The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LIII
No. 1371

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The Chemical Age

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Posts for Ex-Officers

THE inevitable problem of the absorption of demobilised officers into industry has arisen in an insistent form. The Report of the Committee on Training for Business Administration, of which Sir Frank Newson-Smith was the chairman, has recommended that there should be a course of basic training in the principles of business life, with the aim of assisting a man to get and keep a job and also to decide on a particular branch of business in which to make his career. It seems to be suggested that a three-months' full-time course would be sufficient for the purpose.

The difficulty faces men in particular age groups. Those who were already fairly well established in industry before joining the Services will presumably come back to their original firms. They will have forgotten much of the ABC of business, but they will presumably have gained in experience, vision, and character. It would obviously be impossible to promote these men immediately to high positions, but it should be possible for each individual firm to give them the opportunity of regaining their business knowledge with a view to placing them in a suitable position after an interim period had proved that they were likely to be successful there. Most firms are understaffed, so that there should not be much difficulty in reabsorbing those who entered the Services.

Firms engaged in war work, public utilities, and other organisations whose staffs were maintained at a fairly adequate level during the war will find that a high proportion of their personnel were directed to them on a temporary basis and will return to their original firms as soon as possible. Here, again, there will be opportunity for reabsorption. There will remain a hard core of difficult cases in which, for one reason or another, men have worked through the war, sometimes under very arduous conditions, and often under conditions of considerable danger, as permanent members of the firm There will be the difficulty of balancing the scales evenly between those who joined the Services and those who remained in industry to carry on the supply of munitions and necessities. In settling this problem it must be kept in mind that those who stayed at home have frequently borne more of the burden and heat of the war than many of those who

On Other Pages

joined the Services. It must also be remembered that those who stayed at home were directed to do so by the Government and did not in any way shirk their responsibilities. While everything possible must be done for the returned ex-Servicemen, the claims of those who were not in the Services must not be by-passed. This again is a problem which every firm must decide for itself. In doing so, however, the fundamental criterion must obviously be that of ability. Industry must be efficient, and the deciding principle must be the fitness of the individual for a particular post rather than the position which he has occupied during the last six years.

There remains the difficult problem of those who have never been in industry or who were in industry for only a few months before they were called up. These men will be in or approaching their middle twenties. They may have become officers and may, indeed, under conditions of mass warfare, have attained quite a considerable rank in the Army. It is widely supposed that they will object to returning to junior posts. There are many who feel that the anxiety which is being expressed on their behalf is somewhat misplaced. The fact that a man has been a captain in a huge citizen army is not necessarily an indication that he will be equally effective as a captain in industry. It is one thing to command soldiers; it is another thing to lead civilian workers. It is one thing to carry out the orders of a superior officer under conditions of war; it is another thing to exercise initiative and enterprise in modern business life. To those not technically trained it is evident that entry into technical and scientific employment is and must remain closed until they have acquired the necessary knowledge and experience to fit them for the posts concerned. That knowledge cannot be acquired in three months. If the nation desires to do something for these men it must send them to college for at least three years, paying their salaries and expenses meanwhile on a reasonable basis.

It may be contended that the only career for which these men are primarily fitted is that of administration. As officers they should have had some experience in the handling of men and affairs; the higher the post they have occupied the greater will have been this experience. There is a call in many quarters for administration to be made a separate career. Because a man is a good engineer or a good chemist he does not necessarily make a good manager. There is something to be said for the view that management, engineering, chemistry, accountancy, and so forth, should all be regarded as separate professions, each with parallel salaries, but each having defined functions. There is no real reason why a man having a particular salary should not exercise control over another man in a different profession earning a larger salary than himself. It is not salary that is the criterion; but ability to do the job.

Whether these young fellows can be taught to become efficient managers in three months is open to question. It is more than probable that they will have to occupy subsidiary positions for a period before they can be given the sort of position which many of the uninstructed appear to be claiming for them. The view of industry has been well expressed by Mr. Gresham Cooke, secretary of The United Steel Companies, Ltd., who has pointed out that "the capacity to absorb men of the type required at a level commensurate with their war-time responsibilities and experience is limited in even the largest undertaking, for they must compete with an existing staff qualified by technical experience as well as personal ability, and no employer will wish to disturb his staff relationships by blocking all hopes of promotion for his existing staff by the introduction of a large number of newcomers at a high level." It is evident that a balance must be struck between the claim of the demobilised officer and those who are already in industry and who have been there all the time. Each firm may be able to absorb a small number of demobilised officers, but no wholesale staffing by men of this category can be possible unless the whole balance of industry is to be gravely disturbed.

Ward, Blenkinsop & Co., Ltd., of Liverpool, have given 250,000 sulphanilamide tablets to British United Aid to China for use in Chinese hospitals.

NOTES AND COMMENTS

Anglo-American Oil Conference

THE British chemical industry must needs have a profound interest in the outcome of the second Anglo-American oil conference which was lately held in London. The days are long past when the production of petroleum derivatives was a relatively simple process. To-day, petroleum refining is an important branch of chemical engineering which, by utilising the valuable refinery by-products, opens up wide vistas of a petroleum-based organic chemical industry. It will be remembered that a strong delegation, representative of the British petroleum industry, which went to the United States last year, framed, with its opposite numbers in that country, an Anglo-American Oil Agreement which envisages the establishment of an International Petroleum Commission. However, this agreement was brought to naught in the Senate as a result of the opposition of powerful American domestic oil interests, apprehensive lest a super-national authority, with executive powers, should interfere in the industry's operations. It is only natural that in this connection the bogy of an international petroleum cartel should have been raised. It is our opinion that the original document contained no such sinister schemes. On the contrary, its acceptance would have been a contribution to an orderly development of production and distribution of petroleum, and would have gone a long way to remove those rivalries which have tainted the industry since petroleum entered world trade on a large scale. The new agreement makes it quite plain that the Commission to be set up will have a purely advisory function.

Some Delicate Questions

ALTHOUGH Mr. Ickes, U.S. Petroleum Administrator and Secretary of the Interior, pointed out that questions concerning Middle Eastern Oil would occupy the main attention of delegates, there is a conspicuous absence of any reference to it in the revised agreement. This question forms part of the much larger problem of developing the resources of the countries concerned, and is linked with such delicate questions as the withdrawal of Russian troops from Persia, the recent agitation about Azerbaidjan, the control of the Dardanelles, and the position of Turkey, Palestine and Syria. It can be surmised that the Foreign Secretary, in his recent discussions with the British representatives in that part of the world, has also broached this subject. It is noteworthy that the American mission negotiated not only with the Minister of Fuel and Power, but also with the Chancellor, who will soon have to come to a decision on the recommendations of the Ayre Committee (*see* THE CHEMICAL AGE, April 21, 1945, p. 343). In view of the changes wrought by the war in this country's capital position, a reduction of the import of finished oil products would appear indispensable, while at the same time, a noteworthy expansion of domestic refining would not only ease the dollar problem, but would also make use both of valuable by-products and of technical skill.

Rebuilding Italian Industry

A SURVEY of Allied efforts to bring peace and order in the wake of the armies of liberation and to afford a former enemy country an opportunity to redeem itself is contained in a report issued by the Public Relations Branch of the Allied Commission in Italy. This comprehensive review of the Commission's work covers the period from the day in July, 1943, when Allied forces landed in Sicily, to the final surrender of the Nazis in Italy on May 2, 1945. Some points from the report of the Industry Sub-Commission should be of special interest. For instance, of 8926 industrial premises listed in the census for national reconstruction, only 2403 were operating completely, while 2615 were partially active. By April this year, scores of factories, employing 150,000 persons, had been replaced in use, including fertiliser works, oil and soap works, food-processing plants, and chemical plants. Steel production of the Naples and Terni areas went mainly into Bailey bridges, but the civilian allocation soon rose to 30 per cent. Cement production was for a long time strictly controlled by the Armies: but the sub-commission started six plants and obtained a large share of their pro-

duction for civilian construction. Some glass and ceramic works were also put into commission, especially small plants using manual operations.

Italian Chemical Production

CHEMICALS are basic to the Italian economy. They are used throughout industry and are absolutely necessary to agriculture where the soil had become so impoverished through centuries of intensive cultivation that yields were now directly proportional to the fertiliser applied. Superphosphate came from two plants in Sicily, producing together a bare 2000 tons a month in August, 1944. By the next May, there were ten plants working and total production averaged 20,000 tons a month under the sub-commission's efforts. More than 84,000 tons of phosphate rock were imported from North Africa up to March despite price and shipping crises. Many of the furnaces had been blown up internally by the Germans and the special refractory cement needed for repair was next to impossible to obtain. The open-sided dry sheds used for storing superphosphates made ideal garages and military warehouses, so that the de-requisitioning process would often have to be invoked. The Germans had fled with all the platinum in the large nitrogenous fertiliser plant at Crotone, and a makeshift process for converting the synthetic ammonia into nitric acid had to be adopted. This spring also saw a production of nearly 3000 tons a month of copper sulphate, but only by dint of using salvaged brass for raw material. Another plant was producing 600 tons of calcium carbide monthly and four others were beginning the production of carbon bisulphide, essential to the fumigation of grain, the extraction of olive oil and the manufacture of synthetic fibres.

Reopening the Mines

SICILIAN sulphur mines, which in 1943 produced only 400 tons a month, this year brought forth 5500 tons a month from 48 workings. Seven lignite mines in Central Italy produced 65,000 tons in 1944, despite absence of power and rail facilities. Pyrites mines, too, lacked power or were found flooded, but also found were stocks of more than 335,000 tons. Mercury mines, again in Central Italy, were discovered comparatively undamaged. A store of more than 8000 bottles of mercury, most of which had been hidden from the Germans, was located, though most of this stock was marked for foreign markets. Altogether, by May, 1945, more than 100 mines of all sorts were either producing or maintaining the properties with the help of the sub-commission.

Factory Library

AN experience of factory libraries somewhat different from that mentioned by Mr. Simons (recorded in our issue of September 22) is that related by Mr. W. R. Hutton in the September issue of *Books*, the news-sheet of the National Book League. Mr. Hutton describes the library organised in the tinsmiths' shop of a war factory, which began in 1941 while the blitz was still in full force. The library was started by four men who actually worked in the shop, and it had an initial stock of 50 volumes. At first books were kept at the owners' homes and a list was circulated to members who paid 2d. a week. Money went to buy new books. Membership soon trebled and the stock of books rose to 350, partly by purchase, partly by gift. Discussion and exhibitions were arranged. The "librarians" carried on their activities in the lunch-hour, sacrificing spare time and substituting sandwiches for a hot dinner. The fame of the library spread to other shops in the factory, and in time the Welfare Association of the firm took official notice, and found a room to house it. The voluntary staff still functions, but the Welfare Association is now considering the appointment of a full-time librarian, as there are over 1000 members, and 2500 books. The most popular book is Alex Comfort's *The Power House*, which has been "out" 19 times in five months. Fiction and non-fiction are both well read, but poetry is not popular. No mention is made of pilfering. With new techniques in factories, working pace is becoming slower as output increases, and the worker needs something to occupy his mind. Other industrial concerns might consider works libraries, and perhaps even the public libraries might envisage opening factory branches.

