The Chemical Age, June 1st, 1946

WITH METALLURGICAL SECTION

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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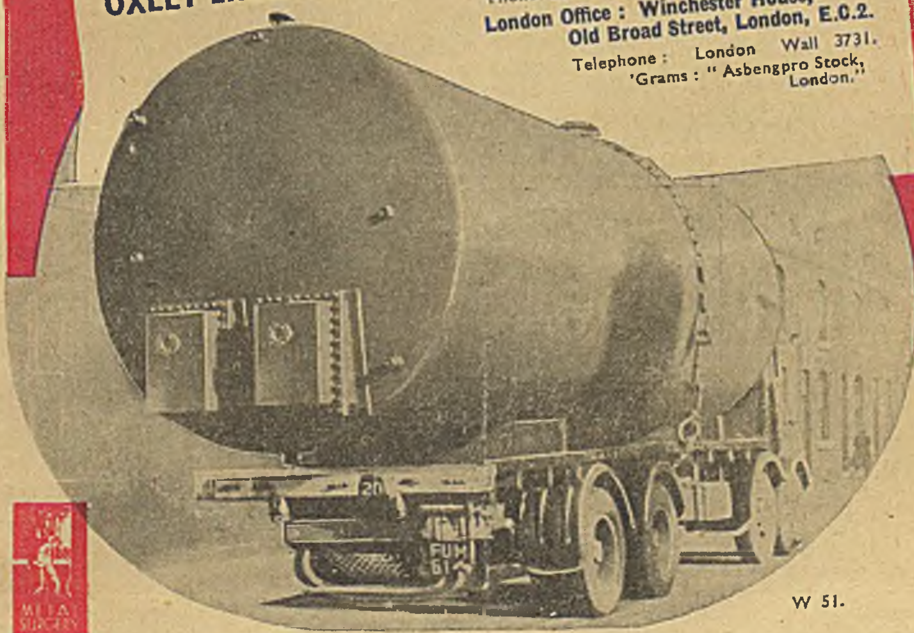

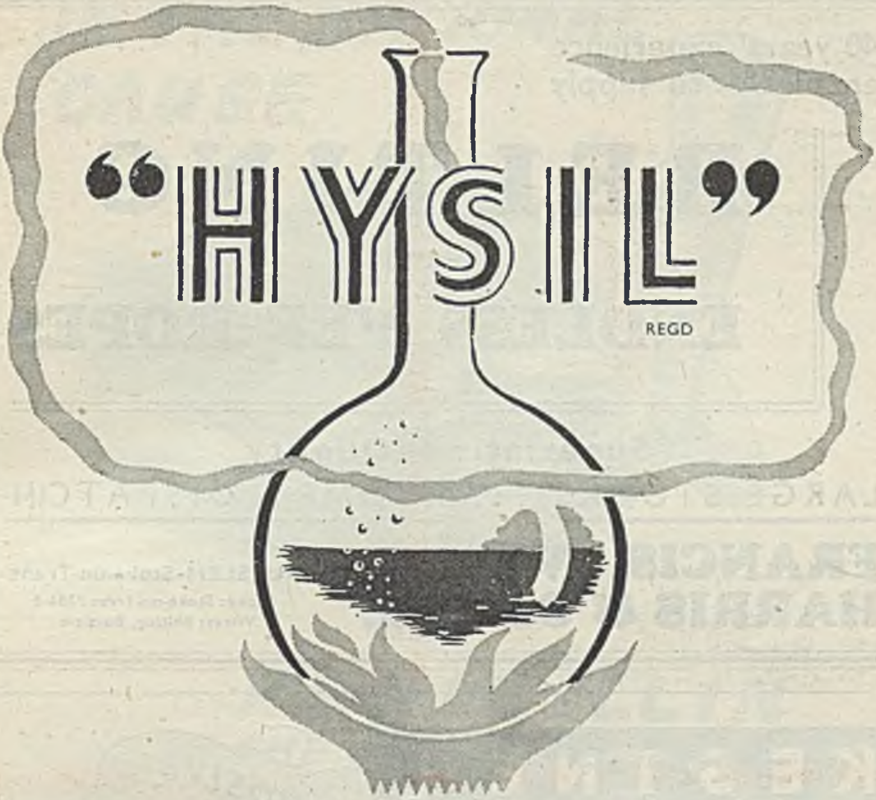

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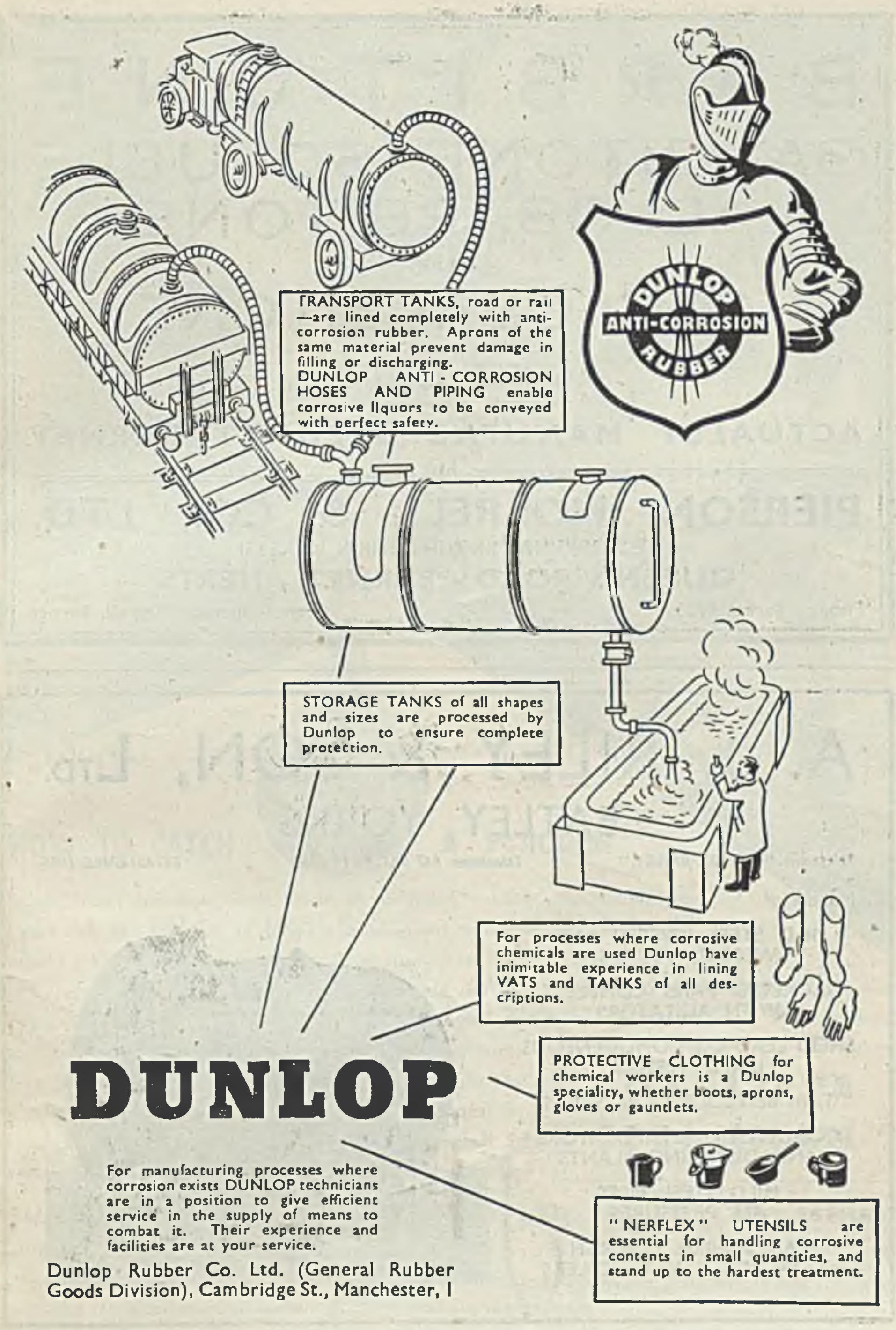
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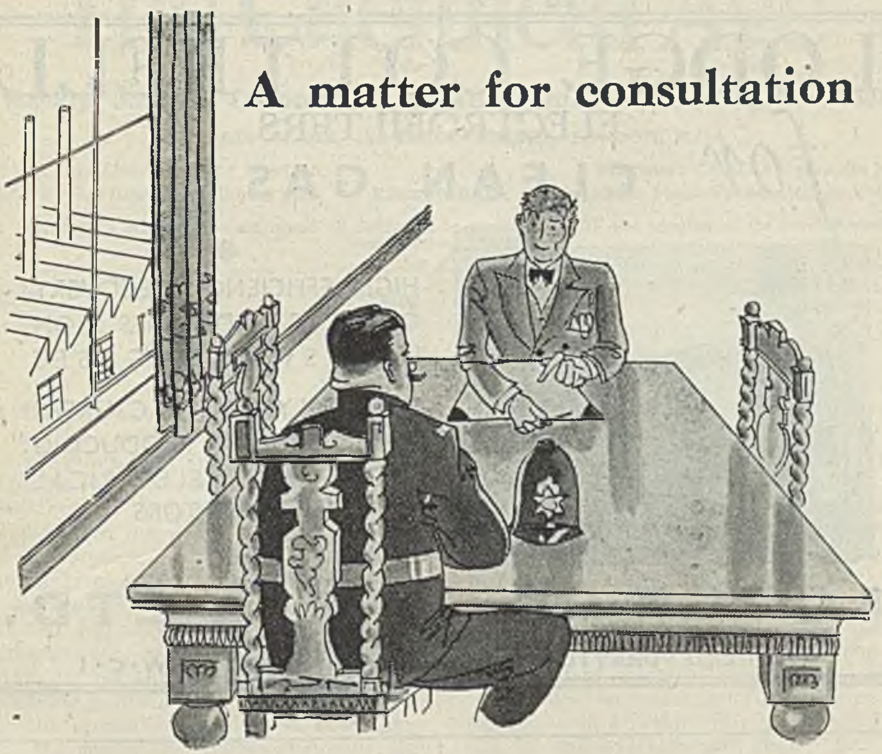

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Penicillin

THE contributions of chemistry to medicine within recent decades have been profound. Although penicillin is not yet produced by direct chemical synthesis, chemistry and chemical engineering have played a most important part in its industrial production, a fact that became abundantly clear from the discourse given to the London Section of the Society of Chemical Industry by Mr. Lester Smith. Chemistry, too, paved the way, for in his opinion it was through the discovery and use of the sulphonamides that the use of penicillin appeared feasible from the beginning. We gather that before chemotherapy the only method of destroying unwanted bacteria was by the application of bodies of the general class popularly called "disinfectants," generally phenols, which were themselves acidic in reaction and destructive of human tissue. The idea of killing the unwanted visitors (or residents) by a neutral agent appears to have been new.

We do not propose to describe the discovery of penicillin; every newspaper and magazine in the country has probably done that already with varying degrees of accuracy. Suffice it for our purpose to note that it was an exclusively British discovery, of the exploitation of which we were robbed by circumstances over which we had no control. Although originally discovered in 1929, it was not until 1940 that the clinical value of penicillin was announced to the world. By that time we had our backs to the wall; for aught we knew, we might be overrun by the enemy within a week or two. First things must come first, and physical defence against the enemy at our gates had to take precedence over war against disease, particularly when the weapons of that warfare required materials, labour, and skilled technical knowledge to be expended upon a project which was not fully out of the experimental stage. So Professor Florey went to America to put his knowledge at the disposal of the United States, and to enlist their help in manufacture. The rest of the story is known to all the world. By 1942, when we were reasonably secure from invasion, large-scale production was started in this country. It is a tribute to the work of our biochemists and chemical engineers that within a very short time we shall be producing per head of population as much penicillin as any country in the world.

There are highlights in the penicillin story which, familiar as it is, deserve some comment. The first method of production was in bottles. That

On Other Pages

sounds easy and not very efficient, judged by mass-production standards. It may not have been efficient, but it was the only method known, and in practice it was very difficult. What shape should the bottle be? It is easy to draw the perfect shape, but it was very difficult in those days to obtain supplies. The perfect shape, moreover, might be very difficult to manufacture. The good old milk bottle turned up 750,000 strong and was the first successful penicillin production plant. It was not ideal, partly because constancy of depth of liquid is desirable; the liquid contained in a milk bottle placed on its side at an angle of 10° is anything but constant in depth. Other designs were in time produced, but they had to be sterilised, the liquid in which the culture grows had to be inserted, then (perhaps the most critical stage) the liquor had to be inoculated with penicillin mould, and all under such conditions that the moulds that destroy penicillin were kept out. After a period of growth at 24°C. the penicillin had to be extracted either by solvents or (later) by active carbon, from which it was recovered by solvent extraction. Then came the difficulties of concentration and purification. At first a purity of 10 per cent. was all that could be expected; now it is possible to produce pure penicillin. Bearing in mind that all these intricate operations, operations requiring quite skilled biochemical technique, had to be performed on the manufacturing scale by unskilled girls and men, it will be immediately clear that the milk-bottle stage was fraught with immense difficulties. The handling of the vessels on the large scale was also a chemical-engineering task of considerable magnitude even though dairymen had already in operation the technique of bulk handling of milk bottles. Some of the plants that the lecturer showed on the screen were beautifully designed and were a clear credit to the chemical engineers.

The composition of the liquor in which the mould grew had to be investigated. It was soon possible to make great improvements on the original liquor, but the real advance came when the Americans discovered that cornstalk liquor was the answer to the chemist's prayers. The influence of trace elements had to be investigated, and proved very important, as trace elements, particularly copper, influence the yield considerably. Finally came the most important practical discovery, namely, that instead of growing the mould in liquor between 1 and 4 centimetres deep it could be grown by submerged culture. That immediately opened the way to the use of large tanks, and the bottle stage was at an end. The story of penicillin manufacture is a fascinating tale of chemical and biochemical research translated on to the manufacturing scale by the application of known principles of chemical engineering. We gather that an account is being written of the whole procedure and its development. We devoutly hope that it will be entrusted to someone who had a sufficiently ready pen to make the story live. Since penicillin to-day becomes available, with certain restrictions, to the general public, the story should have many interested readers.

To our possibly misguided intelligence it seems that mankind is beset with many problems which should be taken right out of the sphere of national competition. On such problems scientific and technical men will work wholeheartedly because they know that they are helping mankind thereby. Some spur to effort there should and must be. The spur appears to be recognition of discoveries made, or work done, by individuals. A philosopher might well say that, since the human spirit must have some incentive to make it give of its best, fame is perhaps as good as any other. But, being a philosopher, he would reflect that the desire for recognition indicates that the human race has not quite grown up yet. Mankind, he would note, is still a child at heart. The eternal " I " must have its outlet. So be it; we cannot change human nature all at once. It was noticeable that there was much that Mr. Lester Smith could not say, not because it is secret, but because full recognition could not be given to the part that each country and each individual has played in this great development. For that reason the report that we have mentioned is being prepared. It was perceptible in the discussion that there was a desire to claim on behalf of certain organisations credit for having being the first to make some of the discoveries on which penicillin manufacture has been based. Again, we say, so be it. The eternal child in all of us demands praise. But let us grow up sufficiently to collaborate freely with one another both on the national and international plane. *Sic itur ad astra.*

NOTES AND COMMENTS

Control of Steel

PUTTING aside all political flummery, it has emerged fairly clearly from the two-day debate in the Commons on the iron and steel industry that the question at issue is the extent to which control should be applied. Mr. Wilmot, stating the Government's case, wants national ownership of the primary sections of the industry, *i.e.*, ore-mining, pig-iron production, and the manufacture of ingots, together with certain other sections, including coke ovens omitted from the coal scheme, and a rather indefinite list of steel fabricating processes. The Opposition stress the willingness of the present owners of the industry to submit to quite a strict measure of State control, but claim that whatever defects the industry had will not be removed by bureaucratic means. Mr. Clement Davies, taking a middle course, hit the nail on the head when he said that the real question was whether the industry, when taken over by the State, could produce material of the quality and quantity and at prices that would enable our manufacturers to compete in both the home and export markets.

