. Bardwell. Activities at the Morristown laboratory will be in addition to the research which is conducted by the several operating divisions and subsidiaries of Allied. While research at Morristown will be directed initially to problems of war importance, the new laboratory is part of a long-range program for the development of new products and processes for peace-time use. The company plans ultimately to erect a large modern research building on property near Morristown acquired for that purpose late in 1942.

Canadian Officers Chosen

Newly elected officers of Canada's three chemical organizations are: Dr. R. K. Stratford, Imperial Oil Ltd.,—president of Canadian Institute of Chemistry; Dr. R. R. McLaughlin, University of Toronto,—president of Canadian Chemical Ass'n; and Dr. R. S. Jane, Shawinigan Chemicals Ltd.,—president of Society of Chemical Industry.

Mathieson Opens Plant

Production of magnesium metal at newly erected magnesium-chlorine plant in Louisiana has begun, according to announcement by Mathieson Alkali Works, Inc., the operating company. The plant is owned by Defense Plant Corp. and has a future capacity of more than 50,000,000 pounds of magnesium metal a year. The design and engineering of this project are said to be unique, and it is the only plant of its type in operation.

The principal raw material is dolomitic stone, a rock resembling limestone and

Advance to New Positions

George A. Benington, below, has advanced from vice-president to president of the Mutual Chemical Company of America. Dr. Herbert M. Kaufmann, formerly president has been elected chairman of the board.

W. O. Frohring, newly-elected director of American Home Products Corporation, manufacturer of drugs, foods and household products, has been appointed special technical consultant to the corporation and its subsidiaries.

consisting of calcium and magnesium carbonates which is shipped from nearby quarries. This ore is calcined, locally produced natural gas being used for the purpose. The resulting oxides of calcium and magnesium are treated with calcium chloride, a product of the process by which soda ash is made at the parent Mathieson plant in Louisiana. The mass is then treated with carbon dioxide obtained from the calcination of the dolomite, which converts the calcium into insoluble carbonate, leaving magnesium chloride. This product, after being concentrated, is electrolyzed, forming magnesium and chlorine.

Oil Co. Buys Plant

Crown Central Petroleum Corp. which occupies a petroleum products depot and distribution center in Elizabeth, N. J. under lease, has purchased the property from the Texas Co. The property includes several acres, storage tanks, processing buildings, a barrel plant and warehouses and was sold for a reported price of $500,000.

Du Pont Adds Company

Patterson Screen Co., Towanda, Pa., leading manufacturer of X-ray and fluoroscopic screens, has combined with E. I. du Pont de Nemours & Co.

The 29-year-old firm will become the Patterson Screen Division of Du Pont Photo Products Dept. Carl V. S. Patterson, founder and president of the Towanda company, will serve as manager of the new division. Frederick Reuter will be assistant manager.

To Manufacture Adhesive Sheeting

American Products Mfg. Co., New Orleans, will go into operation this month on the production of all-resin adhesive sheeting for bonding of veneers into plywoods for aircraft and marine use, according to Harold A. Levey, president. The company formerly manufactured continuous transparent packaging materials of the cellulose acetate and ethyl cellulose types, but was forced to discontinue operations several months ago because of diversion of raw materials to essential war uses.

Sherwin-Williams Plans Latin American Expansion

Announcement of plans for the construction of two new paint plants, one in Mexico City, Mexico and the other in Sao Paulo, Brazil, has been made by Sherwin-Williams Co. Recently returned from a 16,500 mile trip through Central and South America, George A. Martin, chairman of board, disclosed that actual work on the new projects which are to cost approximately $1,000,000 would commence as soon as construction materials are available, probably not before the close of the war. Meanwhile, the company will continue to operate its plants in Havana, Cuba and Buenos Aires, Argentina.

Styrene Unit Beats Schedule

Dow Chemical Co. announced that full-scale production has been achieved six weeks ahead of schedule in the first unit of its new styrene plant at Los Angeles. Dow company officials said the new unit is producing daily sufficient styrene to permit the manufacture of more than 14,000 automobile tires.

AleXitE Relocates Office

AleXitE Engineering Co. of Colorado Springs, Col., manufacturers of products of refined vermiculite, have moved their New York office to 500 Fifth Avenue.

N. Y. Q. Appoints Executive Committee

On June 11th the board of directors of New York Quinine & Chemical Works, Inc. created an executive committee who will be in full control of the business. Members of this committee are: F. J. McHugh, Chairman, J. R. Lane, F. G. Lipiczky, Paul Mackin, Louis L. Pio, F. J. Reid.

Tour Acquires Laboratories

Sam Tour announces that the metallurgical laboratories that were established by him during the fourteen years he was vice president and chemical and metallurgical engineer in charge of the engineering departments of Lucius Pitkin, Inc., will be operated in the future as the laboratories of Sam Tour & Co., Inc.

The organization is maintaining offices at 65 Pine Street, N. Y. C., and laboratories at 45 Fulton Street.

It will take over the work as consultants, engineers, metallurgists, metallographers, radiographers, research development and testing laboratories for clients previously served by the discontinued departments of Lucius Pitkin, Inc. The latter's offices and laboratories will continue at 47 Fulton Street.

Form Chemical Co.

Interlake Chemical Corp. has been organized as a property jointly owned by the Interlake Iron Corp. of Chicago and the Great Lakes Steel Corp. of Detroit, with an authorized capital of $5,000,000.

The purpose of the corporation is to process chemicals recovered from the distillation of coal in by-product coke ovens. It has purchased from Interlake Iron the 3-year-old tar distillation plant and a new tar, acid and naphthalene plant, now under construction.

George R. Fink is chairman and Leigh Willard is president of the new company. Earl Doig and J. A. Mitchell are vice presidents and J. R. Alderman is secretary and treasurer.

Distributes Chemicals

Larbig Chemical & Mfg. Co. of Kansas City, Mo. has announced its entry into the heavy chemical field, distributing chemicals for industry in the midwest territory.

TNT Works to Close

Huge Lake Ontario Ordnance Works, in operation 9 months, will stop production of TNT July 31 because its product is not needed "due to ever-changing requirements of the armed forces."

Expects New Curb for Paint Output

Increasing shortages of solvents will probably mean further restrictions in production of protective coatings for civilian use, suppliers of raw materials indicated June 30 at a meeting of New York Paint, Varnish and Lacquer Association in Hotel Biltmore. About 75% of the coating industry's production is currently being used in war work, it was reported.

Drying oils were also reported to be getting more scarce. In general, however, the situation in pigments was said to be fairly easy.

A. R. DeVos, president, said that there could be no accurate estimate on future supplies of butyl acetate until allocations currently under consideration were determined.

Lee Keane of United States Industrial Chemicals, Inc., predicted that, while ethyl alcohol, acetone and other solvents had been fairly free thus far, they were due to become tighter in the near future because of the huge demands of chemical warfare, lend-lease, etc. He said there was little use at this time in turning to substitutes, pointing out that many users had already switched to some of the more uncommon solvents, only to find that these, too, were becoming difficult to obtain.

There are some resins available and the supply of soluble nitrocellulose has improved considerably, it was said, but the industry will have to find a way of keeping some of the ester solvents on the market.

Army-Navy "E" Awards

American Cyanamid Co., Warners Plant, Linden, N. J.
American Potash & Chemical Corp., Trona, Cal.
American Viscose Corp., Marcus Hook Plant, Marcus Hook, Pa.
Atlas Powder Co., Reynolds Plant, Reynolds, Pa.
Bermite Powder Co., Saugus, Cal.
Carborundum Co., Niagara Falls, N. Y.
Dow Chemical Co., Pittsburgh, Cal.
E. I. du Pont de Nemours & Co., du Pont, Wash.
E. I. du Pont de Nemours & Co., Oklahoma Ordnance Works, Pryor, Okla.
Ethyl Corp., Baton Rouge, La.
Ethyl Corp., Wilmington, Del.
Freeport Sulphur Co., Port Sulphur, La.
Freeport Sulphur Co., Freeport, Texas.
General Electric Co., Plastics Dept., Plant No. 1, Pittsfield, Mass.
Hercules Powder Co., Hercules, Cal.
Hercules Powder Co., N. J. Powder Co., Belvidere, N. J.
Hercules Powder Co., Radford Ordnance Works, Radford, Va.—Star added to "E" flag.
A. C. Lawrence Leather Co., Shearling Division, Winchester, N. H.
Monsanto Chemical Co., Springfield, Mass.
National Carbon Co., Niagara Falls, N. Y.
Niagara Alkali Co., Niagara Falls, N. Y.
Ohio-Apex, Inc., Nitro, W. Va.
Resinous Products & Chemical Co., Bridesburg Plant, Philadelphia, Pa.
Texas Gulf Sulphur Co., Newgulf Plant, Newgulf, Texas—Star added to "E" flag.
Texas Gulf Sulphur Co., Galveston Loading Plant, Galveston, Texas—Star added to "E" flag.

PERSONNEL

F. D. Snell Additions

New members of the Rubber and Plastic Department of Foster D. Snell, Inc. are Irving Merdinger, B.S., New York University, formerly with U. S. Rubber Co.; Madlyn M. Sheldrick, B.S., Brooklyn College; and Asher Wollison, B.S., College of the City of New York. Recently added to the analytical staff was Agatina Carbonaro, M.A., Columbia University, formerly with Arabol Mfg. Co.

Graduates Accept Positions

The following men who received master's degrees in chemistry at University of Kentucky are now employed: Stanley Stephenson, Russell Hunt, Wendell Cropper, and Wharton Nelson—Standard Oil of Indiana; Joseph Stites—assistantship in chemistry, University of Kentucky; Benjamin Stanley—Owens-Corning Fiberglas Co.; Russell Gilkey—Goodrich Rubber Co.

Heads New Laboratory

Dr. Hugh M. Huffman, formerly of the California Institute of Technology has been appointed to direct the operations of a new laboratory at the Bureau of Mines Petroleum Experiment Station in Bartlesville, Okla.

Merker Honored

Harvey Milton Merker, graduate of University of Michigan; officer of Detroit & Michigan chemical societies; president of Orpheus Club, president of Engineering Society of Detroit; superintendent of manufacturing for Parke, Davis & Co. has been awarded the honorary degree of Doctor of Science in chemistry from Wayne University.

Wilmington Vice-President

Wilmington Chemical Corp., New York, has announced that Edmond duPont, son of the late Francis I. duPont, has been made vice-president, in charge of plant operations. He will make his headquarters in Wilmington.

Director of Permutit

Howard L. Tiger, vice-president and director of research of the Permutit Co., has been made a director of the company.

DCAT Appoints Dorland

Ralph E. Dorland, eastern sales manager of Dow Chemical Co., has been appointed representative of the Drug, Chemical and Allied Trades Section on the parent board of directors to fill the unexpired term left vacant by the death of Mr. McDonough.

Lundin Joins Monsanto

Harry W. Lundin, formerly with Liberty Mutual Insurance Co., has become a member of the staff of Monsanto Chemical Co. as director of safety and plant protection section of department of industrial relations.

ASSOCIATIONS

Pharmaceutical Mfrs. Meet

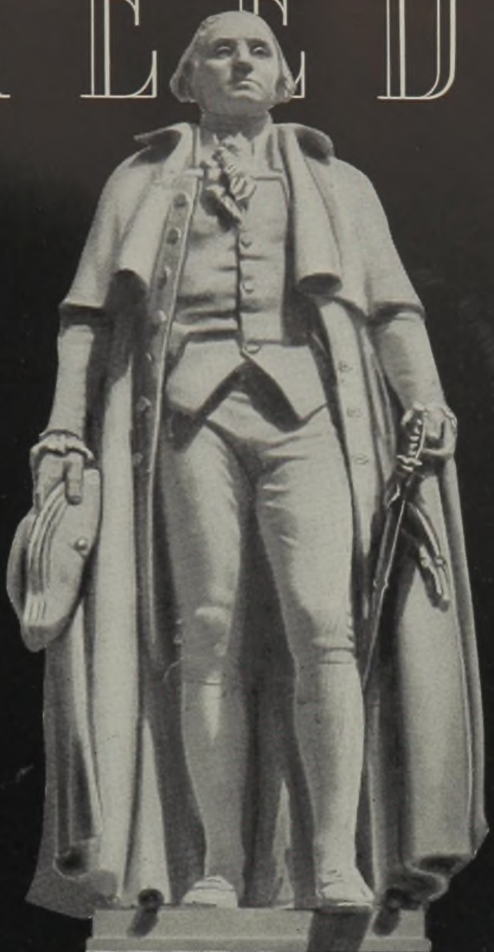
American Pharmaceutical Manufacturers' Ass'n met in Hot Springs, Va., June 14-16. Among the addresses given were "Pharmaceutical Research Today and Tomorrow" by Dr. George D. Beal, assistant director, Mellon Institute; "Industry Problems—War and Post-War Period" by Dr. Carle M. Bigelow, Calco Chemical Div., American Cyanamid Co.; "Raw Material Situation" by Hugh Craig, editor, *Oil, Paint and Drug Reporter.*

Hoyt Discusses Petroleum

Dr. Crieg S. Hoyt, chairman of Department of Chemistry of Grove City College addressed a meeting of Erie Section, ACS, April 30. His paper was entitled "The Composition of Fuels for Internal Combustion Engines."

The steady improvement in the combustion characteristics of gasoline, stated

FREEDOM



America's greatest victory was the triumph of one man's faith at Valley Forge—a faith in Freedom that conquered cold, hunger and despair. Armies could not defeat it. Weary years only strengthened it. And no power can break the sword that it forged at Yorktown, tempered at Gettysburg, and bequeathed to the world at Bataan, Midway and Corregidor.

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20

TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

Tri-Sure

Reg. U. S. Pat. Off.

CLOSURES

Tri-Sure News

NUMBER 7 ★ 30 ROCKEFELLER PLAZA, NEW YORK, NEW YORK ★ JULY, 1943

OUR NEW AVIATION DEPARTMENT

T. H. CHAMBERLAIN

With a view to the future and the possibilities of post war aviation, we have added an Aviation Department to our Company, which, it is planned, will give special services to all branches of the aviation industry.

Mr. T. H. Chamberlain, who is in charge of the new Department, is a veteran in commercial flying, having entered the field in the early 20's. He has flying experience in all parts of the world and as a pilot has more than 2500 hours to his credit. In 1933 he made a flight to Central Africa, was forced down in the sud country of the Southern Sudan and walked 150 miles through bush and swamps to the River Nile, later returning to repair his machine and fly it out. Injured in the hand by a propeller he later became Aeronautical Consultant to a well known British company and spent two years in Portugal on the survey of an air line from Lisbon to South Africa.

DRUMS FOR SALE

5000. Full size top compression lid, metal containers, lacquered on inside and outside, capacity 2 gallons (465 cu. ins.) This quantity is increased by about 500 weekly.

For further details apply
R. H. SCHURR (Partner)
Solvent Recovery Corp.
P. O. Box 52, Pottstown, Pa.

Sterling silver American Flange trophy, donated to the U. S. Air Force Aid Society Sports Meet, held at Triborough Stadium, N. Y. on June 20th, for the 1500 meter race. The winner was Gilbert H. Dodds, Boston A. A. This trophy will be competed for annually until retired.

