The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Reward for Invention

WE have it on high authority that this country must live in the future by the creation of new types of goods. We have seen other nations developing their industries to an extent so great as to threaten our overseas markets seriously in what may be termed standard lines of manufacture. It has lately been stated that Sweden faced a similar position in the last century. Before the British iron and steel industry was developed Sweden provided 39 per cent. of the world's steel requirements; now it supplies only 1 per cent. It is an interesting fact, however, that the actual tonnage of iron produced in Sweden is greater now than it was when that country supplied nearly two-fifths of the world's steel demands. Nevertheless, Britain must be facing much the same difficulty in many standard lines of manufacture, and the future of this country depends upon the extent to which, by invention or by research, we can produce new goods, set up new industries, and apply our skill to manufactures which cannot be undertaken by most of the rest of the world for one reason or another.

That being so, the key to this country's future prosperity appears to lie in the hands of its inventors and research men. These are they who by chance or by considered thought, by scientific research, by engineering development, or in other ways, contribute new ideas that can be applied to the manufacture of goods for which there will be a world market. The Minister of Supply at the luncheon to the Iron and Steel Institute expressed the national attitude to creative scientists of all kinds in language which is worth quoting: "We have emerged from the war with glory; we are battered, we are crippled, but we are still alive. We have come into a new and a rapidly changing world, a somewhat uncomfortable and unfamiliar world; but it is exciting, it is challenging, and it is adventurous. . . . Revolutionary developments are taking place in many fields. . . . This is a scientific age, and you who work in the scientific and technical field have the future of mankind in your hands."

It is not enough to keep going as before. For us in this island it is not enough just to keep up with others; we have to struggle to maintain our technical superiority in those fields which are peculiarly our own.

An unfamiliar and But human nature adventurous world! still remains the same. There are and always will be those invent because they cannot help it. There will always be those occupy their time in scientific research

On Other Pages

because it is so interesting to them that they cannot conceive of any other interest in life. They are the few, they are the enthusiasts. In the view of the world they are slightly mad even as the anchorite or monk, who immures himself in his cell to pray for the world, is slightly mad. For the ordinary man and woman adventure is undertaken—and this particularly applies to industrial adventure—with a view to gain. We work hard, we may enjoy our work, but at the end of it we expect some material success in addition to the æsthetic satisfaction of a job well done. Rewards do not always follow on hard work even if it is successful. It has been made clear of late that Baird, the inventor of television, received no recognition from any Government, nor was offered any reward other than financial; and even that he had to strive for just like any other business man.

The modern spirit of socialism accords ill with a spirit of adventure, because while the socialists urge scientific and technical men and inventors to give of their very best, they withold rewards, on principle. It has become indecent to make profits. If profits are made they are removed by taxation as soon as possible. Even in Russia the successful scientific workers receive very large rewards, and the carrot of material success is ever held before the nose of the inventive donkey.

What should be the reaction of industry to successful development of processes in this country? It must be confessed that there have been too many examples in the past of a firm getting all the material profits and the employee getting none. We can cite more than one case which needs to be investigated. There is first the man who is engaged as a research worker and who is therefore, as it were, under contract to invent. If his work is successful should he be given any material reward other than normal increases in salary or position for which his mental gifts cause him to be fitted? Should he be given a percentage on sales—a royalty, in other words? There are two answers to this. The first is that the firm may employ many scientists and a very great deal of the work of those men must be unremunerative. The research worker is therefore entitled to nothing more than his salary. There is also the view that it is unethical to give rewards to the one man who happens to be successful simply because of the accident of having been put on to a particular line of research capable of yielding a materially successful result.

We confess that this is an exceedingly difficult matter upon which to pronounce any opinion. Our view at the moment is that a man who becomes a research chemist should not be entitled *as a matter of right* to rewards for successful processes which he develops. But if the success is clearly due to certain members of the research staff who stand out head and shoulders above their fellows, rewards in the shape of some sort of bonus should be given. It may be indeed that the outstanding work is of a purely negative character, but it should still rank for a reward whether it be successful in an industrial sense or not. The opinions of our readers upon this point would be welcomed because there is considerable debate on this matter just now in certain official circles.

The case of the inventor who is not paid to invent, *e.g.*, a production engineer who sees a better method of doing his job, comes under quite a different head, and we suggest that if a man is not engaged specifically to undertake development work he should always be given a percentage of any savings that he can make by a patentable invention. This again raises the point as to whether the application of the invention to the man's own firm should rank for such payment as a matter of right, or whether it is a question of the extent to which he can draw royalties from other applications of his invention outside his own firm.

It is for a specific purpose that we raise this question of rewards. There are many who do good work and there are many, therefore, who are in the running for rewards. It might be said indeed that the industrial artist who produces a really fine design is just as entitled to a reward as the research chemist who develops a new process. It is a matter on which there is a good deal of muddled thinking. One thing, however, appears to us to be clear, even though it may not be universally agreed. This country requires inventive genius and inventive effort in every field to the very greatest extent possible. The brave adventurous new world of the socialist is all very well for the theorist who is going to plan it, but it provides no incentive to the individual. The question that we should like to hear debated is this: How shall we get the necessary creative results if we do not offer adequate rewards; and how should those rewards be organised?

NOTES AND COMMENTS

"Britain Can Make It"

ALTHOUGH chemicals will not be directly represented, chemical manufacturers will doubtless find much to interest them in the "Britain Can Make It" national exhibition of industrial design in consumer goods which will be opened at the Victoria and Albert Museum, London, on September 24. How long the exhibition will remain open depends on the attendance of the public. Plastics and other materials are now being used to convert the museum into a large-scale "shop window for Britain" and an encouraging "progress report" was presented at a Press conference this week by Sir Cecil Weir, who has supervised the arrangements for liaison with industry. The exhibition, which will occupy 90,000 square feet, will cover the whole range of consumer goods, and it is estimated that more than 20,000 separate exhibits will be put forward by the fifty or so industries taking part. Space at the exhibition will not be sold, all the exhibits being selected by specially appointed committees, assisted by technical assessors nominated by the trades concerned. The exhibition has been planned as a gesture of confidence in the resilience and capacity of British industry, and its successful launching will mean that this country has completed the first step on the road to peace-time reconversion.

World Science Federation

IF the scientists have the last word, it will not be their fault that new discoveries are not used for the benefit of mankind in general. This is the impression derived from the international conference to found a world science federation, which was opened in London last Saturday by Professor P. M. S. Blackett in his capacity as president of the A.Sc.W. Some 14 countries were represented, the initiative having arisen from the British Association's conference on "Science and the Welfare of Mankind." The purposes of the International Federation of Scientific Workers are, broadly, to ensure the fullest use of science in promoting peace and human welfare, and to secure international co-operation in science and technology. Immediate items in the programme are the peaceful use of atomic energy and the rehabilitation of devastated countries, as well as the application of science to underdeveloped countries. Furthermore, improvement in scientific teaching is to be studied as well as the betterment of conditions among scientific workers. Co-operation with U.N.E.S.C.O. and similar bodies is to be encouraged. This is a pretty comprehensive programme, but it seems fairly obvious to us that something of the kind must be put in hand, and put in hand quickly. It has been said often enough that Science knows no frontiers. That was true enough up to, say, 80 years ago; but recent events have made it appear a somewhat hollow sentiment. The present step, we fully believe, may be regarded as a real advance towards the revival of that ancient truth. The names of the elected officers of the new Federation tend to strengthen this good hope: they are, F. Joliot-Curie, president; N. N. Semenov and J. D. Bernal, vice-presidents; Harlow Shapley treasurer—a remarkable international team.

Alteration in Law

EMPLOYERS and employees alike in the chemical industry are affected by a recent alteration of law regarding claims for damages arising out of personal injuries sustained in the course of employment. Hitherto, damages could not be given if it could be proved that there was contributory negligence on the part of the injured person. Under the recent Law Reform (Contributory Negligence) Act, however, this no longer applies. The new Act lays it down that if a person claims damages under Common Law in such cases, the claim shall not fail by reason of contributory negligence on the part of the claimant, but the amount of the damages allowed shall be reduced to such an extent as the judge (or jury if there is one) considers just and equitable, having regard to the claimant's share in the responsibility for the accident. Although an injury may come under the Workmen's Compensation Acts, the injured person may make a claim under Common Law if he so chooses, but if he fails by this method the Court may, nevertheless, assess damages under the Workmen's Compensation Acts. The new apportionment rule applies also to cases under the Law Reform (Miscellaneous Provisions) Act, 1934, and the Fatal Accidents Acts, 1846-1908. An important proviso is that in all cases where a contract limits liability, the amount of damages re-

coverable under the new legislation cannot exceed the maximum amount laid down in the contract.

Platinum Boom

IT seems unhappily inevitable that the chemical industry must suffer from the "boom" in platinum, which has caused that precious metal to rise in price from £14 per oz. to about £17 in the last month or two, after having remained stable at £9, thanks to price control, for several years. The principal reason for the rise is said to be the demand from the jewellery trade, which was "starved" of platinum during the war, and, in America especially, is now taking full advantage of the removal of the ban on trading and is buying heavily. At the same time it is stated that the output of platinum metal, about 750,000 oz. in 1939, is considerably reduced—though no current figure seems obtainable. During the war platinum, already important as an industrial raw material in the chemical and electrical industries, found many new uses, and, according to a financial correspondent of the *Manchester Guardian*, the present boom may not only prevent further development, but may even undermine much of the progress achieved before and during the war. While the present feverish buying rush continues—it is stated that speculators are paying as much as £24 an ounce—it will obviously be an uneconomic proposition to attempt to expand industrial uses. This boom will be a bad thing for the trade in the long run, as well as for the advancement of chemical science.

State Control of Flavours

ACCORDING to a British United Press message, Russia now has what is officially described as a "Ministry of Gustatory Industries," that is to say, a Ministry of Tastes, dealing with spirits, wines, perfumes, mineral waters, and beer. It has, they say, been formed from a department of the Ministry of Food. This is a real advance in the control of public opinion, which we should hate to see reproduced in this country, though doubtless a qualified theorist could defend it as good sound socialism. It is bad enough to have the quantity of our wine, beer, etc., controlled, without having its flavour dictated as well. It is perhaps not generally known that our Soft Drinks Control during the late war was in charge of a Professor of Ecclesiastical History from one of our older-established universities, but we do not feel that this should be regarded as a precedent; it appears to us to be an injustice to the chemical industry. If agreeably scented esters are, in the words of Miall, "used as flavouring essences and perfumes," they are also, under the same authority, used in many chemical processes. There are not a few members of the Society of Chemical Industry who would be excellently suited at any rate for the job of Under-Secretary for Aromatic Esters when the chemical industry is nationalised—with the reversion of the Ministry of Gustatory Industries, if and when formed; and we leave it to our well-informed readers to think out some suitable names. Wild horses will not drag any suggestions from us.

Institute of Fuel

Royal Charter Granted

MEMBERS of the Institute of Fuel were notified this week, in a letter signed by the president, Dr. E. W. Smith, and the chairman of the Charter Committee, Mr. C. H. Lander, that the King has been pleased to approve the grant of a Charter to the Institute.

The letter added: "Although we are not yet aware of the date at which the Royal Charter will become operative, we feel sure that you would wish us, in taking this early opportunity of acquainting you of this noteworthy development, to place on record our thanks on your behalf to all those, particularly Sir John Greenly, Mr. H. A. Humphrey, and the other members of the original Charter Committee, as well as our fellow-members of the present committee, including Dr. G. E. Foxwell, as Charter Secretary, who, by their continued interest and devoted efforts, have been instrumental in securing the grant."

CHEMISTRY SCHOLARSHIPS

Among 19 scholarships awarded by the Miners' Welfare National Scholarship Scheme and Students' Exhibitions Fund for 1946 are two for an honours degree course in chemistry. These go to G. O. Phillips, of Rhos, Denbighshire (tenable at Manchester University), and A. H. Wragg, of Kiveton Park, Yorkshire (tenable at Sheffield University). Eight exhibitions include one for an honours degree course in chemistry, awarded to J. B. Brown, of Atherton, Lancashire (tenable at Manchester University).

Beryllium Metal

Methods of Manufacture Described

IN view of the monopoly of beryllium metal production formerly held by Germany, detailed information on the methods of manufacture employed is extremely valuable. A recent report (B.I.O.S. Final Report No. 319, Item No. 21) supplements to a considerable extent the scanty data given in an earlier report regarding the manufacture of beryllium metal at the Degussa works, Frankfurt-am-Main (THE CHEMICAL AGE, 1946, *54*, 403). According to this latest report the methods of production and the plant employed by the Degussa firm were not of that high efficiency and meticulous order which are frequently claimed as characteristic of German industry. To quote from the report " It was pretty clear that the plant for this process had been scraped together from old material lying about; and even when rather special apparatus had to be installed, this gave the impression of having been compounded of second-hand items. The whole establishment and procedure gave the impression of 'backyard manufacture.' "

As shown on p. 99, the process consists of two main sections. First, the production of pure anhydrous beryllium chloride from the mineral beryl, and second, the electrolytic reduction of the chloride to metal. Raw material employed is ore containing the mineral beryl ($3BeO.Al_2O_3.6SiO_2$) with an average content of 10 to 12 per cent. BeO (or 3.5 to 4.0 per cent. metallic beryllium). With a recovery of 78 to 80 per cent. and an ore cost of 150 RM. per ton the metal selling price was about 2.1 RM. per lb.

How Recovery is Effected

The first step in the recovery operations is the decomposition of the beryl mineral by fusion with the necessary quantities of lime to give mono-calcium aluminate ($CaO.Al_2O_3$) and calcium disilicate ($CaO.2SiO_2$). Fusion of the ground mixture of ore and lime is effected by heating to 1500° C. for 1½ hr. in a rotary kiln fired with town gas, the kiln being 3 ft. 6 in. in diameter and 6 ft. long with a 9-in. thickness of monolithic fireclay lining. The molten product from the kiln is quenched in water to promote disintegration, the material being subsequently dried and ground to a fineness equivalent to a 72 B.S.I. screen.

Treatment with sulphuric acid results in the formation of insoluble silica and calcium sulphate, leaving beryllium and aluminium salts in solution. The ground clinker is treated with 78 per cent. sulphuric acid in an iron trough, the mixture being continuously stirred until it sets into a dry powdery mass. This mass is then transferred to a steam-jacketed lead-lined vessel to which a wash solution from a subsequent operation is added. Additions of small quantities of glue are also made to aid the precipitation and filtration of the silica and calcium sulphate.