Pumps in the War and After

Pulsometer's Contribution to Victory

FOR almost three-quarters of a century, the Pulsometer Engineering Company of Reading, Berkshire, England, has been a pioneer of pumping activity. To-day, this company makes almost 700 different types and sizes of pump, filtering and refrigerating machinery, and sirens. It is not surprising, therefore, that throughout the vicissitudes of two world wars, Government departments, municipalities and industrial concerns should have made use of the long experience and pumping skill of the company in the great fight for freedom against tyranny. In the varied activities of the fighting services all over the world, for the relief of suffering in hospitals and the saving of life through blood transfusion, in the preservation of the country's food reserves and in Civil Defence, the P.E. Co. was called upon to give all it had of its expert knowledge, craftsmanship, time, and energy in extended working hours, in night and day shifts. It was placed on the priority list of essential industries.

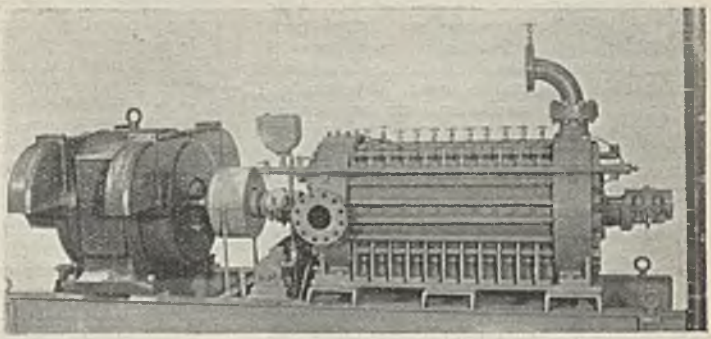

Fig. 1. One of the turbine Phoenix Pumps actually supplied for Mulberry Harbour. It was not possible to photograph the actual installation.

Pumps for water supply, sewage disposal, heating duties, and mobile laundries were supplied to service establishments, R.O. factories, aerodromes, harbour installations, Government departments and industry generally. Hydraulic pumps for harbour commissions, railways, etc., included one or two stand-by dock installations.

The tale of Pulsometer products supplied to the fighting services cannot be told in detail. The use to which some were put is not known by the makers. The following account, however, gives a general idea of those made for known uses.

The Royal and Merchant Navies were supplied with paravane bodies for submarine detection, with bilge and standard and self-priming ships' pumps, with boiler-filling and lighting sets and with circulating and refrigerating plant. Vacuum pumps were used for anti-submarine equipment and for the manufacture of gyroscopic instruments for the Admiralty—particularly for torpedo and gun-laying. All steam sirens and sirenettes used in the Royal Navy are Pulsometer products.

For the Army, thousands of 25-pounder, quick-firing H.E. shells and scores of Bofors gun bases were made. Among the most interesting pumping sets were large turbine and split-casing Phœnix installations for Mulberry Harbours (Fig. 1), turbine pumps for mine disposal on beaches, water supply pumping sets arranged with miles of pipes for use in the desert, together with many special arrangements of portable pumps for water and sewage services in the Middle East campaign. Food and other storage purposes created a demand for refrigerating and ice-making plants. Water circulating pumps were required for the refrigerating equipment of photographic trains. Vacuum pumps served in preserving the bores of guns and for packaging Forces' cigarettes.

In addition to normal standard requirements, the Air Service needed some highly-specialised pumps, including thousands of light-weight fuel pumps (Fig. 2), for aeroplanes, designed and made by this firm exclusively, pumps for the treatment of bearings for the Napier Sabre engines used on Typhoons, for aero-engine testing, and pumping sets for photographic trailers. Pulsometer vacuum pumps helped in the testing of aeronautical equipment, were used for de-aerating compasses, and for the Meteorological Office. Practically all radio valves are produced by the use of Pulsometer vacuum pumps.

Important discoveries have followed every advance in the means of producing high vacua, and in the manufacture of these means the P.E. Co. were pioneers and have since led the way, their vacuum pumps being able to give vacua, as required, up

to .00001 mm. off perfect, measured on a McLeod gauge.

The importance of reliable vacuum pumps is recognised by science and not least by its medical branch, and Pulsometer vacuum pumps have made indispensable contributions to the practical application of discoveries. These "Geryk" vacuum pumps are an intrinsic part of the mechanism of blood transfusion, are used in the manufacture of penicillin and in the most delicate operations, such as the removal of pus from the brain. Refrigeration plant has been in much demand for the storage of blood and vaccines.

The harnessing of a whole nation's industries to one intensive purpose requires the use of the most scientific methods of production, and of much specialised equipment. Pump efficiency depends largely upon designing a pump for the work it has to do and the P.E. Co.'s policy has always been to make pumps for particular requirements. Where pumps are in demand, it saves time and trouble to turn to specialist manufacturers. All types and sizes have been called for, and every pump sent out was made on a priority permit.

In addition to the normal circulating, sewage, and heating pumps required by extended and new factories, special types were supplied for the production of explosives and munitions, for furnaces and coolers, and for fuel refinery processes. There were rubber-lined pumps for steel treatment plant; glandless sump pumps for molten lead; gear pumps for molten sulphur; high-pressure turbine pumps for coal distillation and by-product plants; pumps for oil and solvent circulation.

The claims of mines were met chiefly for dewatering services. For large quantities of water, turbine pumps were used, some as fixed installations and others on wheels to follow the slope of the mine. For small quantities the special Pulsometer in-bye self-priming types were ordered. Coal washing demanded slurry pumps.

Agriculture called for pumps for land drainage or irrigation; milk coolers to cool the daily milk supply; refrigerating plant for storage purposes and vacuum pumps for milking machines.

Pumps for the food and chemical industries were often highly specialised, made of metals adapted to the liquid to be pumped, or of stoneware for the circulation of liquids which must not be contaminated. Milk pumps to meet the exacting conditions of absolute purity, pumps for breweries and pumps for dehydration (Figs. 3, 4), are further examples of Pulsometer specialisation. Refrigeration and cooling plant and vacuum pumps for the manufacture of powdered milk and for petroleum research have all been part of this company's war effort.

Pulsometer filtration plant was supplied for many types of factory, including one for processing photographic materials. The design and erection of the largest pressure water-purification plant in Scotland was a Pulsometer war product.

Russia has received high-pressure waterworks installations, dewatering pumps to salvage mines flooded by the Germans, etc.; while Free France was provided with treatment plant for drinking water for the Cameroons, pumps for palm-oil processing and a high-pressure water supply installation for West Africa.

In Civil Defence, portable pumps of all types and sizes were requisitioned for duty where fire brigade pumps could not be used or were insufficient.

The Switch-over to Peace

Already, orders are being received for replacements of pumping installations in Singapore as well as those destroyed in the British Isles. Old customers continue to send orders for well-tried products, whether these are for pumps, refrigerating machinery, or filtration plant; and for the sake of Britain's export trade it is necessary that the re-born countries of Europe and other parts of the world should know where reliable products may be obtained.

Pulsometer heating pumps cover all types required by heating engineers and contrac-

Fig. 2. Lightweight fuel pumps for aeroplanes designed and made exclusively by the Pulsometer Engineering Co.

tors; while a multiplicity of water supply pumps cover duties for large-capacity waterworks plants, high-pressure installations, and emergency services. Sewage pumps include not only Stereophagus, Fullway, and Freeway pumps, but disintegrators with several knives for cutting solids, and a patent self-clearing automatic enclosed tank solids diverter pumping plant to deal with sewage from small villages, large buildings, camps, etc. These can be sent complete to site and require no elaborate buildings or construction.

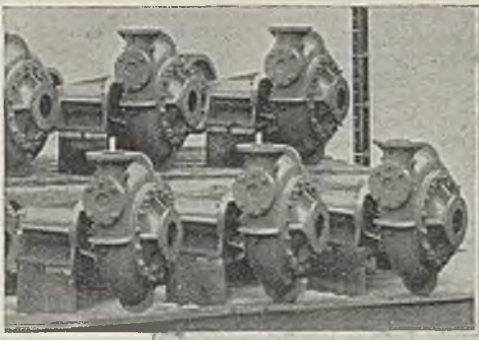

Fig. 3 (left). Centrifugal pumps supplied to Government factories for the processing of dehydrated potatoes.

Fig. 4 (right). 8/50 Geryk vacuum pump for vacuum drying and general dehydration work.

Coke ovens and by-product plants receive pumps for coal quenching, washeries, oil by-products, ammonia liquor, acids, tar and tar liquors, etc. For the chemical and food industries, all-metal, stoneware and self-priming pumps are made. There are spirit pumps for breweries, rubber-lined pumps for abrasive liquids, and rotary pumps for viscous fluids. Steel works needing hydraulic descaling plants, turbine pumps for operating hydraulic lifts, manipulating rams, etc., circulating pumps for furnace cooling water and lubricating pumps, may safely use Pulsometer products. For oilfields and oil refineries there are centrifugal pumps for pipelines, distillates, and low-gravity reflux duties, for sulphur dioxide treatment, hot oil chemical treatment processes, and lubricating oil treatment processes. There are also centrifugal pumps for pulp and paper mills and sugar refineries.

The company is always glad to answer inquiries and to advise on any pumping, refrigerating or filtration matter.

INSTITUTION OF METALLURGISTS

THE Institution of Metallurgists has been registered as a company limited by guarantee without share capital. The objects of the Institution are to promote the study and science of metallurgy and the status of metallurgists and to collaborate with the Iron and Steel Institute and the Institute of Metals. The first members of the council are: W. E. Atkin, J. H. Andrew, D.Sc. (Sheffield University), G. W. Austin (Torpedo Experimental Establishment, Greenock), G. L. Bailey, W. Barr, W. F. Brazener, H. H. Burton (English Steel Corporation, Ltd.), Eric W. Colbeck, Maurice Cook, W. J. Dawson (Hadfields, Ltd.), Edwin Gregory, Roosevelt Griffiths, W. T. Griffiths, R. A. Hacking, J. L. Haughton (National Physical Laboratory), J. E. Hurst, J. W. Jenkin (Tube Investments, Ltd.), J. S. Kerr (Lancashire Steel Corporation, Ltd.), Richard Mather, James Mitchell, Harold Moore, A. J. Murphy, Hugh O'Neil (L.M.S. Research Laboratory), Richard Seligman (Aluminium Plant and Vessel Co., Ltd.), C. J. Smithells (British Aluminium Co., Ltd.), Hubert Sutton and F. C. Thompson. Solicitors: Ashurst Morris Crisp & Co., 17 Throgmorton Avenue, London, E.C.3.