This Poem Seems to be Appropriate in These Days

If you laugh when others cry,
Learn to smile when others sigh,
And always have a twinkling eye—
That's charity, my brother.

If you bless when men revile,
Do kindly acts with kindly smile,
Help some lame dog o'er the stile—
That's charity, my brother.

If you are patient, brave and true,
And always unto others do
As you'd have others do to you—
That's charity, my brother.

If you keep steadfast, never weak,
And always words of wisdom speak,
When smitten, turn the other cheek—
That's charity, my brother.

If you bring joy where there is sorrow,
And show to man the bright tomorrow,
Always give and never borrow—
That's charity, my brother.

If you can love each living thing,
Hear the message that they bring,
The flowers, the beasts, the birds that sing—
That's charity, my brother.

If you can turn grey skies to blue,
And bring the sunshine pouring through,
Give, as God has given you—
That's charity, my brother.

"WE THREE."

Dr. Hoyt, has been greatly accelerated of late by the necessity for gasoline of very high octane rating for aeroplanes. The isoparaffins with the maximum number of side chains have been shown to be among the best antiknocks; in fact 2, 2, 4 trimethyl pentane is the particular octane chosen as the 100 per cent standard of knock rating. The preparation of such molecules in commercial quantity from the more common normal or single branched chain hydrocarbons would result in a tremendous advance in the design of the internal combustion motor.

A most important method which is being widely developed at present is alkylation, either thermal or catalytic. This reaction, in which a paraffin is combined with an olefin, yields a branched chain structure of high octane rating. The alkylation of ethylene is conducted thermally at temperatures above 900° F., the adverse equilibrium conditions being offset by high pressures. Higher members of the series are usually alkylated catalytically at low temperatures using acid catalysts. Acid alkylation is limited to isoparaffins, requiring the isomerization of any normal paraffins before alkylation.

Glasstone on Electrolysis

Dr. Samuel Glasstone, professor of chemistry, University of Oklahoma, addressed several sections of American Chemical Society during the past months on "Electrolysis and Some of Its Problems."

Silver plated from a silver nitrate bath, said Dr. Glasstone, gives a rough mossy deposit. The character of the deposit depends to a large extent upon the pH and the composition of the solution. Better deposits are obtained through the use of addition agents which are adsorbed on the surface of the deposited crystals and prevent further crystal growth away from the base metal. In most cases, it is desirable to have growth along the plate surface rather than away from it.

Another problem in electrochemical work is that of overvoltage. Hydrogen overvoltage, used most frequently in industry, is sometimes defined as the difference between the equilibrium potential of hydrogen and the actual voltage required to cause evolution of gas at the electrode (decomposition potential). Metals with higher melting points have low hydrogen overvoltage, and lower melting metals have high hydrogen overvoltage. The reverse is true for oxygen overvoltage. The causes of overvoltage are not fully understood, but it is believed that between the initial or ion state and the final or gas state, there is some intermediate "slow stage" which is responsible for overvoltage. The speaker listed five possible slow stages: (1) Transfer of H_3O+ from solution to the electrode layer. (2) Transfer of H_3O+ to the electrode. (3) Neutralization of the positive charge by an electron. (4) Combination of H atoms to form hydrogen molecules. (5) Formation and evolution of gas bubbles. At present, the second cause seems to be the most plausible explanation.

Dr. Glasstone went on to discuss a new mechanism of electrolytic oxidation and some of the phenomena observed in aqueous and non-aqueous solutions.

TAPPI War Conference

The Technical Association of the Pulp and Paper Industry will sponsor a technical service conference for all paper manufacturers and paper users engaged directly in the war effort at the Palmer House, Chicago, September 21-24. This will replace the Association's regular fall meeting.

In the past, the TAPPI fall meetings have dealt largely with technical subjects that featured the industry in the region where the meeting was held. This year the meeting is planned as a war conference between representatives of the Armed Forces and the industry. Members of all branches of the paper industry that are making products for the Army, Navy or other war agencies are invited to attend.

The Army and Navy will use 20,000 square feet of exhibit space at the Palmer House to show how paper and containers are used by these services.

OBITUARIES

Samuel T. Blackwood, former president of Philadelphia Wholesale Drug Co., died June 10 in his home in Philadelphia. His age was 73. Mr. Blackwood was a former director of Philadelphia College of Pharmacy.

Harry R. Clark, chief chemist at Staten Island plant of U. S. Gypsum Co., died June 30 of a heart ailment at his home in West New Brighton, after a brief illness. He was 44 years old.

Ben Greenberg, 63, vice-president of Sterling Magnesia Co., died June 22 in St. Vincent's Hospital of complications resulting from injuries suffered in an automobile accident several months ago. He made his home in Bronx, N. Y.

Alfred D. Hammond, manager of New York office of Atlas Powder Co., with which he was associated for 35 years, died July 8 in his home in Westfield, N. Y., after a short illness. His age was 56.

Thomas J. Laffey, former counsel for E. I. du Pont and Atlas Powder Co., died in his home June 21 after a long illness. He was 69 years old.

James E. MacMurray, founder and former chairman of board of Acme Steel Co., died July 1 at Pasadena, Cal. He was 80 years old.

Samuel Reid Russell, senior technician in explosives department of E. I. du Pont Co., who developed methods of blasting, particularly for clearing out big harbors, was found dead July 8 in his room at the Hotel Easton, Pa. His age was 63.

Gustav J. Steigerwald, nationally known oil company executive and broker, died at his home in Cleveland, June 29 after an illness of four months. He had been in the oil business for 45 of his 66 years. He was president of Steigerwald Petroleum Co. and Climax Refining Co.

Robert Rankin Willgoos, salesman for Leatex Chemical Co., died suddenly on July 1, after an illness of several months. He was a member of the New York section of American Assn. of Textile Chemists and Colorists.

CALENDAR OF EVENTS

AGRICULTURAL INSECTICIDE AND FUNGICIDE ASSOCIATION, 10th Annual Meeting, Essex and Sussex Hotel, Spring Lake, N. J. July 22-23.

CHICAGO RUBBER GROUP, Annual Summer Outing, Nordic Hills Country Club. August 14.

SALESMEN'S ASSOCIATION OF THE AMERICAN CHEMICAL INDUSTRY, Bonnie Briar Country Club, Larchmont, N. Y. July 15.

SALESMEN'S ASSOCIATION OF THE AMERICAN CHEMICAL INDUSTRY, Forest Hills Field Club, Bloomfield, N. J. August 12.

SALESMEN'S ASSOCIATION OF THE AMERICAN CHEMICAL INDUSTRY, Pomonok Country Club, Flushing, N. Y. September 14.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Wartime Service Conference, Palmer House, Chicago, Ill. September 21-24.

Government Publications

(Continued from page 98)

Use of Manganese Alloys for Electrical Condenser Plates. Discusses the combination of mechanical strength and high vibration-damping capacity possessed by a number of these alloys, suggesting their use where vibrations are undesirable. R. I. 3689 by E. V. Potter and Ralph W. Huber.

Application of Carbon Tetrachloride-Type Fire-Extinguisher Liquid to Burning Magnesium Chips and Magnesium Incendiary Bombs. The chemical fire-extinguisher industry have generally agreed that carbon tetrachloride-type fire extinguishers should not be used to extinguish burning magnesium or thermit-magnesium incendiary bombs because of violent reaction between the extinguisher liquid and the burning magnesium. If a burning incendiary bomb should ignite adjacent materials it might be expedient to use an extinguisher of this type to control this secondary fire. R. I. 3686 by S. J. Pearce, Leopold Scheflan, H. H. Schrenk, G. E. Ferguson, and H. R. Brown.

Olivine. First used commercially because of its refractory properties. Experimental work now in progress to make it available as a low-cost raw material for the production of magnesium metal. I. C. 7239 by G. Richards Gwinn.

List of Respiratory Protective Devices Approved by Bureau of Mines. Includes oxygen breathing apparatus, gas masks, supplied-air respirators, and dispersoid respirators. I. C. 7237 by H. H. Schrenk.

INDUSTRIAL TRENDS

Steel: Because there is usually a lag of several weeks before the shortage of pig iron produced by the blast furnaces affects the rate of steel production, the full effect of the May coal strikes was not felt until the middle and latter part of June. The week of June 27 found ingot production down to 90.3 per cent of capacity, a three-year low. By the second week in July it was back to 97 per cent, with prospects favorable for an additional moderate advance provided the coal situation continues to improve.

Various unofficial estimates have been made placing the loss of steel production due to the coal strike at anywhere from 150,000 to 190,000 net tons. One method of arriving at an approximation is to contrast the output in June with that in April, since the months have the same number of working days and are fairly close together. The difference this year amounted to a decline of 347,000 tons. Based on years immediately previous, a seasonal decline of around 100,000 tons from April to June appears normal and may be attributed to fatigue of men and equipment at the end of long winter and spring production at high speed, the effects of the first heat waves, and other recurring factors. Allowing generously for such effects this year, the loss of steel tonnage from "other" causes seems to exceed 200,000 tons, and the coal strike is the only fact on record to explain this shrinkage.

Commodities: Registering a much less than usual seasonal decline, the Bureau of Labor Statistics' index of commodity prices decreased 0.9 per cent during June but was 4.6 per cent above last year for the first week in July. Farm products were the chief factor in the increase, the price average for this group having advanced 20 per cent from a year ago. The only other group showing an unusual increase was "raw materials," which went from 99.9 to 114.0 in the course of the year. Chemicals and allied products were unchanged during the month and were 3 per cent higher than last year.

Business Barometers: Construction volume for the first six months of the year was down 65 per cent, reflecting completion of the greater part of the military and industrial construction program for war purposes.

Chain store sales rose 7.0 per cent in June, the apparel group leading the advance with a gain of 27.0 per cent. Drug, grocery and variety chains showed good increases over the corresponding 1942 month.

Carloadings were up 31.4 per cent for the month but only 13.1 per cent over a year ago. The biggest factor in the current increase was resumption of coal shipments. Grain loadings also showed a small gain.

Index of department store sales dropped from 137 to 117 over the month, reflecting usual slackening up of buying at this season, but comparison with the same month last year showed a 39 per cent increase.

Average daily bank clearings decreased from $1,543,872 in May to $1,433,780 in June, but were still 23 per cent above last year.

Retail prices in May were 8.8 per cent over the 1942 month and were 37.6 per cent higher than in August, 1939, immediately preceding the outbreak of war in Europe.

Miscellaneous: A woodpulp deficit of 1,000,000 tons this year and an additional decline of as much as 40 per cent in some regions in 1944 as a result of the pulpwood shortage have been forecast by the American Paper and Pulp Association.

Although construction volume continues to increase in synthetic rubber, nonferrous metals and 100-octane gasoline industries, war construction as a whole is expected to continue its downward trend and to drop more steeply in the third and fourth quarters of this year, according to WPB.

CHEMICAL SPECIALTY COMPANY NEWS

Synthetic Perfumes

George B. Bradshaw, assistant manager of Du Pont Co.'s Fine Chemicals Division, recently described "some synthetic perfumes perfected by Du Pont." He told, for example, of "Astrotone" synthetic musk, equivalent to the active ingredient derived from the Tibetan musk deer, basic of all "classical" perfumes. This the chemist produces from fatty oils derived from plants or animals. Other musk-like odors come from coal tar.

"The ancient art of perfume making has undergone extraordinary changes because of new materials made possible by modern science," said Mr. Bradshaw. "The perfume of today is a skillful blend of the natural and the synthetic.

"'Skatole' is a chemical duplication of civet, another 'classical' perfume base, while 'Indole' matches jasmine and is regarded as the sine qua non of exceptional perfumes."

As attractive in every way as their natural counterparts, except in name, are isobornyl acetate and terpinyl propionate. They practically replace pine needle and rosemary oils and are often used instead of lavender. This pair is made from turpentine, being by-products of Du Pont's development of synthetic camphor.

Only a short time ago it took nearly twenty-five tons of violets to make a single ounce of the natural oil. Today the violet odor is produced synthetically. Until recently a ton of roses was needed to obtain ten ounces of the natural oil. Now this odor is produced in the laboratory.

Lilac, available to everyone, could not be produced, irrespective of labor and costs, until it was made by synthesis, for no satisfactory means has ever been found of extracting the natural oil. Moreover, there is no known natural extract so sweet or so peculiarly powerful in odor as synthetic lilac. Similarly, there was no lily-of-the-valley perfume until it was produced synthetically.

Anisic aldehyde supplies a hawthorne odor and is a satisfactory substitute for lilac. Dimethoxybenzene possesses a mimosa-like scent. Cinnamic aldehyde replaces oil of cassia from China with its cinnamon aroma.

Glycerin-containing Face Cream Gel

While preparations of this type may not be as generally in demand as others more commonly used, they may nevertheless be of interest, especially because of their good emollient effect. The following formulation might be recommended:

Gelatin	20
Glycerin	44
Water	540

Perfume to suit taste.

The gelatin is first dissolved in somewhat more than half the quantity of water and during cooling the glycerin, perfume oil, and the rest of the water are added. The gelatin used for this purpose should be of highest quality, white, and free from odor. Heating the gelatin solution insures stability but despite this fact, the addition of a preservative would be recommended. In place of gelatin, tragacanth or methyl cellulose could of course be used.

Red Mite Control

Use of the new "dinitro insecticides" for red mite control on apple foliage promises, according to Dow Chemical Co., improved crops. An extensive report on the new insecticides, produced by Dow for use either as a spray or dust under the trade designations "DN-111" and "DN Dust D-4," was contained in a recent bulletin of the New York State Horticultural Society.

"Thorough applications of either form," says the Bulletin, "result in killing practically all of the hatched stages and many of the eggs. Apparently this dinitro compound possesses considerable residual effect with the result that many young mites that hatch from untreated eggs, and those from eggs that did not receive lethal amounts of the toxicant, are killed as they move about." This killing frequently takes place some days after the application.

Boyle Appoints Covert

Ross S. Covert, Pacific Coast manager of A. S. Boyle Co. and Miday Chemical Co., has been elected a vice-president of the A. S. Boyle Co. Covert is former owner of Antrol Laboratories which was acquired by American Home Products Corp. in 1940.

Cleans Spark Plug Shells

New method for cleaning aircraft spark plug shells, using Turco Type X and Turco De-scaler as the chemical compounds, removes oil, grease, lead and carbon deposits and is said to leave the spark plug shells chemically clean. According to the manufacturer, drag-out losses per gross of shells, using the Turco method, are about .06 gallons of solution or .03 pounds of Turco Type X. Under the old cleaning methods, losses were 100 times greater, or about 3 pounds of nitrates per gross of shells.