The slurry is then transferred to a wooden plate-and-frame filter-press by a porcelain-lined acid pump, nitrocellulose cloths being employed for filtration. From the filter-presses the clear liquor (about 30° Bé.), with aluminium, iron, and beryllium salts in solution, is transferred to lead-lined agitating tanks equipped with cooling coils. Hot ammonium sulphate solution is added in excess and the liquor cooled to facilitate crystallisation of ammonium aluminium alum. Separation of the alum crystals is effected in ordinary batch centrifuges, the alum being discarded to waste as it is too impure for sale. Complete elimination of the aluminium salts is not secured, approximately 0.5 per cent. as Al_2O_3 remaining in the solution.

Precipitation of Beryllium Hydroxide

Removal of the iron salts is effected by oxidising the iron to the ferric state by the addition of hydrogen peroxide and adjusting the *p*H of the solution to 4.0 by additions of calcium carbonate. Precipitated iron hydroxide and calcium sulphate are removed in wooden plate-and-frame filter-presses equipped with cotton cloths. The solution from the filter-presses, containing about 0.5 per cent. of iron as Fe_2O_3, is pumped into agitators lined with acid-resisting brick. Ammonia gas is passed into the agitator until all free acid is neutralised and the beryllium precipitated as the hydroxide. Apparently, although a large excess of ammonium sulphate was formed at this stage, no attempt was made to recycle the solution after concentration for the formation of ammonium aluminium alum.

Beryllium hydroxide is separated from the solution by filtration in wooden plate-and-frame filter-presses. Should a very low iron content be imperative, the precipitated beryllium hydroxide is dissolved in ammonium carbonate solution, filtered, and subsequently treated with sodium sulphide which precipitates any iron as the sulphide, any such precipitate being subsequently filtered off. Beryllium carbonate may be precipitated from this purified solution by dilution and boiling with steam.

Beryllium hydroxide is spread on iron drying trays lined with filter-cloths, the trays being subsequently transferred in batches to a steam-jacketed drying cabinet where the water content is reduced to about 50 per

cent. A plastic mixture of dried beryllium hydroxide and powdered wood charcoal is prepared for extrusion by the addition of suitable quantities of wood tar and water. This plastic mass is then extruded into a rod of $\frac{3}{8}$ in. diameter by a hydraulic press,

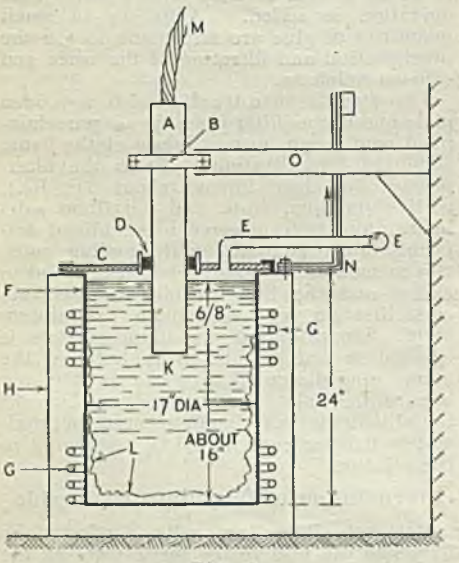


Fig. 1.

the rod being subsequently dried and broken into short lengths. The short lengths of dried rod are packed in charcoal in clay crucibles, the contents being covered with a layer of charcoal and an air-tight lid finally fitted. These small crucibles—10 in. in diameter and 15 in. high—are then passed through a 100-ft. tunnel kiln in which a temperature of 800°C. is maintained by burning town gas. During the 24 hours occupied in traversing the length of the kiln the beryllium hydroxide is dehydrated completely to beryllium oxide, while volatile material is expelled, leaving a hard porous mixture of beryllium oxide and carbon.

Chlorination of this oxide in the presence of carbon is carried out in an electric furnace, the carbonised rods constituting the resistor element of the furnace. The chlorination furnace is a brick-lined box with two 12 in. by 5 in. electrodes arranged vertically, leaving a 24 in. space which is filled with the carbonised rods, the top of the furnace being closed with a gas-tight lid. Alternating current at 120 V. from a 12 kW. supply is fed to the electrodes, the temperature gradually rising to 700-800°C., when chlorine gas is admitted through the base of the furnace. In the presence of the carbon and chlorine the beryllium oxide is transformed into the chloride which volatilises at the temperatures obtaining. Escaping through a duct near the top of the furnace, the volatile beryllium chloride passes into a condenser where it solidifies.

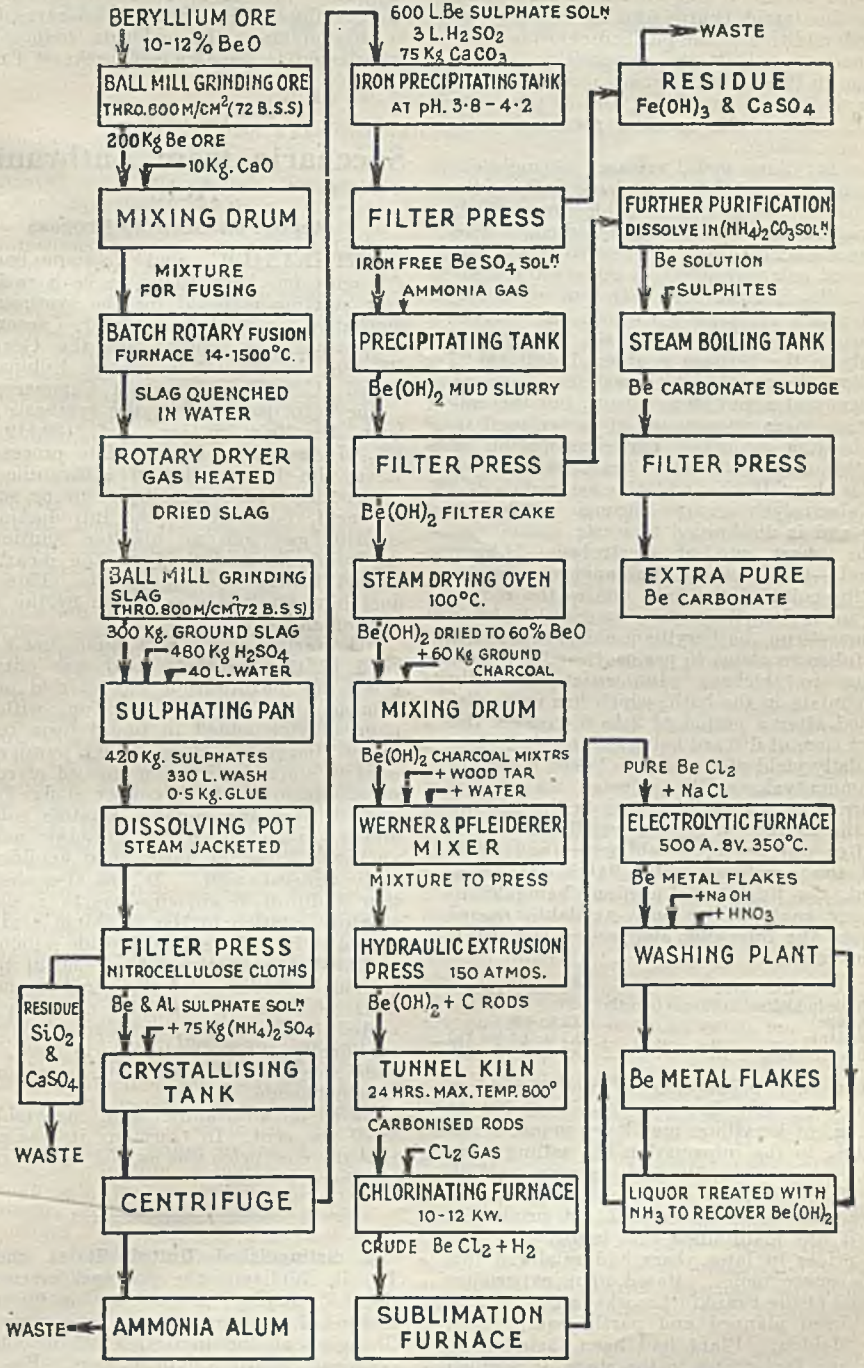
To secure greater purity, the crude chloride from the chlorination furnace is redistilled at a temperature of 550°C. in a hydrogen atmosphere, the furnace being fired with town gas. The volatile chlorides are passed through two condensers in series, the first being maintained at a temperature of 350° C. and the second at about 150° C. High-purity beryllium chloride is deposited in the first condenser, while beryllium chloride contaminated with the chlorides of aluminium, iron, and other metals collects in the second condenser. The contents of the second condenser are returned to an earlier stage in the process for the extraction of the beryllium. Should it be necessary to store the beryllium chloride produced, air-tight aluminium containers must be employed to prevent deliquescence.

Electrolysis

In the final stage electrolysis of the beryllium chloride is carried out in nickel crucibles with auxiliary external electric heating, the nickel crucible constituting the cathode of the direct current electric supply. As shown in Fig. 1, the nickel crucible, 2 ft. in diameter by 17 in. long and 2 in. thick, is practically flat-bottomed and flanged at the top. Two groups of electric heating coils surround the crucible, alternating current being supplied at 220 V. with a maximum of 20 amps. in each. The power fed to each coil may be controlled so that the heating range is from 8.8 kVA. to zero.

The anode is a graphite rod 4 in. in diameter immersed in the charge to a depth of 6 to 8 in., the rod being held in a steel clamp and connected to the current supply by a copper rope. The cathode connection is taken by aluminium tape bolted to the flange of the crucible at the back of the furnace, the tape being connected to an overhead busbar coupled to the anode connection of the next live furnace. The furnaces are coupled electrically in sets of five, power being supplied from an M.G. set delivering 500 amps. When starting electrolysis the series voltage in the circuit is 45—that is, 9 V. drop across each furnace. As electrolysis proceeds the voltage falls to 25—that is, 5 V. across each furnace. At maximum load the current density on the anode section is 40 amps./sq. ft.

In the usual method of operating, the crucible is hot and the charge consisting of beryllium chloride with an equal weight of sodium chloride is brought up to the desired operating temperature of 350°C. in about an hour. The total weight of the charge at the start is about 160 kg. Electrolysis is continued for 24 hours, after which the current is cut off and the liquid portion of the charge ladled into a neighbouring furnace.



Manufacture of Beryllium by the Degussa process.

As both beryllium and chlorine are given off from the liquid charge during electrolysis, a fresh addition of the purified chloride must be made to adjust the composition of the charge in this second furnace to the original ratio of 50 per cent. $BeCl_2$ and 50 per cent. NaCl. Electrolysis is then restarted with this new charge.

The beryllium metal released during electrolysis occurs as flakes adhering to the sides and bottom of the first crucible, from which the liquid charge has been ladled. The flakes are scraped out and treated in a hand-operated colander press to remove the associated liquid chlorides. Output of beryllium metal from each furnace per day is given as 1.1 to 1.2 kg. As the total power supply to the furnace is about 12,000 kWh. per day, the metal yield represents a current efficiency of about 50 per cent., but the calculation takes no account of power used in the heating circuit. The consumption of chloride corresponding to the metal production is about 10 kg. Chlorine evolved during the electrolysis escapes through an uptake pipe and is discharged to waste.

The short run of electrolysis—24-hour periods—is caused by the rapid rise in the melting-point of the bath due to the reduction in the beryllium chloride content. After 24 hours' run the beryllium chloride content has fallen to about 45 per cent. and the melt begins to thicken. Impurities gradually accumulate in the bath, which has to be discarded after a period of 2 to 6 months, the exact time of discard being determined when the daily yield of metal falls below a certain minimum value. The rejected material is returned to an earlier stage in the process for the extraction of the beryllium.

After washing with cold water and nitric acid the beryllium metal flakes are redistilled, the final metal content being 98 to 99 per cent. The only available record showed the following analyses of the beryllium metal:

IMPURITY	PERCENTAGE
Insoluble in hydrochloric acid (mostly graphite)	0.1 to 0.3
Ferric oxide	0.1 to 0.4 (as Fe)
Aluminium oxide	0.2 to 0.8 (as Al)

Maximum production at the Frankfurt factory of the Degussa firm was 160 to 180 kg. of beryllium metal per month. According to the information the selling price of the metal was 350 RM. per kg. With ore at 150 RM. per ton, it was claimed that extraction could be carried out profitably, but it was maintained that increases in the ore prices in later years had rendered this price uneconomic. Based upon experience gained at the Frankfurt works, a new factory had been planned and partly equipped at Rheinfelden. Plant had been installed at this new factory up to the stage of purified beryllium chloride production. For a short time before May, 1945, all the stages of the extraction process up to the production of the beryllium chloride had been carried out at Rheinfelden, the chloride being then transferred to the Degussa works at Frankfurt for electrolysis.

Saccharin from Anthranilic Acid

Report on German Process

ANTHRANILIC acid (*o*-amino-benzoic acid) has been found to be a satisfactory starting material for the synthesis of saccharin (*o*-sulphobenzimide), according to a translated report from the German, PB 901, of the Office of the Publication Board, U.S. Department of Commerce.

The principal steps in the synthesis have been described in Ger. Pat. 130,119 and 122,567, issued to Ciba. The process involves the diazotisation of anthranilic acid to produce *o*-carboxymethyl benzene sulphinic acid, followed by the introduction of chlorine gas into an alkaline solution of the sulphinic acid to form the *o*-carboxymethyl benzene sulphochloride. This product is converted to saccharin by the addition of ammonia.

I.G. Farben researchers found that a high yield of the sulphinic acid was obtained when the diazotisation was carried out in aqueous sulphuric acid solution, with sulphur dioxide added in liquid form to the cooled diazotate. Pure copper powder was used to start the reaction instead of copper salts. Removal of the copper sludge by filtration from the slightly alkaline solution allows production of the sulphinic acid in an easily filterable form upon acidification with mineral acid. It was also observed that addition of chlorine gas to a slightly alkaline solution of the sulphinic acid converted it into the sulphochloride which precipitated quantitatively for removal by filtration. Addition of the *o*-carboxymethyl benzene sulphochloride to ammonia converted it to saccharin, which was isolated by acidification with hydrochloric acid. The yield was about 90 per cent. based on the sulphochloride.

Based on anthranilic acid, the yield was 58-60 per cent. In Germany it was stated that the cost price was as low as that of the Fahlberg process.

A distinguished United States chemist, Dr. R. Williams, the principal inventor of the "Principia" process used in the manufacture of vitamins, has recently arrived in Shanghai at the invitation of the Chinese National Health Administration. His main task will be the working out of a method of enriching rice to eradicate ber-beri.