B.T.H. at War

A Brief Summary of Achievement

IN this brief survey of the outstanding war achievements of The British Thomson-Houston Co., Ltd., it should first be pointed out that many of the company's peace-time products were indirectly required to meet the war effort. A large amount of direct armament production was carried out, however, much of which, by utilising the research and engineering facilities of the B.T.H., was either designed by the company itself, or in close collaboration with various Government Departments.

There is no doubt that the most phenomenal achievement of the war was Radar, in which the B.T.H. Company played an important part, being responsible for the development and engineering of all kinds of Radar sets for use at sea, in the air, and on land. It is interesting to note that Radar equipment, to which the B.T.H. made major contributions, was an important factor in the sinking of the German battleships *Scharnhorst* and *Bismarck*, and in the victory of the battle of Cape Matapan. Earlier in the war and before Radar came into such wide use, several thousand predictors were made by the B.T.H. Co. Another of the most noteworthy events during the war was the use of jet propulsion for aircraft. The jet engine was first developed by the B.T.H. Company in conjunction with Air Commodore Whittle, and after exhaustive experiments, beginning in 1936, an engine, built by B.T.H. Co., was successfully flown for the first time in May, 1941, in a plane built by the Gloster Aircraft Co., Ltd. In September, 1941, a similar engine, manufactured at Rugby, was sent by the B.T.H. Co. to their associated company in the U.S.A.—the General Electric Company (of New York)—for them to study and copy. Following the development of the jet engine, work has been done on the gas turbine, for which there are considerable future possibilities, particularly in the field of ship propulsion.

Fighting the Acoustic Mine

The danger of the acoustic mine was defeated with the help of B.T.H. Co., and for this purpose the company designed and developed over 800 oscillators. The work on these oscillators was put in hand immediately following the introduction by the Germans in December, 1940, of the acoustic mine, and deliveries began in March, 1941. The first oscillator made was the Fessenden type, but although this met with success, it suffered from certain inherent disadvantages in design. The B.T.H. Co. therefore proposed the use of the inductor type oscillator, and after successful demonstrations, the device was put into production and subsequently into successful service against the acoustic mine, towards the end of 1941.

The electric torpedo was another outstanding B.T.H. product. This torpedo represents a radical change from the normal type, in spite of the fact that no manufacturing technique for the device existed in this country when B.T.H. was asked to undertake the work. Moreover, the British model had to be made suitable for over-water discharge (the German torpedo was not), and also lighter in weight to enable a heavier war-head containing more explosive to be adopted. Many difficulties had to be overcome before production was started on a large number of the torpedoes, in a building specially erected and equipped for the purpose.

Only recently H.M. Stationery Office issued a pamphlet releasing details of the atomic bomb, in the development of which the B.T.H. Co. also gave valuable assistance.

Finally, mention must be made of the thousands of Wellington bomber parts, aircraft magnetos, auto-timing devices, switches, motors, generators, compressors, servo motors for auto-pilot control, amplidynes for servo-position control, aircraft cameras, tank components, mines and shells, which were manufactured by the B.T.H. Company.

BRAZILIAN URANIUM

According to recent reports, Brazil has to be added to the list of actual and potential sources of uranium which appeared in THE CHEMICAL AGE of September 22, 1945. Sr. José Jobim, economist and member of Brazil's Foreign Trade Council, envisages the establishment of a considerable production. He pointed out that the production of radioactive minerals in Brazil, although a recent development, was increasing. The principal ores found are those of radium, uranium, thorium, and actinium. The most important deposits occur at Divino, in the State of Minas Geraes, where the minerals appear combined with samarkite and columbite. There are other deposits in Ribeirao de Santa Clara, near Bomba, while analysis made by the School of Mines of Ouro Preto of a sample from Minas shows nearly 10 per cent. of uranium oxide. However, little accurate information has been compiled concerning Brazil's actual reserves of these minerals.

An intensive investigation into the properties of timber, growing in Northern Rhodesia, and its utilisation in the manufacture of cellulose and plastics, has been suggested in a report on the development of secondary industries.

French Chemical Notes

Export Concessions Demanded

(From Our Paris Correspondent)

NOW that the war is over and Germany has been defeated, the French chemical industry is looking forward to occupying the place which Germany formerly held in the world. Complaints from industrial chemists, however, are being made that their efforts to gain export markets are being nullified by the law which taxed war-time profits, and is still covering exports. Before the war, exports were encouraged by a law which freed certain exports from specific taxes, and a return to this legislation is being urged.

Although there are still limitations, for example, in the manufacture of soap and lye, and also in cement production, owing to the coal shortage, the French chemical industry has not been idle. In July, production figures for industrial chemical products were as follows: sulphur, 10,000 tons; copper sulphate, 4000 tons; compound manure, 13,000 tons; superphosphates, 7000 tons; sulphuric acid, 15,800 tons; soda, 7500 tons; calcium carbide, 12,000 tons, and tannin extract, 837 tons.

A new adhesive preparation which glues rubber to metal has also been prepared. A synthetic resin is prepared by heating phenolsulphonic acid over crude rubber to 135° C. A hard mass appears which is easily soluble in ordinary rubber solvents, and the solution can be stretched over a metallic surface, so that vulcanised mixtures can be superimposed. The adhesive is very thermoplastic, becoming soft at 70° C., even after vulcanisation.

Improvement in Fertilisers

The increase in coal supplies has eased the chief problem facing the French chemical industry, but lack of transport still creates great difficulties, especially in the south-east. The improvement is most marked in the fertiliser field, where the Government's emergency measures have yielded their first results. The supply of sulphur is back to pre-war level, and phosphates, potash, and Thomas slag are even available for export. Lack of reserve stocks, however, still makes the position precarious. Operations have been more active since the end of the holiday period, and production is now higher than the latest published figures of 4000 tons a month for copper sulphate, 13,000 tons for concentrated fertilisers, 7500 tons for sodium carbonate, and 12,000 tons for calcium carbide. The shortage of sodium products is still felt severely in the soap and other industries, and lack of chemicals is also holding up the paper and rayon industries which have received pulp and cellulose from Sweden.

Although the first two plants for the concentration of crude potash salts from the Alsatian mines resumed operations on July 15, it will be necessary for the next year or two to ship fertiliser potash mainly in the form of crude salt. After a satisfactory start at the mines it was found that the damage due to neglect of repair and maintenance under the German administration is greater than expected. Of the total labour force of 9000 men little more than half is actually present at the mines, and the factories still suffer from coal shortage. A gradual increase in production, however, should attain about half the pre-war daily output of approximately 15,000 tons by February next.

Scales of Salaries and Wages

In an effort to secure some form of uniformity in scales of salaries in the chemical industry, the levels to which salaries must correspond have now been fixed. This ruling does not apply to engineers, instructors, or to employees on special work, for whom specific rates are given.

The workers are divided into six categories, ranging from unskilled assistants to technicians capable of taking charge of the manufacture of specific products. These categories are further subdivided in accordance with experience and capability. Minimum salaries are laid down and include all extra remuneration which might be classed as additional salary, family allowances excepted. When a worker is promoted, his salary must not be more than the fixed minimum for the new category. Fixed salaries can, however, be augmented by undertaking dangerous or unhealthy work for a time. Rates are calculated on a 40-hour week, and salaries for juveniles are fixed at 50-80 per cent. of the adult wage.

Uranium Deposits

One of the branches in which the French industry is hoping to come to the fore is in the working of uranium. Now that the atomic bomb discoveries have placed a premium on the metal, the quarries of Saint-Gobain, which have long been derelict, are likely to become prominent again. Ever since the first French Revolution, records show that quarries in the Saône-et-Loire department have yielded pitchblende, and in 1904 the Curies extracted uranium from deposits at Couhard à Auxy, and at Grury. The mineral was used extensively at one time by the Saint Gobain glassworks for tinting purposes, but the quarries at Saint Symphorien de Marmagne, from which it had been obtained have not been used since 1914.

Scottish Engineering

Students' Association Formed

A SCOTTISH Engineering Students' Association has been formed with headquarters at Glasgow. Briefly, the aims of the Association are to provide means whereby young men in *all* branches of engineering can get together on a social basis to read and discuss papers and to interchange views and ideas, and to provide activities for younger members of certain technical institutions and societies, which may not themselves be in a position to organise individual student meetings.

Persons under the age of thirty are eligible for membership; there is no subscription fee; and funds are being provided by prominent Scottish engineers and shipbuilders. The business of the Association is managed entirely by a council of student representatives of all participating institutions and societies, over twenty of which have already officially recognised the Association.

Sir Harold Yarrow's presidential address, which is the first meeting of the Association, will be held at 7.15 p.m. on October 11, at the Institution of Engineers and Shipbuilders, 39 Elmbank Crescent, Glasgow, C.2. Light refreshments will be served after the meeting. Other meetings have been arranged for November 7 and December 3. Further information may be obtained from Mr. A. Ross Belch (hon. secretary), 420 Sauchiehall Street, Glasgow, C.2

Air Mail Facilities

Australia and New Zealand

PENDING the re-establishment of unrestricted air mail services with all-air transmission to Australia and New Zealand, H.M. Government has introduced a limited air mail service to those Dominions for the benefit of business firms, to supplement the present air service to North America and thence by surface route.

Correspondence *of business firms only* can be accepted subject to the following conditions: (a) No letter to exceed ½ oz. in weight; (b) the firm should affix stamps to the value of 1s. 3d. on each letter; (c) a firm will be entitled to send two letters by this service in any one week; (d) each letter for transmission should be posted to the Department of Overseas Trade, Hawkins House, Dolphin Square, London, S.W.1 (postage 2½d. prepaid) bearing the word ANZAIR clearly written in block letters in the top left-hand corner. With each letter (or each two letters sent simultaneously) the firm should enclose, as evidence that the letter comes from a business firm, a half-sheet of notepaper bearing the firm's printed letter head and the signature of a responsible officer of the firm and indicating the post which he holds. Registered mail will not be accepted for transmission.

I.C.I. Swansea Plant

Light Alloys Manufacture

NEGOTIATIONS for the purchase of the Waunarllwyd factory, Swansea, by Imperial Chemical Industries from the Ministry of Aircraft Production have now been completed. The factory was constructed and operated by the Metals Division of I.C.I. on behalf of the Ministry for the manufacture of wrought iron alloys required primarily for the Government's aircraft construction programme.

It will give regular work to a considerable number of local men and women —already 1000 are employed—and is being maintained to cope with the prospective peace-time requirements for wrought light alloys in the transport industries, general engineering, and housing, in which activities the largest tonnages are likely to be absorbed. Over the next few months, productive effort will be concentrated largely on material for the housing programme.

SHORTAGE OF TIN?

