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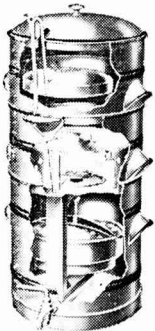
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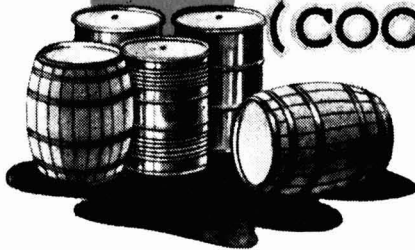
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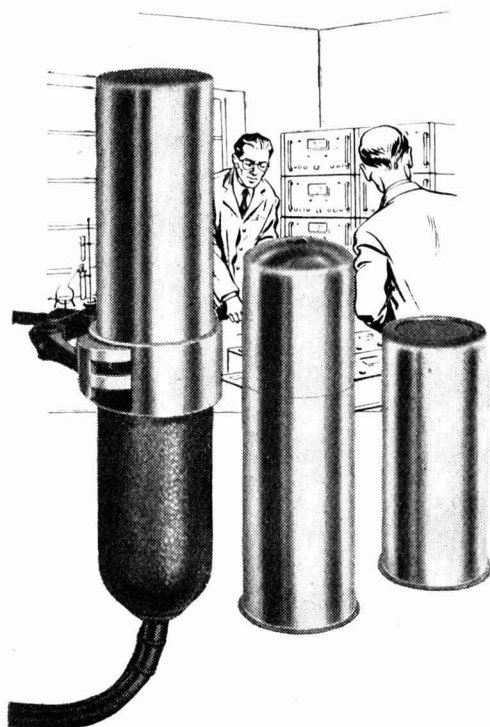
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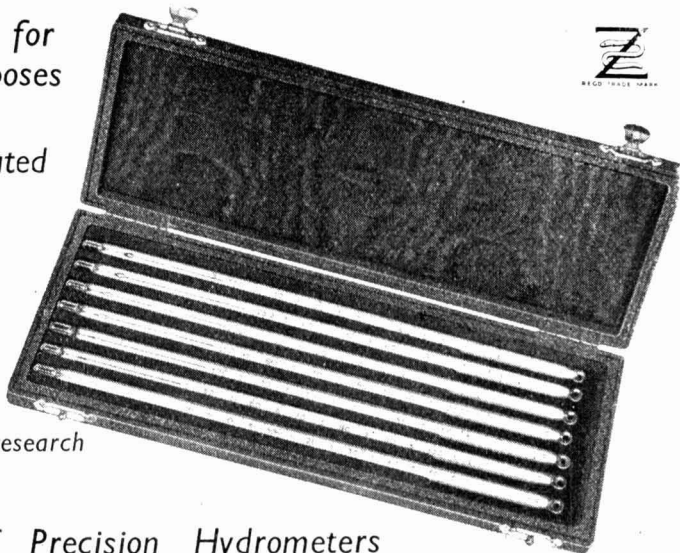
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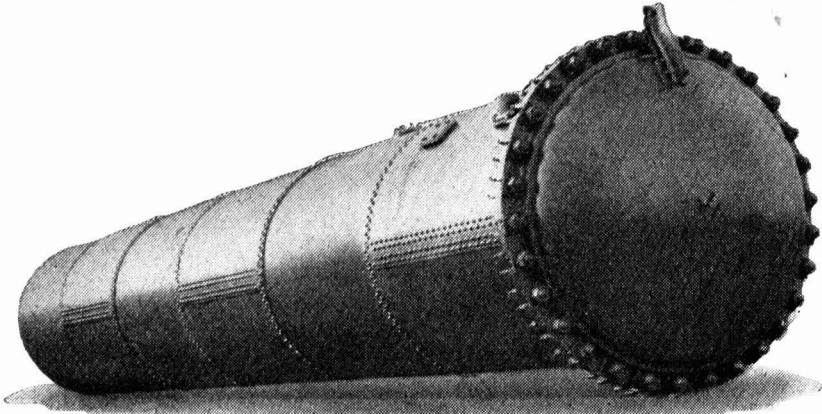
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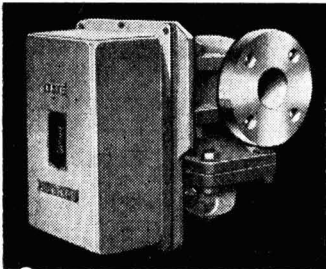
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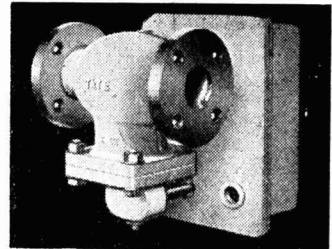
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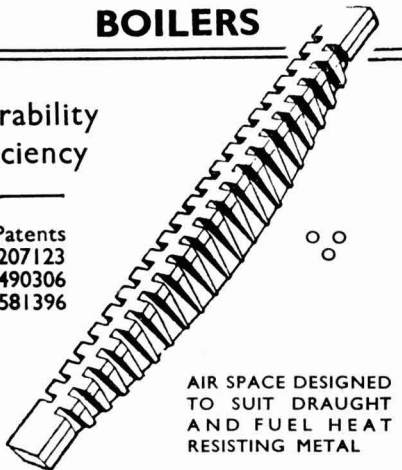
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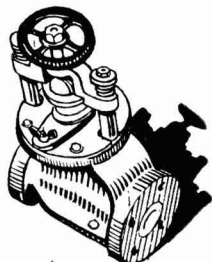
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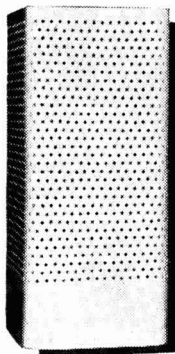
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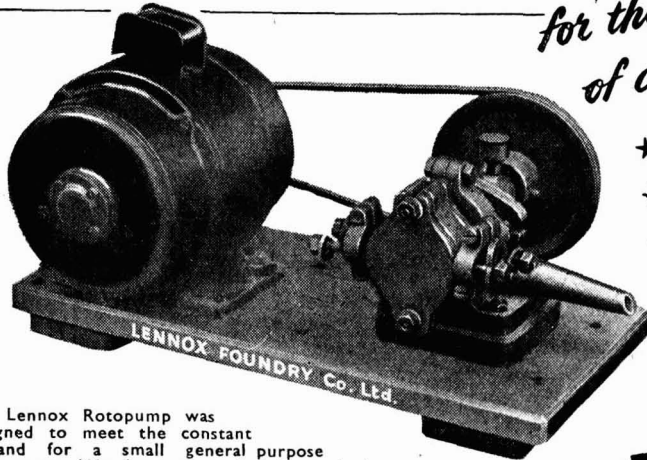


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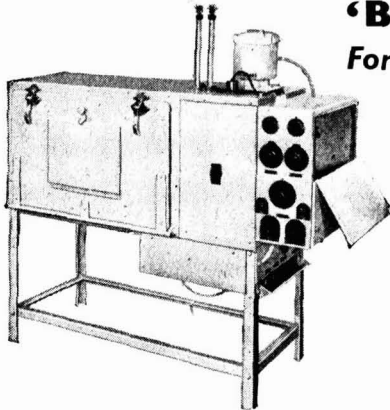
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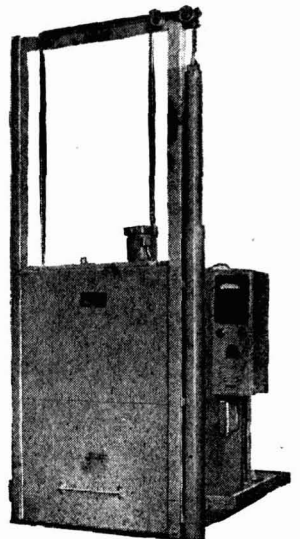


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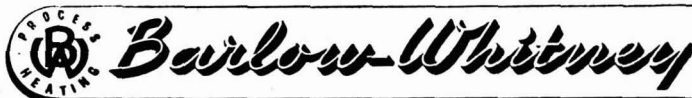


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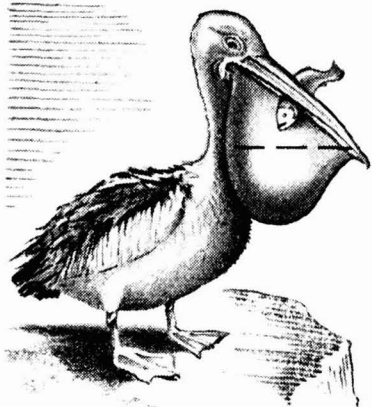


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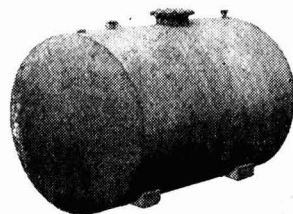


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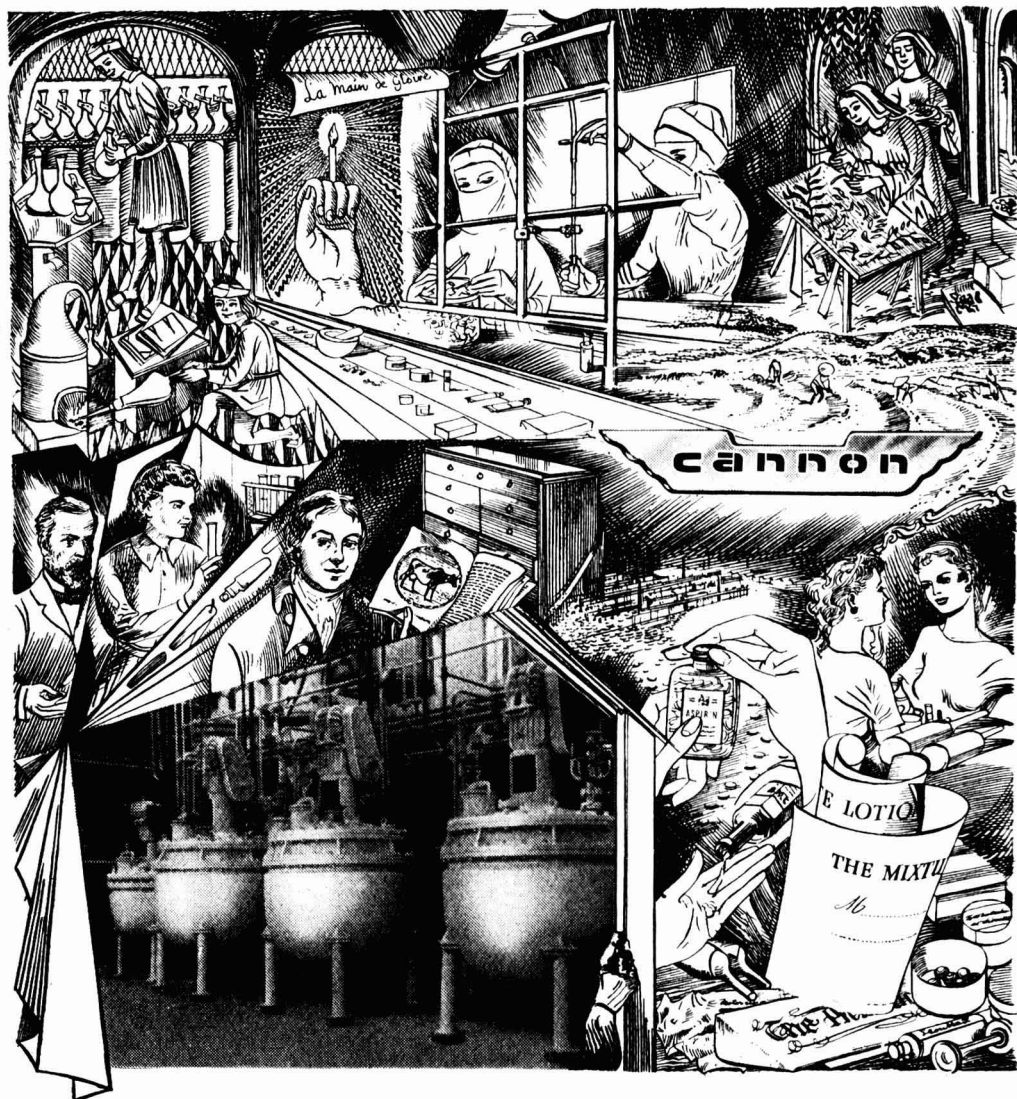
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Beating the Drum

ADVERTISING has been a prominent subject for discussion in recent months. The perpetual washtub war, triangular with its soap *v.* detergent and detergent *v.* detergent sectors, has been the target of several critics who have contended that lower retail prices for these commodities should displace their heavy advertising expenditure and free sample distribution. The TV Bill debate, both in and outside Parliament, has largely presented the advertiser as a villain, or at best as a roughshod outsider able to behave tolerably only if restraining forces are present; even supporters of the Bill have placed major stress upon the clauses that control the advertiser. Last month an M.P. who is also an industrialist wrote to *The Times* suggesting that expenditure upon advertising should be restrained by legislation.