Phosphating Metallic Surfaces

IV. Anti-Trust and Patent Litigation in the U.S.

by W. G. CASS

(*Continued from* THE CHEMICAL AGE, *July* 20, 1946, *p.* 70)

PHOSPHATING in the U.S.A. is chiefly associated with the Parker Rust-proof Co., of Michigan, and other firms under its control, including: the Rust-proofing & Metal Finishing Corporation, of Cambridge, Mass.; the Pyrene Manufacturing Co., of Newark, N.J.; the Parker Wolverine Co., of Detroit; the Western Rust-proof Co., of Chicago; and the Parker Rust-proof Co., of Cleveland. Before the war Parker also had numerous associated companies in Europe—some of which have been re-established—as well as the Pyrene Co., Ltd., in England (Metal Finishing Division).

Anti-Trust Suit

The report of the judgment given in the suit brought against the company by the U.S. Government under the anti-trust laws gives an interesting account of the rise and progress of its phosphating business; and a brief exposition of the application of these laws in the present case. They are mainly contained in the Sherman and Clayton Acts The report, which is given in full in the *U.S. Patents Quarterly* (1945, 65, 563), usually quoted as 65 USPQ, admits the thoroughly sound and fair business methods adopted by Parker, including its agreement with its former great rival, the American Chemical Paint Co., which was entered upon in good faith and without conscious attempt to establish an undesirable monopoly. However, after a thorough investigation the Court found the agreement illegal under the anti-trust laws, and it was ordered to be annulled.

It was alleged that Parker secured a monopoly of the so-called rust-proofing business by use of its patents, by joint action with its licensees, and by various agreements for buying up its most important competitors. The company made no secret of its policy in this direction and was fully convinced, on its interpretation of the anti-trust law and from previous cases in the courts, that there had been, either in intent or in actual fact, no violation of that law.

The company's rise from small beginnings to its present predominant position is here briefly outlined. Starting with a small shop for surface treatment of parts and accessories in the automobile industry, the company was organised in 1915 for promoting the use of chemical coatings applied to metal surfaces generally, especially iron and steel, to prevent or retard corrosion and to provide a suitable basis for paint or other finishes. The principal method used was that of phosphating. The first patents acquired by Parker were those of Richards (U.S.P. 1,069,903), and Coslett (U.S.P. 870,937; equivalent B.P. 8667/1906). This latter process proved very successful, and in 1925 Parker brought a suit against the Ford Motor Co. for infringement. After a lengthy and expensive trial the plaintiffs were awarded substantial damages.

Parker has always maintained a staff of chemists and engineers to improve its products and to provide skilled servicing. This was the more necessary since it has always been in competition with other forms of corrosion resistance, such as galvanising, sherardising, and plating, and with scientific organisations engaged in the search for better means to resist corrosion by metal surfacing, paint-bonding and so forth. A partial monopoly was certainly conferred by the American patent laws, but this was anything but complete or water-tight, especially having regard to the many other alternative methods of protection; moreover, some of the earlier patents have now expired and are free to all. There was need for constant vigilance and research to improve existing patents and provide material for new ones. This, combined with good salesmanship and servicing under a well-controlled licensing system, has accounted for much of the firm's success. It was thus that, before the expiry of the Richards and Coslett patents, Parker had improved processes, such as that of Tanner and Lodeesen, assigned to the company by these two employees under U.S.P. 1,911,726, in 1933. Among other things the time required for phosphating was, in this improved process, considerably reduced. Numerous other improvements have been patented since then in the U.S.A. and elsewhere.

No Restrictive Agreements

At the date of the trial most of Parker's business was carried on with very large corporations, and manufacturer customers accounted for 97 per cent. of the business. With the exception of the agreement with the Norge Division of the Borg Warner Corp., all these customers were treated alike, and there was no understanding or agreement to restrict purchase of other materials and methods from competitive sources.

The company also entered into agreements with non-manufacturers for jobbing purposes or treating with Parker processes the work of outside concerns, in some cases

with exclusive territorial rights, but as already indicated this accounted for only a very small part of the total business. There were also in these cases no restrictive agreements to limit competition. As business increased, prices were reduced, and there is no evidence that the firm ever earned excessive profits. The standard method of computing prices was quantity of material used. It made no difference to a licensee under a Parker patent whether it paid a fee on the basis of amount of work processed, or whether it bought the patented compositions from Parker at a price that included a royalty.

Relations with A.C.P.

In 1932 the American Chemical Paint Co., which had hitherto been engaged primarily in supplying materials for cleaning metal surfaces prior to painting or other finish, began to furnish also materials for phosphating, and at once came into conflict with Parker. There were frequent threats of suit for infringement, and, despite attempts to reach agreement by merger or otherwise, there was active competition between the two companies up to October, 1940.

Three years before that (in 1937) Parker had brought a suit against the Norge Division of the Borg Warner Corp.—one of the America Chemical Paint Co.'s customers or licensees—but A.C.P. was not a party to this suit. It was held that the A.C.P. process as carried out by Norge did not infringe the Parker patent No. 1,911,726 (38 USPQ 468: *see* Appendix "B"). An appeal was, however, taken to the Circuit Court of Appeals (*see* below). In May, 1937, A.C.P. brought a suit against Parker alleging this same patent invalid and not infringed by A.C.P.'s processes and materials. Parker filed a counter-claim alleging infringement, and was upheld by the Court. A.C.P. appealed and eventualy there was an agreement between the two companies under which A.C.P. could continue to supply and service some of its customers pending determination of the appeal.

In December, 1939, J. H. Gravell died. He was the original inventor, and president of the American Chemical Paint Co. and owner of nearly all its stock, and control of the company passed into the hands of several employees. In October, 1940, a further agreement was entered into with Parker while the two appeals were still pending. Under this agreement Parker was given exclusive license on all A.C.P.'s rust-proofing patents and applications for a period of ten years, for the sum of $750,000, payable in annual instalments, provided that the license might be extended for the life of the patents by payment of an additional $50,000 at the end of the ten years. Any further improvements or new inventions would be assigned to Parker, who, for their part, agreed to purchase from A.C.P. all materials on hand. The two suits pending on appeal terminated with a reversal of the judgment in respect to Norge and a confirmation of the judgment against A.C.P. Other pending infringement suits were dismissed, so that A.C.P. was permanently enjoined from carrying on the principal process it had been promoting. Its trade marks were included in the agreement.

This 1940 agreement was intended to eliminate A.C.P. as a competitor, even if Parker did not actually intend to restrain trade and stifle competition. As neither A.C.P. nor any of its employees would benefit in any way by new inventions or improvements, none was made nor likely to be made, since there was an obligation to turn them over to Parker without further recompense. Parker sought to justify this agreement on the ground that it was merely the purchase of patent rights, the settlement of litigation, and the purchase of a business. The use of the term "merely" appears a little inept in this connection, and the attempt to minimise the size or importance of a transaction is no argument in its favour. The view of the Court was that it could not be justified on these grounds and went beyond the achievement of the ends stated. Patent rights may be purchased like any other property, but the fact that patents are involved cannot, under American law, justify a contract which has the object or effect of restraining trade and eliminating competition. There is little doubt, the court judgment says, that one effect undoubtedly was substantially to reduce competition.

The Curtin-Howe Agreements

Another former competitor of Parkers was the Curtin-Howe Corp., organised in New York in 1927. At first the company was engaged solely in promoting the use of wood-preserving inventions developed by Dr. L. P. Curtin, a research chemist. In 1932 he assigned to the company a patent he had secured for a rust-proofing process, which they proceeded to develop, and at once came into conflict with Parker. Other patents and inventions followed. These were also opposed by Parker, who started interference proceedings in the U.S. Patent Office. The Curtin-Howe Corp. was not strong financially from the start, and in 1929 it had sold 51 per cent. of its stock to United Chemicals Inc., in order to secure additional capital. This latter company was not anxious to carry on the business, and endeavoured to sell its patents or grant exclusive licenses. None of these attempts was successful. The company continued to work at a loss—up to $100,000 by 1940.

Ultimately, in November, 1940, Parker bought all the C.H. patent rights in the rust-

proofing and priming fields for $225,000, and retained Dr. Curtin as consultant on a three-year contract. The Court held that the agreements with the Curtin-Howe Corp. were quite legitimate, and did not substantially reduce competition which, in fact, had hardly existed beforehand. There was thus little or no restraint of trade, within the meaning of the anti-trust laws. But it was held that the agreement with A.C.P. was quite different, and although the U.S. Government had failed to prove that it was entitled to any other relief, it was entitled to a judgment that the agreement between Parker and A.C.P. and the officers thereof was illegal. Parker was therefore enjoined from enforcing any of the rights secured under the agreement, including the patents included therein. Judgment was entered accordingly on May 28, 1945.

Despite the gentle and almost velvet-glove-like manner in which the judgment was delivered, it was a rather heavy blow to the Parker Rust-proof Co.; and this despite the fact that the Court felt constrained to include in its judgment a sort of apologia or defence of the American anti-trust laws, thus: These laws were not enacted for the purpose of forcing every type of business into a common mould, or for creating evils or burdens—such as undue interference with business enterprise—greater than those they sought to remedy. Each case must be considered on its merits, and only such contracts and obligations as would prejudice the public interest by unduly restricting the course of inter-State trade come within their scope. The general objectives of the patent laws and of the anti-trust laws are much the same. The former protect the inventor while working and developing his processes, and the anti-trust laws prevent the erection of artificial barriers to intelligent and energetic competition, the complete freedom of which is usually in the public interest.

Further, under American common law, the owner of a secret process is also protected. It would be contrary to the national sense of justice to induce an inventor to make a public disclosure and then deprive him of the benefits by unduly restricting his rights to make use of it. Therefore the anti-trust laws do not include contracts entered into in a legitimate exercise of patent rights which include the fixing of royalties and selling prices, the proportion of total output which a licensee may manufacture, use, or sell, area of territory, and so on; always provided that no condition is attached which would have the effect of enlarging the patentee's monopoly beyond that covered by the patent.

Results of the Judgment

The practical result of the above decision on the rust-proofing patent position is not too clear; but it would seem that the American Chemical Paint Co. has resumed independent activity in the patent field, and there have been several recent British applications (on a corresponding American basis). Two of these, for example, which reached the "open to public inspection" stage some time ago are: 13759/44, Treatment of metal surfaces and agents employed therefor; or more specifically, preparation of iron or aluminium or their alloy surfaces for paint by treatment in final rinsing solution which contains either phosphoric or chromic acid or both, together with a wetting agent. (It will be noted that this appears to be one of the many attempts to apply phosphating to aluminium and its alloys); and 22401/45, Protection of cupriferous surfaces.

Alleged Patent Infraction

In the case of Parker Rust-proof Co. *v.* the Borg Warner Co. (Norge Division), there was an alleged infringement of U.S.P. 1,911,726, Claims 2, 3, 4, assigned to the Parker Co. by Tanner & Lodeesen, 1933.

This is Parker's Spra-Bonderite patent for rustproofing by phosphating iron or steel articles, using baths of ferrous-, manganese-, or zinc-phosphate, or combination of these phosphates. The claims in question are process claims and relate more particularly to means for oxidising the hydrogen formed, *e.g.*, by addition to the bath of an alkaline nitrate, to expedite the process. It was alleged that defendants, by addition of sodium nitrite to a phosphating bath used for coating steel cabinets and refrigerators, were infringing. The defence was non infringement and non-validity. The Court did not pass judgment upon the matter as it was held that the case for infringement had not been sustained.

The essence of plaintiff's invention is the removal of hydrogen so that a gas blanket does not form on the surface of the metal and slow up the reaction. Almost any suitable oxidising agent can be used, and a large number has been named in the patent literature, but especially nitrates, nitrites, and sulphites.

Defendant's process on the other hand (the Borg Warner) consists in the use of a zinc phosphate coating solution prepared by diluting with water the chemical Granodine 30, made by dissolving 1½ lb. of zinc oxide in ½ gal. of 75 per cent. phosphoric acid plus ½ gal. water, in order to make the coating bath a 2 per cent. solution of Granodine 30. This dilute solution is placed in a 1600-gal. tank. High-pressure spraying apparatus is provided, bearing on both sides of the parts to be coated, together with suitable collecting channels, return pipes, etc. Time required is said to be one minute, acceleration being largely due to spraying under high pressure and addition of nitrite. Granodine 30 is continually fed

to the bath to maintain the zinc phosphate content and free phosphoric acid content at the desired values, as these constituents are of course constantly being used up. A solution of sodium nitrite known as "Toner" is also continuously fed at the rate of 2-2½ gal. per hour.

Mechanical Action of Spray

It was urged by defendant that the sole function of the nitrite is to maintain the solution at its original strength so that the process can be continuous and accelerated; and that the purpose of the "Toner" is to prevent injurious accumulation of ferrous phosphate which would interfere with the coating process. Spraying is done under pressure at the rate of about 1760 ft. per min., so that a large volume of solution at full strength is projected within a minute against the entire surface of the article treated. As fast as the solution contacts the surface, it is blasted away by the incoming fresh solution. The speed of the process is therefore largely or mainly due to the mechanical action of the spray, and the oxidation of hydrogen plays little or no part in accelerating.

It is undisputed that sodium nitrite is an oxidiser of ferrous phosphate into ferric (insoluble), which is precipitated as sludge. It is also undisputed that evolution of hydrogen is a necessary incident of the coating process. It was found experimentally that the addition of sodium nitrate to the baths failed to preserve defendant's solution at full strength; but by introducing sodium nitrite the desired results were obtained. It must be concluded therefore that the conversion of ferrous into ferric phosphate and not oxidation of hydrogen is the principal reason for defendant's successful working.

The difficulty with plaintiff's position, continued the Court, is that they claim the specific method of expediting operations by oxidising the hydrogen as formed. The record is convincing, however, that hydrogen oxidation plays no substantial part in the speed of working of defendant's forcible spray process.

The spray process was well known in the prior art, but when Parker first placed on the market phosphating solutions containing nitrate in 1931 it was for the dip or immersion method. It was then known as Bonderite B, and as thus used the time required for five minutes. Previously the quickest time had been ten minutes, using the ordinary Bonderite A preparation, which contained no nitrate. Somewhat later a Bonderite X preparation was introduced, requiring a time of two minutes. It was not until 1935 that plaintiffs first introduced their improved direct spray method known as Spra-Bonderite, by which the process time is said to be reduced to one minute. The degree to which acceleration was due to change from immersion to spray does not appear, but it is highly probable that it was very substantial.