Compromise, not Compulsion

IF we admit that the steelworkers and technicians are so dissatisfied at the idea of working for what is called a "cartel," and not for the good of the State, that they will not put in their best efforts, then there is something to be said for State ownership. If, on the other hand, the men who organise the industry are going to be so hampered by petty restrictions and bureaucratic delays that they cannot get on with the job, then there is nothing to be said for State ownership. It seems difficult to understand why a close official watch on prices and, in a broad way, on the type of product turned out, should not be sufficient to prevent the "steel barons" from "peddling their armaments round the world" (a stigma which Mr. S. Evans laid against the industry); but that is evidently not enough for the Government. Despite the compliments bandied about, our iron and steel industry is not all that it should be; but compromise is generally a better cure than compulsion. Having in view the recent indications given by the Working Parties for cotton and the pottery industries, the Government would be wise, we feel, to tread cautiously in dealing with so large a section of Britain's industrial livelihood.

Interference in Research

IT is probably too much to expect Government draftsmen to pay heed to the remarks of distinguished scientists; but it would have been well if the persons responsible for drafting the Atomic Research Bill had studied the remarks which Professor Rideal, president of the Society of Chemical Industry, made at the "Anglo-American" dinner given by the American Section of the S.C.I. in New York on April 4. To be productive, he stated, research of an academic nature must be free from direction by either industrial or government sources, even though they contribute heavily to its support. THE CHEMICAL AGE is only indirectly concerned at present with the problem of atomic energy, but the Atomic Energy Bill undoubtedly threatens the independence of academic research workers in one branch of study. As Professor Fawcett said, at a conference of university teachers at Leeds last week, "There is no suggestion that it is the intention of the present Government to interfere with research, but this Bill, if passed as it stands, would give the Minister or his successors power to interfere with research in the universities which might be of serious importance." It sounds perilously like the thin end of the wedge, and at any rate the Bill has created serious disturbance among university teachers. The one hope is that this point will be brought out in debate, when it may be revealed whether the intention is to control research, or whether it is merely a question of unwise phrasing.

Seventy-Thousand Scientists

A MINIMUM demand of 70,000 scientists in 1950 for this country and the colonial services is envisaged by the Committee on Scientific Man-Power which was appointed last December by the Lord President, and has just issued its report (Cmd. 6824: H.M.S.O.; 6d.). They hope, however, that this is an underestimate and feel justified in the assumption that 90,000 will be needed in 1955. According to the present state of affairs, the maximum number available at that date will be 64,000, if expansion is to be limited to that expected in the returns furnished to the universities by the University Grants Committee.

Therefore what the Man-Power Committee has had to propound is a scheme for making up this deficit of 26,000; and their immediate suggestion is that each university should straightway double its output of scientists, giving us 5000 new men a year. There is no lack of the available intelligence, but assured financial assistance must be forthcoming on a larger scale than at present. Another job requiring immediate attention is the repair of those collegiate institutions (such as University College, London) which suffered severely during the war. Similar measures are required to provide the corresponding increase in the reserve of technologists, and increased facilities are demanded both at technological institutes and in the technological departments of universities. More money, more space, and more buildings are needed, in fact, if we are to have the scientific workers we must have to compete in industry to-day.

Environment and Safety

THERE is more widespread recognition nowadays of the importance of environmental conditions in industrial premises, not only in reducing the rate at which accidents occur, but in stepping up production, by reason of the psychologically beneficial effect on workpeople. Some indication of the increasing interest in this important subject was forthcoming at the National Safety Congress in London last week. This was held under the auspices of the Royal Society for the Prevention of Accidents and attracted large audiences to the Institution of Civil Engineers, Storey's Gate, particularly at the industrial sessions, when experts in their own field dealt with different aspects of the question of environment. Mr. H. R. Payne, of the I.C.I. technical department, presided at the first session, and in introducing Mr. H. E. Chasteney, H.M. Chief Inspector of Factories, who gave the opening address, he stressed the importance of close co-operation between progressive industrialists and the Factories Department.

Fewer Industrial Accidents

MR. CHASTENEY announced a welcome drop in industrial accidents during 1945, the figures for which have just become available. He said fatal accidents had gone down from 1003 in 1944 to 851, and non-fatal totalled 2400, or 400 fewer than in the previous year. This decline, he pointed out, does not necessarily mean that a higher standard of industrial safety has been reached. Actually, of course, accident figures go up or down in accordance with the volume of employment, while another factor is the attitude of managements, without whose active backing and co-operation accident prevention cannot be a success. Too many people still regard industrial safety as a welfare matter, or one for the works medical officer, whereas, above all, it is a matter of teamwork. As Mr. Chasteney pointed out, if there is dust in a factory, it takes a chemist to tell you its composition; a physicist to tell you whether it is explosive; a medical man to tell you if it is harmful; and an engineer to tell you how to remove it.

Better Lighting and More Colour

MANY accidents are due to bad lighting. Although dark-coloured machinery is bound to be drab, there is no need for so many of our factories to be gloomy. The environmental effect of lighting was the subject of an address by Mr. William Allan, an architect from the Building Research Station, Garston, who pointed out that the human being is the one unalterable factor in lighting conditions and that the psychology of the eye should be the basis of all lighting schemes, inasmuch as our eyes always gravitate to the brightest thing in view and automatically focus upon a contrast. At the next session, Mr. S. A. Wood, of the I.C.I. paints division, dealt most entertainingly with the topic of colour in industry, the purpose of which, he pointed out, is not to impress visitors to the factory, but to provide suitable environment for workers. It is unfortunate that the current paint shortage will prevent many of his hearers from attempting, for the time being, to put some of Mr. Wood's practical suggestions into effect. Of importance almost equal to lighting and colour are heating and ventilation, and these aspects of the general question of improved surroundings were outlined none the less expertly, at the concluding session, by Mr. E. W. Murray, who was able to draw to a large extent upon the questions which reach him in his capacity as curator of the Home Office Industrial Museum. Altogether, the large number of industrial safety officers and others present were provided with much food for thought.

Chemical Engineering Group

Annual Meeting and Luncheon

Mr. M. B. Donald.

THE 27th annual general meeting of the Chemical Engineering Group of the Society of Chemical Industry was held at the Waldorf Hotel, Aldwych, London, on May 22, under the chairmanship of Mr. M. B. Donald.

The report of the general committee for 1945 was presented by the retiring hon. secretary, Mr. R. F. Stewart. This stated that the group had experienced another very successful year of work, despite the continuing difficult conditions resulting from the war. The membership figures were encouraging. New members, particularly younger ones, continued to join the group and the total membership for 1945 was 600. Regret was expressed at the loss of Mrs. William Cullen, who had been a very good friend of the group, particularly in its social endeavours. The friendly co-operation of the group with the Institution of Chemical Engineers had again proved of much benefit to the profession and although changes in the arrangement were under review, co-operation would continue to be close and cordial. The report was adopted, together with the accounts, which were presented by the hon. treasurer, Mr. F. A. Greene, and showed a small surplus.

This Year's Committee

Mr. M. B. Donald and Mr. F. A. Greene were re-elected chairman and hon. treasurer, respectively, and Mr. E. LeQ. Herbert was elected hon. secretary in succession to Mr. R. F. Stewart. Major D. M. Wilson will continue as hon. editor and Mr. H. W. Thorp as hon. recorder. Mr. W. G. Daroux, Mr. A. P. Buchanan, Mr. N. S. Murray and Mr. R. F. Stewart were elected to fill vacancies on the committee.

The chairman referred appreciatively to Mr. Stewart's hard work in the interests of the group during the five or six years he had been hon. secretary and said that a year ago Mr. Stewart had asked to be released from that office, because of his great commitments in industry, but had been persuaded to continue. Now, however, his release had become imperative and the group had been very fortunate in securing the services of Mr. Herbert to take his place. Mr Donald added that he hoped there would be an opportunity later of expressing their appreciation of Mr. Stewart's work in a more tangible manner.

A vote of thanks to the officers and committee for 1945 was accorded on the proposition of Mr. L. O. Newton. Acknowledging this, the chairman spoke of the relations between the group and the Institution of Chemical Engineers. He said one reason for the existence of the two organisations as separate entities was that there were many chemical engineers in this country who were not qualified to enter the Institution and the group filled a long-felt want in providing similar facilities. A co-operative arrangement had been made between the two organisations and suggestions for still closer liaison would be welcomed. Mr. Donald added that it was felt the group had a future and for that reason it had recently been decided to revert to the pre-war practice of publishing its own papers.

The meeting was followed by a luncheon, at which Mr. Donald again presided. The company numbered more than a hundred and the guests included Professor E. K. Rideal, president of the Society of Chemical Industry; Dr. Herbert Levinstein; and Dr. H. J. T. Ellingham, secretary of the Royal Institute of Chemistry.

The toast of " The Group " was proposed in humorous terms by Dr. Ellingham, who coupled with it the name of the chairman. He said the members owed much to Mr. Donald for the quiet, unostentatious, yet efficient manner, in which he carried out his duties.

Mr. Donald's Speech

In response, the chairman spoke of his recent visit to Germany and re-echoed Mr. Churchill's wish that the Germans could be seen earning their own living again as soon as possible. The German police had greatly improved under British training; the miners were working better than might be expected; and on the agricultural side everything possible was being done; but when it came to the chemical industry there was an entirely different state of affairs. The policy so far had been an entirely negative one—the chemists had been told they must not make chemicals, or, indeed, do anything at all. It was essential that the people in industry should be kept busy, otherwise it would be a case of "Satan still finds mischief for idle hands to do." As a group it was of the utmost importance that they should do all in their power to ensure that German chemical engineers should be kept fully employed doing something, however small, as a contribution to world economy.

"As you know," the chairman continued, "certain gentlemen in this country, including myself, have been to Germany, taking notes of chemical plant and writing reports about it. If Germans were allowed to write reports of it in Ullmann, I am sure they would make a better job of it. Others have gone over from this country to assess the value of chemical plant as reparations, but we all know that if you start moving chemical plant to a new site, its value becomes practically negative. The members of the Control Commission in Germany are doing their best, but they need sympathy and active backing from us over here. If there is anything you can do to give that backing, it will not only tend to prevent future wars, but bring a ray of hope to German scientists, who prefer to help in world reconstruction rather than revert to their pre-war practices."

The toast of "The Guests" was proposed by Mr. F. A. Greene, who alluded to Dr. Levinstein as "that extraordinary person—a distinguished scientist and a keen business man."

Response was made by Professor Rideal, who mentioned the appointment of Mr. T. R. C. Fox to the Chair of Chemical Engineering at Cambridge University and said he was glad an Englishman had been appointed, although they much admired the activities of their friends across the Atlantic. He hoped that this country's older foundations would continue to contribute to the membership of the group in ever-increasing numbers.

Address by Dr. Levinstein

Dr. Levinstein, who had been invited to give an address, spoke first of the chairman's references to Germany. He said he agreed that it was necessary Germany should not only grow her own food, but should exercise sufficient industry to keep her people occupied. At the same time a specially careful watch should be kept on German exports of heavy chemicals. He went on to say that investigations into German processes, in which so many chemical engineers from this country had lately been engaged, had, on the whole, produced some very instructive results. Teams of experts had collected about 18,000 German specifications which might not otherwise have become available. These would shortly be published here, and he thought there was no German process of interest which could not be used in this country without much trouble. In the short time that remained, Dr. Levinstein spoke briefly of patents, a subject on which he is an acknowledged expert. He dealt chiefly with the historical aspect, especially with the anomalies of patent law and the reforms recommended by the Swan Committee, whose report he characterised as the most remarkable of its kind he had ever known.

Secondary Phases in Alloys

Investigation by Electron Microscope

FURTHER information on the application of electron diffraction reflection methods and the electron microscope to investigations of metallurgical structures is provided by Heidenreich, Sturkey, and Woods,. The Dow Chemical Company, Midland, Michigan (*J. Appl. Sci.*, February, 1946). It is shown that these instruments can yield valuable information concerning very small amounts of secondary phases and impurities in metals. Thus, for example, when martensite decomposes at 200°C., the slow etching component is highly dispersed Fe_3N. The decomposition at 400°C. yields the usual Fe_3C. Further, the Fe_3N formed at 200°C. transforms to Fe_3C when annealed at 350°C. Other examples are presented.

The successful application of these instruments is dependent upon the production of clean, etched surfaces. Surface preparation is discussed and a satisfactory technique for rinsing etched surfaces is described. In some alloy systems, the etching reaction may result in the redeposition on to the etched surface. In the case of a B-brass containing 0.00050-0.001 per cent. silver, the silver is deposited in the form of spherical particles about 1000 A.U. in diameter. Aluminium alloys appear to offer a serious problem in discovering satisfactory etching materials, owing to the position of aluminium in the electromotive series in relation to copper, silver, etc.

PURCHASES OF BROMINE

The Board of Trade announces that purchases of bromine on Government account have now ceased. Government stocks of fixed bromine will continue to be distributed in accordance with existing arrangements, at £126 per ton delivered London, subject to adjustment for those consumers who give an undertaking to take deliveries at a fixed rate per month.

Supplies of bromine may also be secured from the British Ethyl Company, Artillery House, Artillery Row, London, S.W.1, or from Palestine Potash, Ltd., through their agents, Charles Tennant, Sons, & Co., Ltd., 4 Copthall Avenue, London, E.C.2.

Quinine Monopoly

The Dutch Acknowledge its Ending

(from Our Amsterdam Correspondent)

IN Dutch technical circles it is now taken for granted that, as a result of developments during the war, the virtual monopoly in cinchona bark and quinine salts enjoyed by the Netherlands Indies is definitely terminated. It is well known that the so-called Indonesian territories accounted, as recently as 1938, for 11,000 metric tons of bark output out of a total world output of 13,000 tons, but the research department of the Ministry of Economics at The Hague, in reviewing the present situation, now admits the possibility that the newly-developed malaria-curing "substitutes" are likely to hold their own. A brief review of the chequered story of quinine trading up to the war and somewhat later, as expounded by official Dutch sources, will not be out of place.

Cinchona Culture

Up to 1880, the culture of cinchona was of no great significance and the trade was limited to bark powder, while medical practice tended to administer quinine in the form of its salts. Only after the discovery of the *Cinchona ledgeriana* variety with its high quinine content and its cultivation in Java, did the Netherlands Indies win ascendancy in the world markets. Cultivators in Ceylon could no longer withstand the competition, so an all-round grubbing-up of cinchona trees there and their substitution by tea plantations took place. One result was that the world market for quinine was temporarily overstocked, a position which gave rise in 1893 to the first convention of primary producers, comprising all important manufacturers in ten countries. Later on the factory at Bandoeng joined in also, and in 1913 the well-known "Quinine Agreement" (Kina-Overeenkomst) was signed by more than 200 planters and the manufacturers. Under this agreement the latter had to take over as much bark as corresponded with the sale of quinine sulphate in the years concerned; and the support given to the market by the agreement caused prices to increase by 100 per cent. On the eve of the last war (1938) the agreement was extended for another 10 years, but the administrative body was centred in the "Kina-Bureau" that was established at Amsterdam in 1913.

In 1914-1920 this world cartel throve exceedingly, profiting by the pressing demand from the nations at war, but during the period 1922-1934 over-production developed once again and prices sagged, while output of bark increased by 100 per cent. The authorities sought to meet the altered situation by promulgating the so-called Kina-Ordonnantie (Quinine Regulation) under which the culture and export of bark was strictly regulated by a licensing system, while the regulation of the market remained in the hands of the Amsterdam Kina-Bureau, with the proviso that the Governor-General of the Netherlands Indies might give an immediate order for a wide extension of planting and export in cases of international need, malaria epidemics, etc. At the same time the League of Nations received the drug at much reduced prices. The Dutch still claim that the convention has proved a stabilising factor, because some regulation will always be needed for a product for which both the demand and supply are highly inelastic. They allege, however, that the big price increase during the last war period, when the price of quinine sulphate soared to 85 American cents per oz., compared to 26 cents in 1914, was caused by American purchases and stockpiling. On the whole, it is argued, the price does not really play a decisive rôle in the medication of poverty-stricken populations requiring quinine, because it is the Governments that act as both purchasers and distributors in such cases.