Insecticides

M. W. Stone, U. S. Dep't of Agriculture, describes in *J. Econ. Entomology* the use of dichlorethyl ether for killing wireworm. This chemical was tried against wireworms infesting rows of sugar beet, and it was found that 81-100 per cent of the insects were killed by a solution of 0.2-1.2 oz. of dichlorethyl ether per 100 gallons of water, applied to the soil at the rate of 4-6 gallons of solution per foot of sugar-beet row. Another valuable insecticide, which happens to have fungicidal properties as well because of its copper content, is basic copper arsenate, which was first developed for this purpose in 1939. Field tests show that it is efficacious against many pests, and can be used without damage to plants such as cotton, potato, beans, soya beans, tomatoes and cranberries. Methyl bromide is gaining favour as an insecticidal fumigant, and when used to kill beetles infesting loaded refrigerator cars on railways, it achieves mortality rates of 100 per cent. Heber C. Donohoe and G. H. Gaddis, U. S. Department of Agriculture, describe its utilization, and state that for refrigerator cars an effective dose is either 5 lb. per car at 70° F. or 4 lb. at 80° F.

Breck Obtains New Quarters

John H. Breck, Inc., manufacturing chemists, has announced the opening of its new home at 115 Dwight St., Springfield, Mass.

Hollingshead Appoints Davis

George F. Davis will assume complete supervision of offices and warehouses of Industrial Division, R. M. Hollingshead Corp., in New York and Camden. Davis recently was named sales manager of the company's National WHIZ Industrial Products organization.

Summary of War Regulations

Abrasives—Unfused or levigated alumina excluded from provisions of order controlling supply of manufactured crude abrasives and abrasive grain. Order M-319 amended.

Aniline—End use certificates and standard allocation Forms WPB-2945 and WPB-2947 required for use in allocation.

Anti-Freeze—New containers of less than 5-gallon capacity prohibited from packaging any anti-freeze other than glycol. Order L-307, June 26.

Burlap Bags—Packing of petroleum waxes and stearic acid permitted in new burlap bags. Order M-221 amended.

Butyl Alcohol—Adjustable pricing permitted on deliveries of butyl alcohol by producers. MPR 37, Am. 5, July 1.

Caffeine and Theobromine—Delivery of not more than 2 pounds to any person in any month exempted from WPB authorization requirements, as is also delivery of any amount for compounding into medicinal preparations. Order M-222, amended July 6.

Calcium Carbide—Necessity eliminated for certification of delivery of not more than 10 tons of calcium carbide per month. Order M-190 amended.

Casein—Producers' ceiling prices for industrial casein increased by 3c per pound. MPR 289, Am. 16, June 20.

Casein—Suppliers required to file separate PD-601 forms with WPB for proposed deliveries to each type of customer. Order M-307 amended.

Cellulose Plastics—Cellulose ester flake and cellulose plastics placed under allocation control effective July 1. Orders M-326 and M-326a, June 9.

Chlorate Chemicals—Allocation changed from a monthly to a quarterly basis. Form PD-602 to be used by producers and distributors in applying for requirements. Order M-171 amended June 7.

Chlorinated Paraffin—No longer under allocation. Order M-189 revoked.

Defluorinated Phosphate—Temporary price ceiling of $34.25 per ton f.o.b. producer's plant established pending processing cost study by O.P.A., GMPR Sup. Reg. 14, Am. 186, June 23.

Dyestuffs and Pigments—Restrictions on sale and use extended to cover all but four specific dyes. Quotas set up on use of dyestuffs retroactive to July 1. Order M-103 amended.

Ethyl Acetate—Placed under allocation control effective June 12. Order M-327, June 9.

Ethyl Acetate—Use of ethyl acetate or isopropyl acetate permitted by persons, other than producers or distributors, who owned the chemicals on June 12, 1943, without specific WPB authorization. Order M-327 amended.

Ethylene Glycol—Current market price of 9c per pound established by O.P.A. as maximum price for producers sales.

Gas Cylinders—A preference rating for MRO supplies may not be used to obtain a gas cylinder from a manufacturer, regardless of whether the user carries gas cylinders as operating supplies or as capital equipment. Order M-233, Interpretation 1.

Glass Containers—Four-month quota placed on number of new glass containers which users may accept or have set aside for account for packing certain specified chemicals. Order L-103B, July 1.

Glycol—Order controlling allocation of ethylene glycol, propylene glycol, diethylene glycol, triethylene glycol and mixed glycol simplified to reduce paper work for the industry and WPB. Order M-215 amended.

Glycol Ethers—Placed under allocation control effective July 1. Order M-336, June 22.

Isopropyl Acetate—Placed under allocation control effective June 12. Order M-327, June 8.

Lauric Acid Oils—Order discontinued which restricted use of coconut, babassu, palm kernel and other oils with high lauric acid content. Control now exercised under F.D.O. 46. Order M-60-a revoked June 24.

Pigments—Red lead and orange mineral color pigments exempted from color pigments regulation. Control will be exercised under GMPR pending issuance of separate order by O.P.A. RMPR 180, Am. 1, effective as of May 14.

Potash—Specific price ceiling for sales by domestic producers established at GMPR levels prevalent since 1937. Prices for sales of imported potash to fertilizer manufacturers rolled back to prices fixed for potash produced in the United States. MPR 404, June 18.

Potash—Ban on development of new sources lifted by order of the Secretary of the Interior, permitting issuance of additional prospecting permits and potash development leases.

Rosin—Stabilized rosin prohibited for use in manufacture or preparation of soap. Order M-335.

Rotenone Insecticides—Restrictions on agricultural use and distribution eliminated from M-133, the function being taken over by the War Food Administration under F.D.O. 13, Order M-133.

Sodium Phosphate—Placed under allocation control effective July 1. Order M-334.

Sulfamic Acid—Acid and derivatives no longer under allocation. Order M-242 revoked.

Synthetic Resins—Simplified pricing methods for manufacturers of 19 classes of synthetic resins and plastic materials established at levels generally reflecting March 1942 prices under GMPR. MPR 406, June 22 (replaces GMPR for these products).

Tapioca—Use of tapioca flour restricted in the paper, textile, food and adhesives industry. Order M-333.

Triple Superphosphate—On sales to government agencies, addition authorized of $1.00 per short ton to the $1.00 which manufacturers may charge for bagging the product. GMPR Sup. Reg. 14, Am. 187, June 28.

Urea and Melamine Aldehyde Resins—Placed under allocation control effective July 1. Order M-331.

Zinc—Metal Reserve Company is the only buyer permitted to acquire zinc without allocation. Order M-11 amended.

MARKETS IN REVIEW

CHEMICAL production remained at a high level at mid-year although difficulties in other industries such as the coal strike, and mismanagement of the food situation, both had unfavorable influences upon chemicals. The Federal Reserve Board's index of industrial production for May remained at the April figure of 203 per cent of the 1935-1939 average, rising munitions output serving to offset declines in coal and other civilian production.

That the Government is greatly concerned over the war production program was evident at the start of July. The production goal has been set at a figure of $68,000,000,000 for 1943, and leaders in Washington fear it may fall short by $5,000,000,000. A complaint that the production of equipment for the armed forces is lagging badly came from Undersecretary of War Robert Patterson. Warning that the needs of the chemical warfare service and other Army branches would have to be stepped up was voiced by Lieut. General Brehon Somervell, Commanding General of the Army Service Forces.

The War Production Board, therefore, through the Labor-Management Council, is reported planning improved management-worker relations as one means to expand war output. But there are many other factors which enter the war production picture. The term, "management-worker," does not describe production principles, for example, as well as "administration-management-worker." Policies having to do with labor, wages, prices and distribution have in some instances been grievously mishandled.

Solvents Supplies: The corn situation is a case in point. Due to the imposition of OPA price ceilings on butyl alcohol, butyl acetate and acetone, chemical solvents manufacturers were not able to pay prices prevailing on corn ($1.40 bu. and higher), sent to those levels by demand for feed. Relief measures were taken only after the plant of the Corn Products Refining Co. at Pekin, Ill. had been forced to shut down for lack of raw material. Solvents makers, in face of a 3,677,000,000 bu. supply for 1942-1943, also were unable to obtain any of the huge supplies tied up against loans, or compete with the feed buyers for the little available in open market.

Partial ceiling relief was extended to the chemical industry late in the month when it was permitted to add additional raw material costs to the price maximums for butyl alcohol. No action was taken with regard to acetone, the bulk of which is being produced synthetically through the isopropyl-acetone process. While the life of the Commodity Credit Corporation hung in the balance on the subsidies issue in Congress, its operations were ignored by another Federal agency, the War Food Administration, which set about requisitioning corn stocks held at 96 mid-Western terminal elevators.

Ethyl alcohol users meanwhile are assured of supplies of this major solvent at no rise in prices, although production costs at converted distilleries have risen substantially. The alcohol ceilings will remain and producers are promised a fixed profit over their costs. All this will be accomplished through an involved arrangement whereby the Defense Supplies Corporation, under WPB allocations, will buy the alcohol outputs of industrial alcohol plants, as well as from converted beverage plants, processed from higher-priced wheat in most cases. DSC will then sell the alcohol to industries at the ceiling of 48c per gallon, and to government plants and agencies at an average of DSC acquisition costs.

The alcohol pricing system is another version of government subsidies which will have to be paid somewhere and sometime, even though the difference between costs and prices is paid temporarily by a government agency. The great bulk of our alcohol production this year, probably 450,000,000 out of 550,000,000 gallons, will be consumed in alcohol-butadiene synthetic rubber units and smokeless plants; hence, at the higher costs.

Munitions production has experienced some notable changes that are certain to have an effect upon the supplying chemical plants. The growing use of hexamine in block-busters and other types of bombs is easing the burden on ammonia-nitric acid production, and trinitrotoluol capacity is being curtailed. On July 31, the Government will suspend TNT production entirely at the huge Lake Ontario Ordnance Works, operated by Chemical Construction Corporation, due, the explanation said, "to the ever-changing requirements of war."

Hexamine demands on the other hand must be expected to increase, and keep formaldehyde and methanol, its raw materials, in a continued tight supply position. Methanol-making facilities, requiring hard-to-get compression equipment, are not easily provided. It is possible, however, to shift ammonia synthesis processes over to methanol, and in this connection it is worth noting that the War Department finds itself overbuilt as to ammonia capacity. It is probably over-extended also in the matter of smokeless powder.

This somewhat easier ammonia position should not be without its effect on nitrogen fertilizers. In fact, nitrogen in all forms is estimated to be 15 per cent greater for 1943-1944 than any previous supply in this country. During the calendar year 1942, fertilizer consumption was 415,000 tons (in terms of N), and in 1941 it set a record at 456,000 tons. But the larger supply of fertilizer nitrogen over the next 12 months will be chiefly in the form of solutions and ammonium nitrate; hence, storage and safety problems for the TVA product offer a problem yet to be worked out. The over-all 15 per cent increase in nitrogen supplies also may fall far short of needs in view of the heavy crop and livestock programs.

Trends in Rayon: Military requirements of rayon of the high-tenacity type continue to increase, and plants equipped to produce this specification which enters tires will be required to turn out 68,000,000 lbs. in addition to the 100,000,000 lbs. being made annually. The WPB does not expect that these expanding rayon needs for the war machine will cut greatly into civilian supplies. Rayon production during the first quarter, 160,400,000 lbs., was 4 per cent greater than the same period in 1942, and for the full year 1943 it is figured that there will be some 400,000,000 lbs. of rayon available for non-military uses. This latter total, however, is not much above the 1939 pre-war supply, and it may prove hopeful. The nation's spending power is now much greater.

Military and export needs may take a greater portion of the 641,000,000-lb. rayon production, aside from high-tenacity, than figured, and a factor may be the constant expansion of women's fighting units. Large retailers already are finding it difficult to locate rayon goods in some wholesale markets. However, such war developments as the rayon cord tire should hold out great promise to this industry, a large alkali and chemical consumer, in the post-war period.

Wool consumption apparently reached a peak this spring as far as the apparel industry is concerned, attended probably by some falling off in the use of chemicals, especially caustic soda, bichromate and dyes. Records, however, are being set in this industry. Weekly average consumption for the July 1942, to April 1943 was 11,472,000 lbs., and the aggregate consumption for the period, 493

299,000 lbs. Not without significance to the chemical industry is the recent development of a solvent degreasing process (based upon leather degreasing) employing naphtha for grease removal instead of caustic. Thus far it has been applied mostly to short fibers which often are not recoverable through alkali-cleaning.

Cellulose and packaging: Instead of the curtailment many had looked for, production of cellulosic materials such as cellophane will be fully maintained by the WPB. To assure continuance of cellophane supplies, refined bleached sulfite pulp will even be diverted from such essentials as rayon to the transparent wrapping material. Two large industrial pulp producers have been supplying pulp for cellophane manufacture, and one is scheduled to close down this month due to labor shortages. The diversion of rayon pulp as a result may follow. It is estimated that as much as 80 per cent of cellophane production is used for military packaging. The remainder is carefully distributed for wrapping food and other civilian essentials.

New Paint Restrictions: The materials situation was complicated a bit further for many in the protective coatings field last month by a new drying oil regulation, M-332, in which the food needs of the nation also make themselves felt. The paint industry is now almost wholly dependent upon domestic linseed oil, a substantial portion of which will be diverted to food. New formulas for paint use now restrict the use of non-volatile oils for mixing pigments and colors to 70 per cent by weight, which means that 30 per cent must be made up of such things as mineral spirits, other hydrocarbons and turpentine.

The formulas are said to have been carefully worked out after much study by industry committees, have also obtained the approval of the many government bureaus. At this writing the order as issued leaves room for wide interpretation, notwithstanding. An earlier Bureau of Standards specification, issued May 1, provided for one-third raw oil, one-third bodied oil, and the remainder volatile products and drier. Provision for bodied (cooked) linseed oil in this instance was made to prevent the paint from running.

Heavy Chemicals: Orders for caustic soda for war industries, Lend-Lease and civilian needs ran into heavy tonnages during June. These demands, coupled with insufficient manpower at production and shipping centers contributed to temporary shortages of caustic. Brazil is reported to be an active buyer of the alkali to supply her expanded textile, paper and soap industries. The export market at one time was named at the wide range of $2.45 to $2.70 per 100 lbs. for solid caustic. The difficult shipping situation between here and South American ports eased somewhat during the month. Another heavy movement took place in copper sulfate to the agricultural trade, weather conditions in farm areas explaining the greater need for insecticide materials. The acids provided more cause for concern last month. Demands for acetic were reported in excess of production, which led some to look for allocations.

Fertilizer materials were featured by smaller allocations of potash, despite indications that production may set a new record for 1943-1944. The movement of sulfuric acid to superphosphate makers fell off as a seasonal circumstance but consumption will undoubtedly run high over the rest of the year. The Department of Agriculture is studying measures for the utilization of more spent acid from munitions plants in fertilizer compounds. The production of ammonium sulfate by coke ovens during the first five months dropped to 317,282 tons, from 319,995 tons in the same time last year.

Fine Chemicals: Tartar products, citric acid, formaldehyde, santonin, menthol, were all firm and active items, while the position of glycerine became less stringent. Consumption of glycerine is said to have been curtailed well below the monthly supply basis, and there were expectations that the F.D.A. would allow consumers a 60-day supply instead of the allowed 30-day supply. Nothing further has been done with regard to bringing in shipments of North African argols and tartrate supplies here continue in a strong position. New sources for substantial amounts of menthol are also needed to take the place of the product formerly brought in from Japan and China. Small quantities have been brought in from Brazil. The shutdown of a large corn refining plant had no immediate effect on supplies of corn starch, corn sugar and dextrin for pharmaceutical and other industrial use. Antifreeze demands to cover next winter's requirements grew more active. It was estimated that over 45,000,000 gallons of ethyl alcohol, methanol and similar products had been released for this purpose. The shortage in chemical woods used in charcoal and wood methanol production meanwhile is steadily growing worse. Charcoal industry believes that higher ceilings on raw wood offer a solution.