This, of course, is not a new controversy. It is one of the oldest debates of our time. But after a period of years, during which advertising space was rationed and when the distribution of many everyday necessities had been subject to forms of control, it re-emerges for a large section of the public as an entirely new topic. It requires re-statement and re-argument. In a notable book published for the first time in 1919 Thomas Russell ('Commercial Advertising') summarised the main arguments against advertising as follows:

'(1) Advertising is inseparably bound up with exaggeration, misrepresentation, and overcharging.

'(2) If advertising did not exist, commodities of equal value would be obtained by consumers as plentifully and as cheaply.

'(3) The cost of advertising must be added to the price of goods, and therefore advertised commodities are needlessly dear.'

It was more necessary in 1919 to dispose at length of the first point than in 1954. In the earlier days of large-scale advertising there was undoubtedly a regrettable amount of over-claiming and, indeed, of false claiming. But this, like most social evils, has cured itself. No firm today could sensibly consider spending appreciable sums of money upon advertising that can have only short-term effects upon the sales of its products and whose long-term effects—when the consuming public has found that the claims are unjustified—must be adverse rather than beneficial. There has been, too, a great advance in the ethics of advertising during the past 25 years, and even if a manufacturer were prepared to use advertising unscrupulously it is almost certain that the experts he must inevitably consult would 'educate' him for both his own good and that of the public. If these voluntary pathways to fair advertising seem insufficiently broad to the sceptical, let it be further pointed out that the 1953 Merchandise Marks Act (see *THE CHEMICAL AGE*, 1954, 70, 927) is in operation as a legal sanction, and the words 'fitness for purpose' stretch the widest of nets for catching dealers in deception; indeed, mere carelessness stands to be severely penalised.

The second point requires more complex examination because it can be answered effectively only if there is a reasonable appreciation of both large-scale production techniques and methods of large-scale marketing. Those who know little or nothing about these industrial and commercial aspects of trade can hardly hope to understand how expenditure upon advertising can lead to reductions in the selling prices of goods. Even in 1919, Russell's book gave the complete answer, but it is perhaps more topical to quote from Mr. Craig Wood's recent address at the Advertising Associ-

ation Conference this month: 'And remembering your tremendous investment in plant or machinery and the need to run it at high output in order to get low costs, it is clear that you not only have to create demand but you have to create it quickly—and even having created it and started the stream of goods going off the production lines . . . you must clearly continue to sustain and if possible improve that demand.' It is not wholly accurate to say that without advertising to create mass demand there could not be mass production. Mass production, as we understand it, is apt to be a misleading term; certainly with chemical products in mind, we prefer the term 'large volume production.' Any plant or factory designed to produce in large quantity must involve heavy expenditure, and its running costs per unit of production must be high if it works at appreciably less than full capacity. Only when regular demand reasonably equates with full scale output can such an installation produce goods more cheaply.

It is a superficial argument to say that buyers who need the particular product will seek it out, or that salesmen will be able to find all the buyers. With new chemicals or chemicals produced by some new cost-lowering process, it is true that the most obvious consumers may be located without much expenditure upon advertising. But the total demand thus created will be more slowly built up and the additional potential demand from less obvious consumers will be even more slowly found, perhaps never found at all; yet the cost of production per pound or per ton depends upon volume of output more than upon any other single factor. There may be exceptions to these rules of generalisation, but they will be few in number; and even with some of these, deeper analysis is likely to show that a factory whose maximum output is easily sold without advertising is one in urgent need of expansion. When, however, the sales of the manufactured product are determined across shop counters or through local merchants' offices, advertising is the very heart-pump of distribution. To quote Craig Wood again: 'Why should the retailer be expected to order in large quantities an unknown and unrequested product? His

shelves and his turnover are his bread and butter. He must keep his stock moving . . . he has neither the capital, the time, nor the space to take a gamble with a new and unknown product.'

The third argument against advertising, that its cost must be added to the price of goods, is virtually answered by what has already been said. There cannot be large-scale and lower-cost production unless advertising can create and sustain a large-scale demand. It is true that advertising could in theory create a monopoly-market eventually enabling a manufacturer to raise his prices for sheer lack of competition, but in a society committed to freedom of enterprise this is a pipe-dream. It is a development far more likely to occur in a state-regulated country where state 'announcements' describe state factory products. There is, however, one aspect of the matter that needs to be clarified. An entirely new product, at any rate one aimed at the retail market, stands little chance today of rapid establishment unless a costly advertising campaign introduces it.

In his recent address Craig Wood rightly differentiated between this type of 'new product advertising' and the more normal maintenance advertising of older products. The cost of the former is an expenditure of capital, an investment in exactly the same sense that the installation cost of new plant is investment; by contrast, the cost of maintenance advertising is met out of sales-income and can be regarded as falling upon the consumer more or less directly. When this distinction is made, it becomes easier to understand that modern large-scale advertising is not an extravagant surcharge which the consumer has to meet. This argument may not wholly satisfy some critics. They will argue that the capital expenditure ultimately has to be recovered from the public. Its interest charge may form an addition to selling-price; its recovery by instalments may occur as a result of success but there will be no recovery in the event of failure; yet the public is more likely to benefit than to lose for the advent of a new product intensifies competition, and every sizeable producer will be striving even more vigorously to reduce price to its lowest possible figure.

Notes & Comments

Calcium Phosphates

THE largest single use of sulphuric acid is for converting mineral rock phosphate into superphosphate or its more concentrated modern form of triple superphosphate. For more than a century huge tonnages of mineral phosphates have been moved about the world and applied with or without chemical pre-treatment to farm soils. Moreover, there are other forms besides superphosphate or the raw mineral phosphate that can be used—dicalcium phosphate and fused products such as Rhenania phosphate. The strange thing is that we still know very little about the composition of these materials and the differences in their fertiliser value are assessed by arbitrary tests, principally by solubility in various solvents ranging from water to citric acid and citrate solutions of specified strengths. Some of these phosphatic materials are inorganic polymers and this makes their chemistry less simple than it should be by simple text-book accounts. Phosphatic fertiliser science is an empirical technology, and chemists who have had close contact with it must often have wondered whether a fresh and fundamental start to the study of calcium phosphate should not be made.

The First Milestone ?

IT is possible that a letter in *Nature* (1954, 173, 542) jointly from the University of Edinburgh and Scottish Agricultural Industries' Research Department, will in later years be regarded as the first milestone along such a path. Using single-crystal X-ray methods, an attempt has been begun to ascertain the structures of the complex calcium phosphates. It has been shown that the structure of $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$ is similar to that of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (gypsum), the material being 'built' of sheets containing parallel chains of $=\text{PO}_4-\text{Ca}=\text{PO}_4-\text{Ca}=\text{PO}_4-$, with water molecules linking the sheets, calcium atoms in one sheet being thus joined to oxygen atoms in adjoining sheets. Moreover, the sheets are not flat but 'corrugated.'

Sweeping Changes Possible

THIS may seem academic enough, but the agronomic problem is to develop phosphatic materials in which phosphorus or the phosphate radical is readily released from its chemical associations but without being so 'trigger-free' that it can quickly form insoluble and less available compounds with other chemical ingredients of soils. It is known, too, that new calcium phosphate complexes are slowly formed in soils and that their nature affects the long-term value of phosphatic fertilisers. Clearer knowledge of the structures of all these forms of the calcium phosphates may eventually bring sweeping changes for fertiliser technology, and it is greatly to the credit of one of the larger British companies that it has put this more fundamental type of research into operation.

A New Water Repellent

THE complex molecules or radicals that can be formed by chromium have long offered a challenge to applied chemistry, and detailed news about one new development in this field has appeared in *Industrial & Engineering Chemistry* (1954, 46, 766). Stearato chromic chloride (trade-named by Du Pont as 'Quilon') is a water-soluble inorganic-organic complex, which acts as a surface-active agent in solution but as a water-repellent when absorbed on a polar surface. This obviously useful new product has an interesting research parentage. It has been known for some years, certainly since 1943, that chromyl chloride exerted a water-repellent effect when applied to paper. It was believed that the actual repellent substance was formed on the paper, first through the reduction of chromyl chloride to a basic chromic chloride resulting in the formation of a chromic complex, and next through the combination of this complex with organic acids derived from grease impurities in or on the paper. Somewhat empirical research followed this theory, various reaction products being prepared from chromic chloride, sodium hydrox-

ide, and stearic acid in methyl alcohol solutions. The optimum water repelling effect was always associated with reaction products with the proportionate composition of 1:2:1:4 for stearate:chromium:hydroxyl:chlorine. A polymeric chromium complex is obviously involved, but its precise formulation, empirical or structural, has yet to be elucidated.

Rapid Progress Made

THE substance is already in use for making meat wrapping paper and paper bags for ice more resistant to water. It is also being used as a finishing agent for men's fur-felt hats and in wool treatment. It has been found that the stearate part of the molecule imparts anti-sticking properties to treated surfaces, and this has further widened the field of application, e.g., the backs of labels can be treated to prevent mutual adhesion in a wad of labels. Indeed, practical applications have made rapid progress and would already seem to be well in advance of the fundamental chemistry of the complex compound itself.

The factories of George Kent Ltd., at Luton, Resolven and London, will be closed from 17 July-2 August inclusive.

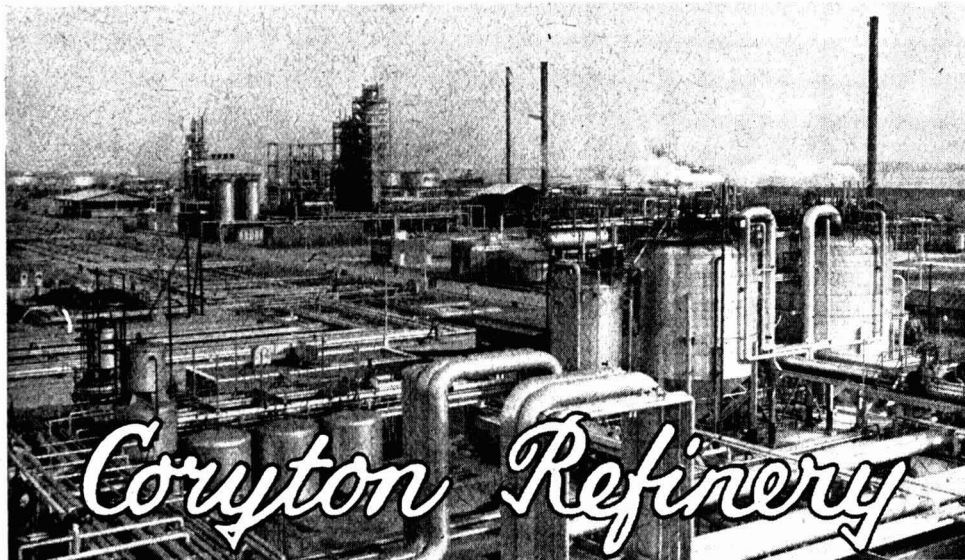
Synthetic Rubber in S. Africa ?

SYNTHETIC rubber may be manufactured in S. Africa as a sequel to the creation of SASOL and other developments of the chemical industry, according to Dr. Francois J. de Villiers, industrial adviser to the Department of Commerce and Industries in the Union. S. Africa's rubber processing factories already import 29,000 long tons of rubber a year at a cost of more than £10,000,000. Overseas experience showed that the bulk of this rubber could be synthetic, said Dr. de Villiers. If it were, an economic rubber synthesising plant, producing 20,000 long tons of rubber a year, would be justified.

The raw materials needed to produce this quantity of synthetic rubber would be either 1,000,000 gal. of benzene and 14,000,000 gal. of ethyl alcohol, or 74,000 long tons of calcium carbide. The fermentation industries based on the sugar molasses of Natal, and SASOL, when it starts production, should provide 7,000,000 tons of ethyl alcohol a year. SASOL will supply the 1,000,000 gal. of benzene needed, and calcium carbide is already being cheaply manufactured in S. Africa, though its production would have to be expanded. Ethyl alcohol at 2s. a gal., benzene at 2s. 6d. a gal. and calcium carbide at £10 5s. a ton are so cheap that a factory producing synthetic rubber should be favourably placed by overseas standards.



A water-relaying exercise, using 6-inch polythene piping, was carried out recently in London by 400 members of the Auxiliary Fire Service. The piping was in 16-foot lengths, weighing 50 pounds each, and officials were impressed with the advantages which the plastic piping has over the same size of rubber hose



NEXT Thursday, 27 May, HM the Queen Mother will officially inaugurate the Coryton Refinery of the Vacuum Oil Co. Ltd. The refinery is one which is concerned only with the production of high quality petrol, oil and waxes, and not with petrochemicals, and it has a number of new and interesting features.

First in Great Britain is the Air-Lift Thermoform catalytic cracker (TCC), which is now producing high octane petrol stocks. The process is licensed exclusively by Socony-Vacuum Oil Co. Inc. of New York, who developed the Thermoform kiln for burning carbon out of the clay used for filtering lubricating oil (see below). During and immediately following the war, some 35 TCC units were erected; these used multi-zone Thermoform kilns for regenerating the catalyst, and were licensed under Socony-Vacuum patents by the Houdry Process Corporation.