New Competition

Regarding the future outlook, it is pointed out that the U.S. authorities have been exerting themselves since 1941 in favour of the expansion of cinchona culture in Bolivia. The latter country and British India were practically the sole competitors of the Netherlands Indies up to that year, but a great many countries have since entered the arena, *e.g.*, Guatemala, Costa Rica, Cuba, and the Belgian Congo. In Bolivia a quinine manufacturing plant is working, while the acreage in Costa Rica is said to amount to 4000 hectares (as against some 100,000 hectares in the Netherlands Indies, of which only 17,000 hectares are special plantations, the rest being mixed). In the Congo the acreage is 1500 hectares and a factory has been set up at Costermansville. There are as yet no reliable data about Tanganyika, but the area planted with cinchona there is believed to be the same as that of the Congo.

While Dutch trading circles are apt to suppose that most of the foreign ventures in this field may in the long run prove to be of a transitory character, a serious view is being taken concerning the synthetic substitutes. In the U.S. an annual output target of 100 tons of synthetics of German origin (atabrine, etc.), has been set, and this is equivalent to no less than 400 tons of quinine sulphate, while 600 tons of the sulphate was the aggregate annual export from the Netherlands Indies and the Netherlands in pre-war years. Paludrine, the British synthetic antimalarial developed by I.C.I., is regarded as another serious threat to the natural product, and it is pointed out that an extensive production of malaria-curing synthetic drugs seems to be established in Soviet Russia, although no precise information as to its extent is available.

New Control Orders

Penicillin

THE Control of Penicillin (No.1) Order, 1946 (S.R. and O. 1946, No. 731) controls the supply of penicillin to the public under the Order which comes into force on June 1. Penicillin and penicillin preparations may be supplied to the public only by hospital authorities, doctors and dentists to their patients, or by any doctor, dentist, pharmacist or authorised seller of poisons against an approved prescription. The quantity which may be supplied against a prescription is limited to the quantity prescribed.

Provision is made for freedom of distribution amongst doctors, dentists, pharmacists, authorised sellers of poisons and their suppliers. For the safeguarding of the prescription system, there is a requirement that pharmacists or others dispensing penicillin shall retain prescriptions if they are not National Health prescriptions. Where a repeat prescription is concerned, the last person dispensing shall be responsible for its custody.

Potash for Crops

Functions Still Obscure

AT a meeting of the Royal Institute of Chemistry (London and S.E. Counties Section) on May 15, at the Royal Institution, Dr. G. A. Cowie read a paper entitled " Potash and Crop Production." He said that the German monopoly of potash, held for about 50 years, was broken when Alsace and Galicia with their potash deposits were ceded to France and Poland respectively after 1918. Later, competition came from the United States, Russia, Palestine, and Spain. Of the world's potash requirements Germany supplied over 90 per cent, in 1913 and only about 60 per cent. in 1938.

The functions of potash in the plant are still largely obscure. Potash plays a vital rôle in the plant's buffer system, but there is no consistent evidence that it functions directly with any primary physiological process such as the synthesis or metabolism of either carbohydrates or proteins. Many observations suggest that plants which respond best to potash additions can extract least potash from the soil. Potash benefits the health of the plant by counteracting the injurious effects of excessive nitrogen or nitrogen and phosphate in the soil. Potash fertilisers are more effective in dry seasons than in wet, partly because extra moisture increases the uptake of " soil " potash. Owing to adsorption by soil, only a few pounds of potash are lost annually by drainage from loamy soils under average rainfalls in this country. Potash fixation explains the relatively low recovery in crops of added potash fertilisers. Soil analysis is useful if it reveals acute deficiencies or definite sufficiencies of exchangeable potash.

BUTTER FROM COAL

AS has been widely announced in the popular Press, the Germans have been making butter from coal, or rather from paraffin, a by-product of coal. The actual plant employed, however, is less familiar, and some of the stages in the process are illustrated on the page opposite. These are in operation to-day at the Imhausen soap-manufacturing plant, at Witten in the Ruhr. The process was invented in 1935 *by Arthur Imhausen, father of the present managing director of the firm (Dr. Karl Heinz Imhausen). The chief chemist is Dr. Hermann Rossow. During the war* 150–200 *tons a month were produced, but with more plentiful supplies of paraffin the production is being stepped up to* 350 *tons. The paraffin is first oxidised and then heated to extract the fatty acids. After further distillation the fatty acid can be used either for making butter or soap. For butter the fatty acid is distilled again and glycerine and carotin are added. From* 100 *tons of paraffin* 80 *tons of fatty acids are obtained, sufficient to make* 40 *tons of either butter or soap. For soap the fatty acids are not distilled, but soda is added. At this factory a special anti-dermatitis soap, which contains* 80 *per cent. fat, is made for the miners : they get four tablets a month. The soap for ordinary Germans contains only* 30 *per cent. fat and they are allowed only one tablet a month. Butter produced by the Imhausen method, which contains no acetone, is the only butter that can be safely eaten by diabetics.*

BUTTER FROM COAL

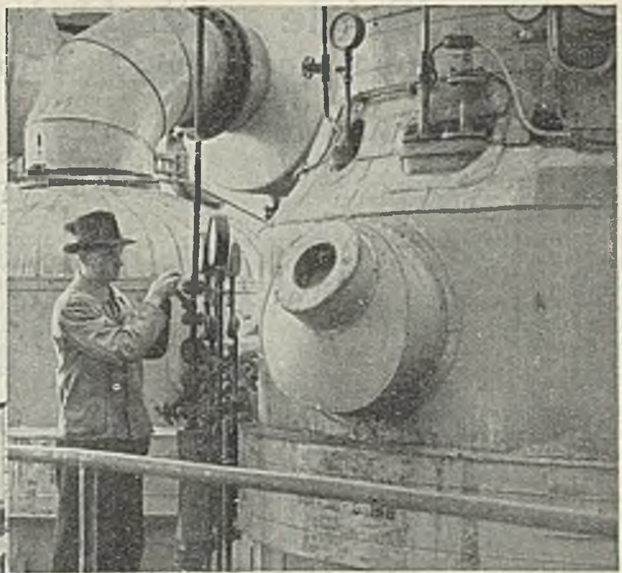


Fig. 1 (right). Feeder tanks of fatty acids above the apparatus where the glycerine is added in the distillery of the Imhausen plant.

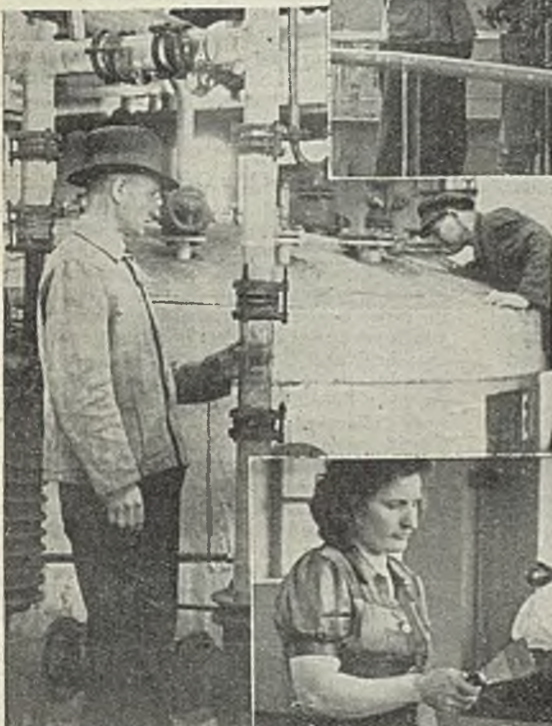


Fig. 2 (left). Splitting the soap by means of sulphuric acid which passes through the glass tubes illustrated.

Fig. 3 (right). Butter leaving the final machine at the Imhausen factory, Witten.

Trade with Holland

Gratitude and Goodwill Towards Britain

(*from a Special Correspondent*)

A COMMERCIAL traveller to the Netherlands in May, 1946—one year after liberation—returns with a profound impression of the goodwill of the Dutch towards Great Britain. Never previously have there been such opportunities for mutually beneficial trading between the two countries. Never, on the Dutch side at least, such friendly anxiety to re-establish the business connections that existed before 1940, to create new connections in every branch of industry and commerce.

Five years of German occupation left Holland starving and virtually bankrupt. An official pamphlet *The German Exploitation of the Netherlands*, issued by the Ministry of Trade and Industry at The Hague, tells the grim story in cold facts and figures. No heroics or self-pity here; no straining after shocking adjectives. The bald statement of account is more moving than rhetoric.

Starving and bankrupt: but Hollanders were undismayed. Allied bombers dropped parcels of food during the last few weeks of the war—mere drops doing little enough to fill an ocean of want, but the gesture was appreciated to an extent that we do not realise. Jack, in the fairy story, planted a bean that grew into a gigantic tree overnight. Those parcels of food had an equally magical effect.

Import Licensing

From the moment of liberation, Holland set to work. Her slogan was the same as ours: "Export or Perish." But a country with few natural resources beyond the industry and brains of its people cannot export without first importing raw materials, machinery, technical information and domestic necessaries. In order not to throw the national finances completely out of balance, Government control of imports was imposed. Authority to import, as far as the foreigner is able to judge, is given fairly and indeed generously. All firms, not compromised by collaboration with the Germans, who were trading abroad before 1940, and new firms showing promise of development, have been allotted a quota of foreign currency and an import licence number. This licence number must be quoted on the exporter's invoices.

During five years while they were cut off from the free world many firms went out of business, their premises destroyed or their principals killed. Others changed their names and addresses. The would-be trader with Holland should not, therefore, rely on a pre-war directory. A Commercial Intelligence Bureau (*Bureau voor Handelsinlichtingen*), however, exists in Amsterdam for the purpose of giving inquirers up-to-date information.

On May 17 the first General Election for the Dutch Parliament since 1937 was held. The Dutch take their politics seriously but soberly, and the visitor could see little of the excitement which marked our own General Election of a year ago. At the time of writing it is too early to estimate the outcome of the election results on trade. One can only say, in general, that the relative states of the parties remain little changed and that the new Government is likely to follow substantially the same policy as its "caretaker" predecessor. The Catholics, whose influence is Conservative, polled the largest number of votes, followed closely by Labour, whose programme is modelled on that of our own Labour Party.

Traces of the Occupation

Standards of commercial practice in Holland are high, except in so far as the 1940-45 period has left traces in habits that must be hard to throw off. During the occupation it was a matter of honour to cheat and lie when dealing with the Germans. "Have you made your clothing contribution to the Winter Help?" "Yes," replies a Dutchman known to all his friends as the soul of truth, "here is the receipt I was given at the Collection Bureau," and exhibits a forged receipt. "We have reason to believe that you are sheltering a Jewess." "I am not, but you won't believe me, so search my house; here are all my keys," says a gentle, innocent lady. After the fruitless search is over she goes herself to the room where a German officer, billeted on her, sleeps, and helps the terrified little Jewish girl out from under the bed. The middle-aged and elderly know that methods which were necessary when dealing with Germans had to be abandoned at once when liberation came. Those, however, who were children when they were taught to lie in a good cause find it hard to understand that there is no cause now that justifies dishonesty.

No fear about language difficulties should deter the prospective trader with the Netherlands. The majority of Dutchmen speak English, and all firms have at least one senior member whose English is fluent. At the risk of seeming to labour the point one must repeat that there is overflowing gratitude and goodwill towards Great Britain in Holland to-day. It is up to the trading communities of both countries to rebuild prosperity on that solid foundation.

Electrodepositors' Meeting

Technical Society's Annual Conference

AN excellent attendance marked the first post-war annual conference of the Electrodepositors' Technical Society at the Imperial Hotel, Birmingham, on May 7-9. The programme included two technical sessions; the conference dinner; a works visit to Joseph Lucas, Ltd., Birmingham, where members of the conference were entertained to lunch; and a visit on the final day to Ryland Bros., Ltd., Warrington, where members inspected the Tainton plant for the automatic plating of brylanised wire.

At the first technical session, Mr. A. W. Hothersall gave his impressions of a recent visit to America in a paper entitled "Electroplating in the U.S.A." This was followed by a paper on "Electrolytic Polishing," by Dr. Charles L. Faust, of the Battelle Memorial Institute, U.S.A. The second session was given over to a discussion on "Electroplating on Aluminium," introduced in a paper by Dr. E. G. West and followed by a paper entitled "Defects in Electroplating Solutions and their Remedies," by Mr P. Berger.

A large number of distinguished guests were present at the dinner, including Sir Edmund Crane (chairman, Hercules Cycle & Motor Co., Ltd.); Mr. L. P. Lord (chairman, Austin Motor Co., Ltd.); Professor M. L. Oliphant (Professor of Physics, Birmingham University); Sir Bernard Docker (chairman, B.S.A., Ltd.); Sir Ernest Canning (chairman, W. Canning & Co., Ltd.); Mr. Walter Hackett (managing director, Accles & Pollock, Ltd.); and Mr. K. H. Wilson (president of the Birmingham Chamber of Commerce).

"Plating" Uranium

The toast of "The Society" was proposed by Professor Oliphant, who congratulated the Society on its rapid growth and said it had played an important part in promoting research and in stimulating national interest in electrodeposition processes and problems. One of the greatest problems which must be solved before atomic energy could be put to industrial use was to protect uranium from oxidation. What it needed was a coating of beryllium, provided this could be deposited in a "nice ductile form." If that could be done, an atomic energy machine could be produced, and it might be that electrodeposition was the real answer to the problem.

Response was made by the president, Dr. S. Wernick, who said the Society was nearing its coming-of-age and had many achievements to its credit, including the first international conference on electrodeposition, which was held in London in 1937. The second conference took place in New York, and the Society proposed to hold the third international conference in London in 1947. The Society had an important function in making available to industry the results of research and development work emanating from the laboratories and workshops as rapidly as possible. It was of increasing importance that the time-lag between discovery and utilisation of a process should be reduced to a minimum if we were to keep in the forefront of progress and hold our own in international trade. To finance the expanding activities of the Society, it was proposed to institute a Publications and Research Development Fund, to which industry would be invited to contribute. Additionally, corporate membership of the Society would become available to industrial firms although the Society did not in any way seek to compete with existing associations.

Mr. E. A. Ollard, past president, proposed the toast of "Metal Finishing and Allied Industries." He said it was very largely the aim of the Society to bring together the laboratory and workshop personnel. Accordingly, it was felt that more local centres should be formed.

Mr. L. P. Lord, responding, said that industry owed a considerable debt to scientific societies, and it would certainly be necessary in the struggle for markets which lay ahead to take advantage of every advance which the scientists made.

The president read a message from Sir Edward Appleton, in which he congratulated the Society on its progress, and expressed the hope that the Publications and Research Development Fund would be well supported.

Mr. H. Silman, chairman of the Midlands Centre, proposed the toast of "The Guests" and Sir Ernest Canning replied.

ATOMIC SCIENTISTS UNITE

An Atomic Scientists' Association has been formed in London to provide a forum for discussion among scientists of the scientific, social, and international problems arising out of the release of "atomic" energy; to press for a political programme for their solution; and to disseminate and explain published material on the subject. A provisional committee has been formed with Professor H. S. W. Massey as chairman. Dr. W. J. Arrol and Dr. E. H. S. Burhop are the hon. secretaries, and all inquiries should be addressed to them at University College, London, W.C.1.

Boys' Hostels Association

First Post-War Dinner

THE Rt. Hon. Lord Mountevans, K.C.B., D.S.O., LL.D., still popularly known to countless people as " Evans of the *Broke*," presided over a distinguished gathering at Grosvenor House, London, on May 22 at the first post-war dinner of the Boys' Hostels Association. Bombed from one of its hostels and with the other requisitioned for the Armed Forces, the Association, which counts many concerns in the chemical industry among its supporters, struggled on throughout the war years in two small houses. With the return of peace it urgently requires funds for the rebuilding and repair of its hostels and the furtherance of its work for homeless youths.

Besides Lord and Lady Mountevans, the gathering included Viscount Leverhulme (the Association's president) with Viscountess Leverhulme, Lord Iliffe, Sir Ernest and Lady Benn, Sir Harold Howitt, Mr. D. R. Hardman, and Mr. R. W. Moore (Headmaster of Harrow School). Proposing a toast to "The London Boy," the Headmaster of Harrow made a stirring speech, to which Sergeant Michael Buckley, a member of the Old Boys' Association attached to the Boys' Hostels Association, responded.