It is predicted in tin-mining circles that there will be a serious shortage of tin in the near future, though it must be realised that when production is once more in full operation in the Far East, that deficiency will soon be covered. A temporary shortage, however, might bring encouragement to the few mines remaining in Cornwall which are able to keep going through State help or by adventurous private enterprise in some of the long-abandoned shallow mines. In the U.S.A., where consumption has so considerably increased since 1943, it is forecast that next year tin may become the scarcest of all industrial metals.

It would seem essential, therefore, that those responsible for working the Cornish tin mines should be alive to the opportunity that has now come to this industry, and may prove a turning point in its history.

M.E.S.C. TO END

According to a joint United States and U.K. statement, the Middle East Supply Centre, which has been the agency of the British and U.S. Governments in dealing with countries in the Middle East with regard to civil supplies and a wide range of economic problems, will be dissolved on November 1. The Foreign Secretary announces that arrangements will be made for a British Supply Mission to the Middle East, to be associated with the British office in Cairo, which will be set up to discharge certain functions of the former British Minister Resident.

Metallurgical Section

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Industrial Uses of Indium

Some Recent Developments

by A. G. AREND

FEW of the rare metals have enjoyed such wide improvements in demand and so many fresh applications as has indium, which 25 years ago was quoted as being of little or no industrial importance. It is no exaggeration to state that it was then regarded as of purely academic interest. This was accentuated by the fact that for long it was the most expensive metal after radium, being much more costly than any of the platinum metals at their peak periods. Less than a century ago, indium was stated to have been sold at some £4000 per oz. but fifty years ago, when its presence had been found in different lithopone insoluble deposits, its value fell to £60 per oz. This was still higher than the existing price of the platinum group of metals, but in certain dentistry and jewellery work, and for the preparation of special low-melting-point alloys, it was realised that unless a material change was made, other cheaper metals would have to be substituted. This resulted in the reduction of the price of indium to about £6 per oz. about the year 1936, while to-day it is quoted at under £2 per oz.

No Real Scarcity

It has been remarked before now that not a few students are unaware of how the prices of metals have changed as a result of their industrial consumption from year to year, though the study of such changes gives a good criterion of how appropriate extraction methods have been worked out to suit. Indium is a striking example of this, as, since the outbreak of war in 1939, all kinds of uses of the greatest importance have been found for it, and, further, uses for which other metals could not be substituted. So far from there being any real scarcity of the metal, it has recently been stated that the potential supply may approach 500,000 oz. per year, which is about four times the world's annual production of platinum. Thus it is seen how the demand causes the market price of a metal to fall, but the uses for indium are unique, and give every indication of being further expanded.

The improved methods of extracting indium have already been described, and need not be repeated in detail, except to remark that the chief sources of the raw material are zinc flue dusts which are dissolved in acid for zinc sulphate manufacture, and the residue from metallic zinc treated in the same manner. In each instance, the insoluble matter, besides containing lead and cadmium, also contains thallium, gallium, and indium, which are to-day recovered, instead of being thrown out as so much waste, as occurred during the last war. The final separation of the metal is facilitated by its forming an insoluble basic sulphite, and it is then deposited electrolytically by a number of different methods.

Pure indium is white, very ductile and malleable, softer than lead, and although normally stable, when heated it bursts into blue flame. Like the metals of the platinum group (rhodium, for example, can be plated so thinly that it is possible to coat a square inch of metal surface at a cost of slightly less than a penny) indium can be electroplated to a remarkable degree of thinness, which did much to popularise its use when the market price was high. But it is not only the metal by itself that has found much industrial application, and many important uses for military purposes have been veiled by a certain secrecy. As it is, the chief uses for the metal are in different plating methods, and for solders and specialised alloys.

Extraction Process

In brief, the improved extraction system comprises dissolving indium-bearing zinc in hydrochloric acid, and the spongy residue, after being left to settle for a few days, is dissolved in nitric acid and evaporated with sulphuric acid. After filtering off the insoluble matter, the indium, together with ferric hydrate, is precipitated by adding ammonia, filtered, washed, dissolved in hydrochloric acid, rendered neutral, and treated with excess sodium hydrosulphite, which gives a fine crystalline precipitate. This still requires further purification to remove iron by dissolution in sulphurous acid, and eventually the basic sulphite is dissolved in sulphuric acid, and the indium precipitated by ammonia and reduced to the metallic state. This is done by fusion with sodium, or heating in a current of hydrogen, but it can be electrolytically deposited from

sulphate, chloride, sulphamate, and fluoborate solutions.

In view of the industrial interest shown in the metal, its physical properties have come in for closer scrutiny. Thus its atomic weight, earlier quoted at 114, and later at 114.8, is now known to be more accurately 114.9. The melting point, quoted before the war as 176° C., is now known to approximate to 155° C. for pure metal. The specific gravity when in the original fused condition is 7.128, but to-day with experience of rolling and hammering other figures are added. Thus the rolling increases the figure to 7.277, and hammering raises it further to 7.422. Most existing literature gives the boiling point as 1000° C., but this is now quoted at 1450° C., which explains why indium does not volatilise like the associated metals zinc and cadmium, a feature which was not properly understood in earlier years, and accounted for unsuccessful searches in the wrong parts of zinc flue systems. Tensile strength is reckoned at approximately 8 tons per sq. in., and Brinell hardness at 1.0, and the fact that the metal can be rolled out to the finest foil is a great feature in favour of a relatively expensive metal. It transpires to-day that indium is not the very rare metal it was once considered to be, for zincblendes have been known to contain as much as 0.025 per cent.

Indium Plating

The plating of indium probably gave the metal its first important industrial use apart from specialised soldering applications, since the highest degree of reflectivity could be gained. Previously reflectors for searchlights and other important purposes were plated with platinum-rhodium and platinum-iridium. It was soon ascertained that the addition of too much rhodium produced a dulling effect, while the coefficient of reflection was directly lowered. With indium plating, light is reflected with marked faithfulness, particularly as coloured lights are reproduced in a manner unknown with other deposited metals. Some platings have been produced of only a few hundred-thousandths of an inch thickness, thus demanding the consumption of only a very small quantity of indium.

For certain surfaces, after the plating has been completed, the fine film is diffused at low heat, but there are other methods of coating zinc-indium to prevent the corrosion of steel without reducing the fatigue resistance. An example of this is seen in the final treatment of hollow steel aircraft propeller blades, where, during the whirl tests and salt spray tests, of a duration of some 4 hours, these alloys remained unaffected, whereas alternative platings tended to wear through at the leading edge, and subsequently peeled. In this instance, the improved plating is carried out in two stages. After thoroughly cleaning the steel surface, zinc plating is applied in the ordinary manner, after which a cyanide bath containing indium trichloride is used, when eventually this indium is diffused into the zinc plate. This is done to ensure increased adherence to the plate. It is a remarkable fact that, although indium gives a softer plating than a lead plating, when it is alloyed to a number of non-ferrous metals greater hardness accrues. Certain of these platings can be made to melt at exceedingly low temperatures, *i.e.*, at little more than the boiling point of water. As a consequence, following plating, the treated part is frequently heated in an oil bath at approximately 177° C., which, when done in conjunction with a previous lead plating, causes immediate fusion and alloying with the lead. This is carried out for the purpose of preparing high-grade bearing surfaces which formerly depended upon lead and silver platings. Although most of these bearings are given a flash plate of indium on top of a coating of lead, bronze bearings can be directly plated. The advantage of this was early appreciated by research branches of the automobile industry, as the indium could be readily diffused into different surfaces for the best types of high-duty bearings.

When plated in the approved manner, indium gives a remarkably bright mirror-like or " star-bright " surface, for all kinds of reflector purposes, while on the other hand, when ultimately diffused into the underlying surface (although this impairs the foregoing brightness), the desired bearing hardness is attained, which, further, can be re-plated on demand. Bearings for aircraft engines are renovated by sealing the part at the bottom, filling the cavity with the prepared plating solution, and introducing a wire of pure indium. The latter takes the place of an anode, and after suitable connection to nearby bus-bars to supply the necessary current, the metal is accurately plated; the solution is then run off, the bearing dried, and the same diffusion treatment followed as before.

Apart from rendering bearing surfaces more durable, the plating process is engaged to impart tarnish-resistance to a great number of small parts required for engineering, electrical work and instruments. These include different varieties of electrical contacts, small screws, spur gears, pinions and racks, etc.

Difficulties in Practice

There are practical difficulties in the preparation of the bath solution for indium plating, and one of the reasons for this is that the cyanide of the metal is very unstable. The precipitate which forms when a soluble cyanide is added to the solution of an indium salt dissolves in excess cyanide. When then heated, however, it is decomposed

with evolution of oxygen, and indium hydroxide can be precipitated. As alkaline baths in general permit a greater margin of safety in preparation of the work to be plated, besides other practical features, these are preferred. The bath recommended by J. B. Mohler, writing in *Iron Age* (1945, *155*, No. 22, p. 47), comprises:

Indium	15 to 30	gm./litre
Potassium cyanide	140 to 160	,, ,,
Potassium hydroxide	30 to 40	,, ,,
Dextrose	20 to 30	,, ,,

When kept within these limits the necessity for aging the plating electrolyte before use is eliminated, while troubles of decomposition and initial preparation of the solution disappear. Current density is applied at 15 to 30 amps./sq. ft. at room temperature, using steel anodes. It is claimed that these steel anodes are not attacked, as they tend to be by other cyanide baths. (Formerly, anodes of ferro-silicon were tried, but there appeared to be a certain reaction between the potassium hydroxide and the silicon content.)

The risk of precipitating part of the indium is avoided by rapidly mixing the concentrated solutions of the salt with those of the mixed cyanide and hydroxide, and then diluting. Although dextrose now appears to be popular, other alternative addition agents were pyridine, hydroxylamine, and a number of selected gums and glues, which restrained crystal growth. The characteristics of the bath resemble those of tin baths, and since nearly all the indium is consistently removed, good white deposits can be assured until scarcely any indium content remains, which is a feature in favour of using a relatively costly plating bath.

Soldering and Brazing

Solders and brazing alloys containing indium, where the unusual fact of two soft metals in combination producing a hard alloy is demonstrated, have been developed to a considerable extent. The important work of constructing electronic tubes depends on having metal parts connected to glass by soldering, and until indium solders were available, this task was extremely difficult, and the bond was often weak. Adherence to glass with indium solders is almost as strong as that made to metal surfaces. In other directions, low-melting-point metals of the bismuth-cadmium order have been hardened by the inclusion of indium. Other indium solders in use are those composed chiefly of lead, *e.g.*, 95 per cent. lead, 3 per cent. silver, 1 per cent. indium.