The first Houdry catalytic crackers employed fixed beds which soon became fouled with carbon and required periodical cleaning. TCC units of early design allowed the catalyst—pellets of a silica-alumina complex with a highly porous structure—to fall by gravity through the reactor and regenerator. It was then returned to the top of the reactor by means of a bucket elevator.

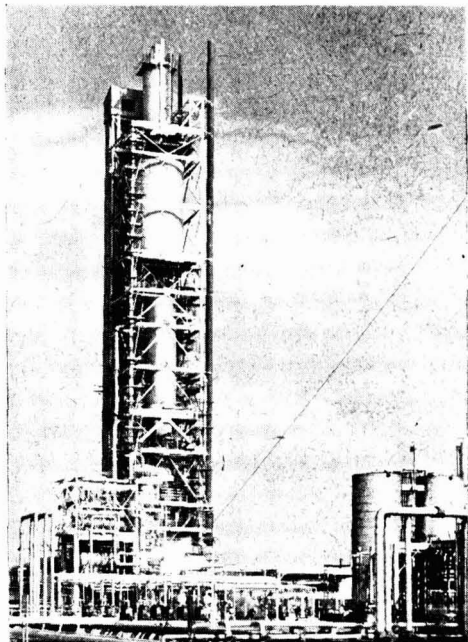
The Air-Lift unit gets its name from the fact that the regenerated catalyst is blown

by low pressure air (about 2 psi.) nearly 300 ft. up a pipe to the top of the reactor, whence it once more falls by gravity. The new unit combines the advantages of easier and simpler operations with greater flexibility to process a wider range of stocks. Investment and operating costs have been reduced, but at the same time the Air-Lift TCC retains all the basic advantages of high liquid recovery, high catalyst activity, high cracking efficiency and high gasoline-to-coke ratio.

The TCC process can be designed to operate on catalysts varying in size from granules of about 60 mesh to lumps or pellets of 3 mesh or coarser, but a synthetic 'bead' catalyst has been specifically developed. This is in the form of small spherical particles, about 4 to 10 mesh in size, resembling translucent glass beads, and with great strength, ruggedness and stability. The activity of the catalyst is due to a very high porosity which imparts large surface areas per unit weight—400 or more sq. m. per g.

Another 'first,' and this the first in the world, is the Thermoform continuous percolation (TCP) unit. In all other percolation plants the process has been performed by the batch, and this is the first continuously operating unit.

The decolorising process of percolation is used as the finishing treatment for lubricating oils and waxes, giving them good



The Air-Lift TCC unit, which is 300 feet high. It took nearly two years to build and 350 piles and 24,000 cubic feet of concrete were used in its foundations

colour, odour and stability. The oil is passed through fullers' earth or bauxite, which absorbs unsaturated compounds liable to give tars and other unwelcome products on atmospheric oxidation.

Plants previously erected have all been non-continuous, the oil being passed through a fixed bed until the clay was

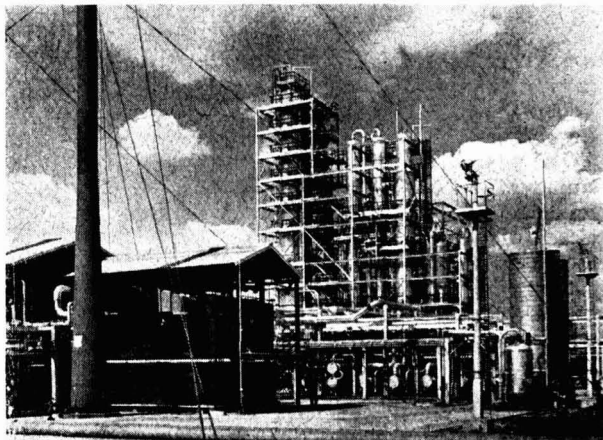
saturated, when it was removed and regenerated in a kiln (the original Thermo-for). At the new Coryton plant, clay is fed into the top of the percolator and oil is led into the bottom; they flow counter-currently and the decolorised oil is removed from the top of the tower. The slurry of clay and some oil led off from the bottom of the tower is washed counter-currently with naphtha, which then passes to a recovery tower; here the oil and naphtha are separated and recycled.

The washed clay goes to a drier and is then elevated to the top of the kiln. After regeneration in the kiln, it is carried to another elevator and so to the top of the percolator tower for another cycle.

The TCP treatment is the final stage in the refining of oils and waxes which have already passed through extraction stages with furfural and methyl ethyl ketone. The furfural extraction plant is designed to remove from the lubricating oil stocks those components which are of low viscosity index and low chemical stability.

Oil is pumped into the side of the extraction tower, where it is intimately mixed with furfural introduced near the top of the tower. Furfural is heavier than the oil and flows counter-currently, extracting the undesirable components, which are mostly aromatic in nature. The extract is led off from the bottom of the tower while the paraffinic raffinate is taken from the top, together with a small amount of solvent.

Both raffinate and extract pass to their appropriate recovery sections, where the

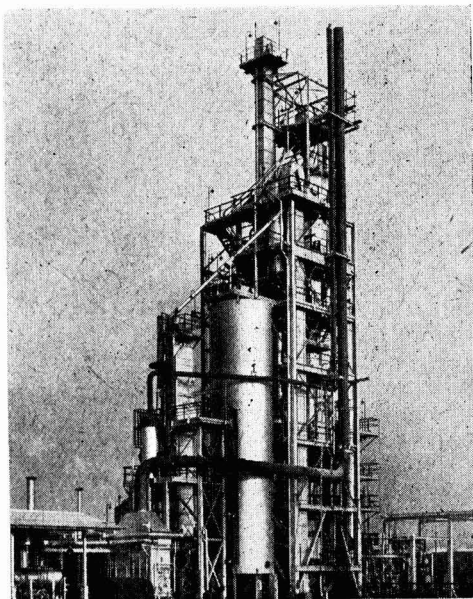


The furfural unit, which removes impurities from lubricating oils and ensures a high viscosity index

solvent is evaporated off and returned to the process, while the raffinate passes forward for further treatment and the extract is used, either as a feed stock for the TCC unit or as a blending agent in other products.

Coryton Refinery will distil and refine mainly Middle East crude oils, the resulting products replacing those previously obtained from dollar sources. A further valuable contribution to national economy has been made.

The TCP unit, the final stage in the processing and refining of lubricating oil stocks. In this unit the oils, or the waxes previously extracted in the methyl ethyl ketone unit, are decolorised with fullers' earth



Aluminium Development

AT the recent annual general meeting of the Aluminium Development Association, held in London, Mr. R. D. Hamer, retiring president, presided and introduced the report for 1953.

In recording the principal activities of committees and staff over many and varied subjects, the report showed good progress with the three-year programme of research and development work begun in 1952, with particular emphasis on structural, marine and the electrical engineering field. During the year part of the association research activities culminated in the publication of no fewer than nine new research reports. There was also a continuation in the trend of educational services with a considerable increase in the use made of them by educational authorities and individual teachers.

The demand upon the association's technical services increased in practically every direction—for example, over 150,000 copies of new or revised publications were despatched (compared with 131,000 in 1952) and over 430 film shows were given; present library resources include 1,300 literature accessions, over 6,300 photographs and more than 2,000 lantern slides.

B

Irish Summer School

A SUMMER school in Organic Chemistry which the Institute of Chemistry of Ireland is arranging to hold at University College, Dublin, from 6-9 July, will be in the nature of a refresher course and is expected to arouse no little interest.

Lectures will be given as follow: 'Fundamentals of Organic Chemistry,' by Professor T. S. Wheeler (Professor of Chemistry, University College, Dublin); 'Newer Methods & Reagents in Organic Chemistry,' by Professor Wesley Cocker (University Professor of Chemistry, Trinity College, Dublin); 'Electrophoresis,' by E. F. McCarthy (Senior Fellow, Medical Research Council of Ireland); 'Organic Chemistry & Analysis,' by Dr. Cecil L. Wilson (Reader in Analytical Chemistry, Queen's College, Belfast); 'Distillation,' by F. T. Riley (Lecturer in Chemistry, University College, Dublin); 'Chromatography,' by Dr. F. J. Coll (Lecturer in Chemistry, University College, Galway); and 'Spectrophotometry,' by P. W. D. Mitchell (Lasdon Fellow, University College, Dublin).

Further information is obtainable from the Secretary, Institute of Chemistry of Ireland, 18 Ely Place, Dublin.

European Fertilisers

Production, Consumption & Trade

JUST published by OEEC is a report on 'Fertilisers: Production, Consumption and Trade in European Countries, 1951-1954' [Document No. CP(53)12], bringing together statistical information relating to the production and consumption of and trade in fertilisers. For 1951-52, the figures are final; they are only provisional for 1952-53; and for some fertilisers, first estimates for 1953-54 are included.

Production of nitrogenous fertilisers increased in 1952-53 by 6 per cent over 1951-52, being 2,179,000 metric tons (as N) compared with 2,050,000, and consumption rose by 11 per cent. Imports showed little change, and exports increased altogether by 14 per cent.

If a comparison is made of the production of the different sorts of nitrogenous fertilisers, calcium cyanamide shows the greatest increase, both relatively and in tonnage. 'Other nitrogenous fertilisers' and ammonium sulphate follow; ammonium nitrate shows a relatively small increase and the production of calcium nitrate shows a decrease.

Estimated production in OEEC countries in 1953-54 shows an increase of 9 per cent over 1952-53, and an increase in consumption of 5 per cent.

Consumption of phosphate fertilisers rose by 6 per cent between 1951-52 and 1952-53, but total production in OEEC countries fell slightly. Estimates of consumption in the current year show an increase of 12 per cent over 1952-53, and anticipated production is 10 per cent up. Quantities produced in the three yearly periods are respectively 2,431,000, 2,397,000 and 2,647,000 metric tons (as P_2O_5).

Total production of potash fertilisers in 1951-52 was 2,084,000 metric tons (as K_2O) and increased the next year by 6 per cent to 2,216,000.

A comparison of the figures of production of the different types of potash fertilisers shows a tendency towards the production of potassium chlorides of a higher degree of concentration. Potassium sulphates, on the other hand, have not followed the general increase.

The report, with many tables, may be obtained through HMSO.

Aiding Turkish Industry

THERE has already been a good response to the invitation extended to foreign investors of capital under the new Law for the Encouragement of Foreign Capital Investments in Turkey.

Among projects approved by the Foreign Investments Committee are the following: Wilson & Mansfield Ltd., London, and G. & P. Maubert, France, rose oil distillery, £T50,000 in machinery; Eastova Ltd., London, extension of the 'Turyag' vegetable oils factory, £300,000 in machinery and equipment; F. L. Smith & Co. SA, Denmark, investment in the Izmir Cement Works, £T400,000; Svenska AB Gassaccumulator Co., Sweden, acetylene gas and azote peroxide factory, Sw. Kr. 300,000, and oxygen factory, £T195,000 in cash, £T605,000 in equipment; Fertiliser Corporation of America, sulphuric acid and superphosphate factory, \$800,000 capital and \$1,200,000 loan; Lever Brothers & Unilever NV, Holland, vegetable oil factory, £T400,000 in machinery and equipment; Michigan Chemical Corp., USA, DDT and other insecticides factory, \$560,000-\$840,000; Unilever NV, Holland, toilet soap and washing powder factory, £T100,000 cash; Abbot Laboratories (Near East) Ltd., USA, manufacture of various pharmaceuticals, \$500,000 cash.

The Future of the BIF

An appeal to British industry to support the British Industries Fair was made last week by Mr. Kenneth Horne, a director of the company formed last month to promote the Fair. In a broadcast, Mr. Horne, one of the seven business men appointed to run future Fairs, said that they would in future be conducted with greater freedom, and industry would have a sense of partnership in the Fair and therefore a greater interest in making it a success. Speaking of plans for the future, Mr. Horne, who is sales director of the Triplex Safety Glass Co. Ltd., said that the directors were planning to spend up to £100,000 yearly on home and overseas publicity for Britain's great 'shop window'; individual directors intended to visit personally other international fairs in search of new ideas and suggestions; and they would examine all new ideas for the improvement of the Fair.

MIDLANDS SOCIETY FOR ANALYTICAL CHEMISTRY

Developments in Coal & Coke Analysis

AT a meeting of the Midlands Society for Analytical Chemistry held recently in Birmingham, the speaker was Dr. R. A. Mott, D.Sc., F.R.I.C., F.Inst.F., Superintendent of the Midland Coke Research Station, Sheffield, who read a paper on 'Recent Developments in the Analysis of Coal and Coke.'

Dr. Mott first dealt with the preparation of samples of coal and coke for analysis, showing that, for coke, errors could occur in reducing a gross sample through sample-dividing, through contamination in size reduction (because of the abrasive nature of coke) and in the analytical determination. The errors in sample-dividing were due to the occurrence of hard, high-ash shale in the coarsest size fraction, to soft, high-ash shale which appeared in the finest size fraction and to the difficulty of mixing uniformly a material with a rough surface; they were, therefore, lower the smaller the particle size at which sample division occurred, and the lower the mean ash of the sample.