Lord Mountevans proposed " The Association," recalling the message written in the frozen wastes in 1912 by his old leader, Captain R. F. Scott, who, thinking of his own son, had written " Give the boy a chance." Lord Leverhulme, in reply, looked forward to the day when they could obtain permits and funds to bring their work back to its old standard.

Trade in April

Chemical Exports Down : Imports Up

FOR the first time for several months, the latest monthly accounts published by the Board of Trade show that exports of chemicals, drugs, dyes and colours from this country were less in value than the previous month. The figures are for April and the export total of £5,013,192 is £780,503 below the March figure, possibly due in part to the Easter holidays. At the same time, it exceeds by £1,616,399 the total for April last year. British India continues to be the biggest customer, her purchases totalling £607,474. France was second with £338,365 and Denmark third with £316,665.

An increase in imports is recorded for the second month in succession. The total of £1,671,504 is £85,317 higher than that for March, but £287,760 less than for April, 1945. The U.S. was the largest supplier, with £741,904, and Spain came second with £244,123.

FRENCH CHEMICALS FOR HOLLAND

As a consequence of the ratification of the Dutch-French commercial treaty, Dutch glass manufacturers will be enabled to carry on their work, which is so urgently needed for the reconstruction of the devastated areas. An official communication states that Holland had to offer compensating exports to France in order to achieve this end. The treaty ensures an adequate supply of soda; and soda ash, in spite of its pivotal importance, is not yet manufactured in Holland, as before the war the Dutch could see no chance of competing with the firmly entrenched soda manufacture of Belgium and France, on whose products, in addition, they could confidently rely. France is also to supply caustic soda, a material in much demand to-day owing to the revival of the Dutch rayon and soap industries, as well as potash and potash products. So far only a small allotment of these last has been made to Holland from Germany. Certain aniline dyes not yet made in Holland are another export item in the treaty, along with increased supplies of artificial fertiliser, the latter subject to approval by the Combined Food Board. A vigorous campaign against rats, an aftermath of war in the long-neglected Dutch rural districts, necessitates the importation of special insecticides.

B.T.-H. JUBILEE

The 50th anniversary of the British Thomson-Houston Co., Ltd., occurred last month, the company having been formed on May 18, 1896, from an organisation which had developed from the original London firm of Laing, Wharton & Down, which started trading in 1886. Thomson-Houston partnership began in America about 16 years before the present company was formed in England. Elihu Thomson was born in Manchester in 1853, and settled with his parents in Philadelphia. At the age of 23 he became Professor of Chemistry and Physics in the Central High School. E. J. Houston, who was born in Alexandria, Virginia, in 1847, was a colleague at the same school and eventually became Professor of Natural Philosophy there. An American, named Churchill, of New Britain, invited these two professors to join him in forming the American Electric Co., which later became the Thomson-Houston Electric Co., and, eventually, the General Electric Co. (of New York, U.S.A.). The connection of the Thomson-Houston Electric Co. with this country began in 1886, when the firm of Laing, Wharton & Down was formed to exploit in Great Britain the sale of apparatus made by the Thomson-Houston concern in America.

S.C.I. Plastics Group

Annual General Meeting

THE 14th annual general meeting of the Plastics Group of the Society of Chemical Industry was held under the chairmanship of Mr. A. J. Gibson at Stewarts Restaurant, Old Bond Street, London, on May 23.

In his annual report, the hon. secretary, Dr. S. H. Bell, stated that with the increased general interest in plastics, war-time developments, and post-war prospects, the membership of the group had increased steadily to more than 600. A high standard had been maintained in the programme of meetings, both as to the quality of the papers read and the attendances. It was with great regret the committee had accepted the resig-

Mr. N. J. L. Megson, Chairman of the Plastics Group.

nation of Mr. J. Idris Jones from the office of hon. recorder. The report was adopted, as also were the hon. treasurer's report and statement of accounts, presented by Mr. A. Lowe.

Mr. N. J. L. Megson was elected chairman for the coming session, with Mr. G. Dring as vice-chairman. Mr. A. Lowe will continue as hon. treasurer and Mr. C. E. Hollis was elected hon. recorder. Mr. W. H. Langwell and Dr. S. H. Bell were re-elected to their respective offices of hon. hospitality officer and hon. secretary.

Mr. S. E. Chubb, Mr. A. Hill, Mr. J. Idris Jones, and Dr. J. C. Swallow were elected to fill vacancies on the committee.

The meeting was followed by an informal meal, after which the members adjourned to Burlington House, Piccadilly, where a paper entitled: "The Tropical Behaviour of Cellulose Acetate Films" was presented by Mr. N. J. L. Megson and Mr. A. K. Unsworth, with Mr. V. E. Yarsley and Mr. W. J. Grant.

Personal Notes

COMMANDER SIR HUGH T. DAWSON and MR. G. ELEY have been appointed directors of British Drug Houses, Ltd.

MR. H. H. S. HILLIER, of Wm. Warne & Co., Ltd., Barking, has been elected president of the Federation of British Rubber and Allied Manufacturers Associations.

MR. V. W. SLATER, B.Sc., F.R.G.C., M.I.Chem.E., and MR. B. E. A. VIGERS, B.A., A.M.Inst.C.E., M.I.Chem.E., who are chief chemist and chief engineer respectively, of B. Laporte, Ltd., have been elected directors of the company.

DR. C. L. WILSON, who has been appointed Professor of Chemistry at Notre Dame University, Indiana, U.S.A., was formerly lecturer in chemistry at University College, London, and during the war held various industrial appointments.

MR. J. DAVIS, B.Sc., A.R.I.C., a member of the Society of Public Analysts, has joined, in a consulting capacity, the Belgrave Translation and Technological Bureau, 33 Denver Road, London, N.16, which specialises in scientific translations.

DR. O. E. MAY, who has resigned from his position as chief of the Bureau of Agricultural and Industrial Chemistry, U.S. Department of Agriculture, after 23 years' association with the Department, has been succeeded by his former assistant, DR. L. B. HOWARD.

PROFESSOR F. A. FORWARD, who has been appointed head of the department of mining and metallurgy at the University of British Columbia, was on the smelter staff of Mount Isa Mines, Ltd., Queensland, from 1930-34 and joined the university in 1935 as assistant professor of metallurgy.

MR. E. T. CASDAGLI, assistant secretary in the Raw Materials Department, Board of Trade, who has also been acting as Director of Fertilisers, has vacated the latter post. He has been succeeded as Director by MR. C. S. CAMPBELL, of the Raw Materials Department.

Obituary

MR. P. D. HENDRIKS, vice-chairman of Lever Bros. & Unilever N.V., died suddenly in Rotterdam on May 27. He was responsible during the war for the management of the Unilever companies in German-occupied territory, and in this capacity he rendered outstanding service to the Allied cause.

The death has occurred in Durban of MR. A. M. ANDERSON, B.A., M.Sc., F.R.I.C., technical director of Lever Bros. (S.A.), Ltd., for the last six years. Mr. Anderson, after obtaining his M.Sc., joined Lever's factory at Port Sunlight as a chemist. He was for some years technical director of a London factory of the company.

Parliamentary Topics

Iron and Steel Industry

AT question-time in the House of Commons, Mr. Martin Lindsay asked the Minister of Supply what major schemes of reconstruction in the steel industry had been started in the last six months.

Mr. Wilmot replied that 27 schemes, costing nearly £16,000,000, had already been approved and licences issued. A further 20 of the more urgent schemes, costing some £48,000,000, had also been approved and the firms concerned had been asked to supply the details necessary for the issue of licences. This covered all the urgent schemes which were ready to proceed. The Minister announced that he would circulate a list of the major schemes on which work had started during the last six months.

Lead Prices

Sir G. Fox asked the Minister of Supply what was the equivalent c.i.f. price in Great Britain of the 24,000 tons of lead bought in the latter part of February and March, based on seven cents per lb. and, approximately, £39 per ton, f.o.b., per lb. and ton, respectively; at what price it was being sold to manufacturers; and what was the total profit or loss to the Government on this transaction.

Mr. Wilmot: The cost of this lead c.i.f. U.K. port varied between £41 7s. and £42 6s. 8d. per ton. The price of lead delivered to consumers' works was £39 per ton up to April 8 and £45 per ton thereafter. These purchases form part of a continuing flow of supplies and it is not practicable to isolate this particular parcel and say how much of the 24,000 tons has been sold, either at £39 or £45, or what profit or loss will result. My aim, however, is to fix selling prices over a period to cover all costs.

Free Trading in Metals

Asked by Capt. Marsden whether he was in a position to announce the decision of the Government in relation to the resumption of free trading in metals, Mr. Wilmot said that future long-term arrangements for marketing metals were under consideration. Meanwhile, in view of the present world supply position and other factors, it would be necessary to continue for some time the existing arrangements for Government purchase of the main non-ferrous metals.

Steel Production (Coal Supplies)

In reply to a question by Col. Lancaster, Mr. Wilmot said that about 100,000 tons of steel production were estimated to have been lost during the last three months owing to insufficient deliveries of coal.

Science Students' Deferment

Mr. Warbey asked the Minister of Labour whether the deferment of call-up for military service in the case of science students who have completed three years' work of national importance, and who are proceeding to science courses at universities, would be extended to include students proposing to study at technical colleges which have recognised courses for university science degrees.

Mr. Ness Edwards explained that the matter was being considered by the departments concerned.

German Technical Reports

Further Processes Recorded

THE following is a list of some of the latest technical reports from the Intelligence Committees in Germany, published by H.M. Stationery Office.

CIOS XXXI—55. *Mansfeldscher Kupferschieferbergbau A.G., Eisleben*: Smelting and recovery of non-ferrous metals (1s.).

CIOS XXXI—56. *Georg von Giesche's Erben, Magdeburg*: Zinc mining and smelting (6d.).

CIOS XXXI—57. *Hugo Schneider A.G. Messingwerke Aluminium Werke, Leipzig*: Brief description of brass and aluminium mills (6d.).

CIOS XXXI—75. *Hüls Chemical Works—I.G. Farben, Hüls*: Hydrocarbon cracking and gas handling. Acetylene purification. Butadiene from dehydration of butanol. Styrene and ethylbenzene (3s.).

CIOS XXXII—59. *Aluminium and magnesium production and fabrication* (50s.).

CIOS XXXIII—16. *F. Krupp A.G. Altendorfer Strasse—Essen*: Coking plant (1s. 6d.).

CIOS XXXIII—18. *Gelsenkirchen Bergwerke A.G. (G.B.A.G.), Essen, and Nordstern, Wanne Eickel*: Coking plant (2s.).

BIOS 294. *Hydrogen peroxide works of Otto Schickert and Co., at Bad Lauterberg and Rheinspringe* (2s. 6d.).

BIOS 319. *Production of beryllium, "Degussa"* (1s. 6d.).

BIOS 345. *A German thermometer for use in the range* 400°-1200°C. (1s. 6d.).

BIOS 359. *Products formed by interaction of acetylene and amines* (6d.).

BIOS 364. *Kalle and Co. A.G., Wiesbaden-Biebrich*: Cellulose derivatives (1s. 6d.).

BIOS 374. *The German aluminium foil industry* (2s.).

BIOS 379. *The German zinc smelting industry* (17s. 6d.).

BIOS 386. *The extruded brass rod industry in Germany* (6d.).

FIAT 56. *Kostheim, Obernburg, Darmstadt*: Sulphate dissolving pulp for rayon manufacture (1s.).

FIAT 145. *I.G. Farben, Dormagen*: Acetic anhydride production from acetic acid (6d.).

Metallurgical Section

Published the first Saturday in the month

Metallurgical Section

June 1, 1946

Training Industrial Metallurgists

New Course at Birmingham

by LESLIE AITCHISON, B.Sc., D.Met., F.R.I.C., F.R.Ae.S.

METALLURGY is one of the oldest of the arts employed to produce articles that are useful to man, in his endeavour to live better and more easily. Like so many other sciences, metallurgy, for many centuries, was just an art and a craft, with scarcely any scientific basis. When first precise knowledge was applied to metallurgy, the predominant approach was through chemistry, reinforced by microscopy. For quite a long time this method sufficed, because there was so much leeway of accurate knowledge to be made up, and because the scientific tools for this attack had already been forged. Naturally, the university schools of metallurgy took a prominent part in using these methods to attack the various problems that presented themselves, and were also able to assist industry to apply the knowledge that emerged.

In this way the science of metals was greatly advanced, both in the laboratory and the factory, but eventually a stage was reached at which the help of physics had to be sought in the elucidation of metallurgical problems. The application, on any appreciable scale, of physics and physical chemistry to metallurgy only slightly preceded the remarkable discoveries about the structure of matter resulting from the work of the atomic physicists. The consequent extension of knowledge of the metallic state; the application of X-rays; crystallography; and the electron theory of matter; provided further weapons for the research metallurgist, of which full advantage was taken, particularly in the universities. Much excellent work has been done, but the field to be tilled is so large that a preponderating proportion of the research energies of our metallurgical schools has naturally been absorbed in such theoretical studies. This is all as it should be, but it has meant that much less time and fewer personnel have been available to attack the problem of applying new knowledge to industrial processes, or of training men possessing a full scientific equipment to take the part they should in industrial production. The problem for the universities to-day is to devise the best means of creating a new balance between the two aspects of metallurgy—firstly, that concerned with the deeper and more fundamental investigation of the metallic state, and secondly, that concerned with the application of such knowledge to the development of better metals for the service of mankind, and to their economic production. The ideal solution will synthesise the two aspects.

Dr. Leslie Aitchison,
Professor of Industrial Metallurgy in the University of Birmingham.

Clearly, such a problem has several facets. The proper solution to it must result in ample opportunity for training men in the theory of the subject, so providing the basis on which everything else may be built. But the theoretical side in itself is diverse, in that it is concerned with what might be called the theory of practice as well as with the fundamental physico-chemical theory of the metallic state. To illustrate what is meant by the theory of practice one might, perhaps, mention such subjects as the theoretical basis of the hot or cold rolling of metal sheets and strips, or the theories accounting for the flow of hot metal through a die, as in the extrusion process. In addition to problems of this type, several others arise, however, from the fact that to benefit the productive industries this knowledge must be applied, and further must be applied in an economic manner, within the structure of a normally constituted manufacturing concern.

These requirements eventually reduce themselves to the plain position that the metallurgist in industry must be well grounded in the theory of the metallic state; must know the theoretical basis of such manufacturing operations as reduction, melting, casting, rolling, forging, or drawing; must possess a sufficient knowledge of the practical means available for applying this knowledge; and, in addition, must fully appreciate the basis on which a manufacturing structure is erected; what are its constituent components; how each component functions; the relationship between them; and how the whole organisation is controlled.

Meeting Industry's Needs

It is evident that such a programme of training is ambitious and is consequently well suited to men of university calibre. But it is not at all too ambitious to meet the needs of the metallurgical industries, which have been expressed more and more loudly and clearly as they have been increasingly realised. In the old days, the industrialist, who took such university men as had trained in metallurgy, used them as backroom boys, generally divorcing them from manufacturing operations, and, but rarely, and then only through pressure from forceful personalities, allowing them any share at all in production or in management. Gradually this practice has altered: partly because a larger number of men of high calibre came from the university schools of metallurgy; partly because metallurgists in industry proved their usefulness in spheres outside those originally allotted to them; partly, too, because an increasing number of university men, trained in other subjects, took service in the metallurgical industries. The leaders of industry realised that men with a university training possessed real assets, and were capable of many more things than examining microsections or estimating the carbon content of a steel. To-day, industry desires that university men shall take a large part in actual manufacture. The industries will staff their research laboratories with graduates, almost as a matter of course, and in recognition of the sound theoretical training such men have received, but, in addition, they ask for university men to take an equally important part in actual production and in the management and control of their factories and their companies.

Knowledge of Fundamentals

The industrial leaders of to-day fully recognise that men cannot be expected to control something they do not understand, and that few men can really understand anything unless they know the fundamentals underlying that thing. It is planned that the Department of Industrial Metallurgy in the University of Birmingham shall provide a training in the fundamentals of the subject which will fit the men taking its courses to accept their place on the managerial or productive side of industry just as naturally as those who study theoretical metallurgy to its highest level enter the research laboratories and institutions of the country.