For brazing purposes, one of the gold-indium alloys has assumed some value for different steel parts used in engineering, as distinct from the gold-indium alloys used for jewellery purposes. Here, again, two soft metals, gold and indium, form a hard and strong product, and yet one which runs well under the tool, and spreads widely on different metal surfaces. For engineering work, the brazing alloy is prepared in the form of a powder, thus differing from the jewellery alloy which is supplied in strip or bar form. This alloy supplants white-gold, which in earlier years served as a substitute for platinum for a number of odd artistic purposes, since, being largely composed of gold, with nickel, manganese, and a number of base-metal additions, it was heavy and in many respects resembled platinum. Efforts were originally made to retain the composition as a secret, but this soon got known, and to-day, the addition of indium in small quantity suffices to render the gold white and more corrosion-resistant than formerly.

Indium-Silver Alloy

Another jewellery alloy consists of sterling silver again combined with indium, which, besides resisting oxidation, is not readily sulphatised in chemical process work. All that has to be done is to plate the silver with a fine film of indium and then diffuse it into the surface. Lastly, no small importance is attached to the use of indium in age-hardening aluminium alloys. A detailed account of this appeared in *Metals and Alloys*, 1941, *14*, p. 168. It was found that alloys of the duralumin type where magnesium was not present showed a marked increase in hardness with additions of 0.05 per cent., 0.10 per cent., and 0.20 per cent. indium, and that the influence of indium was greater on alloys containing only copper. Magnesium additions appeared to add to the difficulties of rolling, while records were made of a variety of other alloying elements besides those of the rare metal.

Finally, indium has also been used in the condition of oxide for the preparation of special glasses, where, according to the proportion added, the colour shades range from yellow to deep amber. The rapid strides made in developing the uses of indium can be assessed by comparing the foregoing notes with one of the small but standard works published in 1920 on rarer metals, by Cahen and Wooton, where it is stated that "neither the metal nor its compounds have any application."

The current (September) issue of the Bulletin of the British Cast Iron Research Association contains two particularly useful reviews of published information, dealing with Vanadium in Cast Iron (by J. W. Grant) and Tungsten in Cast Iron (by S. W. Palmer). Full particulars of the Iron and Steel Industry's plans for research, and of the National Certificates in Metallurgy are also included.

The Technique of Macrography

II—The Examination of Cast Iron and of Alloys

(*Continued from* THE CHEMICAL AGE, *September* 1, 1945, *p.* 197)

ONE of the less known etching media is a water solution of ammonium persulphate in the proportions of 10:90. This solution should not be stored, but supplies should be prepared as required. The advantages claimed are a clear definition of segregations, which show up dark against the general background, and a ready detection of variations in the size of the grains of a steel. The solution is not heated, but the specimens demand a reasonably good degree of finish, the surface being polished with wet papers, until the final polish is given with a No. 400. The solution is dabbed on with cotton wool, and a period of from 30 to 120 seconds is adequate for the actual etching.

Nital Type Etching Media

A quite useful range of etching media commonly employed in industrial laboratories for macrographic work, though not, therefore, necessarily the most advantageous for the purpose, are the media of nital type. These are designed to indicate decarburisation, depth of hardened case in case-hardened steels, depth of hardening in fine-grained tool steels, etc. For macrography, the solutions need to be more concentrated than for micrography, and the time of etching must be somewhat extended. In the main, the method of preparing the specimen does not vary from that normal in micrographic work, unless the magnification power used is higher than normal for micrographic or macrographic work. Essentially these are etchants for low-power magnification and, in addition to the functions earlier specified, they also reveal the presence of large-meshed networks of ferrite. A typical etchant of this class is 10 per cent. nitric acid in alcohol. The polishing paper should range down to No. 400, and the etching period should be not less than 60 seconds, with a maximum of 120 seconds.

Lastly, there is a useful reagent comprising 120 ml. of concentrated HCl, 100 ml. of H_2O and 90 gms. of CuCl, for indicating strain lines in steel. The specimen is usually immersed in the solution for from 60 to 80 hours, and dipped in HCl to eliminate the plating of copper resulting from immersion in the etchant. This is the method recommended by Jevons, so long as the steel tested is of low carbon type containing less than 0.3 per cent. carbon. The wide variation in etching period is to be ascribed to the great differences in the composition and character of steels from different works.

An essential part of macrographic technique is contact printing. The sulphur print is one of the methods indicating the way in which sulphur is dispersed throughout a steel. A sheet of bromide paper, steeped thoroughly in 5 per cent. dilute sulphuric acid is placed on the polished, prepared steel surface. A rubbered roller is used to force out any bubbles of air trapped between the print and the steel. The manganese and iron sulphides decompose as a result of the action of the reagent, and sulphuretted hydrogen is given off. This reacts on the silver salt in the bromide paper and produces a dark brown stain of silver sulphide. After having been left long enough for these reactions to take place, the paper is peeled off, washed with water, and fixed in the normal solution of hypo. The operator is then able to detect from the impression the regions in which the sulphides lie.

The results obtainable from contact printing are largely governed by the degree of attention given to the preparation of the metallic surface for examination and the taking of the print. The above procedure should be rigidly followed, particularly the forcing out of the air bubbles, which demands even but firm pressure. Some macrographers prefer to employ a small hand press for this, but this applies only to small specimens, and cannot be practised when the surface of, for example, an ingot of some size is being examined. It is advisable not to attempt to make more than one print from a single specimen, as blurring and lack of definition are liable to occur when the attempt is made to take another print.

Improved Contact Prints

A number of improvements of this method have been suggested. Vipond, for example, takes a photograph of his sulphur print, washes the prints, then steeps them in a bleaching solution consisting of 50 gm. potassium ferricyanide, 60 gm. potassium bromide, and 1000 mm. water. On examination, the detail of the print is then seen to have vanished, and only a yellowish slight outline is left. The prints are again rinsed, and transferred to a bath of 20 per cent. sodium sulphide in water, in which they are immersed. This brings out the image again, and as many copies as required of the original sulphur print are thus obtained, in no way inferior to the original.

Methods of taking macrographic contact prints for the purpose of detecting phosphorus segregation have been tried, but appear to have been unsuccessful, except in a few instances. A process for revealing

oxide inclusions, not including alumina, has also been worked out, but the claims made for it have not yet been established. The method consists in steeping the photographic paper in a 1:20 aqueous solution of HCl. After development of the contact print, it is said to be possible to detect the size and position of inclusions by the fact that they show up blue on the print. The developing solution is 2 per cent. potassium ferricyanide.

Macrography of Cast Iron

We must now turn aside from macrographic work on steel to consider the same technique as applied to cast iron. There are limits to what can be done in this way and, in practice, the only defects revealed by macrographic work on this material are blowholes, sponginess, breakage, etc. Structural information from etched specimens is not profuse. If, for example, the chemist wishes to obtain a picture of the manner in which graphite is distributed throughout the casting, he prefers, as a rule, to employ low magnification without any etching. In the ordinary way, such macrographic work as is done on cast iron is carried out with the ordinary 2 per cent. nital, or 5 per cent. picral solutions. Where low magnification examination without etching is adopted, the magnification used is within the range 10 × to 30 ×, and vertical illumination is employed.

Recent developments have, however, indicated that by the adoption of a different etching procedure it may be possible to obtain prints indicating the primary dendritic structure of the iron. Austin and Lipnic are responsible for this interesting work, and their methods include polishing with a final paper of No. 320, and etching in a 2.5 gm. solution of ammonium persulphate in 100 ml. of water, the solution being dabbed on with cotton wool for ¼ minute; 1.5 gm. of potassium iodide is then introduced into the first bath, and a further dab-etching of 10 minutes adopted; 1.5 gm. of mercuric chloride is added, and a 5 minute dab-etch carried on. Finally, 15 c.c. of sulphuric acid are introduced, and a final 5 minute dab-etch given. The new method is claimed to link up characteristic dendritic structures with such factors as casting temperature and mechanical properties. Such work of verification as has been carried out by Robinson and Ritchie tends to confirm these claims.

Copper Alloys Examined

Copper-bearing alloys are excellent subjects for macrographic treatment, particularly in the form of cast parts, forged parts, and extruded sections. In general, the specimen is prepared on ordinary lines, grinding being followed by polishing with grades of abrasive paper, down to No. 120 wet paper for ordinary work, but to No. 320 for special work, where the best possible photographic result is desired. There is a wide range of possible etching media, of varying degrees of efficiency, but, in the main, the most satisfactory results appear to be obtained with aqueous solutions of ammonium persulphate. One method strongly recommended by prominent metallurgists consists of ammonium hydroxide (880) 1 part, water 1 part, ammonium persulphate (5 per cent. aqueous solution) 2 parts. This is particularly recommended for work on the brasses.

Another satisfactory solution is a 1:1 solution of nitric acid and water, but as compared with the solution described in the preceding paragraph, this has the disadvantage that, while equal in all other respects, it leaves a small degree of copper stain on certain specimens. On the other hand, given a sufficiently protracted etching, it is possible to detect small chill grains on the surface of freshly cast chill-cast brass ingots.

Ammoniacal copper ammonium chloride is useful for macrographic work on the brasses, giving good sharp contrasts. The method of using this reagent is to make up a 5 to 10 per cent. solution of copper ammonium chloride, and add to this concentrated ammonium hydroxide, until the copper hydroxide precipitate is just dissolved again. Copper-zinc alloys can also be satisfactorily etched with this reagent. The bronzes call for rather different solutions: phosphor bronze and gunmetal are satisfactorily etched with 1:1 nitric acid and ammoniacal ammonium persulphate. The individual grains are clearly contrasted and dendrites brought out.

Reagents for Aluminium Alloys

Turning now to the aluminium alloys, it should be noted that a rather higher finish is required as compared with the copper alloys, and a No. 400 wet paper is advisable, unless the characteristics it is desired to bring out are so well-defined that coarser finishes will suffice. No oil or grease must be allowed to remain on the surface of the specimen. Probably the oldest etching reagents for these alloys are sodium hydroxide and hydrofluoric acid solutions, immersed specimens of small size being used, or dabbing on of the solution for large specimens. Should the immersion method be adopted, it is important to note that no metal holding tool must be employed, or there is a risk of electrolytic action being set up between metal and specimen.

A drawback to the use of the above reagents is that they often stain the specimens badly. For this reason, an improved solution has been adopted in many laboratories. This comprises 10 ml. conc. hydrofluoric acid, 15 ml. conc. hydrochloric acid, and 90 ml. water. It should be used fresh, and the specimen immersed in it for a period

ranging from 30 to 90 seconds. If the alloy contains a percentage of copper, it will be blackened by the solution, and will, therefore, need to be immersed in concentrated nitric acid to remove this deposit.

Another improved etching medium is 15 ml. conc. hydrofluoric acid, 45 ml. conc. hydrochloric acid, 15 ml. conc. nitric acid, 25 ml. water. This, again, leaves a black film on the specimen, which will, however, usually be removed by a simple rinsing.

Aluminium alloys of silicon-bearing type are best etched in a water solution of cupric chloride, 150-160 gms. per litre. This is not carried out by continuous immersion. Instead, the specimen is plunged into the bath for two or three seconds, withdrawn, plunged again, and so on. After each dipping the specimen is scrubbed under water to eliminate the plating or film of copper that forms on its surface. Finally, the specimen is immersed for a brief period in a dilute solution of chromic acid in water, which gives it a nice, bright appearance.