While it may be true that the nitrite used by defendant does in some degree oxidise the hydrogen, there is no evidence that it serves to remove a hydrogen blanket or reduce a visible bubbling action. The evolution of hydrogen in the solution with and without nitrite was easily observable in the court exhibits. Such an observation is impossible in the spraying process, and it may well be doubted whether a hydrogen blanket is possible at all in the forcible spray process. In any case, plaintiff has not established that the acceleration obtained by defendant in his spray process is due to oxidation of hydrogen by addition of sodium nitrite.

The need for maintenance of a proper balance in coating solutions has long been recognised. When a zinc phosphate solution is used it will be thrown out of balance by formation of ferrous phosphate which must be continuously removed if the bath is to operate efficiently. This was an old and well-known practice. The court concluded that there was nothing in plaintiffs' patent in suit to prevent defendants from applying this old-established principle in their spray process. No infringement being found, the bill of complaint was dismissed. (U.S.P.Q., *38*, 468). This judgment was reversed on appeal.

Quinine in the East Indies

Java Plantations Undamaged

ACCORDING to reliable information which has recently reached Holland, the cinchona plantations of Java and Sumatra have, exceptionally, escaped any serious war damage and it is expected that the pre-war rate of production of natural quinine from this source will be reached as soon as the present political issue is settled. During the war the Japanese set up two new quinine factories (at Soekaboemi and Garoet), thus greatly increasing the manufacturing capacity of the Indes, which was formerly centred in the Dutch-owned plant at Bandoeng. The estates supplied some 100,000 kg. of quinine sulphate content to the manufacturers during 1942-45, approximating to two years' "standard production" of the pre-war cartel. The new plants and installations were found nearly intact when the Japanese left the country, but exact information is still lacking on what has happened since under Indonesian rule. The Bandoeng factory, which is in the British-occupied zone, still possesses bark supplies amounting to nearly one-third of the whole pre-war world consumption of some 700,000 kg.

Industrial Electronics

Visit to B.T.-H. Rugby Works

TO aid in demonstrating the manifold applications of electronic apparatus in industry, The British Thomson-Houston Co., Ltd., invited the technical Press to a symposium and an exhibition on industrial electronics, held at their Rugby works. The symposium was ably organised by the company's Electronics Engineering Department, whose activities include the development of radar navigational aids for merchant ships, and electronics engineering associated with research into nuclear physics.

This field is now considered as of importance to all industries, and after the wartime interruption in industrial research work, which necessitated the transfer of the engineering personnel to tasks directly connected with the war, the company intends to proceed with developing its industrial electronics activities on a substantial scale. The progress achieved during the last six years in the development of valves for factory use has made it possible for the company to state that "electronics can now perform functions impossible by other means": it is particularly suited where high speed of operation, precision of control, and the ability to operate for long periods, are essential. Although allowance has to be made for the inevitable progress in alternative methods, there is reason for optimism about the future of electronics in industry.

To mention some of the main applications of B.T.-H. electronics equipment, a wide field exists for the control of motors and generators, while the electronic control of resistance welding has already been established as a specialised line of the company. It has proved valuable during the war for the welding of aluminium alloy parts for aircraft, and several millions of standard gallon petrol cans were seam- and spot-welded by B.T.-H. electronic controls. This method has enabled certain metals and alloys, hitherto considered incapable of being welded, to be welded with ease; moreover, it has permitted the welding of mild steels at considerably increased speeds, thus reducing manufacturing costs and accelerating production. At the same time, it has made possible the reproduction of welds of the highest quality, under normal factory conditions, by removing one of the chief sources of bad welds, *viz.*, variations in the length of the welding time.

Induction heating by high-frequency

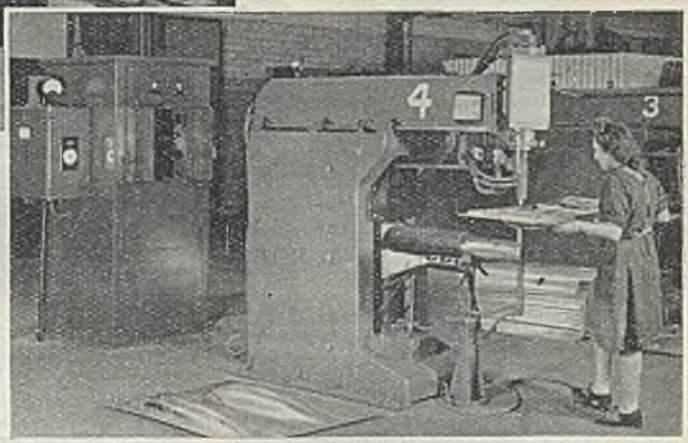


Fig. 1 (above). A corner of the B.T.-H. exhibition, showing samples of welded work produced by spot-welding with the aid of electronic control; also a typical spot-welding machine.

Fig. 2 (below). Spot-welding machine (390 kVA) engaged in welding aircraft parts in aluminium alloy. The Ignitron "Programme" control panel, which enables the value of the welding current to be maintained substantially constant, is seen on the left.

power produced by valve oscillators has been known for many years. However, more recently it has been adopted for the heating of larger masses of metal, covering such applications as surface hardening of gears, small shafts, etc., and through heating for annealing and brazing processes. Another field of application is the melting of special alloys, where highly accurate temperature control and strict cleanliness are desired. In the through heating of billets, preparatory to rolling, forging, or upsetting operations, the advantages of electronic control are obvious.

Dielectric heating, necessarily confined to non-metals, shows great promise for the pre-heating of moulding compounds. A valuable application is in the pre-heating of resin bonded moulding powder in loose or pellet form, while another well-established use is in the bonding of veneers to make plywood, or in making joints in furniture, using a thermosetting glue. Dielectric heating is also suitable for the removal of moisture in many industrial processes. An advantage, when removing moisture, is that the electrodes need not be in contact with the material, so that air may be blown over the work to remove steam, thus preventing flashover due to condensation. Finally, it can be made use of in the welding of thermoplastics, since spot or seam welds can readily be made in thermoplastic tubes and sheets.

In the Chemical Industry

The use of valves in the chemical industry has hitherto been very limited, and it appears that the manufacturers have not received any specific inquiries for the adaptation of their equipment to the needs of chemical plant, although it is averred that there is ample scope in an industry where accuracy, speed, and cleanliness are paramount. In the company's chemical research laboratories, development work is in progress on the use of silicones for insulators and it is hoped to produce silicone lubricating oils as a by-product. Work is constantly being carried out on the fluorescent coating of lamps, to give daylight or colour effects, while the production of layers for cathodes is yet another field of chemical activity which can be undertaken at the Rugby works.

Share in Britain's Recovery

In Britain's progress towards economic recovery, electronic control can play a large part; it can provide more accurate control, thereby eliminating the human element, and probably reducing rejects. Electronic instruments and relays provide the most promising method of eliminating inspection of finished or partly finished products. When, over ten years ago, B.T.-H. installed one of its earlier instruments in a certain company, labour troubles arose, because the workers saw that human control was being eliminated. Under the present conditions of labour shortage, and in view of the necessity of making the best use of the existing man-power, the position is somewhat different. The general acceptance of electronic control by industrial users is much more advanced in the U.S.A. than in this country, although both countries have approximately the same technical knowledge in this field. If British industry is to regain its position when to-day's sellers' market has given way to highly competitive conditions, it will be absolutely essential to supplement the range of standard articles by highly specialised goods, and in the manufacture of both, electronic control should play an increasing part.

Chemical Exports

Decline in Figures for June

AS had been forecast, there was a fall in exports from the U.K. during June. The total value of exports, according to the Board of Trade monthly accounts, issued this week, was £65,000,000, which is just over £20,000,000 less than for May.

June had four fewer working days than May, including the V-day and Whitsun holidays, with consequent dislocation of production and transport, which clearly must have extended longer than the actual holiday period. As a result, the continuous rise in the rate of export since the beginning of the year was interrupted. Present indications are, however, that the export figure for July may well exceed the very good one for May.

Exports of chemicals, drugs, dyes and colours during June were valued at £4,439,576, which is £1,717,339 lower than the figure for May, but £1,283,932 higher than the figure for June, 1945, and £2,682,927 higher than the monthly average for 1938. The list of customers is again headed by British India, with purchases valued at £523,395, followed by Australia (258,088), and Sweden (£198,121). The total value of exports for the six months ended June 30 is given as £31,695,027, which is £15,251,235 higher than the figure for the like period last year.

Imports of chemicals, drugs, dyes and colours during June also showed a decline. The total value is given as £1,405,428, which is £423,062 less than the figure for May, and £474,376 less than the figure for June last year, but £271,037 higher than the monthly average for 1938. The U.S.A. was the largest supplier again, with goods valued at £282,756; Spain was second (£209,184); and the Argentine Republic third (£183,480). For the six months ended June 30, the total value of imports was £8,725,230, which is £2,729,667 less than for the corresponding period last year.

South African Chemical Notes

Review of Most Recent Developments

(from Our Cape Town Correspondent)

THE building controller in Johannesburg stated recently that the general situation in regard to cement was likely to become worse during the winter months, since the railways will be strained to the utmost in transporting increased coal requirements. The closing of a kiln in an Orange Free State factory, because of the water shortage there, also affected the supply, but the kiln had now been reopened, the recent rains having refilled the factory's dams. The unprecedented demand for cement in the building industry depleted the Union's existing stocks, and caused unavoidable delay in the building programme. Every effort was being made, however, to ensure a regular supply for the national housing scheme. Two large Transvaal factories are installing additional plant, and a new factory is being planned for the Lichtenburg district; but, until the railways are able to expand their rolling stock, there is little chance of the shortage of cement in South Africa being eased.

The curve of imports from Britain to South Africa is rising steadily and steeply. A trade expert in Cape Town, analysing the latest figures, said that, although perhaps in some ways Britain's export drive was not spectacular on the surface, what had been achieved was truly astonishing and augured well for the future. Chemicals, drugs, dyes and colours are arriving in South Africa from Britain in larger quantities than ever. The values of these goods imported per month in 1938 was £147,064, and in March this year they aggregated £406,650.

Imported cosmetics are now easier to buy in South Africa, but in this aspect of trade women say they are not being offered as many shades of make-up and as many varieties of scent as in pre-war days. In artists' materials there is still a famine, likewise in many types of imported paint, apparently owing to a lack of containers.

Linseed Oil Problem

There is danger of the South African paint industry being brought to a standstill by lack of linseed oil. Unless the Government succeeds in persuading the Joint Food Council in London and Washington to allocate supplies from South America, the industry will receive no more. This is the result of the stoppage by the Indian Government of all linseed oil exports to South Africa. It is believed that this action is due to shortages in India. Stocks of linseed oil in the possession of paint manufacturers, it is estimated, will carry them over the next few months, but if arrangements are not made to import from South America, the industry will be hard hit. By the end of the year it will be difficult to obtain supplies of paint for houses now being built.

Plant for the recently-established Capital Match Corporation, Ltd., is expected to reach the Union before the end of the year, and production should begin within three months after it arrives, said the chairman of the company at the recent statutory meeting. He said the company's initial output would represent about 12 per cent. of the matches consumed in the Union. A " quality match second to none " was aimed at.

True South African Venture

It was intended to get supplies from South African cardboard factories, and to use locally-made paper and so far as possible chemicals made in the Union. " There are no shareholders from foreign countries, and so it can truly be said that this is a true South African venture, and that all the benefits to be derived from the activities of the company will be for its South African shareholders," said the chairman. Requests from African territories indicated that there would be no difficulty in disposing of the company's products outside the borders of South Africa if they decided to enter the export market.

Recent improvements in production methods have enabled African Oxygen and Acetylene, Ltd., Victoria Road, Salt River, Cape, to reduce the standard price of dissolved acetylene. Since 1927 the company has reduced the price of dissolved acetylene by nearly 35 per cent. and that of oxygen by 60 per cent.

Pyrotechnic Industries of South Africa, Ltd., P.O. Box 322, Johannesburg, are a newly-established company which will manufacture fireworks—the first firm in South Africa to make them. The company is a division of Union Explosives and Engineering Co. (Pty.), Ltd., Elandsfontein, Transvaal. Overseas experts in pyrotechnics are in charge of the company's production. The range will include most of the familiar items.

Kemikon (Pty.), Ltd., 11 High Street, Fordsburg, Johannesburg, are manufacturing tyre paint in black and white, packed in one-pint containers.

First-rate South African writing inks hold the bulk of the local business, although a number of imported writing fluids—mostly advertised for use with fountain pens produced by their respective makers—have a regular sale. Mucilages appear at long last to have passed the experimental stage,

and the prejudice against the locally-made article, which existed for several years, seems now to have gone.

After visiting most of the food factories in South Africa under the auspices of the British Ministry of Food, Mr. B. A. MacDonald, a representative of Balfour, Williamson & Co., Ltd., London, who have considerable interests in the canned food industries in the United States and Canada, considers that factories in the Union compare favourably with the leading factories in California, Florida, and Canada. Mr. MacDonald said that South African factories were equipped with the most modern machinery, and that the quality of locally made jams, canned fruit, and canned vegetables was uniformly high.

A director of a local graphite company returned to South Africa recently from a visit to the United States. He said he had arranged for large shipments on a regular basis, American industrialists being impressed by the quality of South African graphite. At present the company was exporting to Australia, the Argentine, Egypt, Palestine, and Turkey. The company planned to expand in the near future, and had acquired four acres of land at Krugersdorp for a new factory.

Paints and varnishes are to be manufactured in the Union by African Explosives and Chemical Industries, Ltd., an associated company of I.C.I. It has also been announced that the local company would undertake the manufacture of cyanide, leather cloth, and probably chemicals, "in accordance with the policy of developing secondary industries in the Union."

It was recently moved in the House of Assembly that the Government should consider the establishment of an indigenous oil industry. It was pointed out that the Union's coal reserves are estimated at 250,000,000,000 tons, which, at the present rate of consumption, will last 20,000 years. Apart from the problem of coking coal, therefore, the necessity for conserving fuel supplies does not arise. The point is, rather, how to derive maximum advantage from natural resources with which few parts of the world have been so generously endowed. It cannot be said that hitherto this vast potential asset has been accorded the attention it deserves. Coal as a source of steam and electric power has made possible the mining and industrial expansion of the Union. Its by-products are already playing an important part in the economic structure, but the potentialities for their further exploitation remain enormous. In particular, one enormous field is still untapped, namely, the oil reserves contained in the country's vast deposits.