The errors due to contamination could be minimised by the size reduction of coke to through $\frac{1}{2}$ in. in a jaw granulator and to through 72 BS. mesh by successive passes through chrome-steel crushing rolls, this procedure being extremely rapid. An alternative procedure for through $\frac{1}{2}$ in. coke was to stamp on a manganese-steel plate and in a large manganese-steel mortar, but this procedure involved hard manual effort. Rubbing on mild-steel or cast-iron surfaces was unsatisfactory.

Increased Efficiency

Sample-dividing could be carried out most efficiently by the use of the BCRA rotary sample dividers and uniformity of an analysis sample could be ensured by the use of the BCRA laboratory mixer. With the recommended procedure a laboratory sample of 60 g. of through 72 BS. mesh coke was uniform, the sample-dividing error at 72 BS. mesh was negligible and the contamination was of the order of 0.1 per cent ash. For coal the contamination error did not arise, but the other errors mentioned could occur.

Recent developments in the ultimate analysis (C, H, N, S) of coal had enabled im-

proved methods to be adopted in the revision of BS. 1016:1942 'Analysis and Testing of Coal and Coke' which was now being prepared. For carbon and hydrogen the Sheffield high temperature method (from the original work of Belcher and Spooner, *Fuel*, 1941, 20, 130) had been shown to be much quicker, simpler and more accurate than the classical Liebig method. Combustion in an unpacked tube at a temperature of 1,350° in a fast current of oxygen lasted only 10 min., and new operators rapidly acquired the technique. The accuracy of the method was shown by a series of tests on four standard coals in six laboratories.

Kjeldahl Method Recommended

For nitrogen a semi-micro method (the only such method which could yet be recommended for coal owing to the difficulties of sample preparation) had been recommended, based on the original work of Beet and Belcher (*Fuel*, 1938, 17, 53). This was a Kjeldahl method using 0.1 g. coal, 4 ml. of concentrated H₂SO₄, and 2 g. of a mixed catalyst containing K₂SO₄, HgSO₄, and Se, the potassium sulphate raising the boiling point of the acid and the combination of the other ingredients of the catalyst effecting a more rapid breakdown of ring nitrogen to ammonia than either used separately. The digestion procedure required only 25 min. and the distillation of the ammonia 10 min. Since the digestions were carried out in batches and the distillations in a self-emptying steam distillation system, the procedure was very rapid and was suitable for routine use.

For sulphur several procedures were described. The Eschka method, originally devised in 1874, and probably the most widely used, had been considerably improved. It had been shown that under modern conditions of incineration (at 700° or more, under aerating conditions) sulphites were never produced and boiling with bromine was unnecessary. The slow incineration previously thought to be desirable (1 hr. to 800°, 1½ hr. at 800°) could be shortened (a) by reducing the final period at 800° to $\frac{1}{2}$ hr. and (b) by inserting high-volatile coals mixed with Eschka mixture into a hot muffle with a

cool zone at the front to allow at least 10 min. to liberate the volatile matter (in which much of the sulphur is found).

It had been shown that after filtration to remove ash, and boiling to remove carbon dioxide, the best conditions for ensuring a barium sulphate precipitate which could be filtered quickly was to have a suitable excess of acid (pH 0.5-0.2) and to compensate for the tendency of solvation of the barium sulphate by a larger excess of Ba^{++} . This condition was ensured in practice for normal coals and a volume of 150-200 ml., by adding 1 ml. of conc. hydrochloric acid and (rapidly, to the boiling solution) 10 ml. of 10 per cent barium chloride and shaking in a conical beaker. After settling for 5 min. the precipitate could be filtered rapidly (a) on a fine filter paper on the water pump (25 min.); (b) on a filter-paper pad by gravity (15 min.); or (c) on a No. 4 sintered-filter on the pump (5 min.). Filtration on a filter-paper pad was strongly recommended; with this procedure at least 16 determinations could be made per day by one operator.

The Sheffield high temperature method (Beet and Belcher, *Fuel*, 1940, **19**, 42) for the determination of sulphur involved combustion in an unpacked tube at $1,350^{\circ}$ in 10 min. (as in the determination of carbon and hydrogen) with the absorption of the oxides of sulphur and hydrochloric acid in hydrogen peroxide. From the determined total acidity, a correction was made for chlorine by converting the sodium chloride to sodium hydroxide by reaction with mercuric oxycyanide and titrating with acid. This was the most rapid of all methods for this determination.

New Method Being Developed

A promising method for the determination of sulphur and chlorine in coal by combustion in a calorimeter bomb was now being developed. It was a modification of the Strambi method for sulphur, which ensured that no sulphur was fixed in the ash by the addition of Eschka mixture to the coal. The chief modification lay in substituting ammonium carbonate solution for sodium carbonate in the bomb base; this fixed any oxides of sulphur in the gaseous phase so that bubbling of the gases through an alkali was unnecessary. An aqueous extraction of the bomb gave all the chlorine, which could be determined by a modified

Volhard titration, and all the sulphur, which could be determined gravimetrically. A further requirement was to show that the sulphur in these washings could be determined titrimetrically by the use of the substituted benzidine compound (C.A.D.) of Belcher, Nutten and Stephen (*J. Chem. Soc.*, 1953, 1334).

Points from Discussion

In the subsequent discussion it was stated that for analysis of the bomb washings in the modified Strambi method it was necessary to apply a procedure which was specific or highly selective for the sulphate ion, since the usual direct alkalimetric titration would not be possible owing to the use of Eschka mixture. Various procedures for the titrimetric determination of sulphate ion had been used, but the C.A.D. reagent (4-amino-4'-chlorodiphenyl) was the best. It was used in exactly the same way as benzidine, in that the precipitate was titrated with standard sodium hydroxide, but it had the following advantages: the amine sulphate was considerably less soluble than benzidine sulphate and nitrate ions did not interfere by co-precipitating as was the case with barium sulphate. The reagent was now available commercially.

In answer to a number of questions with regard to the filtration of the precipitate, it was stated that the method of filtration on a paper pulp pad was a very old one. It was widely used in the Sheffield steel industry but appeared to be little known elsewhere. Only three textbooks of analytical chemistry described the method—a curious state of affairs as the method was simple, rapid to use and was especially suited to the filtration of finely-divided precipitates. It had been compared with many other methods of filtration and had proved the best for this particular purpose.

The Kjeldahl method for the determination of nitrogen was applicable in the case of coke, but took considerably longer than with coal. A rapid semi-micro method based on gasification in steam, in which the resulting ammonia was absorbed in dilute acid and then determined in the usual way, had been recommended by Beet and Belcher, 1938. One of the difficulties of this method was the rapid attack by the superheated steam on the corks used. Rubber bungs were, of course, useless for this purpose. In the last two years, Japanese fuel chemists,

Sato and Miyazu, working at the Kawasaki Iron and Steel Works, had overcome the difficulties of connections by incorporating a ground glass to ground refractory joint. The BCRA had had some measure of success with a heat-resisting plastic bung.

In view of the amount of literature concerning the precipitation of barium sulphate, it was surprising that it had been overlooked for so long that it could be filtered so soon after precipitation and yield results which were quite satisfactory for technical purposes. It was admitted that these results might be due, at least in part, to a compensation of errors, but the vast amount of experimental evidence available showed that this short standing time could be used with confidence.

Granulation of Precipitate

Many methods had been proposed for effecting rapid granulation of the precipitate, among which might be mentioned the picric acid and agar agar procedures. It had been shown conclusively, however, that these reagents had little or no effect, and it was important to follow the general instructions developed in the BCRA laboratories. It should be added, however, that care must be taken to boil the solution for a short time before adding the barium chloride reagent after adjusting the solution to the optimum pH, in case some barium carbonate was formed.

With regard to sampling from the tops of trucks, the method was now frowned on. The top layers might be affected by rain but were more likely to be dried out by the wind.

The modification to the Volhard method mentioned consisted of avoiding filtration of the silver chloride (necessary because of the sliding end-points otherwise obtained owing to the differing solubility products of silver chloride and silver thiocyanate) by adding nitrobenzene as recommended by Caldwell and Moyer (*Ind. Eng. Chem. (Anal. Ed.)*, 1935, 7, 38). The nitrobenzene appeared to form a waterproof coating around the silver chloride particles and thus prevented further reaction with the thiocyanate used for the back titration.

It was mentioned that recently Schulek, Pungor and Kethelyi (*Anal. Chim. Acta*, 1953, 8, 229) had claimed that the sliding end-point was not due to differing solubility products but to adsorption of silver

ions on the precipitate. They recommended boiling for 3 min., after adding the standard silver nitrate, in the presence of potassium nitrate. When the solution was cooled, the potassium nitrate was preferentially adsorbed and the titration with thiocyanate could be carried out without either filtration or the addition of an organic solvent. Nitrobenzene had a slight disadvantage in that it imparted a faint yellow tinge to the solution and tended to render the end-point difficult to detect exactly when very dilute titrants (e.g. centinormal) were used.

Several high temperature furnaces were available. The type used for the methods described were heated by Silit rods. The tube was made of aluminous porcelain and any condensed liquid was caught in a special adapter device which could be readily removed and washed out.

The advantage of the mercuric oxycyanide procedure for the titration of chloride ion was that after determining total acidity (due to hydrochloric and sulphuric acid) the reagent liberated an amount of sodium hydroxide equivalent to the original chloride present. Thus the same indicator (methyl red screened with methylene blue) could be used. Otherwise, if silver nitrate were added, the acid-base indicator had to be destroyed first to prevent its masking the colour of the indicator used in the argentometric titration. Furthermore, the end-point using an acid-base indicator was easier to detect than with the usual argentometric indicator. A comprehensive study of this reaction was made recently by Belcher, Macdonald and Nutten (*Mikrochimica Acta*, 1954, 104) and was applied to the determination of halogens in fluorine-containing organic compounds.

Likelihood of Errors

In the determination of nitrogen by a semi-micro method, the likelihood of errors arising due to insufficient care having been taken in the sampling operation was regarded as negligible, since this element would be distributed uniformly throughout the coal substance. In the case of sulphur, however, which is present in a number of forms, e.g. organic sulphur associated with the coal substance itself, and pyritic sulphur and sulphate sulphur associated with the inorganic material, great care would be necessary to ensure obtaining a uniform

sample. As an example of the difficulties which might be met, a sample placed sharply on the bench might react to the vibration in such a way that the heavy iron pyrites would be shaken to the bottom of the sample.

Canadian Problem

Increasing Competition from USA

CANADA'S active and vigorous chemical industry is meeting increasing competition from the over-producing industry in the USA, according to our Montreal correspondent. Price cutting and many operating troubles have developed as a result of the mounting flood of US chemicals.

Demand in Canada is still high after setting new high sales volume levels in 1953, but stiff competition has resulted in more attractive offers to consumers. For instance, trade reports say that attractive discounts are offered on large orders, and besides special transportation and packaging deals, companies are offering to manufacture more specifically for the individual customer tastes, etc.

Narrower Profit Margins

This has resulted in narrower profit margins and as most customers refuse to buy in large quantities and demand almost immediate deliveries when they do buy, it has meant heavier inventories at manufacturers' level. Among products reduced in price recently are ethylene glycol, ethyl and isopropyl alcohol, polyethylene, phenol and acetone. The price cuts have hit particularly hard at the newer petrochemical plants at Edmonton, Sarnia and Montreal. In practically every case the domestic producers have had to reduce prices in order to supply at least a major portion of the Canadian market, which, it is understood, they cannot afford to share even very slightly with importers. Canada's two ethylene glycol plants are stated to have been most affected.

However, prices in many segments of the industry are holding firm with no indication of breaks in the near future. Despite sharpening competition, the big industrial chemicals—sulphuric acid and chlorine—have been able to maintain 1953 price increases and sales are actually showing some gains.

Hostels' Appeal Record

FOLLOWING an eloquent appeal for funds by Sir Frederick Handley Page, C.B.E., chairman, at the annual dinner of the John Benn Boys' Hostels Association at Grosvenor House, London, on Wednesday last week, the record sum of £3,500 was contributed to carry on the work of King George's House, which is maintained by the Association. King George's House provides a home for nearly 200 boys who come from overcrowded or unsatisfactory homes. It is the largest residential boys' club in London.

The total announced at the end of the dinner was £3,164, itself a record, but this was made up to £3,500 by Mr. Leslie Gamage, M.C. In this sum was also £500 contributed by admirers, friends and colleagues of the late Sir Ernest Benn, founders of the Association, as a memorial to his father, Sir John Williams Benn.

Guests at the dinner were representative of many professions, trades and industries and Gwendolen, Lady Benn, replying to the toast of the Association, said that although the purpose of the dinner was to raise funds it had developed into an annual reunion of the friends of the Association.

The toast to 'The London Boy' was proposed by Dr. R. L. James, Head Master of Harrow.