Magnesium and Lead Alloys

Magnesium alloys are etched largely on the same lines as the aluminium alloys, but the amount of polishing usually needs to be greater, because there is a tendency for each stage of polishing to result in a slight superficial distortion of the surface films of the metal, which must be eliminated if the results are not to be falsified. The final polish may be carried out with a wet paper ranging down to No. 600. On the other hand, a good result may be had by using a 000 French emery paper, with a later etching in 15 per cent. nitric acid in alcohol for 30 to 60 seconds, followed by the usual etching.

The reagent for etching that has been recommended is a saturated solution of ammonium chloride or ammonium persulphate, the specimen being immersed for a period ranging from 5 to 10 minutes. Other solutions employed with some success include 2 per cent. ammonium persulphate; 10 per cent. ammonium persulphate dabbed on; and, for heat-treated magnesium alloys, 10 per cent. acetic acid, or 10 per cent. tartaric acid in water, with an etching period of 30 to 60 seconds, the deposit left on the surface by the reagent being in most instances (but not all) removed.

Lead and alloys of lead are etched with a solution comprising 75 gm. ammonium molybdate in 500 ml. water, poured into 500 ml. of 6*N* nitric acid, the solution being then agitated to dissolve the precipitate. Only a brief etch is necessary, and the specimen is oscillated to preclude stains.

When surfaces of specimens have been subjected to an etching treatment, and it is desired to retain the etched pattern, the first essential is a thorough rinsing of the specimen to ensure removal of all traces of acid. If any difficulty is experienced, a dip in ammonium citrate will be advantageous. A clear lacquer should then be applied to the etched surface with a brush, care being taken to let down the lacquer so that it is too thin to leave brush marks behind: if there is any doubt on this point, alternative methods of applying the lacquer may be used.

(To be concluded)

SCOTTISH METALLURGY

Professor R. Hay, of the Royal Technical College, Glasgow, in a lecture in the Royal Scottish Museum, Edinburgh, as part of the "metallurgy week" in connection with the "Meet Scotland" exhibition, gave a description of Scotland's contribution to metallurgy through the work of Smeaton, Watt, Neilson, Mushet, and M'Arthur, and laid special emphasis on Professor John Anderson's pioneer work in the field of technical education. That Scotland's contribution to metallurgical development was not a completed story, and that still greater contributions might be looked for from her, seemed evident from the work now being accomplished in various quarters, and by the increasing demand of the rising generation for admission into the ranks of the metallurgists.

At a subsequent meeting in the same series, Dr. P. T. Carter gave a lecture on "Possible Developments of Metallurgy in Scotland." He described the present raw material situation in Scotland, and pointed out that whereas the country was not rich, it could not be described as destitute. Non-ferrous metals were mainly present in amounts too small to smelt, and the future of the Scottish metallurgical industry was likely to be confined to iron and steel manufacture on Clydeside, and magnesium, ferro-silicon, ferro-chrome, and possibly aluminium production in the Highlands based on hydro-electric power.

Other lectures were given by Dr. A. B. McIntosh on "Metallurgical Control of Steel Quality"; by Miss Helen Towers on "Refractory Brick Production in Scotland" and by Dr. John Taylor on "Recent Advances in Metallurgical Research."

Personal Notes

SIR ANDREW DUNCAN, formerly Minister of Supply, has rejoined the board of I.C.I.

PROFESSOR F. G. YOUNG has been appointed to the chair of biochemistry at University College, London.

MR. ARCHIBALD R. JAMIESON, who holds at present the posts of additional Glasgow city analyst, deputy agricultural analyst, and chief assistant to the Corporation chemists, has been selected for the position of City Analyst by the Health Committee.

MR. G. W. LACEY has relinquished his appointment as Controller of Light Metals in the Ministry of Aircraft Production, following the introduction of the simplified control procedure, and has rejoined the British Aluminium Co., Ltd. He is succeeded by MR. C. G. MCAULIFFE.

SIR WILLIAM LARKE, K.B.E., has been released by the Minister of Supply from his post of Controller of Non-Ferrous Mineral Development. Correspondence should now be addressed to the Non-Ferrous Mineral Development Section, Selection Trust Buildings, Masons Avenue, Coleman Street, London, E.C.2.

MR. F. E. SMITH and MR. J. L. S. STEEL have been appointed to be additional directors of I.C.I., Ltd. Mr. Smith was chief engineer and a member of the board of the Billingham Division of I.C.I., and for a large part of the war has been acting as chief engineer and superintendent of armaments design at the Ministry of Supply. Mr. Steel has been chairman of the Alkali Division of I.C.I. since 1943.

DR. N. SMITH, who has been Registrar of Manchester University for the past 25 years, has retired. He took the degree of B.Sc. with honours in chemistry in 1898, and became a D.Sc. six years later. In In 1901, he became assistant lecturer and demonstrator in chemistry at Manchester and was appointed senior lecturer in 1912. Although he afterwards concentrated his activities on the administrative side of university life, he nevertheless continued with his teaching duties as well.

SIR ALFRED EGERTON, secretary of the Royal Society, left London on Tuesday for a visit to Prague, to convey the greetings of the Royal Society on behalf of the men of science of Great Britain to their colleagues in Czechoslovakia. He will be the guest of the Rector of the Charles University, and will discuss with him and his colleagues what aid British science can give to the rehabilitation of science and scientific education in their country. Sir Alfred Egerton is taking with him, for the Masaryk University at Brno and the Royal Bohemian Society of Sciences at Prague, scientific publications of the Royal Society issued during the war years.

MR. W. M. INMAN, formerly sales controller of I.C.I., has been appointed chairman of the Alkali Division in place of Mr. Steel. MR. E. M. FRASER, lately Director-General of Aircraft Production, has returned to I.C.I. as sales controller in place of Mr. Inman. MR. A. T. S. ZEALLEY has been appointed chairman of the Billingham Division, and MR. V. ST. J. KILLERY from Billingham to be chairman of the General Chemicals Division. MR. S. A. H. WHETMORE has been appointed managing director to the Billingham Division jointly with MR. K. GORDON.

DR. GODFREY ROTTER, C.A., C.B.E., D.Sc., F.R.I.C., F.Inst.P., formerly Director of Explosives at Woolwich Arsenal, and recently scientific adviser to the Air Ministry, is awarded the G.M. for bravery after an explosion in an underground bomb depôt (near Burton-on-Trent). A small band of volunteers working under his direction, was led by MR. S. W. MAXTED, B.Sc., A.R.C.S., who worked with Dr. Rotter at Woolwich, and MR. G. E. FOX, leading storeman. Mr. Maxted becomes an M.B.E., and Mr. Fox receives the George Medal.

DR. J. H. CHESTERS, of the Central Research Department of The United Steel Companies, Ltd., has just been awarded the degree of Doctor of Technical Science by the University of Sheffield, for his outstanding researches on refractories. Dr. Chesters obtained his Ph.D. degree in 1931 as a result of researches on induction furnace linings. In 1934, he was appointed to take charge of the Refractories Section of the Central Research Department of The United Steel Companies; he is now engaged on work in the field of open-hearth furnace design, constituting a new approach to the problem of finding suitable refractories to meet the fast working conditions of the furnace of the future.

Obituary

MR. JOHN BELL, who died suddenly at Dundee on September 27, aged 65, was a well-known member of the staff of Imperial Chemical Industries, Ltd., Albert Square, Dundee. He was a popular member of the local Business Club and took a keen interest in sport.

As we go to press the death is reported of SIR DAVID MILNE-WATSON, for many years past one of the outstanding figures in the gas industry. Sir David died at his home at Abbotsbury, Dorset, in the early hours of October 2. Failing health had lately obliged him to relinquish many of his appointments. A full story of his services to the gas and chemical industries will be included in our next issue.

New Control Orders

Benzol Recovery Plant

THE Minister of Fuel and Power has issued the Benzol Recovery Plant (Revocation) Order, 1945, and the Benzol Recovery Plant General Direction, 1945 (S. R. & O. 1945, Nos. 1182, 1183), both of which came into force on October 1. The joint effect of these instruments is to rescind the requirement whereby persons or companies carrying on undertakings for the supply of gas or the production of coke and possessing plant for the recovery of benzol were obliged to cause the gas produced by the carbonisation of coal to be treated by passing through such plant.

Industrial Alcohol

The Minister of Supply has made the Control of Molasses and Industrial Alcohol (No. 18) Order, 1945 (S. R. & O. 1945, No. 1184) which revokes and remakes in consolidated form the Control of Molasses and Industrial Alcohol (Nos. 11 to 17) Orders, 1941-42, with the following amendments: (1) Methanol, formaldehyde, metaformaldehyde and hexamine are released from control and licences will no longer be necessary for the acquisition, disposal, treatment, use or consumption of these commodities. (2) The maximum quantity of industrial alcohol (other than mineralised methylated spirits) which can be acquired, disposed of, treated, used or consumed without a licence is increased from one gallon per month to sixty gallons in six calendar months. The Order came into force on October 1.

Nyasaland Minerals

Corundum and Mica

AFTER a period "between the wars" of virtually no mineral production in Nyasaland, since 1943 two minerals, corundum and mica, have been mined and exported from the Protectorate, according to a report in the *Bulletin of the Imperial Institute* (1945, *43*, 123). The corundum deposits now being worked lie around, and on the lower slopes of, Tambani Mountain, on the Portuguese border N.W. of Blantyre. The mineral was discovered in 1906, but for many years the occurrence was neglected, partly in the mistaken belief that it lay in Portuguese territory. The corundum is now being worked by the Gifter Corundum Co., of Pietersburg, Transvaal, the principal producer of that mineral in South Africa. The annual report of the Nyasaland Geological Survey for 1943 contains the latest description of the Tambani deposits.

The resumption of mica production in Nyasaland recalls the spate of activity which followed the discovery of commercial mica there in 1909. In the three years 1910-1912 more than 100 tons of mica, valued at £11,444, were collected from numerous scattered surface deposits and exported to Britain, but no proper mines were established, and a few years later all activity had ceased. During 1943 production was on a small scale, the exports being termed "samples." The best quality mica, of brown-to-ruby type, was obtained from Kanye Waye, by Mt. Masosa. This deposit was followed down to 25 ft. without any signs of deterioration of quality or size. Generally speaking, the mica from the Kasitu Valley is a slightly green type with a tendency to be of the "red-spotted" class, and is second grade. Even so, it is said to realise an average price of 8s. per lb.

Bauxite Survey

The annual report of the Nyasaland Geological Survey for 1943 also contains some interesting information on coal, bauxite, and cement, the future development of which in Nyasaland may be closely interdependent. The exploitation of the Mlanje bauxite deposits which is now under consideration would require coal, and it has therefore been necessary to investigate the Nkombedzi (or Sumbu) coalfield to determine whether it would meet these requirements. The possibility of establishing a small cement factory using the clay deposits of Lake Malombe is also dependent on fuel supplies, which could only be met economically if Nyasaland coal became available.