Coal Tar Products: The coal strike with its threatened curtailment of coke supplies and byproduct chemical outputs, coincided with a rise in demands for benzol, pyridine and phenol. Benzol appears to be moving into the position of our No. 1 war chemical, and is needed in expanding volume for synthetic rubber (styrene) and for phenol conversion to supply resins and other synthetic organic processes. No serious shortages have developed thus far in coal tar products but shrinkages are likely after the 30 to 60-day time lag between coal coking and chemical processing. In Washington, where more concern was shown over prices, the OPA took steps to impose dollars and cents ceilings on coal tar. Large shipments of cresylic acid arrived from Great Britain for distribution to users here by the D.S.C. Pyridine is being taken in increased quantities for sulfa drug manufacture. The output of toluene for war purposes was further expanded by the opening of a unit for nitration grade by the Gulf Oil Corporation near Philadelphia.

Paint Materials: Steam distilled wood turpentine narrowed its wide discount under the gum product by an advance of 5c per gallon, establishing the former at a base price of 70c per gallon to the dealer, drums extra. Wood rosins were steady, but gum rosins firmed up materially during the month at Savannah. Gum turpentine moved into the hands of the Government through CCC purchases. Pigments, including lead, zinc and titanium oxides, moved in larger volume to consuming centers during June. Shellac deliveries continued under the control of the DSC and very little reached the normal heavy consuming industries. Ceiling prices were raised 3c on domestic casein. This may not prove sufficient to bring out more casein from the dairying sections, the trade thought, and plans for importing larger quantities from Argentina were discussed.

Salt Production Up

As might be expected with intensification of the war, another high record in salt production was attained in 1942, according to a report by the Bureau of Mines. During 1942, 13,693,284 short tons of salt valued at $38,144,234 was produced. However, the increase was not nearly so great as that of 1941 compared with 1940.

Gains occurred in all three types of salt output, the greatest being in the salt of brine, 9 per cent; while output of rock salt gained 7 per cent and evaporated salt 6 per cent compared with 1941. The increase in total salt was 8 per cent.

Demands of the chemical industry and the manufacture of magnesium metal caused the largest increases.

Increased demand was experienced not only by the largest producers but also by many of the smaller operators who reported active demand throughout the year.

8. Case of the Disputed Acknowledgment

CHEMIST SMITH'S best customer was provoked, most warlike, and threatened to sue for staggering damages.

"Come into the office and we'll talk it over," Smith invited.

"And that we will!"

"Have a cigar," Smith offered, as they seated themselves.

"And that I will, and I'll have my last chemical order delivered and delivered in July," the best customer announced.

"Perhaps we'd better start at the beginning of the whole fracas," Smith suggested, waiting until the customer's cigar was well alight.

"A very good idea."

"You received our letter stating that we could accept no more orders for any kind of chemicals for delivery after June of this year until further notice," Smith began.

"And that I did," puffing at the cigar. "But, because I am, as you say, one of your best customers, I sent you an order for July delivery, which you acknowledged, so now I demand delivery of my order in July, according to the terms thereof," the customer averred.

"Quite true, we acknowledged your order, but our letter stating that we were accepting no orders except for June delivery was enclosed with our letter of acknowledgment, so our acknowledgment was in no way an acceptance of your order," Smith pointed out.

"It was to me," the customer announced, getting to his feet and still puffing on his cigar.

"Do I get my chemicals?" standing in the open door.

"I'm afraid not."

"I'll sue, then," slamming the door.

Chemist Smith looked at the door and laughed, even though threatened with a suit by his best customer, for there, stuck in the door jamb, was the unsmoked remainder of the cigar.

"That must have been close to your nose, but you'll lose your suit just as you lost that cigar," Smith mused, and guessed correctly, for the Georgia Court of Appeals in the parallel case of Dow vs. Moultrie (reported in 173 S.E. 448) has ruled that such an acknowledgment does not bind the seller.

"The letter acknowledging an order for July delivery when no more orders were accepted except for June delivery is not an acceptance of the order and does not make a binding contract. The letter acknowledging the receipt of the order and stating that 'we can accept no further business on these goods except for June delivery,' since it constitutes a variation of the dates of delivery, does not amount to an acceptance of the order," was the reasoning of the Court.

9. Case of the Warranted Mixer

"THAT seems like a lot of money to put into a mixer," Chemist Smith demurred.

"Yes, but I warrant that mixer is thus and so, and I'll replace any part free of charge that does not come up to the warranty," the seller announced.

"I'll take it on those terms," Smith agreed. He did not pay for it, and the seller sued in the Minnesota courts.

"The machine didn't come up to your warranty," Smith pleaded.

"That's the first time I ever heard of it," the seller retorted, "and if you'd notified me I would have replaced or repaired any defective part."

"No—you should have known that your own retort was defective without any notice from us."

But the Court ruled in the seller's favor in the case of Beckett vs. Gridley, reported in 69 N.W. 622.

TNT Works to Close

Huge Lake Ontario Ordnance Works, in operation 9 months, will stop production of TNT July 31 because its product is not needed "due to ever-changing requirements of the armed forces."

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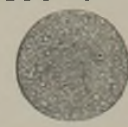

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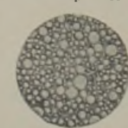

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Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

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
May 1941 $1.09 May 1942 $0.938 May 1943 $0.892

	Current Market		1943 Low	1943 High	19[illegible] Low	19[illegible] High
Acetaldehyde, 99%, drs. wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs. c-l, lb.	...	.11½	.11½	.11½	.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	.04½
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, tech, cbys .. lb	.10½	.11½	.10½	.11½	.10½	.11½
Hydrofluoric, 30% rubber, dms. .... lb.	.08	.09	.08	.09	.06	.06½
Lactic, 22%, lgt, 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	.14½
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	...	.70½
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 Prices

	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, 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.	.1225	.1675	.1225	.1675	.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.	.0635	.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.	.20	.212	.21	.23½	.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						
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.	...	.56¼	...	.56¼	...	...
Copal, East India, ...lb.	...	.12	...	.12	...	...
Macassar ....lb.	.07⅜	.11¾	.07⅜	.11¾	...	.17⅜
Copal Manila,	.13½	.15½	.13½	.15½	.14	.14½
Copal Pontianak, bold (A) lb.	...	.22⅜		.22⅜	.22⅜	.22⅞
Ester ....lb.	.09½	.12	.09½	.12	.08½	.10
Karaya, bbls, bxs, drs ...lb.	.14	.33	.14	.33	.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

Gums
Salt Cake

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Kauri, N Y (A)						
Brown XXX, cases ....lb.	...	.77	...	.77	.60	.77
B3 ....lb.	...	.22	...	.27½	.18½	.27½
Pale XXX ....lb.	...	.65¾	...	.66	.61	.66
No. 3 ....lb.	...	.22	...	.22	.17¾	.22
Sandarac, prime quality ..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.	.04½	.04¾	.04½	.04¾	...	.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	70.00	73.00	...	74.75	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, pure, 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 ......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, 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

Saltpetre
Oils & Fats

	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, 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, 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*)	.09½	(*FP*)	.09½	...	.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	4.35	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.	...	.088	...	.089	.63¾	.666
Light pressed, drs .....lb.	.117	.119	.117	.119	.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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Index to Advertisers

Index to Advertisers

"WE"-EDITORIALLY SPEAKING

We take great pleasure in announcing that Charles Todaro has been appointed advertising manager of CHEMICAL INDUSTRIES.

Mr. Todaro has been with Tradepress Publishing Corporation for several years in various capacities. In 1939 he was appointed circulation manager. In 1941 he transferred to the advertising department and after about two years was made Eastern advertising manager in January, 1943. In his new position he will supervise national advertising.

Before coming with CHEMICAL INDUSTRIES Mr. Todaro had been associated for several years with Meyers Publications, publishers of a number of trade papers. He was also owner and publisher of *Ice Cream Field* for four years.

CHEMICAL INDUSTRIES' staff is very happy at Mr. Todaro's appointment and we are certain that his many friends in the publishing and chemical industries join us in wishing him the best of luck in his new position.

If you have not already marked your questionnaire for the 19th Annual Revision of CHEMICAL INDUSTRIES BUYER'S GUIDEBOOK NUMBER, do so NOW. If your questionnaire is lost, strayed or stolen, ask us for another one. Time is getting short and you may not make it if you delay further.

It's funny that the W.P.B. should claim that the coal strike didn't hurt production much but that the race riots in Detroit did. Don't get the idea that we approve of race riots but it seems to us that the coal strike and other strikes do hurt war production and should not be compared with race riots to imply that they are not serious.

In the midst of grandiose schemes for postwar planning, "Globaloney," abolishing poverty, giving everybody a quart of milk, etc.; we wonder if too many of us are falling for the idea that *the world owes us a living*. Naturally, we believe that the standard of living should be raised for everybody everywhere. But it seems to us that we will accomplish this by understanding that *the world does not owe us a living, we must earn it*. Many people might coast on the backs of the enterprising for a period of years but for continuous progress the will to exert one's brain and energy must be encouraged by high rewards. A comparatively few men who strive hard in a competitive system may raise the standard of living of hundreds of thousands. We should not try to hold the top men down to the mediocre. We should enable them to lift the unfortunate or just average men to a higher plane. To believe this we need only review the contributions of American inventors, scientists and industrialists, who have made possible the American standard of living.

We have it from an ordinarily reliable source that Mussolini is preparing to write his *alibiography*.

Fifteen Years Ago

From Our Files of July, 1928

Institute of Chemistry, American Chemical Society, announces program for second annual session at Northwestern University, Evanston, Ill.

Gerald Wendt, director of Battelle Memorial Institute, resigns from that position after completing plans for the laboratory and the award of contracts. He has been appointed assistant to the president, Pennsylvania State College.

Foster D. Snell, consulting chemist, announces removal of his office from Pratt Institute to 130 Clinton St., Brooklyn, N. Y.

Dr. Charles Platt, former chief chemist in private laboratories of Thomas A. Edison, dies June 15, aged 59.

National Fertilizer Association elects E. L. Robins president at fourth annual convention at Old Point Comfort, Va., June 11-14.

Naval Stores Marketing Corp. capitalized at $500,000, is organized at Jacksonville, Fla., June 10, by 60 representatives of naval stores operators of five southern states.

Charles Hardy, Inc., New York, is appointed sole United States sales agent for Ruetgerswerke Aktiengesellschaft, Germany.

E. I. duPont de Nemours & Company's service department is making survey of economic conditions to determine feasibility of adopting five-day work week.

Paper Makers Chemical Corp., capitalized at $8.000.000 is organized at Easton, Pa. New corporation is result of reorganization and consolidation of interests of Paper Makers Chemical Co., Western Paper Makers Chemical Co., Vera Chemical Co., Vera Chemical Corp., Adirondack Mineral Co., Superior Sizing Co., John Regnier & Son Co., and Keystone Products Co.

Canadian Chemical Association organized at annual meeting of Dominion Chemical Convention at London, Ontario, June 7.

We mentioned the matter of safety on this page last month, but at the risk of being repetitious, we would like another word on the subject. We recently ran across a little bulletin entitled "Safety Speeds Production" which we can recommend as a handy reference. It is written for supervisors in clear, simple style and is dressed up with humorous but pointed illustrations. The distribution of a few of these to some of your plant men may help to prevent accidents which in these days are unintentional sabotage.

For copies address U. S. Department of Labor, Division of Labor Standards, Washington, D. C. Ask for Special Bulletin No. 10, "Safety Speeds Production."

Every once in a while something pops into our mind. The other night while we were sweating away trying to get this issue to bed, for no good reason the song of the invincible Germans, *Deutschland Uber Alles* came to our thoughts. After turning it over in our mind it came out *Alles Uber Deutschland*, and we wondered, after all the devastating allied raids, why someone didn't think of this before, or did they, and why couldn't some song writer make a hit out of this like *Heil Hitler*.

The use of blood plasma in the treatment of hemorrhage, shock, and burns is saving the lives of many of our soldiers, sailors and marines on all of our battle fronts. The Blood Donor Service of the American Red Cross represents a great contribution of the American public to the saving of life among our fighting forces, and is to be viewed as an opportunity for the men and women of this country to contribute of themselves toward the relief of suffering and the preservation of life of those who are fighting in our defense.

The response of industrial workers to the call for blood has been magnificent. Many plants have encouraged and worked out programs for the regular donation of blood by employees, in cooperation with the Blood Donor Service. In many cases mobile units are sent right into the plants to take the blood. The experience of those who have cooperated in this work shows that there is no decrease in efficiency or increased fatigue on the part of the donors. In fact, the psychological effect is a new stimulus to greater effort and improvement in morale, like a "shot in the arm."

If your plant has not already participated in the blood bank we suggest you get the ball rolling by contacting the local Red Cross chapter.

Part 2. Patents and Trademarks

Abstracts of U. S. Chemical Patents

A Complete Checklist Governing Chemical Products and Processes

From Official Gazette—Vol. 550, Nos. 3, 4—Vol. 551, Nos. 1, 2—p. 427

Agricultural Chemicals

Making a thin bodied starch of high adhesive strength and substantial freedom from set-back of its aqueous gel. No. 2,319,637. Herman Schopmeyer and George Felton to American Maize-Products Co.
Converting corn starch substantially completely to crystallized dextrose. No. 2,319,648. James Walsh and James Dudicker to American Maize-Products Co.
Making a purified starch conversion sirup. No. 2,319,649. James Walsh to American Maize-Products Co.
Treating an aqueous yeast solution comprising mixing said solution with a nutrient and thereby activating the yeast in the solution. No. 2,319,831. William Torrington to Emulsions Process Corp.
Refining of cottonseed oil. No. 2,319,970. Ward Bloomer and Walter Zahn to The Lummus Co.
Soil flocculating, acidizing and plant food agent. No. 2,320,060. Blanche Barlow and Joseph Haynes.
Cyclic method of treating ligno-cellulosic material. No. 2,320,294. George Victor Palmrose and Donald Keith MacBain to Weyerhaeuser Timber Co.
Method of applying parasiticides. No. 2,321,023. Lyle Goodhue and William Sullivan to Secretary of Agriculture of United States.

Cellulose

Regenerating cellulose from its cuprammonium solutions in a single stage. No. 2,319,428. Arthur Mothwurf to Imperial Rayon Corp.
Production of sheet materials, from solution of organic derivative of cellulose. No. 2,320,431. Philip Richard Hawtin and Cyril Gardner to Celanese Corporation of America.
Dyed cellulose materials, of improved fastness to light and process of preparing same. No. 2,320,588. Charles Graenacher, Carlo Rossi and Heinrich Bruengger to Society of Chemical Industry.