Export of Fertilisers

THE Board of Trade announce that applications will be entertained for licences to export phosphatic fertilisers for shipment during the period 1 June to 28 February, 1955. It will be necessary to limit the total quantity exported in order to safeguard supplies to the home farmer, but an opportunity to export will be given to every manufacturer who wishes to do so. Export licences will also be issued during the agricultural season 1 July to 30 June, 1955, for the export of nitrogenous fertilisers but will be limited to about 30 per cent of each manufacturer's output, again in order to ensure that adequate supplies are available for home farmers. (Further details may be obtained from the Ministry of Materials, Branch 4 [C], Horse Guards Avenue, London, S.W.1. Tel.: Trafalgar 8888, Ext. 7659.)

Is the IG-Farben Problem Solved?

German Liquidator Poses Question of Further Reorganisation

DR. Franz Reuter, a member of the three-man IG-Farbenindustrie Liquidation Committee set up by the Allies in 1950, which since early 1952 has continued in existence as the IG-Farbenindustrie Liquidation Board, has written in *Der Volkswirt*, the German economic weekly of which he is the publisher, an article* reviewing the deconcentration and liquidation of this German chemical combine and raising the question whether and in what form the relations between the IG-Farben successor companies are to be readjusted when such readjustment becomes possible. This is the first time that a German economist of such prominence and intimate acquaintance with the IG-Farben complex has dealt publicly with the future of the deconcentration policy in the German chemical industry. His views will no doubt carry weight if and when the question assumes practical significance.

Dr. Reuter points out that the deconcentration as carried out is the result of very long and stubborn negotiations with the Allies. The German negotiators, he stresses, always maintained that—particularly in view of foreign competition, the substantial new investments required and the need for large-scale research in the chemical industry—only big units with the largest possible production range could in the long run retain their competitive strength.

Principal Difficulty

As the minimum size required for survival in competitive conditions cannot be precisely stated, it was the principal difficulty in the negotiations to find a compromise solution acceptable to both sides. In the end, however, Dr. Reuter acknowledges, the individual successor companies were allocated almost all the factories and subsidiaries which they claimed as essential to round off their production programmes and to strengthen their competitive position.

Farbenfabriken Bayer AG, owner of Germany's largest chemical works at Leverkusen, was given IG-Farben's 36 per cent holding in the DM. 3,600,000 AG fuer Chemische Industrie, Gelsenkirchen-Schalke, in addition to a large number of minor IG-Farben interests. Badische Anilin- und

Soda-Fabrik AG, Ludwigshafen, received ownership of the Auguste Victoria colliery with a capital of DM. 76,900,000, a one-third interest in the DM. 3,000,000 Oxo-GmbH and a 30 per cent interest in the DM. 2,000,000 Chemische Fabrik Holten GmbH. Farbwerke Hoechst AG, Frankfurt-Hoechst, was given full control of the DM. 20,400,000 Kalle & Co. AG at Wiesbaden-Biebrich, the DM. 8,500,000 Bobingen AG fuer Textil-Faser, the DM. 5,000,000 Behringwerke AG at Marburg and the DM. 36,000,000 Knapsack-Griesheim AG with its various subsidiaries, as well as a 50 per cent interest in Siemens-Plania Chemische Fabrik Griesheim and a 49 per cent interest in the DM. 40,000,000 Wacker-Chemie AG of Munich.

Three-Way Control

All three major IG-Farben successors were given a one-third share in the DM. 24,000,000 capital of Duisburger Kupferhuette. Cassella Farbwerke Mainkur AG, the smallest of the successor companies, was not given any subsidiaries of importance. The 100 per cent IG-Farben interest in Anorgana GmbH, capital DM. 6,000,000, has been offered to the Bavarian State and will be transferred by the latter to private interests.

That, despite the difficulties which had to be overcome, economically healthy units have been created is shown by a comparison of the balance-sheet of the old IG-Farbenindustrie with those of the successor companies, writes Dr. Reuter. Although the latter own part only, albeit a large part, of the West German IG-Farben assets, their combined capital including reserves at the end of 1952 amounted to nearly nine-tenths of the IG-Farben capital of RM. 1,826,000,000 as disclosed for the end of 1943. The figure for Farbenfabriken Bayer is DM. 605,300,000, for Badische Anilin- und Soda-Fabrik DM. 504,600,000, for Farbwerke Hoechst DM. 434,400,000, and for Cassella Farbwerke Mainkur DM. 58,200,000. The assets were divided among

* 'Ist das I.G.-Problem gelöst?', *Der Volkswirt*, Frankfurt-M., Sonderheft 'Chemische Industrie', No. 14, 3 April 1954.

them in similar proportion, but the two smaller successors, especially Cassella, were given proportionately larger liquid funds because of their greater capital requirements for making good arrears in investment.

Although Dr. Reuter considers the result of the IG-Farben deconcentration and liquidation 'not unsatisfactory' from the point of view of shareholders, operatives and the German economy in general, he qualifies this view by remarking that the shareholders and the German chemical industry could have fared much better and the latter might have recovered more quickly if there had been no IG-Farben deconcentration and liquidation at all or if it had been carried out more swiftly.

Liquidation Problems

Special liquidation problems arose in connection with the IG-Farben patents and trade marks, participation in subsidiary and associated companies, the so-called 'residual assets,' and property in the Soviet occupation zone and foreign countries. The 15,000 patents and 4,500 trade marks of IG-Farben, which had a taxable value of more than RM. 60,000,000, were divided among the successors according to need, with virtually free licences available to other interested parties. The important Indanthren and Perlon trade marks were made joint trade marks at the disposal of various producers, and a satisfactory arrangement was also reached with regard to licence agreements concluded by IG-Farben with other interests.

Of the IG-Farben works in the German Federal Republic two were not transferred to any of the four successor companies—the rayon works at Rottweil whose future has been safeguarded by separate arrangements to be announced shortly, and the electro-chemical works at Rheinfelden which has been transferred to Dynamit AG vorm. Alfred Nobel & Co. (DAG), providing the latter with a raw material basis for its plastics production. IG-Farben owned the majority of the capital of DAG as well as another German explosive manufacturer, Wasag-Chemie.

To meet the Allied demand for IG-Farben deconcentration and general decartelisation, and at the same time to avoid splitting the explosives industry into too many small units, most of the subsidiaries of the former explosives firms were sold to Wasag, thus

creating a counterweight to DAG which is still the largest German explosives maker; this arrangement, Dr. Reuter states, appeared to be expedient also in the interest of Germany's competitive position in the export field.

Among former IG-Farben assets in the Soviet zone of Germany are the plants at Bitterfeld, Schkopau and Wolfen, Ammoniakwerk Merseburg at Leuna and Deutsche Celluloid-Fabrik Eilenburg. Dr. Reuter does not attempt to estimate their value or that of foreign IG-Farben assets. Of the latter he says that the realisation of these assets depends on political developments; it will be determined essentially by the agreements to be concluded by the Federal Government with individual States in regard to Germany's foreign assets, and the IG-Farben position in this respect does not differ from that of other enterprises.

Apart from the problems arising in connection with the foreign assets and those that may one day arise with regard to the East German IG-Farben property, the liquidation is now a matter of routine, all important decisions having been taken, even though several years may elapse before the vast financial operations are completed. Nevertheless, Dr. Reuter suggests that IG-Farbenindustrie in Liquidation, the present winding-up company, should remain in existence until all important receipts out of foreign and East German property have been absorbed and allotted to their natural purpose.

Capable of Development

Turning to the future, Dr. Reuter says: 'The IG-Farben successor companies have shown themselves healthy enterprises with dynamic impulses of whom it can be said without exaggeration that they have effectively retained, as far as the division allowed, what was good in the old IG-Farben and capable of further development. One must not, however, overlook the fact that the successor companies are still, in comparison with foreign competitors, to some extent handicapped in carrying out the extraordinary tasks devolving on them not only in German but in world economy.

'Economic life in Europe and the world at large is in need of genuine competition, and one may, with this point in mind, expect that this competition will not in the long run

[continued on page 1154]

I.C.I. Had a Good Year

1953 Sales Reached Record Level : Further Research Progress

THE value of the whole of the I.C.I. group's consolidated sales in 1953 reached the highest figure yet recorded—£281,900,000, compared with £276,300,000 in the previous year, according to the directors' report which is to be presented at the annual meeting of the company in London on 17 June.

The report states that the value and volume of the company's sales in the home market were also higher than in 1952. The company's direct exports in 1953 amounted to £58,000,000, compared with £62,000,000 in 1952, a fall which is accounted for mainly by import restrictions in a number of overseas markets.

The consolidated income before taxation of the company and its subsidiaries increased by £7,351,016 to £36,968,150 (after charging depreciation of £11,551,012) as compared with £29,617,134 in 1952 (after depreciation for that year of £10,138,595). Increases were effected in sales quantities in many of the company's products, particularly those from some of the new plants, but net prices obtained, especially overseas, were frequently lower.

The consolidated income after taxation was £19,758,624, and after deducting dividends paid to minority members of subsidiaries and undistributed income of subsidiaries, the net income of the company was £17,604,068 as compared with £13,498,956 for 1952.

Increase of Dividend

A final dividend of 9 per cent is recommended on the ordinary stock, which, with the interim dividend of 6 per cent paid in December, 1953, makes a total distribution of 15 per cent for 1953, an increase of 2 per cent over the dividend for the previous year.

Alluding to the proposed introduction of a form of profit-sharing for employees, which the board has had under consideration for some time, the report states that the directors are firmly convinced that the long-term interests of the company would be furthered by identifying the interests of employees even more closely with those of the company.

The form of profit-sharing favoured by

the directors is a scheme in which substantially all male and female payroll workers and staff in the UK would, after a qualifying period of service, participate through the allotment for their benefit of fully-paid ordinary shares in the capital of the company. The directors intend to introduce such a scheme when the proposed capitalisation of reserves and scrip issues recently announced by the board have been approved by the stockholders.

Prices Increased, But —

The company found it necessary to increase some of its home trade prices early in the year because of increases in wages, fuel and carriage charges, but during the year certain prices were reduced. Since 1938 the prices of I.C.I. products have risen appreciably less than the prices of the company's raw materials and wholesale prices generally. Raw materials were easier to get in 1953 and although the company's demands for certain materials during the latter part of the year were at record levels, it was generally able, with the co-operation of its suppliers, to satisfy its needs.

The abolition of steel control, the increased production of steel, and the improvement in delivery of engineering plant and equipment were a great help to the company's construction programme. Expenditure on the construction programme during the year amounted to £30,000,000, making a total expenditure of £156,000,000 on new fixed assets since the end of the war.

Increased attention was given to the application of work study for improving the productivity of the company's labour, material and capital resources, and at the end of the year over 43 per cent of the operatives were on some form of payment-by-results.

The company continued to pay special attention to the prevention of works accidents, and its accident rate has steadily fallen so that during 1953 it was less than half what it was in 1946. Progress was made in organising civil defence, and more than 5,000 members of the Industrial Civil Defence Service are now in regular training in the company's factories.

The company's research and development

activities continued on much the same level as in the past two or three years and involved expenditure in 1953 of roughly £7,500,000, which is equivalent to rather more than 3 per cent on turnover. Altogether about 6,600 people, including some 1,700 graduates, are engaged in research and development.

Accent on Development

During and immediately after the war, embryo projects arising both from the company's own fundamental and exploratory researches and from outside sources accumulated faster than they could be developed technologically. Because of this, special emphasis has been laid in recent years on the translation of laboratory results into workable economic projects through the medium of semi-technical and pilot-scale investigations. Most of the arrears of this technological work have now been dealt with, and it is becoming possible to put increased emphasis on the longer term exploratory work on which the discovery of the novel projects of the future ultimately depends.

Basic research on physical methods continued on a substantial scale with the object of developing new and improved research and analytical tools. In particular, important advances were made in the application of chromatography and in the development of methods for examination of the chemical and physical properties of surfaces. The application of electronics has not been neglected; for instance, counting devices enabling extremely small intervals of time to be measured with great accuracy have been developed and are being applied to a number of explosives problems and also to operations such as automatic weighing.

The recent rapid growth of the organic chemical industry makes it necessary to take a long term view of the availability of many of the relatively simple raw materials on which this industry must depend. The company's exploratory work in this field includes a study of several possible methods for increasing the yield from coal of simple chemical raw materials and intermediates, chiefly aromatic compounds.

Further progress has been made in the development of chlorofluorocarbon oils and plant is now available for their production. Pilot-scale production of higher aliphatic amines and cyclohexylamine has been suc-

cessfully undertaken. The pilot-scale production of the petrol gum inhibitor 'Topanol M,' to which reference was made last year, has been expanded, and some promising new inhibitors have been found.

Work continued actively on the development of products which arise from the manufacture of phenol. Outlets for *ortho* phenyl phenol as a fungicide and germicide are being explored in a number of industries. New outlets are being developed for *para*-phenyl phenol.

Research continues in the field of silicone products, and a plant has been designed to manufacture a wide range of these products. Market development is proceeding rapidly with the aid of imported supplies pending completion of the plant.