Industrial Spectroscopy

The 1946 Conference

(from Our Analytical Correspondent)

IT is some years since Twyman[1] made his plea for the formation of a Spectrochemical Society or a section of one of the existing societies dealing with industrial spectroscopy. This plea was supported in these columns at the time.[2] Developments along these lines were naturally retarded by the war, but the need for some such body was frequently underlined by the rapid strides made, immediately before and during the war, in spectroscopic fields of analysis. It was therefore with interest that we learned, early in this year, of the formation of the Industrial Spectroscopy Group of the Institute of Physics, with Mr. Twyman as its first chairman. At the recently held first conference of the Group, on Recent Developments in Industrial Emission and Absorption Spectroscopy, a wide range of topics was discussed.

The first session of the conference concerned itself with infra-red absorption spectroscopy. H. W. Thompson, introducing the topic by his address on the Use of Infra-Red Spectroscopy in Analysis, dealt in turn with the origin of infra-red spectra, their nature, and, finally, their use in analysis. Both qualitative and quantitative applications were considered, and many problems which could only or best be solved by using these methods were rapidly surveyed. Where such mixtures as the cresols or the xylenols are concerned, infra-red investigation is invaluable. In one instance, for example, where the speaker was set an "examination" by a doubting inquirer, he was able to state that the unknown delivered to him only contained 90 per cent of the substances which he was asked to determine. It transpired that 10 per cent. of inert material had been added, just to see what would be reported. Fortunately, the speaker said, they had decided not to "cook" their results!

The second paper of this session was a detailed description, by G. F. Lothian, of Equipment for Infra-Red Absorption Spectroscopy. Instruments for producing and recording spectra with varying degrees of resolution were described in some detail. A useful comparison of American apparatus and the corresponding instruments available

[1] THE CHEMICAL AGE, 1940, *43*, 48.
[2] MASTERS, THE CHEMICAL AGE, 1941, *44*, 231.

in this country was made. In the discussion which followed, new optical materials perfected by Germany during the war were described, among other topics.

Emission Spectrography

The second session of the conference was devoted to emission work, and was introduced by a paper by A. S. Nickelson and F. W. J. Garton on Modern Equipment for Spectrographic Analysis. Qualitative analysis by emission methods is now, it was explained, a simple matter, and the method is common, so that no detailed discussion of it was offered. Quantitative analysis as applied to the determination of trace elements or minor constituents is also well established, and using the ordinary apparatus may be expected to show an accuracy equivalent to that of ordinary chemical analysis when applied to comparable amounts. However, quantitative analysis for major constituents is a different matter, and it is primarily with the apparatus which enables this to be undertaken that the paper was concerned.

In the first place, samples must necessarily be homogeneous, and it is essential that samples chosen for repeat operations should be identical. As source, the direct current arc was the first to be developed, and where sensitivity is the prime consideration it is probably still the best. However, its very nature, gives rise to inaccuracies, particularly with regard to reproducibility for quantitative work. Consequently for such determinations the a.c. condensed spark found increasing application. It has high reproducibility and can be used for materials with low melting-points. On the other hand, its sensitivity is relatively low.

More recently there have been introduced the high-voltage alternating current arc and the low-voltage interrupted alternating current arc. The latter gives high reproducibility, but probably has not, up to the present, been used with a sufficiently high current density, a maximum of 4 to 5 amps. being most used.

Finally, there is the so-called multi-source unit, which gives discharges capable of continuous variation from arc-like to spark-like, according to the demands of the analysis.

The spectrograph employed may either be quartz or grating. The medium quartz instrument is suitable for non-ferrous metals, the large quartz instrument being demanded for the more complex spectra of transition elements. Even this does not, on occasion, give sufficient dispersion, particularly if the visible region is required, and in such cases recourse must be had to the grating instrument, which may give as much as three times the dispersion in the visible region with the first order spectrum. Of grating instruments the most usual are those employing the Rowland mounting, which requires rather a lot of space, or the Eagle mounting, which replaces the prism in a large quartz spectrograph of the Littrow type by a grating. Such spectrographs, in their turn, raise new optical difficulties.

For recording the spectra one may employ either photographic or photometric, *i.e.*, direct-reading methods. In photographic work it is probable that films give better results than plates, since, so far, emulsions specially designed for spectrographic work have not been made available. Direct photometric measurement, recently coming to the fore in America, should receive more attention in this country than it has done, since it is capable of being carried out with a *lower* personal factor than photographic recording.

Identification of Spectrum

Finally, if the spectrum has been recorded photographically, it must be identified, and the appropriate lines measured for density photometrically. For identification, the Judd-Lewis Comparator is still the best available instrument. Photometry of the lines after identification must be carried out with considerable care, since it may give rise to serious errors if not properly handled.

The second paper of this session, by A. Walsh, dealt with Light Sources for the Spectrographic Analysis of Metals and Alloys. The d.c. arc and the logical development of other circuits from this were discussed, the simple condensed spark being first described, and then the other circuits which had been considered in the previous paper. It was clear from the paper that much further work is necessary before the exact factors controlling the nature of a discharge and its reproducibility are fully known and understood. Investigation of discharges, both by high-speed photography and by the oscillograph, has given valuable information in this direction.

The final paper of this session, by H. T. Shirley, presented a Statistical Examination of Sources of Error in the Spectrographic Analysis of Low-Alloy Steel.

In the discussion arising out of these papers, several speakers gave further contributions, from their own experience, on the apparatus and methods described.

If one were to voice any criticism of this excellent conference, it would be the impression that was given that no work was being done in the field of absorption spectroscopy in the ultra-violet. It is quite probable that this impression was completely unintentional, but it nevertheless existed. There is always a tendency for new methods to overshadow the older, but still very useful ones. It is to be hoped that the rapid rise to popularity of infra-red work will not conceal the fact that important work can also be done in other regions.

Chemical Engineering

Need for More Men in the Profession

THERE is a very marked expansion at the present time of those industries which are mainly concerned with some chemical process for their development. So great is the demand for chemical engineers that the Institution of Chemical Engineers, in conjunction with the Institute of Petroleum, the Association of British Chemical Manufacturers, and the British Chemical Plant Manufacturers' Association, recently addressed a memorandum to the Government, calling attention to this remarkable development and at the same time emphasising the very great shortage of trained chemical engineers in this country compared, for example, with America. The number of students studying in a year for a degree in chemical engineering is at present about 40 in Britain, compared with 5000 in the United States.

Proposed Courses

The Government, having taken full information on the subject, has responded to this approach, and is proposing to establish courses in chemical engineering for those who already have a chemistry, physics, or engineering degree. This has been decided as a short-term policy in order to train chemical engineers to meet the demand, which, at present, is more apparent on the plant manufacturing side, as many proposed improvements and developments had to be postponed until after the war. While, therefore, there is a special demand for men to design and erect such equipment, there are also big requirements for chemical engineers in the industries using plant. The value of well qualified chemical engineers is now fully recognised in industry, and in many companies the highest executive posts are open to people of the right calibre.

There are, first, the chemical industries making materials such as sulphuric acid, washing soda, bleaching powder, all of which are used in ever-increasing quantities. Compounds such as these are often used to indicate the state of the chemical industry as a whole owing to the widespread demand for them for intermediate stages in manufacture. In the petroleum industry, for example, there are developments in the chemical treatment of petroleum compounds to give high-octane fuels for aviation, synthetic rubber and a whole range of solvents for lacquers, etc. In the field of atomic energy, the problems involved in the separation of the active constituents from the ores, and the separation of these into isotopes under remote control, require chemical engineering of a high order. On the pharmaceutical side, modern drugs such as the sulphonamides, the substitutes for quinine, and materials such as penicillin, call for entirely new techniques for their manufacture.

The modern developments in textiles are in the direction of artificial fibres which seem destined to be the basis of cloths likely to be superior to many of those produced from natural fibres. The chemical processes and plant and machinery required to produce such a substance as nylon are so intricate as to involve a considerable knowledge of organic chemistry to understand what is happening in the plant. If a chemical engineer does not realise what he is making, it is very difficult, if not impossible, to suggest improvements leading to better yields and more economic operation. The plastic industry is ever expanding. New materials, such as the polyvinyl chlorides, are still being discovered and developed. Considerable skill is required to ensure production to a constant specification. On the agricultural side, there is an ever-increasing demand for all types of fertiliser. The equipment needed to convert the nitrogen from the air and hydrogen from steam into ammonia for fertilisers calls for very high pressures and a detailed knowledge of strength of materials and their resistance to corrosion.

Other Openings

The present low output of coal makes it essential that heat and fuel should not be wasted. The chemical engineer is trained to use fuel economically and to be able to rectify avoidable heat losses. The gas industry is being reorganised on a national basis and the tendency now is to regard coal as much as a raw material for chemical industry as a fuel. In the oils and fats industry new developments are taking place in the improvement of margarine. Continuous methods for the manufacture of soap call for very ingenious methods of plant control, design and operation, and give possibilities of separation of fatty acids for use for other purposes and for selection according to the particular qualities of the soap required. Other industries, such as glass, ceramics, building materials, metal, explosives, dyestuffs, paint, rubber, leather, glue, starch, sugar, fermentation, photography, and essential oils (to mention only some) all require more chemical engineers and chemical plant.

Whereas it has formerly been customary to train candidates for a specific industry, it has now been found that a more fundamental training is possible, so that the graduate is equally fitted for any of the chemical industries mentioned. This is achieved partly by the concept of unit

operations, such as filtration, evaporation, drying, absorption, leaching, etc., because it is found that all these operations enter in some form or another into the process industries and that the principles underlying them are therefore equally applicable to all those industries with slight modifications to suit local conditions.

The details of the degree course have been set forth by the Institution of Chemical Engineers in a brochure entitled: Scheme for a Degree Course in Chemical Engineering. The fourth year of this degree course corresponds roughly to the post-graduate courses now being organised. The exact training which the students receive will depend to some extent, of course, on their previous knowledge and will be designed to enable them to approach the chemical engineering course proper with sufficient background in the general principles of chemistry and mechanical and electrical engineering.

The prospects for chemical engineers are equal to those in any of the highest-paid professions, both as to interests and remuneration. Starting salaries for qualified chemical engineers are good. On the purely technical side many openings lead to four-figure incomes, while for those who show administrative ability the prospects are no less excellent. In both cases there are eventual possibilities of seats on the board of important plant and manufacturing companies. Readers who are interested and would like to have further information are invited to write to the Ministry of Labour and National Service, Technical and Scientific Register, York House, Kingsway, London, W.C.2, and ask for Leaflet P.L. 126.

A CHEMIST'S BOOKSHELF

AQUEOUS SOLUTION AND THE PHASE DIAGRAM. By F. F. Purdon and V. W. Slater. London: Edward Arnold. Pp. 167. 24s.

It is doubtful whether this book will have the whole-hearted approval of theoretical chemists, but we have no doubt of its welcome from the practical chemist and chemical engineer. It contains the minimum of theory and the maximum of practice. Its minimum of theory is indeed so small that if it were not for one short chapter at the end, which summarises the theoretical explanation of the phase rule, it might be said to contain no theory in the sense that that much misused term is generally applied. The book deals with phase diagrams and their application to aqueous solutions. It is intended to serve as an introduction to the use of phase diagrams and ultimately as a laboratory manual, or desk companion, for those workers who wish to apply this method for the solution of problems of heterogenous equilibria.

The authors believe that if it were more generally realised that the phase diagram could be used to solve practical problems without much advanced knowledge of the theory of the phase rule, the use of the phase rule would be very much more general and the chemical industry would benefit accordingly. This book, therefore, concentrates upon the practical construction and interpretation of diagrams from the point of view of elementary geometry and arithmetic. It is an eminently practical book and we predict that since its explanations are simple and understandable, it will prove of immense value both to chemists and chemical engineers, who are finding that the specialised knowledge required of them is beginning to be greater than the capacity of the human brain. The general terms are explained and illustrated by a simple 2-component diagram such as the system ammonium sulphate—water, or, the more complex 2-component system, sodium iodide-water. The practical applications of this simple type of diagram to crystallisation, the purification of crystals, the desiccation of crystals and other common operations is described, thereby illustrating how the diagram can be used without requiring anything more than a knowledge of the terms employed. An explanation of the use of triple co-ordinates is followed by the interpretation of three-component diagrams, and a further chapter dealing with the practical application of these diagrams. At this stage, the authors digress for a chapter to consider how solubility is determined for building up the phase diagrams. They then plunge into the more complicated diagrams of systems possessing more than one component; a chapter on the reciprocal salt pair, for example, in which the points must be represented on a pyramid, is explained by examining the system: Na_2SO_4-NaCl-KCl-H_2O. The salt pair diagram is then applied to evaporation to show how it is used in practice. A difficult chapter, which the reader is implored in the preface not to "skip," is on Jänecke's projection, which assumes that a shadow is cast from a point of light situated at the apex of the pyramid, the eye being placed at the apex and thus viewing the figure from a distance; a long chapter is devoted to practical examples of projections using this method. Finally, the authors discuss the five-component system of four salts and water, and (as previously stated) end with a brief account of the theory of the Gibbs Phase Rule.

As a practical working manual of the use and application of the phase rule, this is one of the best books we have encountered. It can be recommended to all those who wish to use one of the most important tools that physical chemistry has given us.

LETTERS TO THE EDITOR

A Tribute from U.S.A.

SIR,—Your editorial, "A Type of Research We Haven't Got," appearing in the May 18, 1946, edition of THE CHEMICAL AGE, has been called to my attention because it describes Battelle Institute and points out how it and other similar institutions might well be copied in England.

I am pleased indeed by your editorial, not only because Battelle Institute is mentioned as a pattern for a research organisation, but also because of your excellent plea for a system of scientific research outside of political control.

Congratulating you on this well-written editorial, I am.—Faithfully yours,

CLYDE WILLIAMS,
Director.

Battelle Memorial Institute,
Columbus, Ohio.
July 3, 1946.

Superphosphate Manufacture

SIR,—May I direct your attention to an error which arose in my article on "Superphosphate Manufacture," published in your issue of June 22. The last lines of the first paragraph should read: "the calcium sulphate was present as anhydrite, $CaSO_4$."

It will be recalled that in 1926, believing that the calcium sulphate in superphosphate is present as gypsum, $CaSO_4.2H_2O$, I endeavoured to remove the water of crystallisation, in the hope of obtaining a product of higher phosphoric acid content. I then found, probably for the first time, and contrary to general belief, that the calcium sulphate was present as anhydrite, $CaSO_4$.