The 160 samples of Mlanje bauxite analysed are of several grades, the two of most value being: (*a*) bauxite of commercial grade in the raw state, with total silica less than 6 per cent. and alumina averaging 48.84 per cent., with a range of 37.59 to 52.84 per cent.; (*b*) bauxite amenable to treatment and yielding a product with less than 2.50 per cent. combined silica and insoluble silicates, and more than 50 per cent. alumina. The quantity of bauxite of these two grades is quite sufficient to warrant careful consideration as a commercial commodity.

Steel plants in Northern Italy have suffered relatively little war damage. In 1943, Italy produced 1,750,000 quintals of iron and steel products a month, but output gradually dropped until it was only about 200,000 quintals during the first 4 months of 1945. Estimates place the industry's monthly needs at approximately 500,000 quintals of raw steel and at about 250,000 quintals of coal. Electric furnaces are used for the most part. The plants in the Liguria region, which were only slightly damaged during the war, are said to have reserves of iron ore, steel, and cast iron.

General News

From Week to Week

The Import Licensing Department of the Board of Trade moved to 189 Regent Street, London, W.1 (Regent 4090), on October 1.

Sir John Anderson has accepted an invitation from the Manchester Joint Research Council to address a special meeting at Manchester University on October 17 on "Research in relation to reconstruction."

The D.S.I.R. has published a special report on "Swelling Stresses in Gels, and the Calculation of their Elastic Constants from their Hygroscopic Properties" (H.M.S.O.; 1s. 2d., post free).

The Minister of Food announces that there will be no change in the existing prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the five weeks ending November 3, 1945.

Publication of the detailed monthly Trade Accounts will be resumed with the issue for January, 1946. These give particulars of all our principal imports, exports and re-exports, with a considerable amount of information on trade with individual countries.

Only 30 additions are made to the list of persons in neutral countries with whom dealings of any kind are unlawful, in the Trading with the Enemy (Specified Persons) (Amendment) (No. 10) Order, 1945 (S. R. & O. 1945, No. 1156). There are also about twice as many deletions from the list.

The Board of Trade announces that, by arrangement with the Postmaster-General, it has authorised business communications with Siam. The resumption of private trade is not yet permissible. Correspondence for Siam may not yet be registered or insured. Letters, newspapers and printed matter are limited to a weight of 2 oz.

A substantial increase is reported in the importation of artificial fertilisers into Eire and some 81,000 tons reached the country for the last tillage season; a bigger quantity is expected this season. The Minister for Agriculture (Dr. James Ryan) has announced, however, that there is no immediate prospect that supplies of potash and sulphate of ammonia will improve.

A limited amount of shipping space is available from the U.K. for goods destined for Switzerland, states the *Board of Trade Journal*. Exporters are advised to apply through their forwarding agents to the Swiss Legation, 18 Montagu Place, Bryanston Square, London, W.1, giving particulars of the goods concerned, the tonnage involved, dates at which goods can be made ready for shipment and loading port desired.

An inquest was held at Kendal last week on Humphrey, the 16-year-old son of Dr. A. F. Quarmby of Ambleside. It was reported that the boy was grinding sulphur and potassium chlorate in a mortar when an explosion occurred which wrecked the room and embedded pieces of the mortar in his body. The boy had been warned against the risks involved, but was apparently grinding the powder with the mortar on his lap, instead of on a table with due protection.

A new General Licence (S. R. & O. 1945, No. 1198) authorises business communications with Hungary. Starting from October 2, British and Hungarian firms may exchange business information, though the resumption of private trade is not yet permissible. Some time may elapse before direct postal facilities can be inaugurated, as final arrangements have yet to be completed with the Hungarian authorities. Telegraphic communication will be operated immediately.

The Ministry of Supply announces that with effect from October 1, the price of mercury metal will be reduced by £38 10s. per bottle. Detailed revised price schedules will be issued in due course. This drastic cut in the price was not unexpected in view of the continued fall in values in the United States, where the price for some time past has been about half that ruling in London. Present prices for spot metal range from £68 10s. to £69 15s. per flask, according to conditions and quantity.

A preliminary announcement concerning the centenary celebrations of the Imperial College of Science (the Royal College of Chemistry was founded in 1845) states that the King, as Visitor of the college, accompanied by the Queen, will attend a ceremony in the Albert Hall on the evening of October 25, and will be invited to autograph a bound memorial record. On the two following days the extensive college buildings and departmental exhibits will be open to the public.

Arrangements have been made, like last year's, to provide blackcurrant syrup and purée for sale through retail chemists for children, invalids and persons in need of additional vitamin C; the word "children" to include all children up to the age of eighteen. The manufacturer's price for syrup will be 20s. 10d. per dozen bottles and 9s. 4½d. per dozen tins of the purée. The wholesale prices will be 23s. 2d. per dozen bottles, and 10s. 5d. per dozen tins. The vitamin-C content of syrup and purée will be the same, namely, not less than 20 mgm. of vitamin C per fluid oz.

The Board of Trade has received from the Foreign Office a copy of a note, dated August 21, 1945, from the Argentine Minister for Foreign Affairs to H.M. Ambassador in Buenos Aires giving formal notice of termination of the Agreement of Trade and Commerce concluded between the United Kingdom and Argentina in 1936. The agreement becomes due to expire on February 21, 1946.

At the invitation of the French Government, a party of British industrialists, representing the Federation of British Industries, is leaving for Paris under the leadership of Sir Clive Baillieu, President of the F.B.I., and Lord Dudley Gordon. The delegation will be accompanied by Mr. Charles Ramsden, the F.B.I's foreign director, who is going on from Paris to Italy and Switzerland to extend the Federation's connections in those countries.

Important new developments for Scotland announced by the Board of Trade involve the allocation of seven new factories and the re-allocation of three existing plants providing employment for some 6000 workers. Of particular interest to the chemical industry are new factories for the Crittall Manufacturing Company, Shanks and Co., Vactric, Scottish Cables, S. Smith and Sons, and Stewarts and Lloyds, at Paisley, Kilmarnock, Newhouse, Renfrew, Carfin and Mossend, respectively.

Foreign News

The Franco-Swiss trade agreement provides for the supply of French basic slag and North African phosphates to Switzerland.

The Instituto Peruano de Ingenieros Quimicos has been organised with headquarters in Lima.

Potassium nitrate is again being manufactured in the Bordeaux region of South-Western France.

Phospho-Guano, the French fertiliser company, is to raise its capital from fr.12 to fr.32 millions and to issue fr.40 mill debentures.

The salt-pits at Djibouti (East Africa) have raised their output over the past two years to 72,720 metric tons, which were largely exported to Abyssinia and India.

An orange-yellow mineral, obtained from Rajputana and showing pronounced radio activity, has been examined in Calcutta University. It contains 1.2 per cent. uranium.

As asphalt deposits are said to be extensive in Brazil, plans have been made for a plant with an annual capacity of 15,000 tons, to cover domestic needs.

Canadian production of tungsten concentrates amounted to 881,000 pounds last year, as compared with 521,000 pounds in 1942 and 12,000 pounds in 1940.

Matières Colorantes de Saint-Denis, the large French dyestuffs and chemical producer, has been authorised to issue debentures to the amount of 70 million fr. during the next five years.

Sulphur, machine grease, and the Italian liqueur called "grappa," were mixed by an AMG officer to form an improvised but successful remedy for scabies on the island of Elba.

Plans are under way to obtain agricultural limestone at Corner Brook, Newfoundland. The material will be handled by the Agricultural Division of the Department of Natural Resources and is to be sold to farmers.

The cement shortage is still hampering building activities in Kenya. Less than 10,000 tons have been received this year, with requirements aggregating about 50,000 tons, half of which have been ordered in the U.K., while 10,000 tons may be shipped from South Africa.

Anticipating a growing post-war demand, the Southern Agricultural Chemical Corporation will immediately erect a $125,000 zinc sulphate plant at East Point, Ga., to quadruple the size of its operations. The new plant is expected to go into operation in about ten months.

The Office of Strategic Services (O.S.S.) has been dissolved by President Truman. Some of its functions, of the research and analysis branch, and of the presentation branch, except those within Germany and Austria, are transferred to an Interim Research and Intelligence Service established in the Department of State.

The Colonial Secretary has telegraphed to the West Indian Colonies that the establishment of a University College in Jamaica, with a view to its development as a full West Indian University, would have his entire support. He added that he was prepared to consider a financial grant to help towards the cost of the building.

Twenty leaders of Mexican industry, government and finance, are to attend a conference in Chicago next month, sponsored by the Armour Research Foundation of the Illinois Institute of Technology. They will visit industrial colleges and research organisations in the area, attend discussions on research methods, and exchange ideas on the solution of industrial research problems.

Cellulose nitrate plastics, particularly in sheet form, are in demand in Sao Paulo, Brazil. After elimination of supplies from Germany and Japan, the principal pre-war sources, and curtailment of shipments from the United States, imports of nitrocellulose sheets decreased from 62,316 kg. in 1938 to 14,028 in 1943. Decreases are also recorded for other nitrocellulose products.

Japan's steel production, which normally totals 4,000,000 tons, dwindled to 2,007,000 tons in 1944-45. In the first quarter of this year, output declined to 250,000 tons, due to intensified air raids. Production of aluminium fell from 140,000 tons in 1941, to 100,000 in 1944 and in the first quarter of this year was reduced to 6,500 tons.

An agreement was signed last month between the U.S. Military Command in Austria and the Mines Syndicate in the Moravská Ostrava region of Czechoslovakia. Provided that transport is available, the U.S. authorities have agreed to supply, during the next three months, 350,000 tons of Austrian iron ore of a certain quality, against 150,000 tons of Czech coke.

In Brazil, a new occurrence of mica has been found in Minas Gerais near the city of Governador Valadares, while in Bahia, a new deposit of rock crystal was discovered. Lead occurrences have been noticed in Pará, near Rio Fresco, in the Xingú River basin. Prospecting for asbestos is going on in the State of Goiás, while spoolumene has been discovered in the State of Paraíba, near Sta. Lusia.

Helium production activities at the Cunningham, Kans., and Amarillo, Tex., plants of the Bureau of Mines, were suspended at the end of July. Current and future needs will be met by the Exell, Tex., and Otos, Kans., plants, both of which were constructed during the war and embody the latest designs and most modern production methods. The Amarillo plant will become the headquarters for an expanding helium research programme, while the Cunningham plant will be dismantled.

Forthcoming Events

October 9. Institution of Chemical Engineers, and **Chemical Engineering Group**, Apartments of the Geological Society, Burlington House, Piccadilly, London, W.1. 5.30 p.m. Dr. E. R. A. Merewether (H.M. Senior Medical Inspector of Factories): "Industrial Health—Progress, Contrasts and Fallacies."