At the end of 1953 the number of the company's employees in the UK (including those employed in HM Government agency factories) was 107,650, consisting of 30,250 staff and 77,400 operatives.

Travelling Exhibition

MIDLAND Silicones Ltd. are beginning their travelling exhibition with a show at the Nottingham and District Technical College from 22-26 June inclusive. Nottingham has been chosen as being the appropriate centre for the introduction of this exhibition to British industry, for it was at University College, Nottingham—now the Technical College—that Professor F. S. Kipping, who was responsible for the basic research leading to the discovery of silicones, carried out his work.

Much has been written in recent years about silicones, but this will be the first time the complete story has been presented pictorially to British industry. By this means it will be possible to show something of the many uses to which these materials are being put and to give food for thought about their future possibilities. The whole range of silicones will be covered. Many working models will demonstrate the properties of these materials and there will be a daily showing of a film entitled 'What's a Silicone?'

The exhibition will be open daily from 10.30 a.m.-6.30 p.m. (10.30 a.m.-4.00 p.m. Saturday) and invitation cards can be obtained, on request, from Midland Silicones Ltd., 19 Upper Brook Street, London, W.1.

Stork Margarine Works at Purfleet

Results of Years of Research Put into Effect

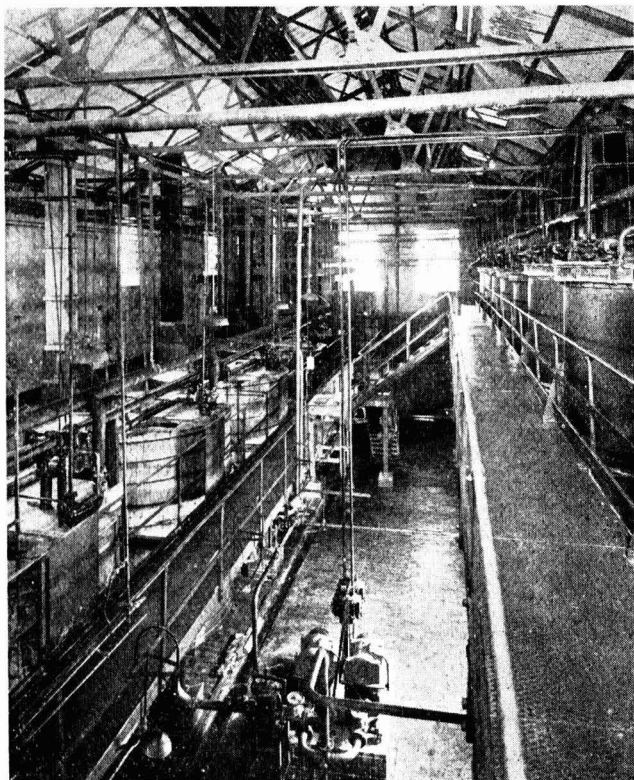
A FEW days ago the margarine and compound cooking fats industries, two of the last of Britain's strategic industries to be freed from war-time control, regained full freedom. Manufacturers are now able to buy, select and blend their own raw materials and to produce the highest quality products they are capable of making. For 14 years the industries pooled their resources and turned out standardised products under strict Ministry of Food control. Brand names were not used and the identity of the manufacturer was not revealed and there was little he could do within the narrow limits of control to improve the rationed products. Now the situation has changed and the individual manufacturer is determined to make sure that the market for margarine is maintained and that his own firm will have its rightful share of the market. The consuming housewife is already being subjected to

a full-scale attack from an army of earnest and industrious advertising experts driven forward by even more zealous sales managers.

Soon after the French chemist Mège Mouriés produced the first margarine from animal fats in 1867, two families of butter manufacturers in the Dutch village of Oss—the Van den Berghs and the Jergens—bought Mouriés' patent and began to produce margarine in Holland. These two families were bitter rivals in the butter trade and this competition continued in the margarine trade.

In the early years animal fats provided the raw materials, but, as the demand for margarine expanded, they were in very short supply and it became necessary to search for additional raw materials. These were found in vegetable oils such as groundnut, coconut and palm. At the start of the century the process was adopted for the hydrogenation

A general view of the edible oil refinery at the Stork Margarine Works, Purfleet, Essex. At the company's other works at Bromborough on the Mersey, a new refinery is being built which will have, it is claimed, the most up-to-date equipment and techniques in the world



of liquid oils, thereby turning them into solid fats, which enabled further advantages to be taken of the liquid vegetable oils available.

Public interest in margarine was comparatively slight until the 1914-18 war when the British Government realised the great importance of this food product and invited the Van den Berghs and the Jurgens to establish factories in this country during 1918.

In 1927 the Van den Berghs and the Jurgens decided to end their rivalry and amalgamated; later, in 1929 they merged with Lever Brothers, Ltd., and so formed what is now Unilever, Ltd. The group was responsible for pioneering vitamin research and for marketing the first vitaminised margarines.

At the outset of the last war, Van den Berghs' Stork margarine was the best selling and most widely used margarine in the United Kingdom. A few days before the margarine industry was decontrolled members of the Press visited the Stork works at Purfleet and were able to see at first hand just how far the industry has progressed since 1940 and to see what good use has been made of the results of 14 years of research.

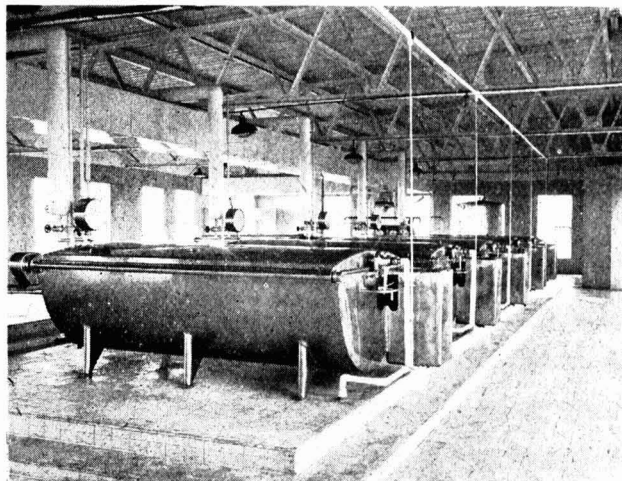
The margarine now being sold and eaten in Britain is not the same as it was in 1940 for the quality has been influenced not only by research in this country, but by that in other countries as well. Unilever operates margarine factories in 27 countries and can learn fully the details of technical advances and other improvements made in each of them. Periodically Unilever technicians

meet in conference to exchange knowledge and there is close and continuous bilateral contact between the companies, so that each benefits from the work of all.

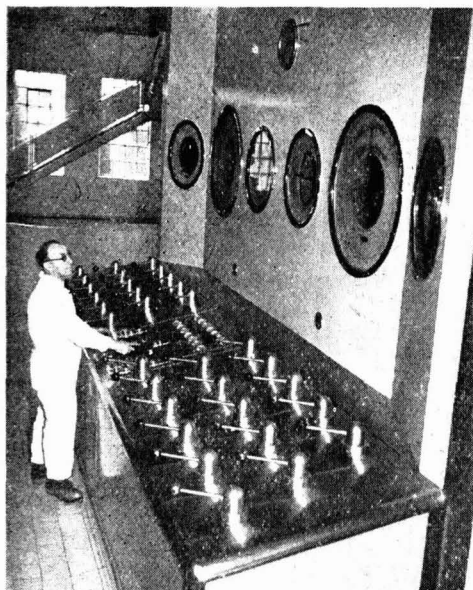
In the Unilever central research laboratories (the Press was told) as well as in the laboratories of Van den Berghs and Jurgens and the other manufacturing companies elsewhere, a great deal has been learned since 1940, not only about margarine itself, but about the raw materials from which it is made. Scientists learned a great deal about the structure of vegetable oils and developed methods for much more delicate control over the blending of the ingredients of margarine. For the past five years Van den Berghs and Jurgens have worked on the flavour and texture most likely to appeal to the British housewife and it is now claimed that it is practically impossible to tell the difference between butter and margarine.

The Purfleet works is divided into two separate parts—the edible oil refinery and the margarine production factory. Of these the refinery is the more important for it is said that three-quarters of the quality of margarine depends upon the skill with which the constituent oils—groundnut, coconut, soya, palm, cotton, sunflower, etc.—are refined. The refinery process is carried out in three main stages: neutralisation, bleaching and filtering, and deodorisation. The object of the process is to remove all traces of free fatty acids, impurities, taste and colour, so as to leave a clear neutral oil.

The margarine factory itself has undergone revolutionary changes. For many years



A section of the dairy showing some of the ten 600-gallon stainless steel maturing tanks where the inoculated milk is allowed to ripen



The control panel where the margarine ingredients are blended and fed to the Votator units

the manufacture has been a relatively lengthy batch process, involving large plant sprawling over a wide area of the factory, much supervision and periods of waiting for the partly finished margarine to mature. Some of the margarine is still made in this cumbersome plant, but most of it is now being produced—as eventually all of it will be—by new continuous methods. The installation of batteries of continuous machines known as Votator units is well advanced. For a similar output the space and supervision required by these units is less than

a quarter of that needed by the obsolete batch equipment. There is little to choose between the two processes in the quality of the margarine they can be made to yield, although perhaps the continuous process produces a margarine of a rather better texture.

Apart from its effect on production costs, the Votator possesses a great attraction in that the raw materials are not exposed to the air at any stage of the manufacture. With the batch method, in which the margarine had to mature in bulk for a period, and to undergo each stage of manufacture in large masses, exposure to the air was inevitable.

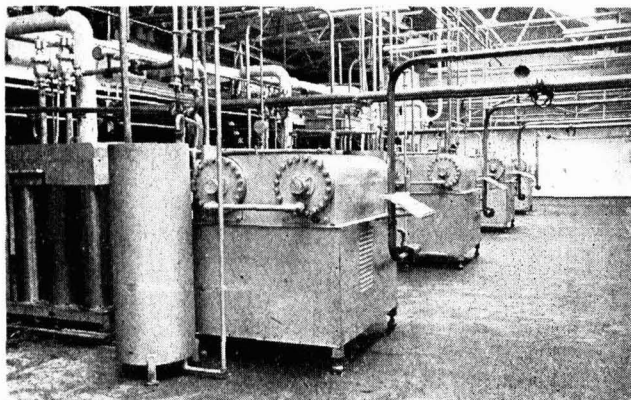
The top floor of the factory houses the dairy. Milk is used to provide aroma and flavour and its preparation and processing are of the highest importance to the finished product. The flavour and aroma arise naturally on souring and selected samples of fresh milk are allowed to sour at controlled temperatures. Samples which develop the desired lactic acid culture are propagated and used to inoculate the milk for the margarine. Before this takes place, however, the milk is pasteurised in order to destroy all non-heat resisting bacteria.

In the main body of the factory, the basic ingredients—refined edible oils and fats, milk, vitamin concentrates, salt and any other ingredients—are measured and brought together either in a churn for margarine made by the churn method or in premix tanks for the Votator method.

The blending of the oils and fats is carried out automatically and controlled by means of a special compounding unit.

With the churn method of manufacture all the ingredients are brought together in a churn fitted with agitators where under controlled temperature conditions a creamy

The main floor of the factory, showing some of the Votator units. The introduction of these machines has replaced the old batch system of margarine manufacture and has vastly improved hygienic conditions



emulsion is obtained. From here the emulsion is passed to cooling drums, the first stage in converting the liquid emulsion into a solid. The cooling drums are kept at a very low temperature by means of refrigeration and rotate at a suitable speed. The liquid emulsion is fed on to the surface of the drum where it solidifies after one rotation and is removed by means of a scraper knife, falling as flakes into a truck. After resting in order that the margarine may mature and attain normal temperature, it passes then through the kneading and blending processes. In the kneading process the margarine is passed through rollers which consolidate the flakes and from here to blenders operating under vacuum where the margarine is worked in order to obtain the desired texture and consistency.

The margarine is fed to packing machines which automatically cut and wrap the margarine in $\frac{1}{2}$ -lb. packets at the rate of 90 packets per minute. The packets coming from the packing machines are automatically packed into fibreboard containers each of which hold 24 or 48 packets.

The Votator method of manufacture combines the cooling, kneading and blending operations in one machine and apart from the space and power saving, has the advantage that from the premixing stage to the wrapped packet the margarine is not exposed to the atmosphere.

The highest possible standards of hygiene are maintained throughout the works and over all ingredients and materials used a rigid quality control is maintained.

The IG Problem

continued from page 1148

be seriously obstructed by deconcentration restrictions. It is known that, according to the correspondence exchanged between Federal Chancellor Adenauer and the then US High Commissioner McCloy, a reorganisation of the relations between the successor companies within the framework of the General Agreement will not be impossible after 1955. . . .