In manufacturing phosphoric acid it is possible to produce any of the three crystal forms of calcium sulphate, namely, $CaSO_4.2H_2O$; $CaSO_4.\frac{1}{2}H_2O$; or $CaSO_4$. But the last form only can be obtained when manufacturing calcium superphosphate.—Yours faithfully,

SVEN NORDENGREN

Landskrona, Sweden, July 22, 1946.

FRENCH IMPORT CHANGE

Modifications in their arrangements for importing goods into France were recently announced by the French authorities in the *Moniteur Officiel du Commerce et de l'Industrie*. Imports are in future to be obtained through three different channels, namely (a) the French Purchasing Mission buying on Government account; (b) import groups; and (c) private traders importing under licence. Detailed lists of the chemicals to be obtained through these media are given in the *Board of Trade Journal* for July 20.

Inert Spindle-Oil

Prevention of Spinners' Cancer

A PAPER of great importance to the cotton industry has been published by the Manchester Oil Refinery, Ltd., Adelaide House, London, E.C.4, and Trafford Park, Manchester. It deals with mule spinners' cancer and has been distributed to all executives in the Lancashire cotton industry. It urges the use of non-carcinogenic, non-dermatitic spindle-oils, a supply of these, with high lubricating and stainless qualities, being now available.

In the latest available annual report of the Chief Inspector of Factories (for 1944), details of which were published in THE CHEMICAL AGE on December 8 last (1945, 52, 533), a marked increase in the incidence of epitheliomatous ulceration was recorded—205 cases, of which 20 were fatal, as against the 1943 figure of 160, with 15 fatal. Of the 20 fatal cases, 17 were attributable to mineral oil, all of them being among cotton operatives. The vital importance of the development and use of a non-carcinogenic spindle-oil thus becomes obvious.

Improved Lubrication Properties

As long ago as 1937, the booklet explains, C. C. and M. J. Twort had proved that oils of vegetable and animal origin, and colourless mineral oils, produced up to certain standards by special chemical processes, were free from carcinogenic constituents. Previously, one of the main difficulties in applying normal colourless mineral oils to mule spinning was their inadequate lubricating power. However, the recommendation of the Tworts was eventually taken up by the Manchester Oil Refinery, Ltd., and the company produced "Puremor" spindle-oil and other white oils of non-carcinogenic quality, which incorporated the work of lubrication technologists and provided an oil that was not only safe and biologically inert, but had improved lubrication properties showing a drop in "bolster" temperature of up to 70°F. over old-type mineral oils.

Although the cost of these oils is higher per gallon than the old types, the fitting of anti-splash devices, resulting in a considerable saving in lubricant consumption, renders the final cost per gallon actually lower. For anti-splash devices it is claimed that it is necessary to lubricate the spindles as little as once a week, or even once a fortnight, against the usual twice daily oiling with normal-type spindle-oils. Even if the cost had been higher, it is felt that such a factor should not be taken into consideration when the possibility of eliminating mule spinners' cancer is envisaged.

The Distillers Company

Chairman's Address at the Annual Meeting

THE 69th annual general meeting of the Distillers Company, Ltd., was held in the North British Station Hotel, Edinburgh, on July 19, when the chairman, Lord Forteviot, O.B.E., M.C., D.L., presided. The following is an excerpt from his address to stockholders:

The consolidated profit and loss account discloses that the total profit earned by the group, after charge for excess profits and overseas taxation, amounted to £6,914,330 and, adding the other revenue and miscellaneous receipts, the total is £7,781,312. After making full allowance for income tax, adding to superannuation and sundry reserves in the books of subsidiary companies, and providing for dividends to outside shareholders, there remains £2,574,760 as the sum available to the company, compared with £2,173,718 for the previous year. The amount applicable to the Distillers Company, Ltd., but retained by the subsidiary companies is £103,920, as compared with £187,262. The board has applied to general reserve £650,000 (making it £4,650,000), leaving available with the amount brought forward, and after deducting directors' fees and interim dividends, the sum of £1,867,586 as against last year's figure of £1,621,842.

It is proposed to pay a final dividend on the ordinary stock of 12½ per cent. less income tax (making 20 per cent. less income tax for the year) and a special dividend on ordinary stock of 2½ per cent. less income tax, thus leaving to be carried forward £591,654 as against £555,815 brought in.

The Balance Sheet

Turning now to the legal balance sheet, I have to make reference to the following matters of interest:—

(1) The capital reserve has risen during the year by £487,611 to £828,812. This has been caused first, by the liquidaation of a subsidiary company with the release of its reserves, and secondly, by the realisation of certain investments at a profit.

(2) The market value of the company's quoted investments is substantially in excess of the book value, as is shown by the notes on the face of the balance sheet. The unquoted securities are at values that are considered by the board to be satisfactory.

(3) During the year the company purchased for cash a holding of 60 per cent. of the issued share capital of Thos. Borthwick (Glasgow), Ltd., grain merchants, etc., Glasgow. This has enabled the company to centralise the purchase of cereals and the sale of by-products. Under the agreement preferential consideration is to be given for a reasonable period to those grain merchants from whom substantial purchases of cereals were made before the outbreak of war.

(4) Stockholders will remember they were informed that with the view to extending its plastics manufactures, the company, in conjunction with the B. F. Goodrich Chemical Co., of Cleveland, Ohio, had promoted a private company, incorporated in England, under the title of British Geon, Ltd., with a capital of £500,000, consisting of 225,000 5 per cent. preference shares and 275,000 ordinary shares, all of £1 each. The company's holding is 55 per cent. of each class of share. The primary object of the new company is the manufacture of polyvinyl chloride and co-polymers. The chairman of British Geon, Ltd., is Sir Walrond Sinclair, K.B.E., chairman of British Tyre & Rubber Co., Ltd., and of United Glass Bottle Manufacturers, Ltd.

(5) As it has not been necessary to draw on the war contingencies reserve for any of the purposes for which it might have been required, the board has decided to transfer the amount at credit thereof, £250,000, to the general reserve, bringing it up to £4,900,000.

(6) No account has been taken of E.P.T. post-war credits, but it is estimated that these will total over £1,500,000, giving the group, after deduction of income tax, an amount in excess of £825,000, which, of course, will be credited to reserve to meet part of the development and re-equipment expenditure.

(7) The provision for deferred repairs amounted at May 15, 1946, to £260,000, and all of this has been earmarked to meet repairs, etc., held up on account of war conditions.

Addition to Provident Funds

While I do not need to comment in any great detail on the consolidated statement of assets and liabilities, it is important to note from this that the current assets amount to £53,205,225 and current liabilities and provisions to £10,053,733. The surplus applicable to the members of The Distillers Co., Ltd., exclusive of the reserve for taxation not yet due, is entered as £17,783,693. Once again substantial appropriations have been made out of group profits for credit to the superannuation and provident funds, making the total of these £3,637,173 at May 15, 1946.

The conservative financial policy adopted by the Board over a fairly long period of years, with the continued "ploughing back" into the business of a substantial portion of the profits earned, while writing down fixed assets, such as land, buildings,

and plant, to what to-day might be termed nominal values, has enabled the board, after a full exploration of the company's position, to be a little more generous on this occasion to the ordinary stockholders. At the same time the appropriation to general reserve has been increased by £150,000, while the carry-forward is £35,839 higher. To mark the end of the war, and as a token of appreciation of the services rendered throughout the war years, the board has decided also to grant a special cash bonus to every employee in the group who, at June 30, 1946, had a minimum of six months' service. The maximum period for the purpose of calculating the bonus will be six years, and time with the Forces will count. It will be granted to all who are qualified—whether director, official, or salaried or weekly wage-earner—and while it will be on a generous scale it will not be extravagant. The board is confident that this gesture will have the unqualified approval of stockholders.

It will be apparent, from a study of the accounts, that the position has been reached where the net assets of the group, even at balance-sheet values, are much in excess of the issued share capital. The board has given careful consideration to this aspect, but at the present time it is not possible to obtain permission to re-organise the capital structure.

Distilling

At this time last year we were hopeful of a return to full potable distilling, but this did not materialise. The Ministry of Food confidently anticipated being able to allot to the industry sufficient cereals to enable production on a pre-war scale to be resumed during the season 1945/46. They adopted a cautious policy, however, and issued only a portion—about 43 per cent.—of the licence to begin with, the intention being to release throughout the year the additional quantity. Unfortunately, this good intention was not realised for reasons well known to all. The spectre of famine has reared its head throughout various parts of the world and the position now is that until the results of the next harvest are known, the board feel they cannot press their claims further at this stage.

The malt distilleries have already completed their quota and are closed down, while the grain distilleries expect to complete theirs by the end of the summer.

Yeast

The voluntary scheme of zoning, to which I made reference at this time last year, and the profit control scheme, continued during the year under review. These have now terminated with effect from June 1, 1946. At the same time the Ministry of Food has withdrawn the subsidy arrangement under which yeast manufacturers, during the war period, received molasses, their basic raw material, at a price considerably below cost to the Ministry. The withdrawal of the subsidy has resulted in a revision of the price of yeast to the trade, but the Ministry has satisfied itself that no unwarranted rise in price has taken place.

Throughout the year the demand for the company's bakers' yeast and yeast-products has continued to increase. While improved processes have been introduced, and efficiency has been maintained, stockholders will be interested to know that plans are in course of preparation for the erection of a modern factory to operate the latest improved processes. It is hoped, in due course, that the company will obtain approval, and the necessary licenses, from the appropriate authorities to enable a start to be made in the construction work.

Industrial Group

Last year I gave stockholders a broad outline of the company's wartime activities in the chemical and plastics fields, and it will probably suffice to say now that we are closely following the needs of those sections of the industries in which we are concerned. Serious problems and delays are involved in the delivery of certain necessary raw and constructional materials, but nevertheless extensive development work is in hand, involving considerable financial outlay, with the view to covering the expansion of supplies for present day and future market requirements.

Under existing abnormal conditions it is still difficult to measure accurately the effect of the withdrawal of the excise allowance on industrial alcohol, but the company is closely engaged in preparing for alternative raw materials, which, it is hoped, will provide a solid foundation on which to base the range of chemicals and plastic materials with which it is concerned.

As I foreshadowed last year, the board, after full consideration, is proceeding with extensions to our central research station, and, in addition, is providing the principal yeast and yeast-products, and chemical and plastics sections, with out-stations fully equipped with facilities for conducting short-term research and pilot plant work. These services are considered an essential and complementary part of the general expansion in our manufacturing programme.

Future Prospects

Turning now to the future, while the further delay in the resumption of a full programme of potable distilling brings renewed anxiety, in other respects, and particularly in the strong financial position of the group, there is good reason to look forward with quiet optimism and confidence.

The report was adopted.

Parliamentary Topics

Steel Consumption

IN the House of Commons last week, Sir Waldron Smithers asked the Minister of Supply what were the facts which formed the basis that home consumption of steel would be 13,000,000 tons, and exports 3,000,000 tons in 1955, considering that the mean curve from 1910 to 1945 included two wars, during which steel production was abnormally high.

In reply, Mr. Wilmot said he assumed that Sir Waldron was referring to the estimate made by the British Iron and Steel Federation in their recent report which was published as a White Paper. The estimate of home consumption at 13,000,000 ingot tons a year assumed full employment, and had regard to the long-term upward trend of steel consumption in all industrial countries. The estimated export of 3,000,000 ingot tons was based on the potential world demand and the changes in the supply position.

Export of Steel Tubes

Sir Stafford Cripps, in reply to a question by Mr. K. Pickthorn, stated: "Exports of steel tubes are limited by the overall amount of steel for all purposes which can be made available for export. So far as the allocation of steel to the Board of Trade is concerned, the proportion available for the production of tubes for export has been agreed with the industry."

Linseed Oil for Linoleum

Sir Stafford Cripps, answering a question by Mr. Prescott, stated that the allocation of linseed oil to the linoleum industry in August would be maintained at the current rate. Future allocations would be determined in the light of the latest information about the supply position.

Argentine Linseed Oil

The Minister of Food, replying to a question by Major Legge-Bourke, stated that a small quantity of linseed oil had been shipped for UNRRA from Argentina. He was aware of no other purchase either of linseed or linseed oil for export from that country in the past three months. Negotiations were still proceeding in the matter of obtaining further supplies of linseed from the Argentine for this country.

West African Ground-Nuts

Mr. George Hall, replying to a question by Mr. J. Morrison, stated that the latest position in regard to the 1945 West African ground-nut crop was shown by the following figures (all of which represent tons): Purchases for export, 330,000; shipments to July 6: U.K., 147,556; Canada, 17,531; Norway, 4771; Denmark, 5755; Holland, 8256; Belgium, 776; total, 184,645; stocks on hand in West Africa on July 6, 145,355. Mr. Hall explained that those figures, which had been converted into decorticated weight where necessary, related only to ground-nuts bought for export.

Metalliferous Mining

Mr. Gaitskell, replying to a question addressed to the Minister of Fuel by Commander Agnew, stated that Lord Westwood had accepted an invitation to act as chairman of a committee of inquiry into the metalliferous mining industry. It was hoped that the full constitution and terms of reference of the committee would be announced soon.

Raw Materials for Plastics

Mr. Gallacher asked the President of the Board of Trade whether he would consider reducing raw material for plastic products that were only marketable because of a shortage in cotton goods, in order to increase supplies for the maintenance of the staple plastics industries.

Sir Stafford Cripps replied that the plastic products which were being marketed as alternatives to certain textile goods were made from polyvinyl chloride. Discussions on its distribution were taking place with the producers and users in the plastics industry, and steps had already been taken to ensure adequate supplies for the more important purposes. Sir Stafford replied: "Certainly," when Mr. Gallacher asked him to see to it that supplies of raw material were available to keep going a plastics industry in Scotland which was threatened with closing down.

FERTILISERS IN HOLLAND

The Dutch farming community is reported to be highly dissatisfied at the extremely slow rate of potash supply from the British and American zones of Germany, as Dutch horticulture is much in need of chlorine-free potash salts. While some 30,000 tons of potash should have come from Germany—a source on which Holland used chiefly to rely (apart from Spain)—at present nearly all supplies are coming from Alsace, which is to supply 50,000 tons under the new commercial treaty. Meanwhile, the French potash output is reported to have reached 285,000 tons in June, as compared with a monthly average of 223,000 tons at the beginning of 1946, and it is hoped that the figure will attain 340,000 tons in July. The nitrate plant of the Dutch State Coal Mines at Lutterade is working below capacity, while other plants were dismantled by the enemy. The Dutch superphosphate industry, however, having escaped serious war damage, should do well, provided that adequate supplies of rock and sulphuric acid can be obtained.