Training in industrial metallurgy is a training in fundamentals and is in no way technological in the sense that the word is ordinarily used. There is a wide gulf between a training that teaches a man "how it is done" from that which teaches him "why it is done." This applies not only to actual manufacturing processes but equally to the organisation of the factory, its lay-out, its equipment, and its personnel. Behind all these, operations and organisation alike, there is a theoretical background, the acquisition of which constitutes the basis of all successful production. Without a knowledge of the fundamentals, efficiency (and therefore economic success) is difficult to attain and precarious to maintain. And these principles are not peculiar to one or other branch of the metallurgical industries. Rather are they of general application and are treated as such.

The Faculty of Control

The new courses will not turn out an industrial metallurgist in the sense that a graduate leaving the university would be able at once to take complete technical or managerial control of a factory or a department. Such would involve the imparting of a great deal of technological "know how" in regard of some given metal or alloy undergoing a given fabricating process. The time available would necessarily limit such instruction to a narrow range, and detailed information of this nature is better acquired by the graduate after he takes up work in his chosen factory. By giving the whole attention to principles—these being applicable to a wide range of materials and processes—and by using specific metals or processes only to illustrate these principles, the student is far better equipped to acquire, rapidly, accurately, and naturally, the operational details he requires. Having an understanding of the principles, his capacity of assimilation of details is very greatly increased, and it is believed that men trained on this basis will be of service to industry far more rapidly than those trained in any other way. Furthermore, a man with such a background is far better able to apply the results of his own or other people's research to industrial problems.

This briefly indicates the approach to what might be described as the technical side of industrial metallurgy, and the approach to the managerial side is similar. Considerable stress has recently been laid on the lack of training received by science students in the arts of industrial management and administration. The successful functioning of an industrial organisation requires men of the highest calibre, and those possessing scientific knowledge have an obvious advantage over those without it. But the scientist cannot function as a manager or as an administrator without some training. He may acquire a knowledge of these subjects in the school of experience, but that is a lengthy process and rather chancy, both to the individual and to his employer. Whether as undergraduates or graduates, the men reading industrial metallurgy will receive a full and broad knowledge of the structure of metal manufacturing organisations; of the functions of all types of personnel; of the interrelations of departments; of the incidence and ordering of efficiency; of the control of quality and of labour; and of the problems of management. In these subjects the approach again is by the path of "why" rather than "how," by reason rather than by manifestation, the intention being to groom men capable of taking positions of responsibility at all appropriate levels of the industrial structure within a short period of leaving the university.

The Plan of the Course

To implement this plan it is arranged that students in industrial metallurgy shall take the same course as those in theoretical metallurgy for the first three years. (The first year in any case is concerned with physics, chemistry, and mathematics only, and is excused to the majority of entrants by reason of their prior studies.) A certain amount of industrial instruction, such as that concerned with the extraction of metals, has to be given in the second and third years to all students. In the fourth year those taking industrial metallurgy will attend lecture courses in three subjects, the first dealing specially with organisation, efficiency, control, administration, and factory lay-out, the second with the theory and practice of metal melting and casting, and the third with the theory and practice of the hot and cold working of metals. Contemporaneously with the lectures, practical work will be done on plant of a semi-production type, and, in addition, all students must spend a fair time in selected factories. Ample provision is also being made in the Department for post-graduate research work on problems of a fundamental type, and also on more specifically defined problems of the kind that arise so readily and frequently in industrial operations. It is believed that this last mode of training will be exceedingly fruitful and the Department will welcome as workers in this field graduates of any other university equally with those from Birmingham.

U.K. ALUMINIUM

The Ministry of Supply has issued statistics relating to aluminium production in the U.K. during the first three months of 1946. These show that production totalled 19,622 long tons, made up of 8264 long tons of virgin (all unwrought forms) and 11,358 long tons of secondary ingot (excluding recovery from crashed aircraft). Arisings totalled 13,765 long tons (excluding those from crashed aircraft); 76 per cent. were segregated and consumption accounted for 13,004 long tons. Aluminium fabrication was as follows (figures in long tons): sheet and strip, 21,412; foil, 1042; extrusions, 6681; castings, 7061; forgings, 566. The figures for magnesium fabrication are: sheet, 46; extrusions, 10; castings, 258.

NICKEL IN BRAZIL

According to official reports, the nickel deposits in the Brazilian province of Goiás have proved larger and richer than has hitherto been suspected, although their existence has been known at least since the closing years of last century. Local and visiting technicians now reckon that these deposits are the largest in the world, with an average nickel content of 12-14 per cent., rising, in the richest lodes, to 28 per cent. The copper content varies, being usually from 8 to 15 per cent. of the amount of nickel. The ore deposits are situated near S. José do Tocantins, N.E. of the town of Niquelândia, and occupy a belt some 12 miles long. At present they are about 200 miles from the railway terminus at Anápolis, but an extension of the line is contemplated.

The nickel-bearing rock is stated to be mainly serpentine resulting from the decomposition of pyroxenite, but there are also present a certain amount or peridotite, and, much more rarely, garnierite. The capacity of the deposit has been variously estimated at 10 million to 20 million metric tons. Up to the time of Brazil's entry into the war, considerable quantities of the ore were exported to Germany and Japan; the mines will in future play their part in the development of Brazil's steel industry.

The necessities of war and peace, coupled with the inventiveness of British industry, have resulted in the production of new and improved alloys having characteristics which were unobtainable hitherto. Many of the rare metals needed in this field have come from the factory of Murex, Ltd., Rainham, Essex, a description of which is given in one of their latest booklets, "Metallurgical and Chemical Products." Another of the firm's new booklets is "Metals and Metallic Alloys and Carbides," which gives standard specifications and typical analyses.

The Microscope in Metallurgy

II.—Studies at High and Low Temperatures

by L. SANDERSON

(Continued from "The Chemical Age," May 4, 1946, p. 500)

ONE of the difficulties that has always confronted the metallurgist is that his studies of the structure of steel by means of microscopic examination told him only the effects of heat treatment, cold working, etc., as exemplified by the structure of the metal when cooled after quenching. He had no clue to what the structure of the hot metal looked like, and there was always the possibility that some essential fact might be discovered by microscopic examination of heated metal.

Experiments were therefore carried out to ascertain the possibility of etching metal while hot, and some success, though of only a limited character, has been achieved. The first attempt was made as long ago as 1897, when iron heated to a red heat was etched with fused calcium chloride in order that the grain boundaries might be examined after cooling. In 1909, similar experiments were carried out with steel, using chlorine gas and hydrogen chloride, and as a result the structure of the steel was clearly developed. In 1913, the unusual method of heating steel to a high temperature *in vacuo* was adopted as a means of revealing the structure. It was found that different crystal faces gave rise to differential volatilisation, and it appears probable that the existence of minute quantities of oxygen is responsible for this effect. A similar microscopic technique has been employed with success in connection with silver.

Special Furnace

Naturally, observation through the microscope of a test-piece of metallic type throughout the period of heating involves a furnace of novel design. In *Gefügeuntersuchung bei Temperaturen bis* 1100° *C.*, by Esser and Cornelius (*Stahl und Eisen*, May 18, 1933, p. 532), a convenient type of furnace is described. Its floor is a transparent silica plate, which seals it off, and the microscope is located beneath this floor. The furnace itself is of cylindrical form and its ends are water-cooled. By its means, the authors were able to study the α-γ transformation of iron, the decomposition of pearlite and secondary cementite, the austenite-martensite transformation when steel with 2 per cent. carbon and 2 per cent. manganese is tempered, and the temper carbon formation at higher temperatures.

Another problem for the metallurgist was the microscopic examination of metals at low temperatures. This was particularly necessary for metals forming dental amalgams. These contain a proportion of liquid mercury, with the result that at normal room temperature they become pasty. As a means of examining their structure, it was necessary that all the preparatory work on the specimens should be carried out at a temperature below −40° C., while examination under the microscope had also to be carried out at this sub-zero temperature. The method adopted is clearly described in *Proceedings of the Royal Society for* 1927, by Rosenheim and Murphy. The amalgams to be examined, if of mercury or liquid type, are introduced into a small mould of cylindrical form composed of either vulcanite or glass, and having one extremity sealed off by a plane glass slip. The mould is immersed in a paste of carbon dioxide snow and acetone, which freezes it, and after the sealing plate has been removed, a smooth surface is left that can be etched.

Some amalgams are, however, of pasty form. These are placed in a mould built up of two rings, of which one is detachable from the sealing plate, leaving a portion of the frozen amalgam protruding beyond the edge of the mould. If the mould is composed of vulcanite or ebonite, it can be ground down together with the amalgams. The combined mass is held in a clamp of wood and hand-ground, using pieces of emery paper, in the normal manner. It should be noted, however, that the emery paper, before being used, is itself immersed in the freezing paste already described. The final polishing is carried out by means of a wash-leather, but no polishing powder is employed, and the leather is frozen in the same way as the emery. Etching of the specimens is then carried out, employing a solution of 25 per cent. hydrochloric acid,

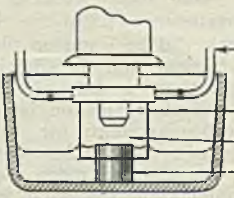


Fig. 8

cooled to −60° C., and washed in cooled acetone without drying. The microscope stage is provided with a special fixture indicated in Fig. 8. Over the objective is fitted a tube of brass carrying a glass tube inside which the specimen is placed, and cooled by the passage of a current of dried air saturated with cooled acetone.

Electronic Examination

It should be noted that the electron microscope is likely to be of great value to the metallurgist in his studies of the behaviour of metals at high temperatures. This type of microscope can be applied to the photography of metal at elevated temperatures. Since the specimen being heated is located at a considerable distance from the photographic plate, without the interposition of glass lenses, it is possible to apply extremely high temperatures. Furthermore, as the effect of the electrons on the photographic emulsion is intense, extremely brief periods of exposure suffice. Thus, the α-γ transformation of iron has been observed, the grain boundaries having been shown up by activation with barium, and the entire process has actually been filmed. Pearlite in steel has been photographed at 40,000 magnifications.

The technique of the electron microscope for opaque objects has not been dealt with so far. It must be remembered that this type of instrument is limited in the examination of opaque objects, such as metals, in a manner precisely similar to the light microscope. Reflection methods adopted as a means of overcoming this restriction have not been highly successful. Oblique illumination provides images lacking in quality, with poor resolution and much distortion. Scanning, which approximates to " vertical illumination " in the light microscope, has numerous problems to overcome before it is possible to consider it a reliable technique. Complex but valuable replica techniques have now been perfected to enable the superficial structures of opaque materials to be reproduced in a transmissible form.

Scanning Technique

In the scanning electron microscope, the procedure resembles that of television, and will produce a direct-recorded image of the surface studied. The field is split up into individual elements scanned in succession by an electron beam or probe having a cross-section of the same order as the individual element. The beam reflected from the surface results from the absorption or transmission of electrons and from secondary emission by constituents within the field. This reflected beam is projected upon a fluorescent screen. Light effects are generated and reconverted into electrical impulses by the photo-cathode of an electron multiplier. These impulses are magnified sufficiently to enable them to operate the printer bar of a facsimile receiver. An electron micrograph can be recorded in approximately eight minutes.

While hitherto no sensational progress in the scanning microscope has been reported, and though the instrument is extremely intricate and expensive, it is believed by many that it is likely to prove the instrument of the future for applications where the replica technique cannot produce the desired results. It has the advantage that little preparation of the subject is required, while the results are obtained more quickly than by the replica technique. It is highly probable that advances in the study of television, fluorescent materials, electron multipliers, and facsimile recording will react favourably on scanning technique.

Replica Technique

The replica technique at present holds the field. It consists in making an extremely accurate reproduction, in an electron-transparent medium, of an etched or otherwise prepared metallic surface. The replica must be made of some substance that is uniform, without defined structure, transparent to electrons, and either positive or negative. How far reaction to electron transmission is effective is governed by variations in cross-section and in the rugosities of the surface subjected to the electron beam. When the result is seen on the fluorescent screen or photographic reproduction, there will be observed modifications in the intensity of light from grain to grain, dark boundaries between the grains and between different constituents, and additional optical effects somewhat resembling those of the light microscope. It should be noted, however, that because of the considerable focal depth, electronic micrographs are often much more arresting than those of the normal microscope, and can be stereoscopically examined with great advantage.

One form of replica is the auto-generated or externally produced oxide or other reaction film on a prepared metallic surface, *e.g.*, the coating of aluminium oxide developed by normal oxidising process or by anodising technique on aluminium and its alloys. This film can be separated from the metal on which it has formed, either by various special techniques, or by floating it off with mercury, the little grains of metal left on it being afterwards dissolved away. About ten minutes are necessary for the film to appear and be removed. It is then floated on water over a screen of fine mesh, and transferred for electronic magnification.

Another replica method comprises depositing and detaching a thin film of polyvinyl formal on an etched surface. A third is the prior condensation of a thin film of evaporated silver on the metallic surface, thus obtaining a positive replica in collodion. A fourth is to condense evaporated silica on a polystyrene negative moulded to the original metal and then isolated, thus obtaining a positive replica in silica. This last technique gives superior resolution and detail, but as compared with the previous method takes far longer (about 2 hrs.). The polystyrene technique may on occasion require undesirable pressures. The silica film obtained as a result of condensation completely wets and covers the negative polystyrene replica; it possesses a virtually flat external surface; it has no defined structure; and in thickness of 100 to 200 A.U. resists the electrical charging effects caused by the beam. Hence a layer of this type is not only satisfactory from the mechanical point of view, but also surpasses alternative materials in resolution and delineation of form at maximum resolution.

The electron image derived from a contact replica, whether positive or negative, is caused by modifications of thickness in addition to alterations in inclination and elevation. It is stated that variations in elevation of 20 A.U. on the prepared metallic surface are discernible by the silica replica, while spots 150 A.U. apart on the metallic surface are capable of resolution. With other techniques a much lower resolution limit is obtainable.

It has been satisfactorily established that the replica method gives exceptionally accurate reproduction of prepared surfaces, and it has even been extended to the study of friction, lubrication and wear. Nevertheless, there are risks attendant on the use of this technique. In the first place it demands skilled manipulation of the polystyrene negative and the correct apparatus both for moulding and isolating the film, and for evaporation and condensation of the silica on the moulding. Whatever errors are made in these operations are infallibly shown up on the screen, and may seriously mislead the research worker. The surfaces to be examined by electron microscopy must also be prepared with the greatest possible attention to detail. Successive and painstaking polishings and etchings must be carried out to obviate any possibility of distortion of the surface, and to produce the requisite fine etching of constituents, grain boundaries, etc. Similarly, the photographic and development work must be beyond reproach.

Limitations of the Method

The chief limitation of the replica method is that resolution for metals does not go below 100-150 A.U., whereas 20-30 A.U. is obtainable with the direct-transmission method working on transparent subjects. Hence for opaque objects it appears inevitable that the scanning method is the only technique ultimately likely to produce resolutions approximating to those of the transparent subject.

It should be noted that the structure of thin condensation metallic films has been examined by the direct transmission method. A resolving power of approximately 30 A.U. on films of aluminium, gold zinc, cadmium, copper, and magnesium has been produced on substrates transparent to electrons by evaporation from filaments of tungsten, molybdenum, and chromium-aluminium. It was thus proved that atoms could migrate over the condensing substrate, forming crystalline aggregates with interstices between them. The mechanics of mirror formation have also been elucidated to some extent, while optical reflectivity and ability to absorb and adsorb metal condensed from vapour have been investigated.

Diffraction Technique

Diffraction methods are also being employed, and the standard existing electron microscopes can be suitably adapted to this procedure. Interpretation of the patterns obtained corresponds broadly to that of X-ray patterns. The technique can be used as a means of ascertaining the form and size of the elementary cell of the crystal. Given adequate data for identification, it is also possible to decide what compounds are present. Opaque specimens are rotated into a position of grazing incidence for the beam.