Ceramics

Addition opacifier for porcelain enamels. No. 2,319,247. Glenn McIntyre and Monroe Bahnsen to Ferro Enamel Corp.
Making laminated glass. No. 2,319,534. John Crowley.
Salt glazing ceramic ware. No. 2,320,099. William Ramsay and George Bole to The Stark Brick Co.
Artificial glass, which comprises a transparent rigid thermoplastic resin sheet which is surfaced with a film of a substantially infusible and insoluble polymer of an ester. No. 2,320,533. Irving Muskat Maxwell Pollack and Franklin Strain and William Franta to Pittsburgh Plate Glass Co.

Chemical Specialties

Forming a unitary vitreous chemical composition adapted to act as a cleaning agent and as a water softening agent. No. 2,319,260. Alexis Pincus to American Optical Co.
Printing paste comprising an aryl diazo salt. No. 2,319,265. Swanie Rossander, Chiles Sparks, and Carl Maynard, Jr. to E. I. du Pont de Nemours & Co.
Lubricant for solid dies. No. 2,319,393. Samuel Epstein and John Kreiser to Bethlehem Steel Co.
Aqueous drilling mud. No. 2,319,395. Hugh Eyck and Chester Fulton to Southern Phosphate Corp.
Deodorized sulfur-bearing lubricating composition. No. 2,319,630. Carl Prutton and Harry Johnson to The Lubri-Zol Corp.
Composition for use in the vapor phase treatment of plastic materials containing volatile plasticizing agents, comprising camphor, ethyl alcohol, propanolbutanol mixture, dimethyl phthalate, and water. No. 2,319,660. Arthur Clark to Technicolor Motion Picture Corp.
Lubricating oil composition containing a mineral oil and a compound selected from the acyl phenol monosulfides. No. 2,319,662. Elmer Cook and William Thomas, Jr. to American Cyanamid Co.
Drilling mud. No. 2,319,705. Earl Post and Charles Bonnet to American Cyanamid Co.
Textile impregnating solution composed of water, monosodium phosphate and slaked lime. No. 2,319,822. Warren Moody and Stanley Wagar.
Heat-hardenable adhesive composition. No. 2,319,826. Fred Pellett to General Electric Co.
Adhesive consisting of a water-soluble concentration of acid blown-down liquid of the sulfite process of paper manufacture. No. 2,319,933. Bradford Ritchie to Ralph Leach.
Process of making pressure-sensitive adhesive tapes. No. 2,319,933. Earl G. Kerr to Allied Chemical & Dye Corp.
Coal spray oil composition. No. 2,319,942. Clarke Miller to Standard Oil Co.
Adhesive composition comprising a polyisobutylene elastomer and a pale solid hydrogenated resin. No. 2,319,959. Hurber Tierney to Minnesota Mining & Mfg. Co.
Thixotropic petroleum lubricating jelly, having improved viscosity-temperature characteristics and improved lubricating properties at low temperatures. No. 2,320,002. William Lutz and John Pool to Gulf Research & Development Co.
Liquid composition, comprising an alkali soluble protein in dissolved condition, an acetal adapted to decompose to form aldehyde under acid conditions, a substantially non-volatile acid substance for decomposing said acetal. No. 2,320,087. William Lee, and Carl Erikson to The Arabol Manufacturing Co.
Non-toxic color coating for hair and skin comprising at least 50% saccharide in candy-like form. No. 2,320,098. Sverre Quisling.
Lubricating composition comprising a major proportion of mineral lubricating oil and a minor proportion of an oil-soluble metal oxide. No. 2,320,228. Delton Frey to The Lubri-Zol Corp.
Polishing composition, comprising an oil-in-water type emulsion. No. 2,320,236. George Hogg to Hercules Powder Co.
Lubricating oil, which is normally fluid comprising mineral lubricating oil and between about 0.8% and 2.0% of an oil-soluble alkaline earth metal soap of organic acid. No. 2,320,241. Vance Jenkins to Union Oil Company.
Alkaline-soluble cutting oil composition comprising a base oil, and emulsifying agent of the oil-in-water type, and an addition agent selected from the class of phenols. No. 2,320,263.
Detergent composition, comprising a stable calcium hypochlorite containing upwards of 50% available chlorine. No. 2,320,279. Varton Mardiras Kalusdian to The Mathieson Alkali Works, Inc.
Detergent and sterilizing composition. No. 2,320,280. Varton Mardiras Kalusdian to The Mathieson Alkali Works, Inc.
Preparation of a urea-formaldehyde adhesive. No. 2,320,301. Paul Powers to Armstrong Cork Co.
Anto-ring-sticking lubricant. No. 2,320,392. Ellis White to Shell Development Co.
Wood stain solvent. No. 2,320,426. Henry Goodman, Jr. to Carbide and Carbon Chemicals Corp.
Non-melting insoluble insect control material comprising a molded body of sodium fluoride and water. No. 2,320,520. Harold Jennings and John Hutzel to Smithereen Co.
Conditioning of drilling muds. No. 2,320,622. Benjamin Lindsey to The Milwhite Co.
Water sealing composition for oil wells. No. 2,320,633. David Mitchell and Harry Marks and Harry Beene.
Wax composition, having improved tensile strength, high melting point, fine grain structure, and increased water-repellent characteristics. No. 2,320,644. Edward Nill to The H. A. Montgomery Co.
Well treating fluid. No. 2,320,673. Troy Stewart.
Lubricant compound, of high film strength and lower coefficient of friction. No. 2,320,984. Carl Prutton to The Lubri-Zol Development Corp.
Detergent, normal petadecyl-8 sulfate. No. 2,321,020. Emil Dreger and John Ross to Colgate-Palmolive-Peet Co.
Preparing a soft oil limed rosin varnish. No. 2,321,127. Albert Camp to Hercules Powder Co.
Aqueous dispersion of paraffin wax, in a continuous aqueous medium containing candelilla wax soap as the dispersion-stabilizer. No. 2,321,240. Rotheus Porter, Jr. to Bennett Incorp.
Aqueous thickening solutions, comprising a water-soluble cellulose ether and a thickening agent. No. 2,321,270. Rudolph Becwar to Galvin Manufacturing Corp.
Improved lubricant, for use in internal combustion engine. No. 2,821,-307. Louis Mikeska and Eugene Lieber to Standard Oil Development Co.
Solvent type of printing ink, comprising a pigment and a vehicle, said vehicle being a lacquer comprising as a solute an organo-soluble cellulose ether. No. 2,321,316. Norman Peterson and Joseph Sherk to Dow Chemical Co.
Lubricating and sealing composition, for metal parts. No. 2,321,384. Herman Hemker and Robert Fuhrman to Arthur L. Parker.
Printing paste, which comprises a dyestuff of a group consisting of direct and acid colors. No. 2,321,501. Charles Miller to E. I. du Pont de Nemours & Co.
Lubricant containing, dissolved therein 0.05% to 5% of tetra-n-butyl ammonium iodide. No. 2,321,517. Raphael Rosen to Standard Oil Development Co.

Coal Tar Chemicals

Producing bitumenlike materials from coal. No. 2,319,326. Adolf Jenkner.
Production of solvents from a mixture of sulfur-bearing high temperature coal tar fractions. No. 2,319,987. Jacquelin Harvey, Jr. one-half to Southern Wood Preserving Co.
Production of solvents from a mixture of sulfur bearing high temperature coal tar fractions. No. 2,319,988. Jacquelin Harvey, Jr. one-half to Southern Wood Preserving Co.
Production of solvents. No. 2,319,989. Jacquelin Harvey, Jr. one-half to Southern Wood Preserving Co.
Production of solvents. No. 2,319,990. Jacquelin Harvey, Jr. one-half to Southern Wood Preserving Co.
Production of solvents. No. 2,319,991. Jacquelin Harvey, Jr. one-half to Southern Wood Preserving Co.

Coatings

Coating of surfaces with liquids by spraying. No. 2,319,353. Fernand Schwartz and Marc Chavannas to Ecla Patents Corp.
Thermoplastic coating composition consisting essentially of a homogeneous mixture of paraffin wax and thermoplastic resin. No. 2,319,389. Frank Corkery and Samuel Burrough to Pennsylvania Industrial Chemical Corp.

Producing oil-containing surface coatings of low viscosity which dry with the characteristics of wood or oiticica oil but without their wrinkling tendencies. No. 2,319,507. William Krumbhaar.
Coating composition. No. 2,319,852. Arthur Doolittle to Carbide and Carbon Chemicals Corp.
Method and composition for producing crystalline coatings. No. 2,319,886. Robert Sandstrom.
Applying a coating of a heat resistant ferrous alloy containing aluminum to an article. No. 2,319,977. Arthur Cape and Antone Gaxiola to Coast Metals, Inc.
Preparation of coating compound from drying oil and phenol-aldehyde resins. No. 2,320,126. Charles Groff and Wilbur Castor to Stoner-Mudge, Inc.
Forming an asphalt coating which comprises spraying an asphaltic fluid mixture of asphalt and an inflammable organic compound. No. 2,320,255. Raymond Bacon and Isaac Bencowitz, to Texas Gulf Sulphur Co.
Incorporating a flatting agent, into a coating composition. No. 2,320,527. Francis Licata to National Oil Products Co.
Coating material base, consisting of a beta-pinene resin. No. 2,320,-717. Frank Corkery, and Samuel Burroughs to Pennsylvania Industrial Chemical Corp.
Coating composition, comprising a drying oil, and 30 to 50% of mixture of branched chair paraffinic hydrocarbons. No. 2,321,303. Edward McArdle to Standard Oil Development Co.

Dyes, Stains

Azo dye compounds. No. 2,319,217. Joseph Dickey and William Strain to Eastman Kodak Co.
New vat dyestuffs. No. 2,319,719. Willy Burneleit to General Aniline & Film Corp.
Vat dyestuff of the anthanthrone series. No. 2,320,694. Werner Zerweck and Rudolf Muller Kurt, Bahr to General Aniline & Film Corp.

Equipment

Electrical heating conductor comprising a metal of the platinum group covered by an outer protective layer of an alloy of said metal. No. 2,319,364. Paul Ziegs.
Fractionating apparatus. No. 2,319,365. Jesse Reed.
Apparatus for hydrogenating hydrocarbons. No. 2,319,508. Rene Lepreste, H. Douglas Hadden, Ralph Tobin and Joseph Dannenberg.
Electrolyte recording medium comprising a porous insulating support carrying an electrolytically sensitive composition. No. 2,319,765. Paul Talmey to Radio Inventions, Inc.
Light polarizer comprising glass whose metallic content produces the polarization. No. 2,319,816. Edwin Land to Polaroid Corp.
Dielectric element comprising a solid solution of polar compounds, each of which possesses molecular rotation in the solid state. No. 2,319,838. William Yager to Bell Telephone Laboratories, Inc.
Viscosimeter, for the determination of the viscosity of a fluid at elevated pressure. No. 2,320,218. Stuart Buckley to Standard Oil Development Co.
Viscosimeter for the measurement of viscosity at high pressures. No. 2,320,219. Stuart Buckley and Claude Hocott to Standard Oil Development Co.
Distillation apparatus for steam plants. No. 2,320,853. Patrick James Delahanty.

Explosives

Smokeless powder charge, adapted to resist fragmentation upon initiation. No. 2,320,243. Bill Mackey to E. I. du Pont de Nemours & Co.
Method for making granular ammonium nitrate explosives. No. 2,320,-971. Milton Lindsley to The King Powder Co.
Detonating explosive, comprising a mass of discrete grains each constituting a balanced explosive composition. No. 2,320,972. Milton Lindsley to The King Powder Co.

Food Chemicals

Manufacture of mild powder from milk containing its natural milk fat. No. 2,319,362. Otto Wouters.
Preparing a flour-bleaching compound, which comprises mixing sulfur trioxide and the nitrate of a metal. No. 2,320,058. Souren Avedikian.
Reducing acidity of distilled alcoholic beverage liquor. No. 2,320,486. Frederick Stuart.
Food-dusting sugar, having wax incorporated therein. No. 2,320,831. John Schlegel and Louis Lang, to The National Sugar Refining Co.
Coffee processing with yeast. No. 2,321,148. George Kirby, William Redmond Johnston and Charles Frey to Standard Brands Incorp.