October 10. Institute of Fuel (North-Western Section). Municipal Annexe, Dale Street, Liverpool, 2.30 p.m. Mr. W. A. Pain: "Power from Process Steam."

October 10. Society of Chemical Industry (Newcastle section) and **Royal Institute of Chemistry**. Chemistry Lecture Theatre, Newcastle University, 7 p.m. Dr. H. Baines: "The Choice of Photographic Materials for Scientific Purposes."

October 10. British Association of Chemists. Lecture Theatre, Pharmaceutical Society, 16-17 Bloomsbury Square, London, W.C.1. 6.30 p.m. Dr. V. L. S. Charley: "Vitamins in Fruit Juice Concentrates."

October 11. Society of Chemical Industry and **Royal Institute of Chemistry** (Edinburgh and East of Scotland Sections). North British Hotel, Edinburgh. 7.30 p.m. Dr. D. Jordan Lloyd: "Protein Fibres."

October 11. Royal Institute of Chemistry (Cardiff Section). Visit to I.C.I. Dowlais works. 2.30 p.m.

October 11. Royal Institute of Chemistry (London and South-Eastern Counties Section). Public library, William Street, Slough, 7 p.m. Dr. J. M. Walter: "Recent Advances in Plastics."

October 11. Society of Chemical Industry. (R. & B. M. Group and London Section). Gas Industry House, 1 Grosvenor Place, London, S.W.1. 6 p.m. Professor E. K. Rideal, F.R.S.: "Some Physico-Chemical Problems in Construction."

October 12. British Association of Chemists (St. Helens Section). Y.M.C.A. Buildings, 7.30 p.m. Mr. H. Pritchard: "Chromatography."

October 12. Society of Chemical Industry (South Wales Section). Royal Institution, Swansea, 6.30 p.m. Mr. F. Gill: "New Physical Methods in Examining Petroleum Products."

October 12. Society of Dyers and Colourists, Royal Technical College, George Street, Glasgow, 7.15 p.m. Dr. W. T. Astbury, F.R.S.: "Molecular Relations between Wool and the Plastics."

October 13. Institution of Factory Managers, Bonnington Hotel, Southampton Row, London, W.C.1, 10 a.m. Council Meeting.

October 13. Institution of Chemical Engineers (North-Western Branch), College of Technology, Manchester, 3 p.m. Mr. H. Griffiths: "Some Problems of Vacuum Technique from a Chemical Engineering Standpoint."

October 13. International Society of Leather Trades' Chemists (British Section), Manchester Group). Engineers' Club, Albert Square, Manchester, 2 p.m. Mr. D. Woodroffe: "Post-War Plans for the Leather Chemist"; Messrs. H. Jones and E. Chadwick: "Synthetic Resins and their Possible Use in the Leather Trade."

October 15. Association of Austrian Engineers, Chemists and Scientific Workers in Great Britain. Austrian Centre, 69 Greencroft Gardens, London, N.W.6, 7.30 p.m. Dr. F. Eirich: "Modern Views on Colloid Science (with special refrence to the Ultra centrifuge)."

October 16. Hull Chemical and Engineering Society. Regal Room, Regal Cinema, Ferensway, Hull, 7.30 p.m. Mr. E. H. Brittain: "The Origin and Development of Patents."

Company News

Hydrol Chemical Company, Ltd. (369,510), 9 King's Bench Walk, E.C.4.—The nominal capital has been increased by £1900 in shares of £1, beyond the registered capital of £100.

New Companies Registered

Fielden & Co. (Rochdale), Ltd. (398,813). Private company. Capital £2000 in £1 shares. Industrial drying engineers, consulting, chemical, and general engineers, etc. Subscribers are: L. A. Mitchell, Ltd.: L. A. Mitchell (permanent director), chemical engineer. Registered office: 37-Peter Street, Manchester, 2.

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.)

BRITISH DOMOLAC CO., LTD., London, S.E., manufacturers of chemical substances. (M., 6/10/45.) September 8, by order on terms, £4000 charge, to Freehold and Leasehold Permanent Benefit Building Society; charged on White Pines (formerly Glyn Wynne), Camden Park Road, Chislehurst. *——. February 14, 1944.

Satisfaction

CATALIN, LTD., Waltham Abbey, chemical manufacturers. (M.S., 6/10/45.) Satisfaction September 10, of debenture registered October 10, 1930.

Chemical and Allied Stocks and Shares

THERE has again been only moderate business in stock markets, where attention continued to centre on the outcome of the important Washington and London talks. British Funds were well maintained, and home rails held all but a small part of a good rally, while small gains predominated in industrials. Among the latter British Celanese, which rose strongly to 34s. 3d., were prominent, with the second preference also higher at 32s. 6d. on the news that a large block of shares overhanging the market has been absorbed. On the other hand, in some cases there was an easier tendency, financial results coming to hand showing further evidence that difficulties of the transition period are affecting earnings of various companies. Reduction in the interim dividend of Thos. Firth & John Brown, which is 1¼ per cent. lower at 3 per cent., tax free, was unexpected, and the shares declined sharply to 60s. xd with John Brown 10s. ordinary falling to 26s. 3d. in view of the controlling interest of the latter in the first-named company. It is recognised in the market that earnings of concerns which have been exceptionally active on war work must be affected by the drying-up of Government contracts; on the other hand, it is expected that in numerous instances net profits may be little changed because E.P.T. provision will be correspondingly reduced.

Imperial Chemical have been active and firm at 39s. 6d., buyers being attracted by the indications of large scope for further expansion of the business both at home and overseas. Turner and Newall moved up to 82s. 6d., also being favoured on the company's widespread interests. Lever and Unilever rallied to 50s. 3d. following a decline to 48s. 9d. on the news that the dividend is again limited to 5 per cent. although earnings on the shares are again substantially in excess of this rate. This cautious policy arises from the dividend guarantee in respect of Lever N.V. The Dutch company made profits to cover dividends equal to those paid by the English company, but cash resources were not sufficient to pay them. A final decision in regard to the dividend guarantee is promised as soon as possible.

The reduced Firth Brown interim affected sentiment in regard to iron and steel shares, but colliery shares firmed up, the latter reflecting hopeful views in regard to compensation arising from the Government's nationalisation plans. Babcock & Wilcox eased to 57s., Hadfields to 31s. 4½d., and Dorman Long to 26s. 4½d. On the other hand, Powell Duffryn were firm at 22s., Staveley at 47s., Lambton Hetton at 18s. 4½d., and Carlton Main colliery at 20s. 9d.

De La Rue rose strongly to £11¼ on indications of growing expansion of the plastics activities of the group. A rally to 18s 10½d. was shown in Amalgamated Metal shares, and Imperial Smelting firmed up to 15s. 3d. Goodlass Wall 10s. ordinary continued to attract attention and were higher again at 25s. 3d. In other directions, Birmid Industries were higher at 94s., and General Refractories 10s. shares 16s. 9d., but on the other hand, following the reduced distributions, United Gas Industries

shares fell back sharply, the ordinary being 8s. down at 50s., while the deferred shares lost 3s. at 11s. Allied Ironfounders have been firm at 52s. The units of the Distillers Co. were steady at 116s. 3d., but United Molasses eased to 41s. 3d. and British Plaster Board to 35s. 7½d.

British Drug Houses changed hands round 39s. Boots Drug strengthened to 56s., Timothy Whites were 42s. 1½d., and Sangers 31s. 3d. Low Temperature Carbonisation 2s. shares eased to 2s. 6d. B. Laporte remained around 87s., Burt Boulton were 26s., Cellon 5s. shares 26s., Monsanto Chemicals 5½ per cent. preference 23s., and Greeff-Chemicals Holdings 5s. shares again 9s. Oils continued firmer under the influence of the Anglo-U.S. petroleum agreement. Shell were 83s. 9d. and Anglo-Iranian 115s.

British Chemical Prices

Market Reports

A GOOD volume of inquiry is reported from nearly all sections of the London market and the general tone is steady. In the heavy chemicals section contract deliveries are being maintained with fair regularity and in other directions the supply position is, if anything, a little easier. Particulars of the revised price schedule for mercury products are awaited following the reduction in the price of the metal by £38 10s. per bottle. Revised prices of sulphuric acid came into operation on October 1. Licences will no longer be necessary for the acquisition or disposal of methanol, formaldehyde, and hexamine which articles were removed from control as from October 1; prices are not affected—the market being steady on a good demand. Red and white lead are in strong request, as are most of the raw materials for the paint industry, all available supplies finding a ready outlet. The lifting of the Export Licensing restrictions from a wide range of chemicals has certainly increased export activity, but any real benefit which the trade can enjoy in this direction depends largely on a considerable improvement in the shipping position. Although the tone of the coal-tar products market remains steady, buying is a little hesitant owing to the persistent belief that strong American competition will be felt in the export markets.

MANCHESTER.—Steady to firm price conditions have been reported on the Manchester chemical market during the past week. Both home and export business has been maintained at a reasonably satisfactory level, and fresh inquiries covering a fair number of products have been dealt with since the last report. Home trade contracts covering the leading "heavies" are being drawn against steadily by industrial users in Lancashire and the West Riding of Yorkshire. In the by-products section, Continental buying interest in pitch is prominent, while a steady home trade demand continues in creosote oil, carbolic acid and motor benzol. Among the fertiliser materials, sulphate of ammonia, basic slag and agricultural lime are active sections.

GLASGOW.—In the Scottish heavy chemical trade during the past week there has been no change in the home market, business remaining steady. Prices continue firm. The export position is also unchanged, inquiries being received regularly, but shipping space is rather limited.

Price Changes

Sulphuric Acid.—168° Tw., £6 2s. 8d. to £7 2s. 8d. per ton (reduction of 7s. 4d. per ton).

SITUATIONS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

ASSISTANT (25–35) required for Technical Director of Company manufacturing Plastics, London area. Knowledge of Chemical Engineering an advantage. Interesting position with excellent prospects for young man possessing persistence, drive, initiative and thorough knowledge of Factory Administration. Box No. 2239, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

QUALIFIED chemist required for old-established Firm of Cable Manufacturers in the London Area to take charge of the Paper Cable Laboratory. In addition to supervising the routine work of the Laboratory, applicants must be capable of undertaking investigational and development work and of dealing with various chemical problems arising in power cable construction, installation and operation. Sound experience in the technique of cable practice is essential and preference will be given to applicants familiar with high voltage applications. Age about 30–35. Commencing salary £400–£500 according to qualifications and experience. Participation in the Company's superannuation scheme is a condition of employment becoming effective after one year's service. Applications will be treated as strictly confidential and should give full details of education, training, and qualifications and complete record of all previous experience. Box No. 2236, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED

POWDER filling machine wanted. Send full details and prices to Box No. 2238, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

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