The latest development is the electron micro-analyser in which an electrode probe separates electrons from their parent atoms in the specimen. The energy absorbed varies for every chemical element, and the variations are sufficiently great to be measurable by existing techniques for measuring the velocities of electrons. While this technique does not yet appear to have been applied to the examination of opaque metallic surfaces, there is reason to believe that it will soon be applied to the identification of surface films, products of corrosion, etc.

The electron microscope has so far been used in metallurgy mainly as a means of investigating microstructures not capable of resolution by the optical microscope; to examine the surface films on metals; to establish the shape and dimensions of crystals and other properties of minute inclusions or precipitated constituents; and to carry out basic investigations into pure metals and solid solutions, with regard to their strength, form of distortion, etc.

German Chemical Industry

Revival in Greater Hesse

THE region of the middle Rhine and lower Main is one of the most important centres of chemical manufacture in Germany. To-day this region forms one of the three "Länder" into which the U.S. occupation zone has been divided, and much of the industrial reconstruction work in Greater Hesse has been concerned with chemical and allied trades. Both the U.S. Military Government and the regional and local German authorities have done their best to continue operations in these chemical factories. The chief difficulty encountered is that of raw material supplies.

There is normally a heavy industry with iron and steel works in the Lahn and Dill district, and one of the local steelworks, that of Buderus at Wetzlar, is now producing calcium carbide, which is urgently needed for mining lamps and in welding and cutting, and used to be obtained from other parts of Germany. As there was no calcium carbide production in Greater Hesse, two electric furnaces of 1000 and 1400 kW, normally used for metal smelting, were brought into service. Production now amounts to 50 tons a month, which could be raised to 150 tons if the necessary raw and auxiliary materials could be made available. While the first experiments were made with a view to making carbide for the company's own requirements, part of the output is now distributed through the regional economic office to other users. Production costs, however, are stated to be high.

Large quantities of sulphuric acid were found in armament factories at the time of the collapse, and in future all local needs will be met by the plant at Höchst provided that sufficient pyrites can be obtained from the British zone. The war-time shortage of phosphates still persists, although allocations for the U.S. zone are reported to have been increased from 40,000 to 120,000 tons, as compared with estimated requirements of 200,000 tons, of which Greater Hesse accounts for 75,000. Nitrogenous fertilisers are also in very short supply, since arrivals from Oppau and Leuna are small and irregular. The cyanamide requirements, estimated at 35,000 tons, must also be procured from other parts of Germany, but a source of potash is available near at hand.

Glass Industry Proposed

It is intended to build up a glass industry in Greater Hesse, for which sand and lime are available from local resources. Soda supplies, however, are difficult, as the capacity of the Heilbronn plant is not large enough to cope with any increase in demand; formerly, substantial quantities of alkalis were obtained from Eastern Germany. Similarly, the region depends on imports from other zones for caustic soda for paper and soap manufacture. Altogether, it has been found that many raw materials are now in short supply, because trade with other zones is still strictly limited, but if these critical raw materials could be obtained in adequate quantities, there would be no plant or labour shortages.

Welding Research

Leading Industrialists Contribute

APPLIED science and engineering industry in the widest range are well represented on the new Council of the British Welding Research Association, the President of which is Sir William Larke, K.B.E. SIR STANLEY V. GOODALL, K.C.B., who was largely responsible for the designing of the Royal Navy's fighting ships that gained command of the seas in the recent war, has been appointed chairman of council of the Research Association, and in that capacity Sir Stanley will be largely responsible for guiding the development of a department of science in which he has long been interested and made notable contributions, as one of the pioneers of large-scale applications of welding to ship construction.

In view of the extremely broad scientific and industrial scope of welding, research and development, the council has been formed on the widest possible basis.

The Governing Council

The council, which is the governing body of the British Welding Research Association, and over which Sir Stanley Goodall will preside, is as under:

MR. J. W. BAILLIE, vice-chairman of the British Constructional Steelwork Association; PROFESSOR J. F. BAKER, O.B.E., M.A., Sc.D., of the Chair of Mechanical Sciences, Cambridge University; MR. HENRY BERRY, M.P., chairman of the Metropolitan Water Board; SIR LESLIE BOYCE, K.B.E., chairman and managing director of the Gloucester Railway Carriage & Wagon Co., Ltd.; MR. I. R. COX, managing director of Metropolitan-Vickers Electrical Co., Ltd.; SIR CLAUDE GIBB, C.B.E., chairman and managing director of C. A. Parsons & Co., Newcastle-on-Tyne; MR. G. R. GRANGE, a director of Alexander Stephen & Sons, Ltd., shipbuilders and engineers, Glasgow; LT.-COL. SIR JOHN GREENLY, K.C.M.G., C.B.E., chairman of Babcock & Wilcox, Ltd.; MR. V. E. GREENWOOD, a director of Murex Welding Processes, Ltd.; SIR WILLIAM J. LARKE, K.B.E., director of the British Iron & Steel Federation; DR. A. MCCANCE, F.R.S., deputy chairman and joint managing director of Colvilles, Ltd.; COMMANDER SIR ROBERT MICKLEM, C.B.E., R.N., deputy chairman and managing director of Vickers-Armstrongs, Ltd.; DR. J. H. PATERSON, managing director of Arc Manufacturing Co., Ltd.; Mr. R. B. Shepheard, chief ship surveyor, Lloyd's Register of Shipping; Sir Frederick A. Stewart, D.L., chairman of Thermotank, Ltd., Glasgow, of Kelvin, Bottomley & Baird, Ltd., Glasgow, and of the North British Locomotive Co., Ltd.; Sir Ewart Smith, a director of Imperial Chemical Industries, Ltd.; Mr. A. J. G. Smout, a director of Imperial Chemical Industries, Ltd.; Mr. C. M. Spielman, M.C., managing director of Whessoe, Ltd.; and Mr. W. W. Watt, managing director of British Oxygen Co., Ltd., and president of the Institute of Welding.

Professor Baker is also chairman of the Association's Welding Research Board, which directs the technical side of the investigations.

LETTERS TO THE EDITOR

Library Chemists

Sir,—In view of your remarks on library chemists in The Chemical Age for May 4, it may interest your readers to know that this is a well-established profession in this country.

They are employed particularly in the research sections, not only in Government laboratories and research associations, but also by a variety of industries in the fields of light, heavy, and electrical engineering, steel, non-ferrous metals, plastics, food, photography, building materials, etc.

The Association of Special Libraries and Information Bureaux (ASLIB) was founded in 1924 to provide a meeting-ground and forum for their activities. The Association has grown in strength steadily, particularly during the war, wherein scientific information services played a not inconsiderable part.—Yours faithfully,

E. M. R. Ditmas,
General Secretary, ASLIB.

52 Bloomsbury St., London, W.C.1.
May 24.

British Electron Microscopes

Sir,—We are sure that in fairness to British industry, you will correct a misstatement which appears in your issue of April 27, p. 442, col. 2, to the effect that electron microscopes are not made in this country. In correction of the impression given, we would inform you that:

(a) The electron microscope was first developed in this country. This company produced one in 1936, and development in the United States followed in 1938 or 1939.

(b) Despite some interruption of this work by the war Metropolitan-Vickers continued the development, and two years ago produced a 50 kV microscope giving a visual image of × 10,000 magnification, with such resolving power as to allow a further ×5 magnification by photographic enlargement, *i.e.*, giving total enlargement of × 50,000 in photographs.

(c) This instrument (which is described in this company's leaflet D.L.902/17-1) has a performance at least comparable with the best obtained in the United States or elsewhere.—Yours faithfully,

K. G. Maxwell,
Metropolitan-Vickers Electrical Co., Ltd.

Manchester, 17.
May 24.

[We regret the injustice unwittingly done to the enterprise of British manufacturers. —Ed.]

Welsh Industries Fair

Interesting Chemical Exhibits

No one who had known South Wales during its dismal "Special Area" period could fail to be amazed and cheered on touring the Welsh Industries Fair, which opened at the Drill Hall, Cardiff, on Monday, and closes to-day. The National Industrial Development Council of Wales and Monmouthshire, who organised it, has every reason to be proud of this fruition of 14 years' steady development. When the prosperity of the Welsh coal and steel industries declined, and unemployment was up in six figures, it became clear that the only thing to do was to develop new and varied light industries. Many scoffed, but it has been done.

Mr. H. A. Marquand, M.P., Parliamentary Secretary to the Board of Trade, in declaring the exhibition open, had great hopes for the future of Wales. He fully stressed the need for these new industries, but pointed out also that all this was of no avail without adequate production of coal, steel, and building materials.

The chemical and metallurgical industries will play an important part in the prosperity predicted for Wales by the speakers. I.C.I. (Metals Division) exhibited copper and yellow-metal sheets and light alloy billets, while T. Dryden, Greenfield Chemical Stores, Landore, showed a wide range of laboratory apparatus and materials in glass, fireclay, and other materials, together with a number of thermometers of all sizes and types. Interesting samples of pure manganese and alloys, such as manganese-copper and silicon-copper, were exhibited by Metal Alloys (South Wales), Ltd., who are on the Treforest Trading Estate, while Silicon (Organic) Developments, Ltd., who manufacture on the Bridgend Estate, demonstrated the use of ethyl silicate in precision casting, and in other directions where its refractory and electrical-resistant qualities are of value.

A CHEMIST'S BOOKSHELF

FORENSIC CHEMISTRY AND SCIENTIFIC CRIMINAL INVESTIGATION (4th Ed.). By A. Lucas. London: Edward Arnold. Pp. 340. 25s.

Beauty, though it may be acclaimed unanimously, will inevitably defy analysis. In like fashion, the precise property or properties which convert a book into a classic would be very difficult to define. However, as a rule, very little deliberation is required in order to determine whether a book falls into this category. The properties are, *in situ*, unmistakable.

This book has for many years been the unchallenged classic work in its field. During the time in which criminology was being developed into a science through which the detection of the criminal became surer (and on which, on the side, the detective story writer has waxed fat) the scientist—as the term is usually interpreted—and in particular the chemist, were, strangely enough, a very small part of this development. Thus, the well-known work of Gross approaches criminal investigation from the point of view of the police officer. Glaister's *Medical Jurisprudence* focussed attention on the medical man as a pivotal specialist, and more specialised works often put no premium on special chemical knowledge. For example, Osborn's *Questioned Documents* tends to lay stress rather on the examination of and close familiarity with the physical characteristics of writing, paper, and so forth, and is less concerned with a chemical examination of the evidence.

A much-needed corrective to this attitude was applied by the appearance of the first edition of this book, which first clearly defined forensic chemistry, and drew attention to the need for specialised treatment. The author stipulated that for the practice of this branch of science a medical qualification, though useful, is neither essential nor (which is less generally recognised) sufficient. Since its first appearance, the book has grown in scope and stature, until it now provides a well-documented and essential work for anyone who would practise the application of chemical methods to legal problems, either criminal or civil.

One might almost go further, and assert that a close study of certain parts of the book could provide a salutary part of the training of any analyst. The reviewer has particularly in mind the introductory chapter, in which the practice of forensic chemistry is considered under three heads: (1) the reception of the article to be examined, (2) the examination, and (3) the communication of results. It might be pointed out that the job of the analyst in general resolves itself under these three heads; and the instructions and exhortations here set forth would not come amiss to any student.

This new edition is not, it must be admitted, flawless. But most of the reasons for which it can be criticised are undoubtedly consequent just on its possession of the status of a classic. In the early days it was necessary to stress details of chemical procedure not now so essential, since it is generally accepted to-day that a chemist should be the man to practise forensic chemistry. So that one comes on incongruities of detail, such as the explanation, in a footnote, of the volume-nomenclature for the strength of hydrogen peroxide, in a book which elsewhere refers to microchemical tests, without details of procedure, as being within the compass of the operator. Again, it is questionable whether the tests described for the recognition of inks, or for the identification of metallic particles on files, for example, are the best now available. They would appear to be chosen with a view to ready availability of reagents, especially to the non-chemical investigator. But it is just in the hands of such an investigator that the tests quoted might be expected to give unreliable results.

A few instances have been noted where the page-numbers given as cross-references do not appear to have been altered for the new edition; while the authors mentioned in the copious bibliographies attached to each chapter might profitably have been included *in toto* in the index, instead of according to some rule of choice whose nature the reviewer has been unable to determine. These criticisms can, however, be safely offset by the general excellence and undoubted importance of the work as a whole. It is greatly to be regretted that the announcement of the death of the author should so nearly coincide with the appearance of this new edition of the valuable contribution to a field with which his name will always be intimately associated.

CECIL L. WILSON.

THE B.D.H. BOOK OF ORGANIC REAGENTS FOR ANALYTICAL USE (9th Ed.). London: The British Drug Houses, Ltd. Pp. 196. 4s. 6d.

Owing to the war nearly five years have elapsed since the eighth edition of "The B.D.H. Book of Organic Reagents" was published; and the appearance of the ninth edition is indeed welcome.

In preparing the present volume the editors have again followed the practice of omitting monographs describing methods of analysis which extended experience has shown to possess only a limited value, and introducing new matter relating to procedures which depend on the use of organic reagents not described in earlier editions. Thus, while descriptions of the method of use of three reagents have been omitted, monographs dealing with four additional reagents appear in this edition, the newly described reagents being triketo-hydrindene hydrate (for free amino acids), 8-hydroxy-quinaldine (for the gravimetric determination of zinc), benzyl-*iso*-thiourea hydrochloride (for the characterisation of sulphonic acids), and *p*-nitrobenzene-azo-orcinol (for the colorimetric determination of beryllium). In addition, "Morin," a reagent for the colorimetric determination of aluminium, has now been preferably described as 3 : 5 : 7 : 2′ : 4′-pentahydroxy-flavone instead of tetrahydroxy-flavonol.

The present edition contains 41 more pages than its predecessor, so that the increase of one shilling in its price cannot be deemed unreasonable. As the editors modestly hope, the book does indeed serve as a handy laboratory guide, not only to analytical chemists, but also to any scientific investigator who has occasion to conduct delicate analyses without having had the leisure to keep abreast of the increasing complexities of this branch of chemistry.

MODERN CHEMISTRY. By A. J. Berry, M.A. Cambridge: The University Press. Pp. 240. 10s. 6d.

The importance of a proper historical perspective is generally recognised by teachers, but the older works on this subject necessarily give great prominence to the work of the pioneers while dismissing later work in a few words. Important as was the work of the pioneers, it is arguable that it is of even more importance to modern chemists to follow step by step in chronological order the manner in which the more recent discoveries have been made. While the student of political institutions cannot afford to neglect what was done before the Conquest or before the Restoration, that is no more than a background against which modern developments must be studied if he wishes to obtain a clear picture of the way in which we are now governed. So it is with chemistry. Mr. Berry, who is University Lecturer in Chemistry at Cambridge, deserves our thanks for focussing attention on the development of some of the newer branches of science, among which may be mentioned: classical atomic theory; electrochemistry; stereochemistry; radioactivity; isotopes and atomic numbers; gases; solution; and chemical change. He has selected these subjects to illustrate his theme, and he has wisely not attempted to cover the whole field.

Chemistry has changed considerably in character over the past century. One of the changes has been a transformation from a largely descriptive science into an exact science. Another has been the extent to which physics has been combined with chemistry to form physical chemistry and to assist in chemical investigations. At one time chemists were chary of accepting conclusions based on physics; history has changed that attitude. The quantum theory, with its effect on the atomic model, is an example. Progress in the synthesis of natural products has been another feature of recent years, and there is no doubt that the biochemical aspects of organic chemistry will become of increasing importance; one needs only to mention penicillin to be certain on that score. The conclusion is that modern science is getting less and less into water-tight compartments, and that one branch of science is reacting upon another with great acceleration in the rate of advance. In the same way, industrial chemistry has been based on discoveries in pure chemistry, and it seems possible that—if anyone lives who could undertake the task—a comprehensive history of science and of industrial applications would make fascinating reading. Failing that, we heartily recommend this fascinating book as showing the logical connection between the facts and enabling us to see things in their true perspective, without which advances in fundamental science would be almost impossible. The research worker, above all others, needs to know something of the stages and methods of thought by which the conceptions which he now regards as truth were formulated and came to be accepted. This book will help him materially in that direction.