Personal Notes

MR. J. W. PEALING has resigned from the board of British Emulsifiers, Ltd.

MR. H. R. FRANCIS has been appointed joint managing director of Lacrinoid Products, Ltd., with Mr. H. E. Baum.

DR. FOSTER D. SNELL, who was chairman of the American section of the Society of Chemical Industry in 1944-45, has been elected president of the American Institute of Chemists, in succession to Dr. Gustav Egloff, the distinguished petroleum chemist.

DR. D. F. TWISS, D.Sc., F.R.I.C., who after 32 years as chief chemist to the Dunlop organisation, has just retired, has achieved a world-wide reputation as an expert on rubber and has played a great part in the scientific development of the industry. Among

Dr. D. F. Twiss.

his outstanding achievements is the discovery of the use of zinc isopropyl xanthate as a rapid accelerator for vulcanisation Another of his discoveries is the use of metallic oxides, especially zinc oxides, in the presence of organic accelerators of vulcanisation, which not only enables the combination of rubber and sulphur to take place more rapidly but produces stronger and more elastic rubber. In 1934 the Institution of the Rubber Industry awarded him the Colwyn Gold Medal for his scientific contribution to the knowledge of rubber.

Before joining Dunlop, as their first scientist, in 1914, Dr. Twiss was a lecturer in chemistry at Birmingham Technical School, which is now Birmingham Central Technical College. He was trained at Mason College, Birmingham, and was placed first on the roll of undergraduates when the college became the University of Birmingham as a result of the activities of Joseph Chamberlain. He holds research degrees of London and Birmingham Universities. He is joint author of "A Textbook of Inorganic Chemistry" dealing with the chemistry of sulphur and oxygen, and "A Course of Practical Organic Chemistry." He is vice-president of the Institution of the Rubber Industry, past member of the Council of the Royal Institute of Chemistry (his fellowship dates from 1908), and past chairman of the Midlands section of the Society of Chemical Industry.

LIEUT.-COLONEL E. BRIGGS, chairman of Lever Bros. (Port Sunlight), Ltd., since 1938, is relinquishing that position at the end of the year, when he is retiring. He will be succeeded by MR. G. A. STOKES NAIRN, who is now at Unilever House, London.

MR. T. MAY SMITH, who has retired from the board of A. Boake, Roberts & Co., Ltd., after being a director for 30 years, had been with the company for 41 years. MR. G. BUCK, MR. F. H. MACKENZIE, and MR. F. WILKINSON have been appointed to the board.

MR. A. W. MARSDEN, A.R.I.C., who is lecturer in the Department of Agricultural Chemistry at Imperial College, has been appointed head of the Chemistry Department at Seale-Hayne Agricultural College, Newton Abbot, in succession to Dr. E. Vanstone, who is retiring after holding that position since 1918.

MR. WILLIS M. COOPER, B.Sc., who has been transferred from the St. Louis office of the Monsanto Chemical Co. to the London office of Monsanto Chemicals, Ltd., will be assistant and project chemical engineering adviser to the managing director. During his eleven years with the Monsanto Chemical Co. he has been, in turn, analytical chemist, control chemist, production supervisor, development engineer, area supervisor, and process engineer.

MR. J. C. HANBURY, A.R.I.C., who has been appointed vice-chairman of Allen & Hanburys, Ltd., became a junior director in 1933 and technical director in 1943. A member of the executive of the British Pharmaceutical Conference and of the council of the Wholesale Drug Trade Association, he represents the firm in the Association of British Chemical Manufacturers and the Association of Malt Products Manufacturers.

Obituary

MR. JOHN EDWARD SAUL, F.R.I.C., has died at West Wittering, Chichester, in his 85th year.

MR. FREDERIC WILLIAM JOLLYMAN (76), whose death has occurred at Keynsham, near Bristol, was chief chemist of the Imperial Tobacco Co. until his retirement just before the war. He had been with the company more than 40 years.

General News—From Week to Week

Penicillin is shortly to be made available for use by veterinary surgeons in the treatment of diseases of dairy cattle.

The paraffin oil priority scheme will continue to operate as hitherto for a further twelve months beginning August 1.

Crewe Hall, regarded as one of Cheshire's finest Elizabethan mansions, is being leased by Calmic, Ltd., manufacturing chemists, together with part of the park.

Gall nuts will no longer be imported on Government account, according to a Board of Trade announcement. Future imports will be through normal private trade channels.

A revised edition of *Wood Preservatives*, by N. A. Richardson, B.Sc., A.R.I.C., has been published by the Department of Scientific and Industrial Research and is obtainable from H.M. Stationery Office, price 6d.

A trade agreement for the exchange of goods to the value of £500,000 on each side has been signed by Great Britain and Rumania, whereby Great Britain will supply chemicals, machinery and leather in return for timber.

The Control of Iron and Steel (No. 51) (Scrap) Order, 1946 (S.R. & O., 1946, No. 1101), which comes into force on July 29, increases the maximum prices of iron and steel scrap to meet the recent increase in rail freight rates. The increases vary from 5d. to 1s. 6d. a ton according to district.

Imperial Chemical Industries have taken 2, Grosvenor Place, close to Hyde Park Corner, London, W., on a long lease at a rental approaching £10,000 a year, for use as offices. The building, which was formerly the town mansion of the Duke of Buccleuch, has recently been occupied as the Caledonia Club for Scottish Servicemen.

Five hundred gallons of methylated spirit were destroyed on Wednesday last week, when fire broke out in the Blackfriars Street premises of Anderson, Gibb & Wilson, wholesale drysalters, Edinburgh. But for the prompt arrival of the local Fire Forces, who prevented the outbreak from spreading to adjoining buildings, the damage might have been considerably greater.

An amendment slip, No. PD.474, has recently been issued to the British Standard for white spirit, B.S.245. The slip announces the deletion of the requirement limiting the residue after spontaneous evaporation and describes an alternative method for the determination of volatility. Copies of the slip can be obtained free from the B.S.I., 28 Victoria Street, London, W.1.

Speaking at the annual meeting of Boots Pure Drug Co., Ltd., recently, Lord Trent stated that the company had followed up its pioneer work in developing the production of penicillin by making a comprehensive study of the new therapeutic agent known as streptomycin, an agent that held out promise of being of value in the treatment of some human diseases that did not respond to penicillin. The company was well advanced in its investigations.

The Ministry of Food has now indicated its readiness to import 800 tons of sardine oil held at Lisbon by a Fife importer and originally destined for the linoleum industry. They stipulate that the price should be reasonable and they reserve the right of allocation, although indicating that the linoleum industry will receive most of the oil. The possibility that herring and other fish oils may be used as a substitute for linseed oil in paint and allied products is now being explored.

Damage to the extent of thousands of pounds was recently prevented by the prompt action of Sir Shanti Bhatnagar, who is in this country as leader of a delegation of Indian scientists. Walking in Oxford, he noticed flames coming from the Organic Chemistry Laboratory. He tried to enter the laboratory and give the alarm, but found the door locked, so he climbed to a window, forced it open, climbed in and extinguished the fire, saving the building and its valuable contents.

The announcement made last Saturday by Scottish Oils, Ltd., of the closing of Hopetoun and Deans oil works at the Breich shale pit, West Lothian, will affect some 500 shale miners and oil workers. The miners should be able to get work in neighbouring pits, but there will be considerable unemployment among the oil workers. By concentrating operations at fewer oil works, it is hoped to increase their production more nearly to the full capacity, with a corresponding reduction in costs.

In his speech at the annual general meeting of Newton, Chambers & Co., Ltd., the chairman, Sir Samuel Roberts, Bt., announced that for some years they had been experimenting with a resin lacquer used for coating the linings of brewery tanks, food containers, etc. This lacquer prevents corrosion and is acid-resisting. They found it to be popular and profitable, so they had formed a new branch with its own manager to develop it with energy. The chairman also expressed his confidence in the successful future of the chemicals branch.

A special certification mark applicable to plastic materials and products has been registered by the British Standards Institution. The scheme covering the use of the mark is administered by the Mark Committee of the B.S.I. in collaboration with the British Plastics Federation. Details are obtainable from the B.S.I., 28, Victoria Street, London, S.W.1.

Over 100 acres at Airdrie, in the Glasgow area, have been bought by Boots Pure Drug Co., Ltd., for the purpose of erecting a new factory. In making this announcement, the chairman, Lord Trent, said that owing to dispersal schemes and the introduction of new industries into Nottingham, the company had found difficulty in getting female labour. He hoped there would be no labour shortage in Scotland.

I.C.I. announce that their southern region sales office has moved from Mill Hill to Gloucester House, 149 Park Lane, London, W.1 (tel.: GROsvenor 4020), to which all correspondence should now be addressed. Until further notice, the telephone number Mill Hill 3600 should still be used for calls to the following departments: agricultural, dyestuffs, engineering trades, household products, metals, distribution, accounts and packages.

Foreign News

The annual shipment of 250,000 tons of thorium-bearing sand from India to America has been discontinued, and the production of thorium in India will in future be permitted only in the closest arrangement with the Government, according to *Science and Culture*.

A Danish-American syndicate is boring in Jutland in a search for rock salt and oil. According to local press reports, the syndicate has discovered rich deposits of rock salt at a depth of 750 ft., sufficient, it is claimed, to cover the demands of the whole of Scandinavia for 1000 years.

The potash industry of Alsace, according to latest information from France, has now attained a production level equal to the pre-war standard, at least so far as extraction from the mines is concerned. Output of concentrated salts has reached 85 per cent. of the 1938 level.

From India comes news that the Atomic Research Committee of the Council of Scientific and Industrial Research, at its first meeting in Bombay recently, expressed the opinion that atomic research should be given first priority and encouraged by the Government of India on a very large scale. The committee recommended that a betatron, capable of 2,000,000-volt rays, be established at the Tata Institute, with a team of ten scientists for its operation.

New Companies Registered

Neo-Chemicals, Ltd. (414,987).—Private company. Capital, £100 in £1 shares. Manufacturers of and dealers in chemicals, etc. Director: E. V. Cherubini. Registered office: 36 Oxford Street, W.1.

Sam Kyle, Ltd. (24,304).—Private company. Capital, £3000 in £1 shares. Dealers in all kinds of chemicals, minerals, etc. Director: Samuel Kyle. Registered office: 6 Auchanfoshan Terrace, Glasgow.

A. B. Knight (London) Ltd. (415,181.)—Private company. Capital £1,000 in £1 shares. Importers or exporters of chemicals of every kind. Director: R. Epstein. Registered office: 203 Regent Street, W.1.

Ambrol Products, Ltd. (413,534).—Private company. Capital £100 in £1 shares. Chemical manufacturers, etc. Directors: J. Fletcher, J. C. Kenny. Registered office: 30 Willow Street, Accrington.

Stevens & Hodgson, Ltd. (414,156).—Private company. Capital, £10,000 in £1 shares. Manufacturers of and dealers in plant and appliances for use in the chemical trades, mining and quarrying, etc. Subscribers: W. R. Stevens; J. R. Hodgson. Registered office: 38 Gt. Charles Street, Birmingham, 3.

Company News

Permission to deal in £19,245 ordinary stock has been granted **I.C.I., Ltd.**

British Industrial Plastics, Ltd., have been granted permission to deal in 1,500,000 new ordinary shares of 2s. each.

It is announced that the name of **D.D.T. Products, Ltd.,** 41 North John Street, Liverpool, has been changed to **D.D.T. Insect Products, Ltd.**

Minimax, Ltd., is paying a final dividend of 8 per cent., making 16 per cent. for the year, plus bonus of 4 per cent. (both unchanged). Net profit for 1945 is returned at £38,457, in comparison with £38,502 for 1944.

Eno Proprietaries, Ltd., report net profits of £151,403 for the year to March 31 last, the figure for the previous year being £160,027. Ordinary dividend totalled £122,625 (£124,917).

The net profits of **Macleans, Ltd.,** for the year to March 31 last are given as £268,842, in comparison with £177,827 for the previous year. The ordinary dividend is 45 per cent.

The report of **Yeast-Vite, Ltd.,** for the year to March 31 last gives net profits as £163,532, as against £171,986 for the previous year. Ordinary dividend is 15s. 10d. per share.

Veno Drug Co., Ltd., made net profit of £244,696 for the year to March 31 last, as against £217,105 for the previous year. Dividend on deferred ordinary shares is 2s. per share.

Net profits of **Beecham Maclean Holdings, Ltd.**, for the year to March 31 last, are reported as £361,562, compared with £263,773 for the previous year. The ordinary dividend is 46 per cent.

Net profit of £56,482, in comparison with £47,908 for the previous year, is reported by **A. Boakes, Roberts & Co., Ltd.**, for the year ended March 31 last. A final ordinary dividend of 2 per cent. added to interim dividends totalling 9 per cent. makes 11 per cent. for the year, an increase of 2 per cent.

Provision for £8000 expenditure on research during the current year is made in the accounts of the **Yorkshire Dyeware and Chemical Co., Ltd.** Including dividends from and profits of subsidiary companies, the net profit is given as £45,577 for the year to March 31 last, as compared with £40,344 for the previous year. The final dividend of 12½ per cent. makes 17½ per cent. for the year, as against 10 per cent. dividend and 5 per cent. bonus for 1945.

The **Beecham Group** report for the year to March 31 last shows trading profit, etc., of the company and subsidiary companies totalling £2,756,106, as compared with £2,474,987 for the previous year. Net profits of the group were £437,528 (£367,902). Dividend on the 10 per cent. preferred shares amounted to £100,000 (same); on 5 per cent. redeemable preference shares to £7500 (same); and three interim dividends on the deferred shares, aggregating 32 per cent., plus 4 per cent. victory bonus, totalled £288,131, as against £242,000.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

SATINITE, LTD., Widnes, chemical manufacturers. (M., 27/7/46.) June 20, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 41 Turret Road, Wallasey; 30 Osmaston Road, Prenton; and 9 Milnthorpe Street, Garston, Liverpool. *Nil. December 3, 1945.

PLASTICRAFT, LTD., Kingsbury, manufacturers of plastics. (M., 27/7/46.) June 25, £2000 debentures; general charge. *£4300 debentures. September 22, 1945.

OMEGA PLASTICS, LTD., London, E.C. (M., 27/7/46.) June 20, mortgage and charge, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 79 Washington Avenue, Little Ilford, together with machinery, utensils, etc., also a general charge.