Industrial Chemicals

Production of o-phenoxy-phenyl-benzoate. No. 2,319,197. Paul Bachman and Berndt Hammaren to General Chemical Co.
Production of a balanced fuel. No. 2,319,209. Don Carmody to Standard Oil Co.
Chlorinated hydrocarbon solvent of trichlorethylene and perchlorethylene stabilized by presence of a compound. No. 2,319,261. Arthur Pitman to Westvaco Chlorine Products Corp.
Benzene-soluble hydrogenated resinous polycyclopentadiene, said product ranging from light in color to colorless in character. No. 2,319,271. Frank Soday to The United Gas Improvement Co.
Compound resistor comprising a plurality of bodies of predetermined size and contour composed principally of recrystallized silicon carbide. No. 2,319,323. Albert Heyroth to The Carborundum Co.
Abrasive article. No. 2,319,331. Jacob Kurtz to Callite Tungsten Corp.
Manufacturing lubricating grease. No. 2,319,405. Martin Ittner to Colgate-Palmolive-Peet Co.
Preparing a highly active catalytic surface useful in hydrofining. No. 2,319,453. Marion Gwynn.
Stable crystalline anhydrous alpha lactose product and process. No. 2,319,562. Paul Sharp to Cornell Research Foundation, Inc.
Peroxidized product of esterification under heat of ingredients consisting of a polyhydric alcohol, tetrahydrofurfuryl alcohol and an alpha unsaturated alpha beta polycarboxylic acid. No. 2,319,575. Maynard Agens to General Electric Co.
Peroxidized ester of a polycarboxylic acid and an alcohol-ether containing a single alcoholic hydroxyl group and at least one ether linkage. No. 2,319,576. Maynard Agens to General Electric Co.
Method of separating electro-deposited layers. No. 2,319,596. Arthur Grant to United States Rubber Co.
Hygroscopic salt solution essentially comprising a halide of calcium and lithium and having dissolved therein as an inhibitor for retarding corrosion of ferrous metals small proportions of an arsenite and an organic nitrogen base. No. 2,319,667. Alvin Edmunds to The Dow Chemical Co.
Hygroscopic salt solution containing an aryl guanidine inhibitor. No. 2,319,668. Alvin Edmunds to The Dow Chemical Co.
Preparing hydroxylamine hydrochloride. No. 2,319,669. Philip Ehman and Walter Walker to Ansul Chemical Co.
Manufacturing acetylene with regenerative heating and without the application of evacuation for obtaining reduced pressure. No. 2,319,679. Rudolph Hasche and William Hincke to Wulff Process Co.
Producing dry, non-deliquescent $Na_3Fe(CN)_62H_2O$. No. 2,219,695. Urner Liddel to American Cyanamid Co.
Diazotized amino dehydroabietic acid and diazotized amino dehydroabietic acid esters coupled to an aromatic coupling compound. No. 2,319,696. Edwin Littmann to Hercules Powder Co.
Improved product for forming aqueous solutions containing calcium ions and hypochlorite ions, comprising a calcium hypochlorite and sodium tetra phosphate. No. 2,319,697. James MacMahon to The Mathieson Alkali Works, Inc.
Production of aliphatic dihydric alcohols. No. 2,319,707. Walter Reppe, Willi Schmidt, Alfred Schulz, and Hans Wenderlein to General Aniline & Film Corp.
Production of a metarsenite. No. 2,319,777. Marc le Duc.
Mica flakes bonded together with a cementing agent comprising a heat blended mixture of an alkyd resin and a polyvinyl ester. No. 2,319,780. Fred Pellett to General Electric Co.
Abrasive grains bonded together by a bond that comprises a resin-hardening agent. No. 2,319,791. Loring Coes, Jr. to Norton Co.
Abrasive. No. 2,319,792. Loring Coes, Jr. to Norton Co.
Abrasives. No. 2,319,793. Loring Coes, Jr. to Norton Co.
Abrasive. No. 2,319,794. Loring Coes, Jr. to Norton Co.
Interpolymer of (1) a polymerizable unsaturated alkyd resin and (2) a phthalic diester of 3-chloroallyl alcohol. No. 2,319,798. Gaetano D'Alelio to General Electric Co.
Polymerizable composition comprising (1) a polymerizable unsaturated alkyd resin, (2) a poly-(1-halogenoallyl) ester of a polycarboxylic acid. No. 2,319,799. Gaetano D'Alelio to General Electric Co.
Separation of polynuclear from mononuclear aromatics. No. 2,319,813. Aristid Grosse and Julian Mavity to Universal Oil Products Co.
Preparing unsaturated acyclic imines. No. 2,319,848. Jared Clark and Alexander Wilson to Carbide and Carbon Chemicals Corp.
Preparation of aromatic sulfonamide-phenol-dihalide reaction products. No. 2,319,876. William Henry Moss to Celanese Corporation of America.
Treating emulsions of oil and water. No. 2,319,885. Claudius Roberts to Petrolite Corp. Ltd.
Treating natural oils and fats by saponifying the mass with an alkali to form soap. No. 2,319,929. Harold Hoffman and Albert Zeigler to Armour and Company.
Heat stabilizer for polymers of vinyl chloride. No. 2,319,953. Winfield Scott to Wingfoot Corp.
Heat-stabilizing polymerized masses containing a polymer of vinyl chloride which comprises adding to the polymer one of the group consisting of the alkali metal, the alkaline earth metal, and the lead aryl sulfonamides. No. 2,319,954. Winfield Scott to Wingfoot Corp.
Cellulosic sheet material carrying a waxlike, moisture resistant, scuff-resistant, nontacky surface coating. No. 2,319,957. John Speicher to Hercules Powder Co.
Producing dehydroabietinal which comprises reducing an acid halide of dehydroabietic acid. No. 2,319,976. William Campbell to Hercules Powder Co.
Improving the plasticity of aqueous mixtures prepared from clay. No. 2,320,009. Anderson Ralston and Everett Hoffman to Armour and Co.
Improving the plasticity of aqueous mixtures prepared from inorganic solids chosen from the group consisting of lime and plaster of Paris, and like cementitious materials. No. 2,320,010. Anderson Ralston and Everett Hoffman to Armour and Co.
9,9-Di-gamma-aminopropyl-fluorene. No. 2,320,029. Herman Bruson to the Resinous Products & Chemical Co.
Preparing esters of dichloro carboxylic acids. No. 2,320,034. James D'Ianni to Wingfoot Corporation.
Preparation and use of catalysts. No. 2,320,063. Casimer Borkowski and Jacob Schille to the Best Foods, Inc.
Water alcohol solution of aminoacid-diamine-dibasic acid interpolymers. No. 2,320,088. Robert Leekley to E. I. du Pont de Nemours & Co.
Acyl acrylamide and its preparation. No. 2,320,089. Joy Lichty to Wingfoot Corp.
Diacyl acrylamide, and its preparation. No. 2,320,090. Joy Lichty to Wingfoot Corp.
Indicating dissolved oxygen, in water having a very poor conductivity such as condensor water. No. 2,320,095. Georg Ornstein.
Purifying used oil. No. 2,320,106. Joseph South to Texas Co.
Storage of supercooled normally crystalline polymeric material. No. 2,320,112. Ralph Wiley to The Dow Chemical.
Improving the catalytic activity of granular catalysts consisting essentially of alumina, which consists in removing particles smaller than about 40 mesh from the catalyst granules by a steam of water. No. 2,320,118. David Blaker to Phillips Petroleum Co.
Manufacturing a protein product, which comprises adding a protein precipitating enzyme to an aqueous dispersion of an acid and enzyme precipitable protein. No. 2,320,165. Francis Atwood and William Paterek to Atlantic Research Associates, Inc.
Production of capillary active compounds, characterized by condensing higher molecular fatty alcohols with halogenketones. No. 2,320,-181. Winfred Hentrich, Alfred Kirstahler and Fritz Schlegel "Unichem", Chemikalien Handels, A. G.

Arylaliphatic ketone, having a plurality of CH_2CH_2COOH radicals on an aliphatic carbon atom contiguous to the carbonyl group. No. 2,320,217. Herman Bruson to The Resinous Products & Chemical Co.

Condensation product of dicyandiamide with ethylene oxide. No. 2,320,225. Walter Ericks, to American Cyanamid Co.

Process of making 12-ketostearamide. No. 2,320,232. William Hanford and Richard Haveh Wiley to E. I. du Pont de Nemours & Co.

Dihydroxy-benzoyl formhydroximic acid halides. No. 2,320,234. Walter Hartung and Nathan Levin, to Sharp & Dohme, Inc.

Process for the production of formaldehyde. No. 2,320,253. Herrick Arnold to E. I. du Pont de Nemours & Co.

Drying moist nitrosyl chloride gas. No. 2,320,257. Herman Boekhuis, Jr. to The Solvay Process Co.

Regenerating finely divided solid contact material, containing combustible deposits. No. 2,320,273. Edwin Gohr and Willliam Thompson and Homer Martin to Standard Oil Development Co.

Process for cleaning rugs. No. 2,320,281. Varont Mardiras Kalusdian to The Mathieson Alkali Works, Inc.

Improving the resistance of glycerides, to foaming when heated to high temperature. No. 2,320,319. Howard Balck to Industrial Patents Corp.

Separating 2,4, lutidine and 2,5, lutidine. No. 2,320,322. Francis Cislak and Orin Cunningham to Reilly Tar & Chemical Corp.

Forming retractile articles having sufficient plasticity and extensibility in the moist or gel state to permit stretching. No. 2,320,381. Rene Picard and Rene Fays.

Making an aliphatic acid anhydride by direct oxidation of an aliphatic aldehyde with molecular oxygen. No. 2,320,461. Irvin Murray and Frederick Roberts to Carbide and Carbon Chemicals Corp.

Treating mercury contaminated surfaces. No. 2,320,468. Merle Randall.

Derivatives of tropic acid amide—and manufacture thereof. No. 2,320.497. Wilhelm Wenner to Hofmann-La Roche, Inc.

Printing non-fibrous waterswelling pellicies. No. 2,320,510. Ralph Cornwell and Charles Rosser and John Yourtee to Sylvania Industrial Corp.

Stabilization of hydro-carbon mixture. No. 2,320,616. Ludwig Knich, August Schutte to The Lummus Company.

Manufacture of high test bleach. No. 2,320,635. Francis Mericola and Howard Roderick to Wyandotte Chemicals Corp.

Synthetic tannins. No. 2,320,678. Edmond Marie Tassel.

Surface active agent, and the process of treating fibrous materials therewith. No. 2,320,707. Hillary Robinette to Commerical Solvents Corp.

Fractionation of mixtures of fatty oils, and free acids derived there from. No. 2,320,738. John Jenkins to Pittsburgh Plate Glass Co.

Preparing products for, plastics, glues, lacquers and finishes, from natural and artificial albumins. No. 2,320,766. Peter Voskresensky and Maria Sheremet.

Converting hydrocarbons of relatively low value and utility. No. 2,320,799. Robert Ruthruff.

Soluble fusible aminoplast intercondensed with a halogenated nitrile. No. 2,320,816. Gaetano D'Alelio to General Electric Co.

Polysalicylide-modified aminoplast. No. 2,320,817. Gaetano D'Alelio to General Electric Co.

Condensation products of aminotriazines, aldehydes, and halogenated, aliphatic nitriles. No. 2,320,818. Gaetano D'Alelio to General Electric Co.

Reaction products of aldehydes and bis-diamino triazinyl disulfides. No. 2,320,819. Gaetano D'Alelio and James Underwood to General Electric Co.

Condensation products of an amino-triazole, and aldehyde, and a halogenated nitrile. No. 2,320,820. Gaetano D'Alelio to General Electric Co.

Preparation of organic acid esters. No. 2,320,844. Howard Black to Industrial Patents.

Condensate of a terpene compound, and an ether selected from the group consisting of diaryl and alky-arylethers. No. 2,320,846. Joseph Borglin to Hercules Powder Co.

Depolymerizing olefinic polymers. No. 2,320,851. Paul Cramer to General Motors Corp.

Inhibiting styrene against polymerisation by adding 1.5 dinitroanthraquinone to the styrene. No. 2,320,859. Stanley Georg Foord to International Standard Electric Corp.

Carburizing material, characterized by its property of preventing copper migration during selective carburizing, comprising soft coal coke impregnated with a material. No. 2,320,872. Paul Kramer and Francis Steigerwald to Park Chemical Com.

Preparing formoguanamines by reacting a biguanide with formamide. No. 2,320,882. Wilbur Oldham to American Cyanamid Co.

Protecting a chlorinated aromatic dielectric, employed in combination with electrical apparatus disposed in a ferrous container by applying to the container a protective coating of a solid chlorinated aromatic compound. No. 2,320,921. James Ford to Westinghouse Electric & Manufacturing Co.

Translucent polymeric methacrylic esters. No. 2,320,924. Warren Gift to Rohm & Haas.

Grouting a cavity in the soil which includes initially forcing into the soil a liquid solution of tetra sodium pyrophosphate. No. 2,320,954. Francis Sullivan.

Removal of mercaptans from mercaptan-solvent mixtures. No. 2,320,-939. Leonard Leum to The Atlantic Refining Co.

Treatment of copper-oxide rectifiers, with nitrogen. No. 2,320,962. Earl Wilson to Westinghouse Electric.

Solvent extraction of tung oil. No. 2,820,970. Arthur Lansing to Commerical Solvents Corp.
Making a substantially neutral barium sulfate. No. 2,820,980. James Pierce, Jr.
Bonding rubberlike plastics and aluminum. No. 2,320,999. Murray Beebe to Scovill Manufacturing Co.
Removing a granular catalyst, from a reaction chamber wherein the reaction is conducted in liquid phase. No. 2,321,015. Hyman Davis to The Lummus Co.
Making an alkyl substituted aromatic compound. No. 2,321,022. Arthur Lawrence Fox to E. I. du Pont de Nemours & Co.
Purifing alkyl phenols containing non-basic nitrogen compounds. No. 2,321,036. Daniel Luten and Aldo Benedictis to Shell Development Co.
Conversion of epihalohydrin, to the corresponding glycerine monohalohydrin. No. 2,321,037. Kenneth Marple and Theodore Evans to Shell Development Co.
Branched chain guanamines and processes of producing same. No. 2,321,052. Jack Thurston to American Cyanamid Co.
Coating sheet material with adhesive. No. 2,321,072. Bernhardt Eiseman, Jr.
Glyoxal tetra-acetals of glycol mono-ethers. No. 2,321,094. Louis MacDowell and Raymond McNamee to Carbide and Carbon Chemicals Co.
Purification of naphthalene. No. 2,321,117. Donald Wilcock to The Sherwin-Williams Co.
Treatment of fluid pervious formations. No. 2,321,138. John Grebe and Leonard Chamberlain to The Dow Chemical Co.
Centrifugal purification of liquids. No. 2,321,144. Leo Jones to The Sharples Corp.
Stabilizer, for metal dispersions in lubricants. No. 2,321,203. Robert Henry and Syllvester Britton to Phillips Petroleum Co.
Organic solution of formaldehydeurea reaction product. No. 2,321,-208. Arthur Howald to Libbey-Owens-Ford Glass Co.
Converting impure acidic sodium sulfate, into substantially pure normal sodium sulfate. No. 2,321,218. Charles Levermoe.
Anhydrous, organic solution of formaldehydeurea reaction products. No. 2,321,234. John Murray and Andrew Kassay to Libbey-Owens-Ford Glass Co.
Making a plywood, with highly compressed resin-treated surface plies. No. 2,321,258. Alfred Stamm and Raymond Seborg.
Preparation of chloroacetamide. No. 2,321,278. Edgar Britton and William Shawver to The Dow Chemical Co.
Safety fuel. No. 2,321,280. Cecil Brown to Standard Oil Development Co.
Producing dry hydrogen chloride. No. 2,321,282. Roch Comstock to Bay Chemical Co., Inc.
Thermoplastic vinylidene chloride graphite compounds No. 2,321,292. Alden Hansen to The Dow Chemical Co.
Regenerating a solid catalyst contaminated with combustible material. No. 2,321,294. Charles Hemminger and Charles Tyson to Standard Oil Development Co.
Manufacture of mercaptothiazolines. No. 2,321,296. Louis Howland.
Addition products of a cyclohexylamine compound, selected from ayclohexylamine, n-ethyl cyclohexylamine and n-methyl cyclohexylamine and a zinc salt of a dialkyl dithiocarbamate. No. 2,321,-301. Joy Lichty to Wingfoot Corp.
Reaction products of aldehydes and diazine derivatives. No. 2,321,-364. Gaetano D'Alelio to General Electric Co.
Coated abrasive article, consisting of a backing and a surface layer of abrasive grains attached by a binder. No. 2,321,422. Norman Robie to The Carborundum Co.
Reacting a phenol with a light oil styrene fraction in the presence of a condensation catalyst. No. 2,321,440. Alger Ward to The United Gas Improvement Co.
Water-soluble products, of the simultaneous condensation in an acid medium of an aromatic compound, and an unsaturated carbonyl compound. No. 2,321,451. Rudolf Bauer to General Aniline & Film Corporation.
Mobile anhydrous organic solution, uncongealed at room temperature, of an anhydrous aluminum salt of an organic carbocyclic acid. No. 2,321,463. Daniel Condit to Standard Oil Co.
Manufacture of a water-insoluble tertiary base. No. 2,321,467. Noel William Cusa to Imperial Chemical Industries.
Alkyl thio substituted amino benzoic acid alkamine esters, and salts thereof. No. 2,321,468. John Donleavy to Allied Laboratories, Inc.
Recovery of an allyl halide, of the group consisting of allyl chloride and allyl bromide from a mixture comprising it and propylene. No. 2,321,472. William Engs and Simon Wik to Shell Development Co.
Producing a nucleating agent, useful for accelerating the hydrolysis of a titanium salt solution. No. 2,321,490. John Lewis Keats and Henry Stark to E. I. du Pont de Nemours & Co.
Phenol-furfuryl alcohol resinous condensation products. No. 2,321,-492. Wallace Kinney.
Petroleum sulfonate product, which essentially comprises a substantially neutral petroleum sulfonic acid salt of a polyalkylene polyamine. No. 2,321,496. Leo Liberthson to L. Sonneborn Son, Inc.
Producing articles from magnesium oxychloride cements. No. 2,321,-522. Ernest Sands.
Preparation of an aceta-alcohol. No. 2,321,542. Richard Brooks, to E. I. du Pont de Nemours & Co.
Preparation of a water-soluble methylol urea. No. 2,321,544. Harry Dittmar and Daniel Strain to E. I. du Pont de Nemours.
Producing phenol. from benzene. No. 2,321,551. Donald Loder, to E. I. du Pont de Nemours.
Preparation of a 1,2-di(methoxymethoxy) ethane. No. 2,321,557. Sidney Sussman to E. I. du Pont de Nemours & Co.