THE CHEMICAL ANALYSIS OF FOODS (3rd Ed.). By H. E. Cox. London: Churchill. Pp. 317. 24s.

This book, well known in its earlier editions, is designed not so much for the specialist in food analysis, but rather for the general analyst who may from time to time require to deal with food problems, or for the chemist who is primarily concerned with one type of food, but who may have occasion to handle other products less frequently. Thus, while the detail given is considerable, sufficing adequately for a laboratory handbook over a wide range of methods, the author obviously cannot, in a work of this size, give full information on all the many branches with which he deals. Therefore, in addition to a surprising amount of detailed information given within these covers, ample references guide the seeker to sources which will be of further help in his work.

In this new edition, the more important of the many recent advances in food analysis are included, always with due regard to the unusual standards which have been set during war-time. So that war-time standards are, in general, only considered where it is likely that they will have some permanence. As a reference book of value, this should be on the shelves of any general analyst; and it is probable that even specialists in food analysis will find it of use when they wish to refresh their memories rapidly on topics with which they have not had recent contact.

General News—From Week to Week

The office of the works general manager of Waterlow & Sons, Ltd., is now at Bloomfield House, 85/86 London Wall, E.C.2. (Tel., BIShopsgate 5400).

The Government of Eire is about to introduce legislation creating an Industrial Research Institute. One of its functions will be the periodic testing of manufactured goods.

Reduced night rates are available from tonight on the telephone services between Britain and Canada, the U.S.A., Cuba, and Mexico. The reduced rates (£2 5s. to the U.S. and Canada, except British Columbia; £3 elsewhere) apply between 10 p.m. and 10 a.m. British time.

Mono Pumps, Ltd., have now moved to their own premises, Mono House, 67 Clerkenwell Road, London, E.C.1. When the necessary constructional alterations have been completed, the research and development station, at present at Bromley-by-Bow, will also be installed on the premises.

The University of London has accepted an offer from the trustees of the late Sir Henry Wellcome of a sum of £74,000 for the endowment of the Chair of Pharmacology tenable at the College of the Pharmaceutical Society, and henceforward to be entitled the Wellcome Chair of Pharmacology.

Recommendations for the reorganisation of the ironfounding industry in Scotland have been made by the Forth Valley Industrial Development Council, who recently examined the problems confronting the light castings industry in the East Stirlingshire area.

In the course of their visits to a number of provincial centres, the delegates to the Imperial Press Conference, which is being held in London this month, will inspect some of the most important industrial work, including the Port Sunlight factories of Lever Brothers and the Billingham establishment of I.C.I.

Refresher courses for ex-Service paint men, held recently under the auspices of the London section of the Oil and Colour Chemists' Association, were so successful that they are being repeated at the Borough Polytechnic, Borough Road, London, S.E., on June 4, 11, 18 and 25, from 6.30 p.m. until 8 p.m. each evening.

In accordance with an announcement made by the Minister of Food on April 30, an order has now been made with effect from June 30, revoking the Vitamin B_1 (Control) Order, 1941, which provides for the control of the manufacture, production, sale and use of Vitamin B_1 for any purpose except medicinal, pharmaceutical or scientific purposes.

Speaking at the Slough branch of the B.A.C., on "Heat Transfer in Chemical Processing," Mr. W. C. Peck discussed the velocities of fluids flowing through copper tubes and demonstrated differences between viscous flow and turbulent flow, drawing attention to the stagnant flow close to the wall of the tube in the latter, which had been the basis of much aerodynamic research.

The National Union of Manufacturers has issued a memorandum setting out its views on the nationalisation of the iron and steel industry, and expressing its strong feelings that it is contrary to the national interest to interrupt the industry's development plans at this juncture and, in the place of ordered progress, engender uncertainty and anxiety throughout a large proportion of our commercial life.

The report of the chairman, Mr. L. P. O'Brien, at the annual meeting of B. Laporte, Ltd., this week, stated that planned extensions of the company and its subsidiaries operating at Luton went to the limit of the potentialities of the site. For the manufacture of new products and additional quantities of others, the company must go further afield. For example, additional production of hydrogen peroxide was envisaged at Warrington.

The May issue of Fuel Efficiency News alludes to the scope for improving the utilisation of fuel, and states: "Proof of the standard of efficiency that is obtainable is provided by the experience of the largest chemical works in the country. At this works fuel efficiency had always been regarded as being of prime importance; nevertheless, during the past three years, no less than 67 new schemes have been completed, saving 49,510 tons of coal a year. At this same works 39 further schemes are under consideration which will save another 100,000 tons of coal a year."

A tribute to a great chemist was paid on May 15 at the Royal Society of Arts, when Professor C. S. Gibson delivered the first Sir William Jackson Pope Memorial Lecture, the subject being the life and work of Pope himself. No more appropriate lecturer could have been found, as Professor Gibson collaborated with Pope from 1901 onwards in his work at the new School of Technology in Manchester. Nationally and internationally, Pope was a great man in the history of chemistry and chemical education. Professor Gibson justly described him as "the best educated and most cultivated scientist I have met," yet he never took a university degree.

What is described as "a very substantial" grant has been made to Liverpool University by the Government in connection with atomic research. As a result, a new building for nuclear physics will be erected, and the most up-to-date equipment is to be installed. This will include a very much larger cyclotron than that with which Sir James Chadwick and his staff have hitherto done their fundamental work, and a high-pressure electrostatic generator to produce very high voltages.

Application has been made to the Board of Trade for the registration of a projected British Feltmakers' Research Association with limited liability without the addition of the word "limited" to its name. Among the objects of the proposed Association are: the promotion of research and other scientific work in connection with feltmaking; the maintenance of laboratories, workshops, etc., to carry on experiments; and the provision of funds for such work and of payment to persons engaged in it.

On Thursday last week the main drawing office of George Kent, Ltd., Luton, was damaged by a fire which spread rapidly despite the fire-resistant qualities of the building and the automatic extinguishers. Much of the drawing work in progress was removed, and it is hoped that more can be salvaged, while the production shops were unaffected. Valuable assistance was received from other firms in the town; within 48 hours half the staff were provided with alternative accommodation, and the remainder were rehoused within four days.

Foreign News

The U.S. steel industry is reported to be preparing to make a strong effort to gain the South American market, once pent-up domestic demand has been met.

Permission has been granted to the Unión Química del Norte de España to construct two factories in the province of Vizcaya (locality not stated) for the production of cuprous oxide and of solvents, according to *Ion* (1946, *6*, 175).

Soap production in South Africa is continuing to expand. It was revealed recently that in 1944 the Union exported 6,732,609 lb. of soap and in 1945 5,446,828 lb. The quantity of soap supplied as ship's stores in 1944 was 356,490 lb., and from January to November last year 172,110 lb.

The latest issue of the Year Book of the Chemists' Club of New York, a copy of which reached us recently, covers the period 1942-46. Besides the usual detailed lists of members, rules, etc., it contains an interesting outline of the Club's history, which has an intimate relation with the growth of chemistry and industries based on chemical science in the U.S.

Scrap-metal firms in the regions of the Rhineland, Westphalia, Lippe, and Schaumburg-Lippe, have been united in a new trade association, with headquarters at Dortmund.

Search for oil in Papua is to be resumed by Oil Search, Ltd., which, before the war, spent large amounts in exploratory work in Australia and the Northern Dependency.

The establishment of a mixed Bulgarian-Soviet mining company, to study and exploit Bulgaria's mineral resources, is envisaged in a draft bill recently submitted in the National Assembly.

Proposals for an expansion of the South African Alkali Company, with the acquisition of additional chemical and pharmaceutical interests, will be submitted to shareholders of that company at an early date.

The production of antimony in Sardinia at the end of 1945 was almost normal. In Tuscany, the Macchia Casella has resumed operations, but the Rosia mine is closed owing to the destruction of the beneficiating plant.

The Consolidated Mining & Smelting Co. of Canada, Ltd., has purchased from the Dominion Government two chemical plants—one near Calgary, Alberta, and the other at Trail, British Columbia. Both are now producing a fertiliser compound composed mainly of ammonium nitrate.

A new process for the reclamation of deformed shaped steel by a method of cold moulding is reported from Germany. It is stated that deformed girders can be straightened without losing in strength. The cost of this new process is said to be 60 per cent. below that of new material.

Two new chemical factories for the production of various chemicals established recently in Spain are the Laboratorios Andrómaco S.A. in Madrid, with a capital of 2 million pesetas, and the Industrial Química Ibérica S.A. in Barcelona, with a capital of 1.2 million.

In the Belgian province of Limbourg, according to Belgian Press reports, borings have located a new seam of coal, representing a reserve of 700 million metric tons, and application has been made for a mining concession covering 3724 hectares (nearly 16 sq. miles) in the districts between Bree and Maeseyck.

It is reported from Australia that the first reports have been received from the Australian scientific mission in Japan. Among the first batch is a technical study of the manufacture of agar-agar, virtually a Japanese monopoly before the war. Copies of the reports are available for inspection at the Chamber of Manufactures in each state and at Canberra, but no announcement of their publication has yet been made.

It is reported that the South Australian Government proposes to encourage the further prospecting for uranium of an area at Mount Painter which, two years ago, at the request of the British Government, was examined by geologists and geophysicists. About £59,000 was spent, and a few tons of uranium ore located.

Tasmanian mines produced ores and metals last year to the value of £2,200,000 and employed 5178 men. The following are the quantities of chief minerals and metals mined: Coal, 149,000 tons; copper, 7472 tons; lead, 6298 tons; tin, 801 tons; wolfram, 211 tons; zinc, 15,609 tons; pyrites, 40,168 tons; asbestos, 276 tons; gold, 13,050 oz.; silver, 816,157 oz.

The Dutch superphosphate industry has made great strides recently and has fully regained lost ground, thanks to regular large imports of phosphate rock, and to the recovery of the domestic sulphuric acid industry. Attention is now being turned to the possibilities of foreign markets when, as is hoped, the producers' output exceeds the pent-up home demand.

Shipments of chrome ore from the Philippines to the United States have been resumed with a consignment of 3000 long tons of refractory ore for Baltimore. A further shipment of 2500 tons is scheduled. The Benguet Consolidated Mining Company has acquired new mining equipment and hopes to export 5000 tons monthly, with a possible increase to 10,000 tons later on.

Details of the new commercial agreement between Switzerland and Belgium-Luxembourg include the import into Belgium of aluminium and alloys and products thereof, cellulose nitrate, carborundum, silicon carbide, glacial acetic acid, hydrogen peroxide, and nitrogen fertilisers; into Switzerland of naphthalene, copper sulphate, dicalcium phosphate, zinc oxide and zinc dust, copper, zinc, tin, cadmium, and antimony metal, iron and steel products, and pottery and glass.

The huge development in copper production in Namaqualand (S.W. Africa) during the war has hitherto been veiled in secrecy, but it is now recorded (*S. Afr. Min. and Eng. J.*) that the American-controlled Ookiep Copper Co. spent £409,000 in 1940-45 on the development of the East Ookiep mine. In those five years the Namaqualand mines yielded 64,047 short tons of copper, the average daily output in recent times being 50 tons. Last year the company's Nababeep mill treated 511,765 tons, assaying 2.66 per cent. copper, with a yield of 28,203 tons of concentrates assaying 42.08 per cent. copper.

Forthcoming Events

June 5-28. The Tea Centre, Lower Regent Street, London, S.W.1, 10.30 a.m. Exhibition of Chemical Discovery.

June 5. Institute of Welding. Institution of Civil Engineers, Great George Street, Westminster, London, S.W.1, 2.30 p.m. Annual general meeting, discussion and dinner.

June 5. Society of Chemical Industry (Food Group). Indian Lounge, Winter Garden, Blackpool, 10 a.m. Joint meeting with Royal Sanitary Institute (Food and Nutrition Section of R.S.I. Health Congress). Mr. W. B. Adam, Dr. Ethel M. Cruickshank, Dr. E. Kodicek: "Nutritive Value of Processed Foods."

June 6. The Chemical Society and University of Oxford Alembic Club. Physical Chemistry Laboratory, South Parks Road, Oxford, 2 p.m. Sir Robert Robinson, Mr. J. M. G. Pryce, Professor C. N. Hinshelwood, Dr. D. D. Woods, Dr. E. B. Chain: "The Chemistry of Anti-Bacterial Substances."

June 13-26. Dorland Hall, Lower Regent Street, London, S.W.1, 11 a.m. Johnson, Mattley & Co., Ltd.: exhibition of specialised products and services.

New Companies Registered

C. B. Powell, Ltd. (410,904).—Private company. Capital £500 in £1 shares. Dealers in chemical tools and plant, etc. Director: C. E. Powell. Registered office: 4 Pavilion Buildings, Brighton.

Henry Brompton Trading Company, Ltd. (411,028).—Private company. Capital £500 in £1 shares. Manufacturers of and dealers in plastics, chemicals, fertilisers, etc. Director: L. Reisz. Registered office: 240 High Holborn, W.C.1.

Nukemco Laboratories, Ltd. (410,803).—Private company. Capital £100 in £1 shares. Manufacturing chemists, druggists, etc. Subscribers: J. S. Davies, J. H. Gadsden. Solicitors: Rhys Roberts & Co., 5 New Court, Lincoln's Inn, W.C.2.

E. & R. (Exporters) Ltd. (410,683).—Private company. Capital £1000 in £1 shares. Chemists, druggists, chemical engineers, etc. Subscribers: A. L. Pears, C. G. Shaw. Registered office: 24 St. Mary Axe, E.C.3.

Walverdene, Ltd. (410,732).—Private company. Capital £2000 in £1 shares. Manufacturing, analytical and wholesale and retail chemists, druggists, etc. Directors: L. Clough, H. Clough, J. Haythornthwaite. Registered office: Central Chambers, Market Street, Nelson.

Hector Gill (Blackpool) Ltd. (410,051).—Private company. Capital £1500 in £1 shares. Manufacturers of and dealers in cement, adhesives, pastes, chemicals, etc. Directors: J. H. Gill, Marion Gill. Registered office: 7 Cross Street, Blackpool.

W. A. Hill (Westbourne), Ltd. (410,450).—Private company. Capital, £1000 in £1 shares. Wholesale and retail chemist and druggists, chemical engineers, etc. Subscribers: S. Rose; J. T. Headley. Registered office: 4 Westbourne Grove, W.2.

Associated Bleach Co., Ltd. (410,463).—Private company. Capital, £1000 in £1 shares. Chemical manufacturers, chemists, druggists, etc. Directors: G. F. Gordge; B. Ballon. Solicitor: Asher Fishman, 12 Devonshire Row, E.C.2.

Trustin Ltd. (410,097).—Private company. Capital £5000 in £1 shares. Manufacturing, wholesale and retail chemists, pharmacists, druggists, etc. Directors: E. C. S. Backhouse, P. C. Backhouse, D. S. Backhouse, C. F. Mackenzie. Registered office: 6 Corporation Street, Birmingham.

Gamo Chemicals (London), Ltd. (410,491).—Private company. Capital, £500 in £1 shares. Manufacturers of and dealers in chemicals, fine chemicals and chemical products, etc. Subscribers: G. Ader; Dr. H. Ader, 9 Gilling Court, Belsize Grove, N.W.3.

Finsbury Bottle Co., Ltd. (410,040).—Private company. Capital £1000 in £1 shares. Manfacturers of and dealers in glass bottles, chemicals, gases, drugs, etc. Directors: A. J. Read, W. J. Fraser, Arthur J. Read, Junr. Registered office: 169 Hackney Road, E.2.

Weller Bros. (Mouldings), Ltd. (401,001).—Private company. Capital £1000 in £1 shares. Manufacturers, importers and exporters of and dealers in plastic materials and products, chemicals, etc. Directors: C. D. Weller, S. T. Weller. Registered office: 8 South Side, Clapham Common, S.W.4.

United Metal Electrodes and Welding Equipment, Ltd. (410,200).—Private company. Capital £10,000 in £1 shares. Manufacturers and suppliers of and dealers in apparatus and accessories for use in welding, chemical and other scientific apparatus, etc. Directors: B. Turner, L. J. Yeoman. Registered office: 14 Howick Place, S.W.1.