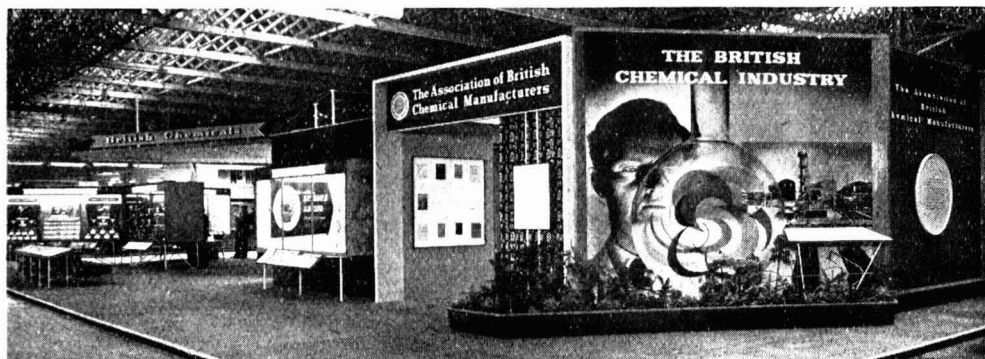
'There are prominent personages and friends of the old IG-Farben who today, on grounds of inner conviction, reject the idea of its revival. Apart from the age-old principle born from experience that what has gone under is hardly ever restored in the same form, the old IG-Farben suffered from organisational shortcomings which, in the view of these experts, were in some part caused by excessive centralisation. It may be recalled that plans aiming at division and decentralisation were already developed inside IG-Farben before the end of the war.

'Besides, things have changed a great deal in the German chemical industry since 1925, and more particularly since the end of the second world war, in regard to both personal and material conditions, so that new and more suitable forms and groupings may one day be found in the interest of closer co-operation. When the reorganisation ban is no longer in force, it may be advisable to approach the problems of a more or less far-reaching readjustment above all in three fields—research; marketing, especially abroad; and investment.'



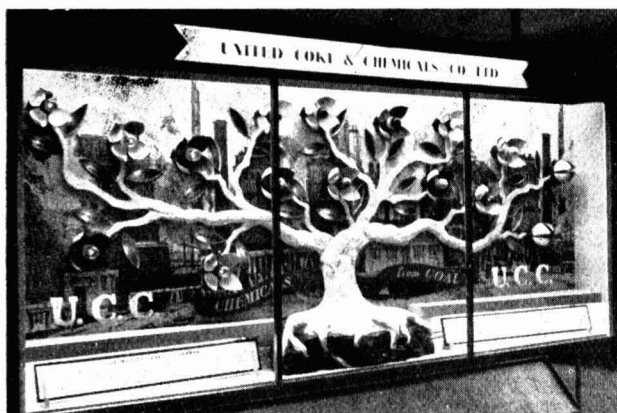
On their stand at the 1954 British Industries Fair at Birmingham, Bakelite Limited showed their newer materials as well as new applications for standard products. Features were copper-clad Bakelite, a polyester chair and mouldings from high impact polystyrene, alkyd, etc.

Chemical Manufacturers at 1954 BIF

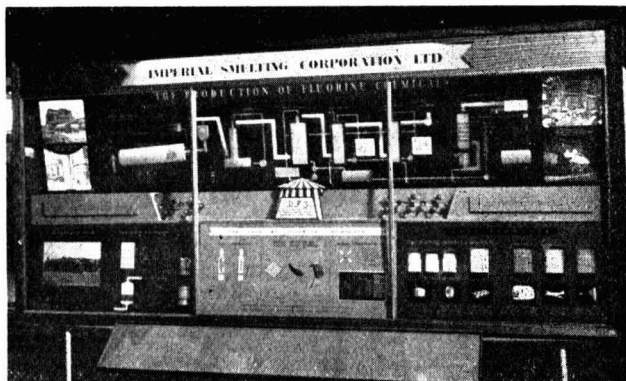


As our readers are aware, the Association of British Chemical Manufacturers decided, in view of the lessening interest among individual exhibitors in recent

years, to stage a comprehensive exhibit this year at the BIF, Castle Bromwich. On a large, commanding site in the exhibition, twenty of the leading chemical companies of Great Britain were provided with separate display units under the aegis of the ABCM. Every one of these displays was well designed and attractive, and the illustrations chosen here are representative of the high standard of the complete stand. Top, a



general view of the Association's exhibit; centre, the display of United Coke and Chemicals Co. Ltd., '250,000,000 Years of Growth,' illustrating a range of chemicals derived from coal at their Orgreave and Brookhouse works; and right, fluorine chemicals featured by the Imperial Smelting Corporation, together with sulphuric acid, vanadium catalysts and zinc pigments. The Association's venture attracted interest and favourable comment from many home and overseas visitors, and the general conclusion was that the stand had been a success



Epoxy Resins

Shell to Make 'Epikote' in Britain

'EPIKOTE' resins will be manufactured for the first time in England when a new plant now under construction is completed next spring.

Although their first manufacture in Europe was undertaken only a year ago by Shell at Pernis, near Rotterdam, the demand for these resins has been so heavy that Shell are installing an Epikote unit at their Stanlow plant in Cheshire. This unit will increase manufacturing capacity to keep pace with demand and ensure that these versatile products are available to British industry from home production.

Wide Application as Finishes

Epikote resins have wide application in finishes for food containers, washing machines, refrigerators and similar articles and in the electrical industry. Epikote based finishes are distinguished by great flexibility, abrasion resistance and adhesive power. Food tins and similar containers can be painted with these materials, crushed before consignment to save storage space in dispatch and expanded and re-formed at their destination with undamaged surfaces. Epikote based paints, by virtue of their weathering qualities and protective powers, are of great value in the maintenance of industrial plant.

With the increased production from the new plant it is expected that Epikote based paints will in time become available for household use. In polluted industrial atmospheres, these products can be expected to last at least twice as long as the conventional paints.

The four main methods of using Epikote resins may be summarised as follows:—

1. By combination with other synthetic resins, such as phenolic or amino resins, to produce stoving finishes.
2. By curing with amines to produce cold-cure or stoved coatings.
3. By esterification with drying oil fatty acids to produce air-drying and stoving finishes.
4. By esterification with drying or non-drying oil fatty acids, used in conjunction with amino resins, to produce stoving finishes.

German Journal in English

ALTHOUGH a knowledge of the German language is still considered essential to the chemist, that knowledge seldom extends further than the ability to read, with the constant assistance of a dictionary, a paper of purely chemical interest. The utterances of economists and business men in any language have never been very comprehensible, and it seems that many readers of *Chemische Industrie* have urged the publishers to make the more important articles available in a language more easily understood.

As a result, an English edition of this well-known German journal is to appear twice-yearly, in April and October. The editors announce that it will present a cross-section of the German and European chemical industries, consisting largely of reports and news items not generally published in the English technical press. There will be a selection of the best and most important contributions which have already appeared in the German edition.

The subscription rate is US \$4.50 for the remaining 1954 issue and the two 1955 issues. The first issue, which is a sample one, contains articles on various economic aspects of Europe's chemical industry, Polish large-scale synthesis, German plastics industry, phenol synthesis, and other matters.

New Titanium Process

ACCORDING to a recent announcement by Mr. J. A. Fuller, president of the Shawinigan Water & Power Co., the company has succeeded in making high-grade titanium metal by an electrolytic process and is planning to expand this work to the scale of a larger pilot plant as a step towards commercial production.

Mr. Fuller added that he believed that by using the new method, which yields metal of a very high grade, the company would be able to make titanium on a commercial scale at prices substantially lower than had been possible before. Moreover, the new method was thought to be capable of being developed into a continuous process instead of the batch system by which all the world's small supply of titanium metal had been produced in the past.



METHODEN DER ORGANISCHEN CHEMIE. (Houben-Weyl, 4th edition). Vol. II. Edited by E. Müller with the collaboration of O. Bayer, H. Meerwein and K. Ziegler. Georg Thieme Verlag, Stuttgart. 1953. Pp. xxiv + 1070, 252 illustrations. Moleskin, DM. 139.

The publication of the 4th edition of 'Houben-Weyl' will replace the four volumes of the 3rd edition by a set of about fifteen volumes. Volume VIII has already appeared and has been reviewed in this journal (*THE CHEMICAL AGE*, 1953, 68, 332).

In the previous editions, descriptions of analytical methods were scattered throughout the whole text. A new policy has now been adopted and all the important methods of analysis have been collected in a single volume. In fact, Volume II can stand on its own feet as an independent, comprehensive work on organic analysis.

The first part of the book opens with an account of qualitative and quantitative elementary analysis by macro-, semimicro- and ultramicro-methods (248 pages). Many procedures are described in great detail and the book can be used by the analyst as a working text. A large number of references to additional and alternative methods is also given. The following section (466 pages) covers the detection and estimation of functional groups, a great variety of methods being given for each type of compound. For example, the section on C=C double bonds includes eleven qualitative tests and fifteen quantitative procedures as well as an account of the detection and estimation of conjugated double bonds.

The second part of the book deals with gas analysis, melting and boiling point determinations, thermal analysis and chromatography. The volume concludes with a chapter on the analysis of solvent mixtures (76 pages) which should be of great value to chemists in many branches of industry.

The articles maintain a high standard of clarity and a critical evaluation of the various

methods has been given wherever possible. The contributors are drawn from industry as well as from the universities and it is clear that many sections have benefited from the wide experience which their authors have gained in large industrial analytical laboratories. The literature is covered up to 1952 and the book contains good subject and author indexes. The printing, paper and binding are excellent. The volume can be purchased separately and merits a place in the library of every organic chemical laboratory.—J. C. P. SCHWARZ.

ORGANIC PROTECTIVE COATINGS. Edited by W. von Fischer and E. G. Bobalek. Reinhold Publishing Corporation, New York; Chapman and Hall Ltd., London. 1953. Pp. 387. 60s.

For some time now it has been the practice of the American Case Institute of Technology to sponsor through its Organic Coatings Division a number of lecture series and conferences on the subject of organic coatings. These activities have been designed to serve the needs both of the technical staff employed in the paint and varnish industries of northern Ohio and of the lecturers and students at the Case Institute. Like a previous volume, 'Paint and Varnish Technology,' the present book is the outcome of one of these lecture series, and the material it contains is complementary to that in the former book. In this volume greater emphasis is laid on the problems of coatings formulation from the viewpoint of paint as an engineering material. The editors have obtained the services of a number of distinguished contributors in the preparation of this work which is likely to prove of value as a textbook for advanced courses in paint technology and as a reference volume for those engaged in the manufacture and use of paints, varnishes and lacquers.

In the opening chapter on paint as an engineering material, the senior author describes how the rapid progress in paint technology

which has taken place in the last 30 years has been vitally necessary in order that protective coatings could be provided capable of filling the requirements of the modern technical industries using steel and non-ferrous metals. This is followed by a discussion of commercial paint formulation. Some contributed chapters include 'Some Theoretical Considerations Regarding the Significance of the Pigment Dispersion Problem in Paint Formulation,' by D. M. Gans; 'Anti-corrosive Pigments: Their Function, Composition and Testing,' by A. J. Eickhoff; and 'Design for Reflectance Properties,' by J. R. DeVore. A description is also given of the production and use of luminescent coatings, including the new fluorescent paints used for poster advertisements. Much attention has been paid in the USA in recent years to the accurate colour specification of manufactured articles, and considerable care has been taken, for example, to ensure that the white colour of domestic refrigerator doors is the same whether the machine is the first or the last of a production batch. Extensive use has been made of the GEC automatic recording spectrophotometer, which is capable of recording in a few minutes the reflectance curve of an opaque sample. In the chapter on the reflectance spectrophotometry of pigmented materials, J. L. Saunderson provides a valuable account of the mathematical problems involved in colour matching calculations.

Developments in the production of new pigments are ably surveyed by E. C. Botti. An extensive account of the use of vinyl resins in organic protective coatings is provided in which the general chemical and solubility characteristics of these resins and suitable stabilisers and plasticisers are considered. Aminoplast resins, particularly those based upon urea or melamine, are also much used in organic coatings, and their application is discussed by C. H. Parker and F. J. Hahn. The performance of a coating is greatly dependent upon the bond between the paint and the underlying surface, and the account by F. L. Browne of the properties of wood that may affect paint performance is therefore most useful. The application of lacquer finishes has been much favoured in the furniture industry, and during the last four years the Hercules Powder Co. has actively promoted a hot-spray process for applying these lacquers which is claimed to have many economic advantages. Two

members of their staff contribute an account of this process. Following this the senior editor deals with the fundamental principles involved in formulating water-containing emulsion and latex paints.

In the remaining part of the book, E. E. McSweeney discusses the use of synthetic resin coatings as a protection for metal surfaces, A. J. Sherburne deals with their applications in electrical insulation, and M. Kin describes the use of silicone resins in the production of heat-resistant paints.

British readers will find that this book provides a valuable and comprehensive insight into modern American practice in paint technology.—G.S.E.

ENERGY TRANSFER IN HOT GASES. National Bureau of Standards Circular, No. 523. Government Printing Office, Washington. 1954. Pp. 126, 54 figures, 15 tables. Buckram bound \$1.50.

The study of flames and of combustion generally has attracted considerable attention in recent years, no doubt because of its fundamental importance in the development of jet engines, gas turbines and rocket motors. A number of symposia have been held both in the USA and in Europe and this book represents the proceedings of one of these held in September, 1951, at the National Bureau of Standards.