Leather

Artificial leather. No. 2,321,047. Paul Salzberg to E. I. du Pont de Nemours and Co.

Medicinals

Pharmaceutical preparation having bacteria-growth inhibiting properties and containing a nitrofuran. No. 2,319,481. William Stillman, Albert Scott, and James Clampit to Norwich Pharmacal Co.
Resolution of racemic alpha-hydroxy-bets, beta-dimethyl-gamma-butyro lactone, and new compounds obtained by such resolution. No. 2,319,545. Stanton Harris, and Karl Folkers to Merck & Co., Inc.
Stigmastadienone 22,23-dibromide. No. 2,319,808. Erhard Fernholz and Homer Stavely to E. R. Squibb & Sons.
Therapeutic pressor composition and method of preparing it. No. 2,319,902. Oscar Helmer to Eli Lilly and Co.
Process for producing halogenated cresols. No. 2,319,960. Cyril Treacy to Merck & Co.
Diagnostic compositions, comprising in dry solid form, the salts of the para-dialkylaminobenzal-dehydes with non-oxidizing inorganic acid. No. 2,320,282. Jonas Kamlet to Miles Laboratories, Inc.
Toilet preparation for topical application comprising a preparation which depresses the respiration of the tissue to which it is applied. No. 2,320,478. George Sperti, to The Institutum Divi Thomae Foundation.
Topical remedy of the type which causes depression of cellular respiration in the tissue to which it is applied. No. 2,320,479. George Sperti to The Institutum Divi Thomae Foundation.
Taeniacide containing areca nut and a quaternary nitrogen containing organic compound of the alkaloid group consisting of strychnine derivatives, muscarine and curare. No. 2,320,630. Orley Mayfield and Jack Henry to Dr. Salsbury's Laboratories.
Delta 5 cholestenone-3 and a method for producing the same. No. 2,320,847. Adolf Butenandt to Schering Corp.
Pollen antigen, comprising the reaction product of a pollen and tannic acid. No. 2,321,043. George Rockwell, to Eli Lilly and Co.
Preparing sulfapyridine. No. 2,321,332. Lester Szabo, to S. M. A. Corp.
Vitamin composition. No. 2,321,400. George Lubarsky.

Metals, Alloys

Heat treaatment of copper-chromium alloy steels. No. 2,319,538. William Digby to Everard Tuxford Digby.
Welding rod, comprising an alloy containing zinc, tin, lead and the balance copper. No. 2,319,539. Louis Dodd to Magnus Metal Corp.
Determining manganese in the presence of iron. No. 2,319,580. William Brown.
Treating steel to improve machinability. No. 2,319,635. Wilbur Saylor.
Recovering tin from a hydrochloric acid bath containing tin in solution. No. 2,319,887. James Stack, Alvida Stack.
Reducing a metallic ore. No. 2,320,206. Walter Engel and Niels Engel.
Austenitic steel, which is composed of chromium nickel and a small percentage of columbium. No. 2,320,260. Vere Browne to Allegheny Ludlum Steel Corp.
Treating ferrophosphorus. No. 2,320,242. Grover Bridger.
Improving the normal characteristics of metal by subjecting the same to the action of terpin hydrate. No. 2,320,626. Christopher Luckhaupt.
Removing phosphorus and arsenic compounds, from vanadate solutions. No. 2,320,661. Kurt Schneider.
Covered arc welding electrode,, of aluminum bronze substantially free of iron. No. 2,320,676. Clinton Swift Ampco Metal, Inc.
Covering for arc welding electrodes. No. 2,320,677. Clinton Swift to Ampee Metal, Inc.
Electrodeposition of manganese. No. 2,320,773. Colin Garfield Fink and Morris Kolodney to Electro Manganese Corp.
Welding electrode, consisting of a copper ally having a thin adherent coating of silver. No. 2,320,920. James Fletcher, to Tipaloy, Inc.
Coating an aluminous metal surface, which comprises depositing a black nickel coating thereon. No. 2,320,998. Murray Beebe, to Scovill Manufacturing Co.
Electrodeposition of nickel, from an acid bath. No. 2,321,182. Henry Brown to The Udylite Corp.
Froth flotation process, of separating phosphate ore values from acidic siliceous gangue. No. 2,321,186. Ludwig Christmann, and David Jayne, Jr. and Stephen Erickson to American Cyanamid Co.
Abrasive resistant alloy adapted to be meltably deposited upon a ferrous base consisting of chromium, molybdenum, copper, manganese, titanium with carbon and silicon. No. 2,321,227. William McLott.
Fluorine-free alkaline metal chloride base flux, for welding aluminum. No. 2,321,309. Mike Miller to Aluminum Co. of America.
Smelting iron ore. No. 2,321,310. Thomas Moore to Standard Oil Development Co.
Coating, upon a mechanical metal part for locking the same to another metal part when forcibly engaged therewith. No. 2,321,414. Arthur Parker.

Paints, Pigments

Nucleating and hydrolyzing titanium salt solutions to obtain a hydrolysate which on calcination yields a TiO_2 pigment of uniformly small particle size, improved hiding power, tinting strength and color. No. 2,319,824. Carl Olson to E. I. du Pont de Nemours & Co.
Painting or lacquering, and determining the presence or lack of thin spots by applying an undercoat containing a fluorescent material No. 2,320,842. Charles F. Arnold and Laurence Kortkamp to General Motors Corp.
Preparing a dispersion of pigment particles, of colloidal fineness. No. 2,321,007. Samuel Cabot, Samuel Cabot, Inc.

Paper, Pulp

Apparatus for the recovery of chemicals from black liquor of wood pulp mills. No. 2,319,399. Alexander Hamm to Combustion Engineering Co., Inc.
Converting lignin constituents of ligno-cellulose into distillable liquid and crystalline products. No. 2,320,598. Harold Hibbert and Archibald Cramer.
Paper sizing. No. 2,320,771. Paul Davidson, to Strathmore Paper Co.
Art of coating paper, and the like with a coating composition. No. 2,321,244. Francis Rawling to West Virginia Pulp and Paper Co.

Petroleum Chemicals

Production of motor fuel of low sufur content. No. 2,319,354. Curren Sperling to Petroleum Conversion Corp.

Manufacturing benzene, ethylene, and acetylene from normally gaseous paraffins. No. 2,320,274. Everett Gorin to Socony Vacuum Oil Co., Inc.

Lubricating oil. No. 2,320,287. Eugene Lieber and Louis Mikeska to Standard Oil Development Co.

Thickened mineral oil composition having high stability against breakdown. No. 2,320,312. Robert Thomas and William Sparks to Jasco Incorporated.

Manufacture of high anti-knock gasoline hydrocarbons by alkylation of an isoparaffin with C3 and C4 olefins in the presence of a liquid alkylation catalyst. No. 2,320,336. Frank Bruner and William Skelton to The Texas Company.

Conversion of nonbenzenoid hydrocarbons to aromatics. No. 2,321,-006. Robert Burk and Everett Hughes to The Standard Oil Company.

Motor fuel, improved in anti-knock value. No. 2,321,311. August Mottlau to Standard Oil Development Co.

Petroleum Refining

Conversion process of cracking hydrocarbon oil while in admixture with a metal halide catalyst in a vertical reaction zone. No. 2,319,199. Wayne Benedict to Universal Oil Products Co.

Conversion process of subjecting hydrocarbon oil to catalytic cracking conditions in admixture with a powdered cracking catalyst. No. 2,319,201. Charles Angell to Universal Oil Products Co.

Heat treated copper-nickel-molybdenum steel oil well sucker rod and process of making the same. No. 2,319,250. John Mitchell.

Dehydrogenation of naphthene hydrocarbons. No. 2,319,452. Aristid Grosse and William Mattox to Universal Oil Products Co.

Heating a mixture of hydrocarbon oil and metal halide catalyst to catalytic conversion temperature. No. 2,319,495. Gustav Egloff to Universal Products Co.

Converting hydrocarbon oils into high antiknock gasoline. No. 2,319,-500. Henry Grote to Universal Oil Products Co.

Catalytic cracking of a normally liquid heavier hydrocarbon oil charge to convert the same to gasoline hydrocarbons. No. 2,319,590. DuBois Eastman and Charles Richker to The Texas Co.

Process for catalytic conversion reactions. No. 2,319,620. Percy Mather to Universal Oil Products Co.

Separation of toluene from a mixture containing toluene and non-aromatic hydrocarbons of substantially similar boiling point. No. 2,319,694. Russell Lee, and Herbert Holm to Socony-Vacuum Oil Co., Inc.

Producing gasoline from heavier hydrocarbons. No. 2,319,710. Reginald Stratford and Roy Smith to Standard Oil Development Co.

Refining of petroleum oils boiling in the motor fuel boiling range. No. 2,319,738. Minor Jones to Standard Oil Development Co.

Flash distillation of oil for production of maximum yields of high viscosity oils. No. 2,319,750. Jackson Schonberg and James Maxwell to Standard Oil Development Co.

Process of catalytically cracking hydrocarbon oils. No. 2,319,836. Alfred Woerner to Standard Catalytic Co.

Refining petroleum oil included within substantially the kerosene distillate-gas oil range. No. 2,319,926. William Hancock to Hancock Oil Company of California.

Converting hydrocarbon oils into gasoline of high knock rating. No. 2,319,948. Edgar Pitzer to Standard Oil Co.

Removing sulfur from gasoline. No. 2,320,047. Edwin Nygaard and Orland Reiff to Socony Vacuum Oil Company, Inc.

Converting low-boiling paraffins, of at least four carbon atoms per molecule along with gaseous olefin hydrocarbons into higher boiling hydrocarbons. No. 2,320,127. Karl Hachmuth, to Phillips Petroleum Co.

Converting a naphtha charging stock, rich in aliphatic hydrocarbons of from 6 to 12 carbon atoms into hydrogen and a motor fuel or motor fuel component rich in aromatic hydrocarbons involving a cyclic catalytic operation. No. 2,320,147. Edwin Layng and Louis Rubin to The M. W. Kellogg Co.

Alkylating low molecular weight paraffinic hydrocarbons, with low molecular weight olefinic hydrocarbons to form paraffinic hydrocarbons. No. 2,320,199. Bernardus Sellmeyer to The M. W. Kellogg Co.

Use of bauxite to improve the ordor of petrolatum. No. 2,320,223. Henry Dempsey to Standard Oil Development Co.

Purification of a wet sludge, resulting from the treatment of a petroleum distillate with sulfuric acid. No. 2,320,242. Vaman Kokatnur, and Joseph Jacobs, Jr. to Autoxygen, Inc.

Converting hydrocarbon gases into liquid hydrocarbons at elevated temperatures. No. 2,320,251. John Throckmorton, to The Pure Oil Co.

Reducing the color and corrosiveness of acid-treated oils, on copper. No. 2,320,266. Charles Cohen, to Standard Oil Development Co.

Improving the color and reducing the corrosiveness of acid-treated oils on copper. No. 2,320,267. Charles Cohen to Standard Oil Development Co.

Sweetening hydrocarbon distillate oils, containing mercaptans. No. 2,320,277. Minor Jones and Richard Brandon to Standard Oil Development Co.

Catalytic conversion of hydrocarbon oils. No. 2,320,284. Robert Krebs and Edward Nicholson, to Standard Oil Development Co.

Conversion of paraffin hydrocarbons, into other branched chain paraffin hydrocarbons in the liquid phase and in the presence of a liquid aluminum halide-hydrocarbon catalyst. No. 2,320,293. Povl Ostergaard, to Gulf Oil Corporation.

Additional patents on petroleum refining, photographic chemicals, resins, plastics, rubber, and textiles 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.

Recovery of aluminum values from subdivided aluminiferous materials containing alumina. No. 409,880. Ture Robert Haglund.

Process for the production of sulfur from a sulfide of iron-containing material. No. 409,881. Ture Robert Haglund.

Bituminous composition or binder for paving, flooring, roofing and the like and for insulation purposes. No. 409,883. Sixten Magnus Hjelte.

Apparatus for controlling the proportionate admixture of an ingredient with a liquid. No. 409,892. Ralph Willoughy Osborne.

Process for the production of ramie yarn for use in preparing woven articles. No. 409,893. Mark Sabner.

Method of producing separated ramie fibres in condition for spinning while in a dry condition. No. 409,894. Mark Sabner.

Method and apparatus for sheeting dough. No. 409,898. LeConie Stiles.

Process for desalting fish which consists in watering the fish with an aqueous solution containing at least one food preservative salt together with a carbonate and/or bicarbonate and a very small amount of pepsin and/or papain. No. 409,899. Paul Stockhamer.

Method of finishing textiles to give a full, crisp hand thereto similar to a starch finish which comprises applying thereto an aqueous emulsion of a phthalic anhydride-polyhydric alcohol resin modified by the incorporation therein of a member of the group consisting of benzoic acid and alkyl-substitute benzoic acid. No. 409,907. American Cyanamid Company. (Donald W. Light and Alden D. Nute).

Bronze welding rod comprising in excess of 8% aluminum and 2% iron, the balance being substantially of copper, and a covering on said rod containing principally fluorides, and a binder. No. 409,-913. Ampco Metal, Inc. (Milan A. Matush).

Wrapping sheet comprising an outer sheet of rubber material coated on one side with a transparent adhesive and an inner sheet of cellulose material bonded to said outer layer by said transparent adhesive, and a coating of an adhesive material applied to and cohering with the cellulose material and adapted to adhere to the goods wrapped therein to the exclusion of air from between the wrapper and the goods. No. 409,922. Canada Foils Limited. (Carlaw P. Olstad).

Process of making olefine oxides by the direct chemical combination of olefines with molecular oxygen in the presence of active silver surface catalysts at temperatures between about 150° and about 400° C. No. 409,933. Carbide and Carbon Chemicals Limited. (George H. Law and Henry C. Chitwood).

Process of making olefine oxides by the direct chemical combination of olefine with molecular oxygen in the presence of active silver surface catalysts at temperatures between 150° and about 400° C. No. 409,934. Carbide and Carbon Chemicals Limited. (George H. Law and Henry C. Chitwood).

Boron carbide composition comprising a fusion of boron carbide and a carbide of the group consisting of tungsten carbide, molybdenum carbide and chromium carbide. No. 409,935. The Carborundum Company. (John A. Boyer and Carl Grant Rose).

Method of producing a pair of metal slabs having a relatively thick steel backing and a relatively thin copper facing fusion bonded to said steel backing suitable for reduction by rolling into thin composite stock. No. 409,936. Clad Metals Industries, Inc. (Thomas B. Chace).