Studio Lamba, Ltd. (409,993.—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in plastic moulding, wood and metal materials and compounds, and organic and inorganic chemical substances and products, etc. Subscribers: Rose M. French, Elizabeth Howard. Solicitors: Mawby Barrie & Letts, 62-4, Moorgate, E.C.2.

Mono-Plastics, Ltd. (410,071).—Private company. Capital £35,000 in 200,000 ordinary shares of 1s. and 25,000 7 per cent. participating cumulative preference shares of £1 each. Manufacturers, importers and exporters of and dealers in all kinds of plastics and composite structures, moulding and chemical powders, etc. Directors: V. N. Scott, A. A. Henley. Registered office: 19 Grosvenor Place, S.W.1.

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.)

C. & D. PRODUCTS (BRISTOL) LTD., druggists, chemists, etc. (M., 1/6/46.) May 1, mortgage, to Martins Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 1 Park Avenue, St. George, Bristol, together with plot of land at rear and plant, machinery, etc.

Company News

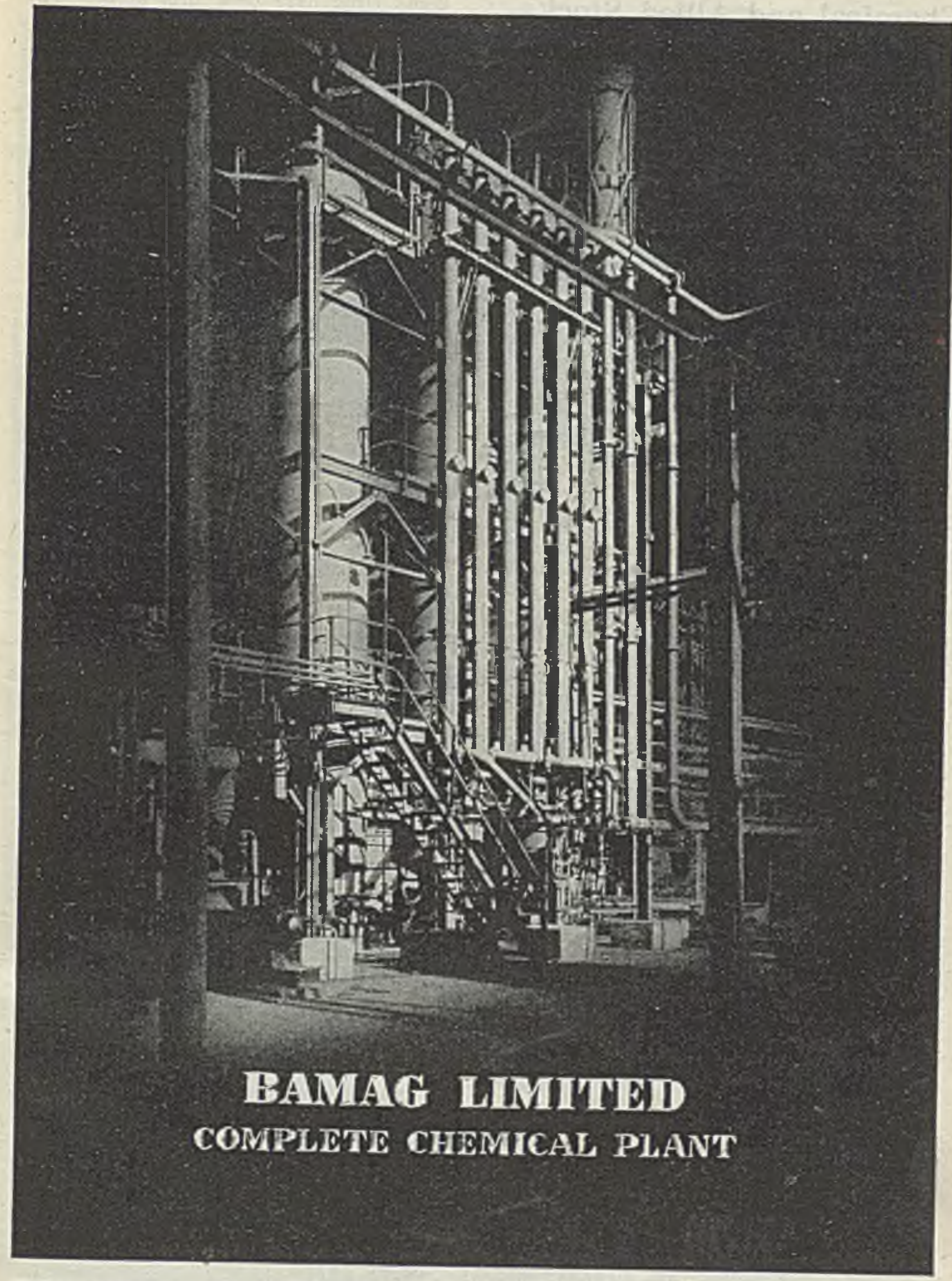
Fricker's Metal & Chemical Co., Ltd., are paying an ordinary dividend of 6 per cent. for 1945, this being the same as for 1944. Net profit was £5794 (£5274).

An ordinary dividend of 15 per cent. (the same as for the previous year), plus bonus of 2½ per cent., is being paid by **B. Laporte, Ltd.,** for the year ended March 31 last. Profit totalled £192,644 (£179,754).

An increased dividend is being paid for 1945 by **Eaglescliffe Chemical Co., Ltd.**—7½ per cent. final (as against 5 per cent. for 1944), making 12½ per cent. (7½ per cent.). Net profit is given as £13,290 (£12,652).

Net profit of £99,350 for 1945, as compared with £99,490 for the previous year, is announced by **Newton Chambers & Co., Ltd.** A final dividend of 10 per cent. (same) on ordinary and preference shares, makes 15 per cent. for the year (same).

The directors of **Goodlass, Wall & Lead Industries, Ltd.,** are recommending an ordinary dividend of 10 per cent. for 1945. This is an increase of 1 per cent. on the payment for 1944. Net profit amounts to £232,068 (£222,635).


BAMAG LIMITED
COMPLETE CHEMICAL PLANT

Chemical and Allied Stocks and Shares

STOCK markets became hesitant and less active this week, reflecting the latest home and international political news, and British Funds, following a moderate rally, were inclined to ease. Industrial shares continued to attract a good volume of business, but movements generally were small, although there were some outstanding features. Profit-taking was again very moderate, when the extent of recent gains is borne in mind. The nationalisation groups were reactionary, although home rails became firmer in anticipation of an increase in railway fares and charges. Iron and steel shares fluctuated on the latest nationalisation developments.

Shares of United Steel, Consett Iron, Thomas & Baldwins, and manufacturers of pig iron and steel ingots eased, but Guest Keen, and Stewarts & Lloyds were fairly steady as these companies apparently come into the category of concerns only part of whose activities are to be nationalised. On the other hand, Tube Investments and Babcock & Wilcox were inclined to rally because they appear to be outside the Government's plans. Responsible leaders in the industry have made it clear that the nationalisation threat has done serious harm to the industry as a whole, and has also affected export trade.

Imperial Chemical at 43s. 9d. remained active, while Dunlop Rubber strengthened further to 65s. 6d. on the full results, and there was activity up to 66s. 3d. in Lever N.V. in anticipations of the dividend statement. Levers were also higher at 58s. 9d., but in other directions Distillers at 124s. 6d. were hesitant on conflicting market views whether there will be a higher dividend for the past year. Amalgamated Metal improved to 19s. on further consideration of the past year's results. B. Laporte have been firm at 96s. 3d. on the full figures for the past year; the increased payment of 17½ per cent., which includes a 2½ per cent. Victory bonus, is well covered, despite the extent to which taxes bear on profits.

In response to the higher payment of 12½ per cent. (against 10 per cent.), Greeff-Chemicals 5s. ordinary shares strengthened to 11s. 3d. United Molasses at 54s. 3d. xd were higher on balance, the strength of the balance-sheet attracting attention. Borax Consolidated were 48s. 3d., British Aluminium 42s., British Match 47s. 6d., and Imperial Smelting 19s. 6d. Textiles eased on the report of the Working Party; but there was increased demand for Bleachers up to the higher level of 17s. 9d. in expectation of payment of further arrears of preference dividend.

Boots Drug have been firm at 60s. 6d., while in response to the dividend increase, Griffiths Hughes advanced to 61s. 3d. Aspro at 36s. 6d. lost part of an earlier advance, Sangers were firm at 33s., with Timothy Whites 46s. 6d. xd, and Beechams 25s.

British Glues and Chemicals 4s. ordinary held firm at 14s. 4½d. British Industrial plastics 2s. shares eased slightly to 9s. 9d. Erinoid were 13s. 6d., and British Xylonite have been dealt in up to £7½. Oils were firmer, aided by the V.O.C. dividend increase, and Anglo-Iranian strengthened to £5½. Mexican Eagle Oil fell sharply, but later firmed up a little on hopes that negotiations with Mexico may be resumed.

British Chemical Prices

Market Reports

CONTRACT deliveries of industrial chemicals have covered good quantities and a fair amount of new inquiry in the London market is reported, both for the home market and for shipment. In the soda products section, steady deliveries of solid and liquid caustic soda have been effected, and this is also the case with bicarbonate of soda and sulphide of soda. Among the potash chemicals, permanganate of potash is in steady request, while bichromate of potash and yellow prussiate of potash continue to occupy a strong price position with offers restricted. There is pressure for deliveries of all available grades of sulphuric acid, while values are fully maintained for hydrochloric acid, tartaric acid and citric acid. There has been no change in quotations for the lead oxides and the demand is steady. Pitch continues to be the main feature in the coal tar products market and firmer values are expected. The demand elsewhere continues steady.

MANCHESTER.—Steady price conditions have been reported during the past week in virtually all sections of the Manchester chemical market, though no actual changes of any consequence have occurred. Existing contracts with home consumers, including the cotton textile trades, are being well taken up and fresh inquiry and replacement buying are on a fairly free scale, with the full range of soda products, magnesium and ammonia compounds, and the mineral acids, coming in for attention. Shippers are also maintaining buying interest and steady additions to order-books for export are being made. Some classes of fertilisers are finding a ready outlet still, and a good demand for most of the leading light and heavy tar products is reported.

In the Soviet Union large iron-ore deposits have been discovered around Kremenchug.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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

Abrasives.—A. Abbey. (Carborundum Co.) 13095.

Paints.—A/S Wöldikes Kemiske Fabrik. 13038.

Alkali aluminium fluoride.—A/S Norsk Aluminium Co. 13185-88.

Cryolite.—A/S Norsk Aluminium Co. 13189-91.

Heavy-media separation.—American Cyanamid Co. 13063, 13066.

Aminophenyl compounds.—American Cyanamid Co. 13481-82.

Hydrocarbons.—13076. Sulphurised oils. 1339. Anti-foaming agents.—13400. Lubricants.—13401. Composite materials —J. C. Arnold. (Standard Oil Development Co.)

Detergent compositions.—W. Baird, E. G. Parry, T. E. Thompson, and I.C.I., Ltd. 13661.

Resinous compositions.—Bakelite, Ltd., J. E. H. Hayward, and P. H. Calderbank. 13227.

Separation of sulphur.—Bournemouth Gas & Water Co., and W. F. Thorne. 13140.

Fungistatic substances.—P. W. Brian, P. J. Curtis, J. F. Grove, and I.C.I., Ltd. 13169.

Cellulose esters.—British Celanese, Ltd. 13517.

Electric cables.—British Insulated Callender's Cables, Ltd., and R. W. Blades. 13216.

Heating insulated material.—British Insulated Callender's Cables, Ltd., J. C. Quayle, and P. Jones. 13408.

Accounting machines.—British Tabulating Machine Co., Ltd. (United States, May 15, '45.) 13229.

Resins.—British Thomson-Houston Co., Ltd. 13364.

Polysiloxanes.—British Thomson-Houston Co., Ltd. 13365.

Silicon compounds.—British Thomson-Houston Co., Ltd. 13366.

Chlorinated methylchlorosilanes.—British Thomson-Houston Co., Ltd. 13463.

Metal polishing.—T. M. Calvert, and E. Kronisch. 13611.

Insecticides.—Ciba, Ltd. 13670-71.

Lubricants.—Compagnie Française de Raffinage. (France, March 28, '42.) 13025.

Synthetic penicillin.—C. S. Dillon. 12926.

Lactic aldehyde.—C. S. Dillon. 13598.

Dyes.—E.I. Du Pont de Nemours & Co. 13494.

Amines.—E.I. Du Pont de Nemours & Co. 13495-13496.

Coating of materials.—W. E. F. Gates, and I.C.I., Ltd. 13009.

Fire extinguishers.—General Aniline & Film Corporation. 13068.

Xanthylium dye salts.—General Aniline & Film Corporation. 13174.

Powder metallurgical processes.—General Electric Co., Ltd., and I. Jenkins. 13159.

Anthracene purification.—J. P. Hatton, R. May, and I.C.I., Ltd. 13170.

Hot dipped galvanising.—S. J. Hurley. 13118.

Bleaching process.—Imperial Chemical Industries, Ltd. 13657.

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Drying, concentrating or crystallising liquid materials.—A/S Niro Atomizer. Dec. 11, 1941. 7116/46.

Device for controlling the flow of a fluid. —N.V. A. S. W. Apparatenfabriek. June 7, 1940. 8175/46.

Producing and preserving albumin milk.—Bernese Alps Milk Co. November 7, 1944. 24496/45.

Bleaching of cellulose fibres.—R. Bloch, K. Goldschmidt, P. Goldschmidt, I. Schnerb, and Palestine Potash, Ltd. October 31, 1944. 19655/45.

Resinous polymerisation products.—British Thomson-Houston Co. June 23, 1942. 10034/43.

Process and composition.—J. F. Buckman, and W. R. Meyer, trading as Enthone Co. November 4, 44. 24863/45.

Process for discharging cupriferous dyeings of direct azo-dyestuffs.—Ciba, Ltd. October 31, 1944. 26913/45.

Hydrogenation of organic compounds.—E.I. Du Pont de Nemours & Co. November 1, 1944. 28844/45.

Products useful for decorative and protective coating compositions and the like.—E.I. Du Pont de Nemours & Co. November 1, 1944. 28845/45.

Compositions comprising acrylonitrile polymers and copolymers and shaped articles produced therefrom.—E.I. Du Pont de Nemours & Co. November 4, 1944. 29112/45. 29120/45.

Interpolymers.—E.I. Du Pont de Nemours & Co. November 7, 1944. 29643/45.

Synthetic linear condensation polymers.—Imperial Chemical Industries, Ltd. September 3, 1942. 14403/43.

Sulphur-containing polymers.—Imperial Chemical Industries, Ltd. November 1, 1944. 28843/45.

Fluorohydrocarbons.—Imperial Chemical Industries, Ltd. November 1, 1944. 29003/45.

Polyformals.—Imperial Chemical Industries, Ltd. November 2, 1944. 29111/45.

Production of resinous aldehyde condensation products from dicyandiamide.—E. Johnson. September 2, 1943. 6991/46.

Production of magnesium compounds.—Marine Magnesium Products Corporation. August 26, 1944. 8987/46.

Electrolysis of magnesium chloride fusions.—Mathieson Alkali Works. April 17, 1942. 9606/43.

Manufacture of esters of mono-methylene-ethers of γ-keto-2 gulonic acid.—N.V. Chemische Fabriek Naarden. August 3, 1943. 7028/46.

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Hardenable compositions containing urea-aldehyde resins.—American Cyanamid Co. October 5, 1943. 576,995.

Means for supplying liquids to grinding, cutting or other machines.—Avimo, Ltd., H. C. M. Stevens, and A. M. W. Paul. November 3, 1944. 577,063.

Alloy.—British Non-Ferrous Metals Research Association, E. A. G. Liddiard, and R May. March 16, 1939. 577,065.

Methods of preparing coatings.—Chicago Vitreous Enamel Product Co. September 27, 1943. 576,974.

Fertilisers.—G. L. Cloke. February 22, 1944. 577,117.

Concentration of minerals by froth flotation.—Davey Paxman & Co., Ltd., and F. H. Alliman-Ward. April 21, 1944. 576,982.

Manufacture of thiophenols.—E.I. Du Pont de Nemours & Co., and F. K. Signaigo. September 1, 1941. 577,013.

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