SCOTT BADER & CO., LTD., Wollaston, celluloid merchants, etc. (M., 27/7/46.) June 27, mortgage, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on Wollaston Hall, Wollaston, 17 Broadway, and 121 Midland Road, Wellingborough, and 2 Westfield Avenue, Higham Ferrers, with machinery, etc., also general charge. *Nil. March 1, 1946.

Satisfaction

SIR WILLIAM BURNETT & CO. (CHEMICALS) LTD., Isleworth. (M.S., 27/7/46.) Satisfaction June 27, of charge registered March 15, 1934.

Chemical and Allied Stocks and Shares

HELPED by a better trend in "Kaffirs," the recent reaction in which was an unsettling influence, stock markets have shown a satisfactory undertone, although British Funds reflected home political uncertainties and were somewhat less firm. Argentine rails relapsed following their recent advance, and home rails were dull pending the interim dividend decisions. Despite the attention centred on new issues, buying interest predominated in the industrial section, but on balance movements have been small and indefinite.

Imperial Chemical eased to 42s. 9d., Turner & Newall were 92s. 6d., Levers 56s., and Metal Box shares at 118s. 9d. xd were firm on the chairman's statement that, when regulations permit of a bonus, it is the intention to bring the issued capital more into line with that actually employed in the business. Despite the good results, General Electric eased to 103s. 9d. xd on the possibility that part of the company's business may be nationalised. Associated British Engineering jumped 15s. to 61s. 3d. on the directors' proposals, but in contrast, Brush Electrical 5s. ordinary eased on the latter to 11s., De La Rue were firm at £12¾, with British Industrial Plastics 2s. ordinary 8s., and Kleemann 45s. Dealings in British Xylonite ranged up to close on £8, while Ilford strengthened to 80s. Greeff-Chemicals 5s. ordinary transferred at slightly over 13s., Monsanto Chemicals 5½ per cent. preference marked 23s. 9d. and, elsewhere,

Metal Traders shares were good at 27s. 3d. Fisons were dealt in up to 63s. 4½d., and Cooper McDougall up to 43s. 6d., W. J. Bush at 90s., and Burt Boulton at 27s. 6d. B. Laporte were maintained at 100s., with business up to 102s. 6d. Morgan Crucible first preference have changed hands at 29s.

Iron, coal and steel shares showed small irregular movements, although Lambert Bros. were good at 80s., and a further rise to 16s. 3d. in Pease & Partners was attributed to estimates as to the break-up value of the shares. Stewarts & Lloyds eased to 49s. 6d., and Tube Investments to £6 1/16, while Ruston & Hornsby moved lower at 57s. 6d. Guest Keen were 37s. with the new shares 2s. 3d. premium. In other directions, Dunlop Rubber were 73s. 9d.; the new debentures were 3¼ premium over the issue price of 101. Among Indian securities, Indian Iron were prominent with an advance to 103s. 9d. Textiles eased, although on hopes of improved results, Calico Printers strengthened to 23s. 9d. British Celanese were 36s. 9d., and Courtaulds 56s. 6d.

Borax Consolidated kept steady at 49s. British Aluminium improved to 43s. 3d. on the growing demand for the metal, but British Plaster Board eased to 35s. 6d., and Associated Cement to 70s. Still reflecting the good results, British Glues 4s. ordinary were 15s. 10½d. with the participating shares higher at 45s. 6d. General Refractories have receded to 22s. 4½d., but in other directions, Triplex Glass rallied to 41s. 3d. after an earlier decline, although there are conflicting views in the market whether a higher dividend is likely for the past financial year.

Boots Drug rose to 65s. on the meeting, but later eased to 64s. 9d., while Beechams deferred have been 27s. 3d. on the full results. Sangers held firm at 33s. 9d., and Timothy Whites rose further to 48s. 6d. The units of the Distillers after further rise, receded to 134. United Molasses were 56s. 6d., and Imperial Smelting 19s. 6d.; but Amalgamated Metal came back to 21s. 3d. British Tar Products shares changed hands up to 14s. 6d., and British Lead Mills around 12s. International Bitumen Emulsions shares have transferred up to 7s. 4½d. Oil shares showed small movements, Shell easing to 94s. 4½d. after 95s. Anglo-Iranian strengthened to 100s. 7½d. on the full results and the news that the company's production reached a record level last year.

British Chemical Prices

Market Reports

AN active demand continues in almost all sections of the London industrial chemicals market and the effect of the approaching holiday season has been hardly noticeable. Supply problems remain the chief feature and although there has been a slight improvement in one or two directions there is no immediate prospect of an easing in the allocation arrangements which are in operation for a number of products. A considerable export demand for pigments is awaiting an improvement in raw material supplies, and the position is the same for zinc oxide, titanium oxide, lithopone, sulphate of alumina, and chromium sulphate, to mention but a few of the items concerned. The undertone of the market is very firm and the trend of prices is towards higher levels. A strong tone characterises the market in coal-tar products and available supplies are already booked. Rather more inquiries for cresylic acid are reported.

MANCHESTER.—In spite of the seasonal holiday influences, which are leaving their mark both on deliveries to the consuming end and on the volume of new business, fairly steady trading conditions have been reported on the Manchester chemical market during the past week. Textile and other industrial chemicals are being taken on the home market in reasonably good quantities and export inquiries during the past week have covered a wide range of both light and heavy products. The undertone is very firm in all sections. Fertilisers are seasonally quiet, but in the tar products a steady demand continues and with one or two exceptions the make is finding a ready outlet.

GLASGOW.—Considerable activity was experienced in the Scottish heavy chemical market last week on the resumption after the holidays. Prices generally show a continued tendency to increase and supplies are not readily available. The export market has been exceedingly busy with inquiries and orders for formaldehyde, aluminium and zinc stearates, toluol, xylol, carbon tetrachloride, copper sulphate, and sulphur. The supply position for export is not improving owing to the return of export restrictions on certain commodities, including zinc oxides, and certain difficulties are also being experienced with shipment.

Price Changes

Lead Nitrate.—About £55 per ton d/d in casks.

Lithopone.—30%, £28 2s. 6d. per ton.

"Nitro Chalk."—£9 16s. per ton in 6-ton lots, d/d farmer's nearest station.

Oxalic Acid.—£100 to £101 per ton in ton lots, packed in free 5-cwt. casks.

Sodium Sulphide.—Solid, 60/62%, spot. £20 2s. 6d. per ton d/d in drums; crystals 30/32%. £13 7s. 6d. per ton d/d in casks.

Sulphur.—Per ton for 4 tons or more, ground, £14 15s. to £16 10s., according to fineness.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each. Numbers given under "Applications for Patents" are for reference in all correspondence up to acceptance of the complete specification.

Applications for Patents

Vapour generating devices.—Steam Torch Corporation. 17670.

Liquid-supply systems.—Sterling Industries, Ltd., and P. E. Thomas. 17770.

Acid pickling tanks.—N. Swindin. 17445.

Water cooling towers.—J. E. Temple. 17342.

Vitamin D composition.—W. W. Triggs. (E.I. Du Pont de Nemours & Co.) 17892.

Welding devices.—B. H. L. Williams. 17706.

Hydrazo esters.—Wingfoot Corporation. 18111.

Heat-resisting alloys.—Allegheny Ludlum Steel Corporation. 18861.

Heat exchangers.—Aluminium Plant & Vessel Co., Ltd., and H. F. Goodman. 18414.

Aluminium base alloys.—Aluminium Co. of America. 18862.

Moulding powders.—A.S.P. Chemical Co., Ltd., C. L. Walsh, B. A. Adams, and H. R. Bott. 18892, 18893, 18894.

Barium carbonate.—F. W. Berk & Co., Ltd. (F. W. Berk & Co., Inc.). 18907.

Barium sulphates.—F. W. Berk & Co., Ltd. (F. W. Berk & Co., Inc.). 18908.

Lithium recovery.—F. W. Berk & Co., Ltd. (F. W. Berk & Co., Inc.). 18909.

Alkali earth metals.—F. W. Berk & Co., Ltd. (F. W. Berk & Co., Inc.). 18910.

Treatment of cellulose pulp.—Bertrams, Ltd., and A. G. Stewart. 18826.

Treatment of ores.—Bolidens Gruvaktiebolag. 18604.

Welding equipment.—E. A. Bost. 18389.

Organo-silicon compounds.—A. Bowman, E. M. Evans, J. R. Myles, L. C. Payman, and I.C.I., Ltd. 18876.

Dyestuffs.—British Celanese, Ltd. 18307.

Dyestuffs.—British Celanese, Ltd. 18459.

Hydrocarbons.—British Thomson-Houston Co., Ltd. 18882.

Coating compositions.—British Thomson-Houston Co., Ltd. 18883.

Inorganic compounds.—Cinema-Television, Ltd., and R. B. Head. 18283.

Chemical recovery devices.—D. Dalin. 18592.

Treatment of gases.—L. J. Derham, and F. J. Johnson. 18887.

Insecticides.—K. B. Edwards. 18213.

Organo-siloxanes. — J. G. Fife (Dow Chemical Co.). 18628.

Heat exchangers.—M. Frenkel. 18619.

Magnesium coating.—H. M. F. Freud. 18691.

Light aluminium hydroxide. A. B. Futo. 18631.

Processing of iron ore.—General Electric Co., Ltd., and P. Rabone. 18429.

Emulsifying, etc., equipment.—F. W. G. Greener. 18447.

Ferro-chrome.—W. B. Hamilton. 18520.

Hard alloys.—Hard Metal Tools, Ltd., and E. M. Trent. 18743.

Mica sheets.—M. D. Heyman. 18610.

Treatment of fatty acids.—Lever Bros. & Unilever, Ltd. 18577.

Welding.—Linde Air Products Co. 18354-5.

Analysis of gases.—J. Malecki. 18746.

Treatment of aqueous solutions.—E. N. Mason & Sons, Ltd., and F. A. Soward. 18579.

Heat determination of liquids.—W. M. Mercer. 18612.

Complete Specifications Open to Public Inspection

Vinyl ethers and polymers thereof.—General Aniline & Film Corp. Dec. 23, 1944. 31840/45.

Polymerisation and interpolymerisation of ethylene. — Imperial Chemical Industries, Ltd. March 14, 1942. 12006/43.

Dispersion of ethylene polymers.—Imperial Chemical Industries, Ltd. Aug. 10, 1942. 12893/43.

Dialkyl peroxides as polymerisation catalysts.—Imperial Chemical Industries, Ltd. Nov. 16, 1942. 18987/43.

Granular calcium nitrate with a low water content. — Lonza Elektrizitätswerke und Chemische Fabriken A.G. Dec. 19, 1944. 30238/45.

Morpholine salts of sulphonated azo dye components and their preparations.—Marconi's Wireless Telegraph Co., Ltd. Dec. 21, 1944. 34639/45.

Preparing a material which has a high content of carotin.—N.V. Philips Gloeilampenfabrieken. Oct. 17, 1941. 14024/46.

Producing water-insoluble layers on substrata, and the manufacture of preparations suitable therefor.—N.V. W. A. Scholten's Chemische Fabrieken. Aug. 18, 1944. 14070/46.

Catalytic treatment of sulphur-bearing hydrocarbon distillates.—Shell Development Co. Dec. 21, 1944. 28781/45.

Unsaturated halogenated hydrocarbons.—Shell Development Co. Dec. 19, 1944. 28782/45.

Basic calcium chlorate from solutions containing both calcium chlorate and chloride.—Solvay & Cie. Dec. 20, 1944. 33678/45.

Catalytic conversion system.—Standard Oil Development Co. July 3, 1941. 78293/42.

Catalytic synthesis of hydrocarbons.—Standard Oil Development Co. Dec. 20, 1944. 15746/45.

Continuous crystallisation in vacuo of sugar solutions and the like.—G. L. Willaime. Sept. 30, 1941. 13728/46.

Amino acids.—Winthrop Chemical Co., Inc. Dec. 19, 1944. 26142/45.

Alkyl aminocyanoacetates. — Winthrop Chemical Co., Inc. Dec. 19, 1944. 26667/45.

Complete Specifications Accepted

Synthetic resinous reaction products of aldehydes and triazine derivatives.—British Thomson-Houston Co., Ltd. July 29, 1942. 578,196.

Resinous condensation products. — W. Charlton, J. B. Harrison, and I.C.I., Ltd. Feb. 2, 1944. (Samples furnished.) 578,229.

Manufacture of metal castings by the centrifugal method.—Clay Cross Co., Ltd., and F. Jervis. Dec. 13, 1940. 578,296.

Polymerised product and method of making same.—F. J. Cleveland (Pittsburgh Plate Glass Co.). Jan. 19, 1942. 578,266-7.

Production of soaps and like hydrolysis and neutralisation products.—Colgate-Palmolive-Peet Co. July 11, 1942. 578,278.

Copper alloys.—M. Cook, W. O. Alexander, and I.C.I., Ltd. Jan. 14, 1942. 578,223.

Treatment of gases or vapours with liquids. —O. G. Dixon, and I.C.I., Ltd. June 16, 1943. 578,309.

Production of halogenated hydrocarbons.—E. I. Du Pont de Nemours & Co. Oct. 4, 1944. 578,179.

Manufacture of rubber-like plastic materials.—E. I. Du Pont de Nemours & Co., and J. L. Parker. June 21, 1944. 578,214.

Refractory compositions.—C. E. Every (Titanium Alloy Manufacturing Co.). Aug. 16, 1944. 578,177.

Production of gas-expanded ebonite.—Expanded Rubber Co., Ltd., and A. Cooper. March 14, 1944. 578,233.

Manufacture of nickel-iron alloys.—General Electric Co., Ltd., and R. C. Chirnside. July 16, 1942. (Cognate applications 9906/42 and 10737/42.) 578,193.

Insecticidal coating compositions.—I.C.I., Ltd., A. C. Hetherington, and E. G. Noble. March 31, 1944. 578,206.

Refractory lining for melting pots used in the alumino-thermic extraction of metals.—E. Lux. April 15, 1944. 578,165.

Stabilisation of 1, 2-dinitroethane.—C. W. Scaife, and I.C.I., Ltd. May 19, 1944. 578,169.

Production of cellulose ethers.—J. H. Sharphouse, and J. Dawning. Nov. 22, 1943. 578,286.

Machines for the extraction of oil or other liquid from seeds, meal and the like.—A. W. Sizer. Feb. 10, 1944. (Cognate applications 2447/44 and 3901/44.) 578,202.

Process for the manufacture of amides and of azo dyestuffs obtainable therefrom.—Soc. of Chemical Industry in Basle. Feb. 6, 1941. (Cognate applications 1583/42 and 1584/42.) 578,268.

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