Bearing comprising a strip of copper clad sheet steel consisting of a steel backing having a thin cupreous facing fusion bonded to the steel. No. 409,937. Clad Metals Industries, Inc. (Thomas B. Chace).

Method of making a tin oxide refractory body. No. 409,946. Corning Glass Works. (Dan McLachlan, Jr.).

Dough spreader for insertion between the die and the pressure cylinder of a press for making macaroni, spaghetti, and the like. No. 409,948. G. d'Amico Macaroni Company. (Frank Spinozzi).

Apparatus for thermo-chemically cutting rectangular metal bar stock. No. 409,952. Dominion Oxygen Company Limited. (Homer W. Jones).

Pneumatic tire having a rubber composition tread forming a plurality of functionally continuous ribs. No. 409,953. Dominion Rubber Company Limited. (Gleen G. Havens).

Steel-cutting edged tool composed essentially of chromium 15-40%, tungsten-molybdenum group metal 8-25%, carbon 0.5-3%, iron 5-15%, and the remainder substantially all cobalt. No. 409,955. Electro Metallurgical Company of Canada Limited. (William A. Wissler).

Cutting tool comprising 15-40% chromium, 8-25% tungsten-molybdenum group metal, 0.5-3% carbon, 4-15% nickel, remainder cobalt. No. 409,956. Electro Metallurgical Company of Canada Limited. (William A. Wissler).

Fine fibrous glass having a composition comprising a base forming the major constituent of a non-alkaline glass which comprises calcium oxide 18-28%, magnesium oxide 1-7%, alumina 9-17% and silica 55-65%. No. 409,959. Fiberglas Canada Limited. (Robert A. Schoenlaub).

Method of treating normally vaporous hydrocarbons for storage and subsequent use that includes converting the hydrocarbons to their solid hydrates, accumulating within a storage zone a large body of the hydrates containing the hydrocarbons in commercial quantities, maintaining the hydrates in said storage zone under stabilizing temperature and pressure conditions, and later liberating the hydrocarbons from their said hydrates for use. No. 409,962. The Fluor Corporation, Ltd. (Arthur J. L. Hutchinson).

Method of making a copper oxidized button and stabilizing it with reference to uniformity of resistance changes with temperature changes between substantially 100° and 212° F. No. 409,966. General Motors Corporation. (Donald W. Randolph and Robert H. Bigler).

Producing cast compounds of difficultly fusible metals by mixing the ingredients thereof with a binder, forming said bonded mixture as a solid coherent rod, melting said rod by the heat of an electric arc formed between said rod and an electrode, and cooling the melted compound. No. 409,972. Haynes Stellite Company. (William A. Wissler).

Method for reducing the shrinkage of regenerated cellulose rayon fabrics. No. 409,973. Heberlein Patent Corporation. (Ernst Weiss).

Process for producing ornamental pattern effects in cellulosic textile fabrics. No. 409,974. Heberlein Patent Corporation. (Georges Heberlein).

Process of producing synthetic catalysts capable of promoting decomposition reactions in hydrocarbons and their derivatives and capable of maintaining high activity on extensive use. No. 409,977. Houdry Process Corporation. (John R. Bates).

Production of clean distillate stock from liquid or liquefiable heavy hydrocarbons. No. 409,978. Houdry Process Corporation. (Eugene J. Houdry).

Method of curing meat by holding in cure with curing agents and in contact with nitrate containing cloth. No. 409,980. Industrial Patents Corporation. (Levi Scott Paddock and Cleo A. Rinehart).

Method of treating calf carcasses which comprises removing the skin before the animal heat has been dissipated, promptly thereafter covering the skinned surface with a cloth and enclosing the clothed carcass in a moistureproof covering. No. 409,981. Industrial Patents Corporation. (Beverly E. Williams and Andrew S. Hartanov).

Method of bleaching glyceride oils which comprises treating a refined glyceride oil with up to about 1% of an activated adsorbent earth to effect a partial decolorization of the oil, separating the activated earth adsorbent from the oil, and thereafter heating the oil to a higher temperature of about 350° to 400°F in order to effect more complete decolorization. No. 409,992. Industrial Patents Corporation. (Eddie C. Glenn).

Method of treating animal tissue having portions of fatty material and portions of nonfatty material of relatively tougher tissue than said portions of fatty material. No. 409,983. Industrial Patents Corporation. (Charles T. Walter).

Catalytic cracking apparatus. No. 409,987. The M. W. Kellogg Company. (Louis C. Rubin, Walter B. Montgomery, William J. Degnen, and Francis Rapasky).

Forming a bearing surface by depositing on a backing member by the electric arc an alloy from a welding rod containing copper 89%, tin, 9% and lead 2%. No. 409,989. Magnus Company. (Louis C. Dodd).

Rubber hydrochloride sheet having a flexible highly stretchable thermoplastic coating comprising 94-70% by weight of a wax and 6-30% by weight of rubber-like film-forming constituent and having a relatively lower softening point than the rubber hydrochloride. No. 409,991. Marathon Paper Mills Company. (Allen Abrams, George W. Forsey and Charley L. Wagner).

Froth flotation apparatus comprising a tank for pulp, a rotary impeller in the tank, means for delivering separate streams of gas and pulp to the impeller for intermixing thereby, means for creating a pressure zone about said impeller in excess of normal hydrostatic pressure, and means for causing the intermixture discharged by the impeller to pass out of said zone in separate streams at reduced velocity. No. 409,994. Mining Process and Patent Company. (Arthur Chester Daman and Leland Hamilton Logue).

Additional Canadian Patents granted and published Jan. 12, 1943, will be given next month.

Tru-Cure
401,729

GAMBLE'S
401,828

Kromo-Lite
401,835

THERMOGEN
401,936

FUME-RITE
401,947

BLOCPLASTIC
401,952

PERMANENTE
402,036

ANNUAL REVIEW OF BIOCHEMISTRY
402,043

C&S CHEMICAL SUPPLY CO.
"Clean and Save The C & S Way"
451,583

Hydrolite
451,921

AM-L-ITE
455,942

Barrett
456,482

IOLINE
456,491

ANSCO COLOR FILM
456,556

NITROLENE
457,056

D
457,273

Unit-Suds
457,530

'Wellcome'
458,008

GLAMORTEX
458,070

CEIL-COTE
458,095

SELOPHEN
458,291

TERRA TOX
458,311

NPD
458,336

458,413

458,414

APLOCOP
458,579

CELOPON
458,673

Ad
458,862

SCHEEL
458,923

COLORTHRU
458,937

VARENE
459,128

LoFLO
459,182

M-3
459,224

SOVATONE
459,231

NYOCAL
459,246

SUPERTROL
459,321

SHOOTONE
459,355

S C.P.INC.
459,382

ANSUL
459,459

459,572

RED ROSE
459,603

NOXTANE
459,647

ALATOL
459,677

PHOBOTEX
459,679

LETHOGAS
459,694

DEVOPAKE
459,738

BYSULOX
459,752

Fungi-San
459,801

M
459,878

Armstro
459,899

FERROID
460,002

PYR-E-PEL
460,063

PENOLA-MAR
460,099

PENOLAMARINE
460,100

AGNITE
460,130

NOTHAL
460,311

LIMEGON
460,391

Trade Mark Descriptions†

401,729. Truscon Labs., Inc., Detroit, Mich.; filed Dec. 17, 1942; Ser. No. 457,486; for concrete curing; since April, 1942.
401,828. Gamble Stores, Minneapolis, Minn.; filed Mar. 31, 1942; Ser. No. 452,041; for liquid fly spray; since June, 1938.
401,835. Harold M. Crosby, New York, N. Y.; filed Oct. 2, 1942; Ser. No. 455,909; for chemical materials; since Sept. 24, 1941.
401,936. Autogenous Gas Co., Cleveland, Ohio; filed Jan. 22, 1942; Ser. No. 450,389; for highly refined gas; since Dec. 1, 1941.
401,947. Central Chem. Corp. of Md., Hagerstown, Md.; filed Dec. 17, 1942; Ser. No. 457,459; for fumigant; Apr. 10, 1942.
401,952. The Dicalite Co., Los Angeles, Calif.; filed Mar. 9, 1943; Ser. No. 458,982; for plastic; since Dec. 18, 1941.
402,036. The Permanente Metals Corp., Oakland, Calif.; filed Mar. 16, 1942; Ser. No. 451,651; for magnesium; since Jan. 15, 1942.
402,043. Annual Reviews, Inc., Stanford Univ., Calif.; filed Feb. 5, 1943; Ser. No. 458,352; for a publication; since May, 1932.
451,583. C. F. Stuard, doing business as C. & S. Chem. Supply Co., Chickasha, Okla.; filed Mar. 12, 1942; for solvent; Mar. 1939.
451,921. The White Co., Baltimore, Md.; filed Mar. 26, 1942; for casein wall paint; since July 1, 1935.
455,942. Acma Paint Works, Inc., Denver, Colo.; filed Oct. 3, 1942; for ready-mixed paints; since June 13, 1941.
456,482. Allied Chemical & Dye Corp., N. Y.; filed Oct. 28, 1942; for chemicals; since July 9, 1912.
456,491. Ioline Co., Newark, N. J.; filed Oct. 28, 1942; for iodine; since Sept. 1942.
456,556. General Aniline & Film Corp., New York and Binghamton, N. Y.; filed Oct. 31, 1942; for film; since July, 1942.
457,056. Fred L. Trickey, doing business as Nitroloid Co., Berlin, Wis.; filed Nov. 25, 1942; for thinner; since July 2, 1927.
457,273. Joseph Dixon Crucible Co., Jersey City, N. J.; filed Dec. 8, 1942; for graphite lubricants; since May 29, 1942.
457,530. Reade Mfg Co., Inc., Jersey City, N. J.; filed Dec. 19, 1942; for unit-suds for washing compounds; since Oct. 23, 1943.
458,008. Burroughs Wellcome & Co., U. S. A., Inc., New York, N. Y.; filed Jan. 19, 1943; for medicinals; since Jan. 1, 1894.
458,070. Inertol Co., Inc., Newark, N. J.; filed Jan. 21, 1943; for waterproofing and protective paint; since Dec. 28, 1942.
458,095. Evans Bros., Inc., N. Y.; filed Jan. 22, 1943; for paints; since Jan. 1, 1941.
458,291. The Selig Co., Atlanta, Ga.; filed Feb. 1, 1943; for disinfectant, germicide, and antiseptic; since Dec. 29, 1942.
458,311. Wood Treating Chemicals Co., St. Louis, Mo.; filed Feb. 2, 1943; for wood preservative; since Feb. 4, 1943.
458,336. National Package Drugs, Inc., St. Louis, Mo.; filed Feb. 4, 1943; for medicinals; since Jan. 15, 1938.
458,413-4. Stuart Oxygen Co., San Francisco, Calif.; filed Feb. 8, 1943; for medical oxygen and other gases; since Dec. 15, 1942.
458,579. Applied Chemical Corp., New York, N. Y.; filed Feb. 17, 1943; for impregnating substances; since January, 1942.
458,673. Arkansas Co. Inc., Newark, N. J.; filed Feb. 22, 1943; for detergents, for processing of textiles; since July, 1939.
458,862. Franklin E. Everson, doing business as F. E. Everson, N. Y.; filed Mar. 2, 1943; for detergent; since June 15, 1942.
458,923. William H. Scheel, Inc., Brooklyn, N. Y.; filed Mar. 5, 1943; for lac and varnish gums; since May 1, 1889.
458,937. Benjamin James Hardy, as Colorthru Chemicals, N. Y.; filed Mar. 6, 1943; for paints; since Sept., 1942.
459,128. Newport Industries, Inc., Pensacola, Fla.; filed Mar. 15, 1943; for oil substitute for paints; since Mar. 4, 1943.
459,182. H. R. Williams, as Fusion Eng., Cleveland, O.; filed Mar. 17, 1943; alloys; since Dec. 2, 1942.
459,224. Eugen Hirsch, N. Y., filed Mar. 19, 1943; for paints; since Jan. 28, 1942.
459,231. Socony-Vacuum Oil Co. of N. Y., N. Y.; filed Mar. 19, 1943; for paint; since Dec. 3, 1942.
459,246. New York-Ohio Chemical Co., Lewiston, N. Y.; filed Mar. 20, 1943; for chlorinated metals; since Feb. 26, 1943.
459,321. Turco Products, Inc., Los Angeles, Calif.; filed Mar. 24, 1943; for cleaning compound; since Oct. 29, 1939.
459,355. American Chemical Paint Co., Ambler Pa.; filed Mar. 26, 1943; for hormone spray for horticultural; since Jan. 21, 1943.
459,382. Standard Chemical Products, Inc., Hoboken, N. J.; filed Mar. 26, 1943; for textile oils; since Jan. 2, 1943.
459,459. Ansul Chemical Co., Marinette, Wis.; filed Mar. 29, 1943; for refrigerants; since Apr. 30, 1915.
459,572. Mitchell-Bradford Chemical Co., Bridgeport, Conn.; filed Apr. 1, 1943; for salts to darken metal; since April, 1939.
459,603. Red Rose Chem. Co., N. J.; filed Apr. 3, 1943; for naocl; since Mar. 22, 1943.
459,647. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed Apr. 5, 1943; for chemical preservative; since May, 1941.
459,677-460,311. The Selig Co., Atlanta, Ga.; filed Apr. 6, 1943; since Mar. 19, 1943.
459,679. Society of Chemical Industry in Basle, Basel, Switzerland; filed Apr. 6, 1943; for chemical substances; since Mar. 14, 1939.
459,694. Parsons Chemical Works, Grand Ledge, Mich.; filed Apr. 7, 1943; for fumigant; since June 16, 1933.
459,738. Devoe & Raynolds Co., Inc., N. Y.; filed Apr. 9, 1943; for paints; since Oct. 1, 1941.
459,752. General Chem. Co., N. Y.; filed Apr. 9, 1943; for weed killer; since Mar. 4, 1943.
459,801. Cyrus D. Bias, as Tobacco States Chemical Co., Cave City, Ky.; filed Apr. 12, 1943; for preparation; since Sept., 1941.
459,878. The Johnson-March Corp., New York, N. Y.; filed Apr. 14, 1943; for wetting agent; since Mar. 22, 1943.
459,899. C. M. Armstrong, Inc., N. Y.; filed Apr. 15, 1943; for lactates; since Feb. 12, 1943.
460,002. R. B. D. Lauder, as Ferroid Supply Co., Stretford, Manchester; filed Apr. 19, 1943; for fluxes; since June 26, 1924.
460,063. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Apr. 21, 1943; for fire retardant; since Mar. 30, 1939.
460,099-460,100. Standard Oil Co. of New Jersey, Wilmington, Del.; filed Apr. 22, 1943; for lubricating oils; since Mar. 27, 1943.
460,130. Agnite Corp., N. C.; filed Apr. 24, 1943; soot remover; since Feb. 4, 1936.
460,391. Pittsburgh Chemical Lab., Pittsburgh, Pa.; filed May 3, 1943; for washing powder; since June 1941.

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