The 16 papers included deal mainly with flame spectra, radiation and temperature, atomic hydrogen in flames, etc., although one of them reviews the present position of flame theory. The title of this collection of papers is, perhaps, somewhat misleading for, as R. H. Tourin points out in the tenth paper, a distinction must be made between a heated gas, by which is usually understood a gas brought to equilibrium at a high temperature by purely thermal means, and a flame, in which the excitation of the gas molecules is due partly to thermal and partly to chemical effects. A. G. Gaydon in the first paper also points out that there is evidence for marked departures from equilibrium in the radiation from at least some parts of some flames.

This collection of specialised papers will be of considerable interest to the physicist or physical chemist whose field of study embraces the subjects of flame and combustion for they make a valuable contribution to knowledge. The price is reasonable for this well-produced and illustrated book.—R.L.

Healthy Swiss Industry

Ciba Report Steady Increase in Sales

THE healthy condition of the Swiss chemical industry is clearly demonstrated in the 70th annual report of Ciba Ltd., presented at the company's recent general meeting.

'Although the abundant and rapidly increasing supply of highly processed chemical products has led to ever keener competition for markets,' the report begins 'we have succeeded in increasing our sales in all fields where we are active, even in what has become a pronounced buyers' market. . . . The sales to customers of all Ciba sales organisations reached a total of Fr.650,000,000—as against Fr.563,000,000 in 1952—an increase of about 15 per cent . . . this represents a new record.'

The relative significance of Ciba branch establishments in other countries is increasing: from 1949 to 1953 the world turnover of the organisation increased by 30 per cent, while turnover of the Basle parent company increased by only 14 per cent (representing a fall in percentage total from 41.4 to 36.3).

How the separate branches of manufacture have contributed individually to the growth of turnover as a whole is shown in the following table—

	PERCENTAGES OF TOTAL TURNOVER				
	1949	1950	1951	1952	1953
Dyestuffs and textile auxiliaries	53.2	53.5	52.9	47.4	48.7
Pharmaceuticals and cosmetics	40.8	40.3	39.1	45.5	43.5
Plastics, etc.	6.0	6.2	8.0	7.1	7.8

'In the field of dyestuffs the recovery made in 1953 balanced the loss suffered as a result of the depression in the textile industry during the period 1951-2' says the report. 'In addition, the expansion of existing and the establishment of many new production units for synthetic fibres brought about an increased demand for specialities. The many innovations and improvements in the application of dyestuffs and textile auxiliaries had a similar effect. . . . By comparison with 1952, the production of dyestuffs and textile auxiliaries increased by an average of about 26 per cent. . . . Only the American market in dyes continues to show a weakening trend.'

Due credit is given in the report to the significance of the continued existence of EPU, which has enabled markets in the chief consumer countries to be broadened and consolidated by the increased liberalisation of

European trade. 'During the year under review the European market has absorbed about 60 per cent of deliveries from Basle. Altogether, the sales of the parent company in 1953 reached a total of approximately 11 per cent more than that of the preceding year.'

Canadian Demand Lower

DEMAND for some of the chemical industry's products was lower during the first quarter of this year than during the corresponding period last year, said Mr. H. Greville Smith, president of Canadian Industries Ltd., speaking at the recent annual meeting of the company.

During the past quarter, said Mr. Greville Smith, two misfortunes occurred which would have some effect upon the company's financial results. Production of polythene flake at Edmonton was interrupted by an explosion early in March. The damage was covered by insurance and partial operation has already been resumed. Referring to the cessation of operations at Windsor Works, following the subsidence and flooding of part of the plant site in February, Mr. Greville Smith said: 'In recent years Windsor Works, which were built in 1911, have been at an increasing disadvantage competitively with newer plants more favourably situated in relation to markets for caustic soda and chlorine. This fact, coupled with the high cost of repairs and the possibility that further difficulties might be experienced in the future, was responsible for the decision not to reopen the plant.'

Proposed Pharmaceuticals Manufacture

In order to improve distribution of their products in Scotland and Northern Ireland, and to ease production problems at their Hounslow factory, Parke Davis & Co. Ltd. have acquired a 15,000 sq. ft. factory at Carfin Industrial Estate, Glasgow, formerly occupied by the Glacier Metal Co. Ltd. At first stock will be shipped to the new establishment from Hounslow, then pharmaceutical chemicals in bulk, and finally it is hoped to begin manufacture of pharmaceuticals. The new factory should be open by early autumn, and it is hoped that manufacture on a small scale will begin within a few months.

• HOME •

Tungsten Ores Cheaper

Continuing a succession of changes in recent weeks, the Ministry of Materials' selling prices for tungsten ores of standard 65 per cent grade and ordinary quality (wolfram and scheelite) have been reduced by 20s. to 185s. plus 10s. charge per long ton unit delivered consumers' works.

Midlands Engineering Symposium

A symposium and exhibition 'Applications of Plastics to Chemical Engineering' is to be held on 26 May at the University, Edgbaston, Birmingham, the Midlands Centre of the Institution of Chemical Engineers, Graduates and Students Section. The following papers are to be presented: 'Polyester Resins' by J. R. Stevenson (British Industrial Plastics Ltd.); 'Fluorine-Containing Polymers' by H. M. Whitcut (I.C.I. Ltd.); and 'Plastic Linings, Coatings, Cements and Fabrications' by V. Evans (Prodorite Ltd.).

High Steel Production

Steel production in April averaged 368,400 tons a week. This exceeds the previous highest output of 364,800 tons a week achieved the previous month and compares with a weekly average of 348,500 tons for April last year. Pig iron production during April averaged 232,100 tons a week, which was 1,200 tons higher than the record figure reached in March.

Erratum

In our report of the annual meeting of The Institution of Chemical Engineers the results of the ballot for the election of Ordinary Members of Council were incorrectly given (see THE CHEMICAL AGE, 1954, 70, 1042). Those elected were Dr. E. H. T. Hoblyn, Dr. H. R. C. Pratt and Mr. K. B. Ross.

Agencies Sought in Syria

We have been advised by Khayat Estates and Trading Co., Khan Olabié, Aleppo, that they seek commission agencies for all chemical products, particularly oils and acid oils for soap manufacture, sodium bicarbonate, caustic soda, zinc oxide, lithopone, tartaric acid, bone glue, etc.

Salt Mine Reopened

At the Northern Ireland salt mine at Carrickfergus, County Antrim, which has been reopened after 15 months, 13,000 tons of salt will be produced for industrial and domestic use. A new boring at Maidenmount mine, two miles from Carrickfergus, has led to a resumption of work.

Poisons List

In the House of Commons last week Mr. Swingler asked the Secretary of State for the Home Department if, having consulted the Poisons Board, he was in a position to reply to the suggestion that calomel be put on Schedule 1 of the Poisons List. Sir D. Maxwell Fyfe replied: 'Yes. The Poisons Board has advised against controlling the sale of calomel under the Poisons Law.'

'Dumping' Oil

At a conference in London last week delegates from 40 countries agreed to fix zones in which the 'dumping' into the sea of crude oil, fuel oil, heavy diesel oil and lubricating oil, be prohibited. Britain was among the first to sign the convention and later it was stated that if the convention were obeyed there should be a substantial diminution of the pollution of Britain's beaches within four or five years.

Fuel & Power Advisory Council

The Minister of Fuel and Power has appointed Sir Lawrence Bragg, F.R.S., and Professor H. W. Melville, F.R.S., to be members of the Scientific Advisory Council from 1 September this year.

Synthetic Detergents

Unofficial estimates prepared by the Petroleum Information Bureau show that synthetic products account for 170,000 tons out of a total of just over 500,000 tons of soaps and detergents consumed in the UK last year. This is a substantial increase compared with 1952, when synthetics accounted for less than a quarter of the total. The UK is now the world's largest consumer of synthetic detergents, apart from the USA.

OVERSEAS

Oil Refinery Opened

The Standard-Vacuum Oil Co.'s refinery at Wentworth, Durban, was recently opened by the South African Minister of Economic Affairs, Mr. Eric Louw. He said overseas investors had shown practical proof of their confidence in South Africa by putting £7,000,000 into the undertaking which would save the country about £1,500,000 in foreign currency yearly.

Better America Through Chemical Progress

This week has been 'Chemical Progress Week' in America. All over the country plant communities have been organised, regional and local committees have been established, hundreds of meetings have been arranged, and many plant visits and other events, to show citizens what chemical science and industry have done to make their life better. Industry leaders have made numerous personal and radio appearances, and the motto of the industry has been: 'A better America through chemical progress.'

Uranium Search in Southern Rhodesia

Every district mining officer has been issued with a geiger counter for the detection of uranium ore, according to the Southern Rhodesian Minister of Mines, Mr. G. A. Davenport. There has, however, been no significant discovery of uranium. The mining officers are encouraged to prosecute a search of uranium when going out to any particular part of their districts.

Fall in Gold Production

Canadian gold production continued to decline in January as compared with a year earlier, the month's output amounting to 293,049 fine ounces as compared with 371,265. Output in Ontario dropped to 160,916 fine ounces from 210,188, Quebec to 63,456 fine ounces from 97,388, and British Columbia to 20,504 fine ounces from 20,698. In the Northwest Territories there was a rise to 26,625 fine ounces from 22,369. In the Prairie Provinces to 20,719 fine ounces from 19,992, Newfoundland and Nova Scotia to 797 fine ounces from 630, and the Yukon to 32 fine ounces from nil.

The ABC of Modern War

The 'ABC' of modern war is being vigorously tackled by Norway's Military Research Institute. 'ABC' stands respectively for atomic, biological, and chemical warfare, and an 'ABC' Council has now been formed in Norway, with both military and civil representatives, to consider the practical measures which should be taken on the basis of the research results so far achieved.

Israel Potash Production Rising

Potash production is steadily rising at the Dead Sea Works, a company spokesman declared in Jerusalem recently. Last month's output was 2,600 tons, an increase of 45 per cent over the average during the previous three months, and production should reach 3,000 tons a month in May. Potash is being extracted from the carnallite accumulated in the evaporating basins since the plant closed in 1948, and the normal process has not yet been put into operation. Large quantities of carnallite remain to be removed.

Latest Model Insulated Wagon

Mathieson Chemical Corporation recently started in service the first of a series of all-steel, insulated rail cars of advanced design for the shipment of dry ice. The 54-ton car has 20 per cent greater capacity than the standard dry ice car. Among its new features are improved insulation, roller bearings to forestall transit delays from journal failures, and a modified underframe to reduce transmission of shock to the car body.

Exploitation of Turkish Oil

The Council of Ministers in Turkey has approved a plan submitted by the Government's petroleum administration for the division of the country into nine zones for oil prospecting. This is in accordance with the new law authorising the exploitation of Turkey's oil resources by foreign capital. Radio Ankara says that the decision is considered to be very important because it comes at a time when many foreign companies are making requests for the right to prospect for and exploit Turkish petroleum.

PERSONAL

DR. G. S. HARTLEY has been appointed to the board of Pest Control Ltd.

After a Dunlop board meeting last week, SIR GEORGE BEHARRELL, the company's president, presented a gold badge to the chairman, LORD BAILLIEU, on his completing 25 years' service as a director.

MR. G. A. S. NAIRN, chairman of Lever Brothers, Port Sunlight Ltd., since 1947, is to retire on 30 September having reached the age of 65. He is to be succeeded by MR. F. S. WALKER, the commercial member of the United Kingdom Soap Executive of Unilever Ltd. in London. Mr. Nairn was born in Liverpool, educated at Liverpool College and began his business life in that city. His first appointment at Port Sunlight was as personal assistant to the late Mr. J. L. Ferguson. Soon afterwards he was appointed to the board of the associated company William Gossage & Sons Ltd., of Widnes. He remained with Gossages until 1934 having, in 1932, become its chairman. In 1934 he joined the executive committee at Unilever House which was responsible for liaison with the interests of Unilever on the continent of Europe. On the outbreak of war he assumed similar responsibilities at Rotterdam. After the German invasion of Holland in 1940 he went to Toronto as president of Lever Brothers Ltd. of Canada. In January, 1945, he returned to Unilever House as a member of the United Kingdom Food Executive, and two years later went to Port Sunlight as chairman.

Mr. Walker, who is 58 years of age, began his business career with Lever Brothers Ltd. at Port Sunlight. Following a period of service in London with the accounting and audit departments, he returned to Port Sunlight in 1938 as commercial director of Lever Brothers, Port Sunlight Ltd. During the war years he was at Port Sunlight and at the end of 1944 was appointed a member of the United Kingdom Soap Executive of Unilever Ltd. in London.

MR. R. T. PRIESTMAN, managing director of T. J. Priestman Ltd., has been elected president of the Aluminium Development

Association. A member of the Institute of Metals for more than 30 years, he joined the ADA council in 1947 as the representative of ALAR Ltd. He is a member of the ALAR Ltd. council (of which he was at one time chairman) and chairman of the technical committee. He is also a council member of the Federation of Light Metal Smelters. The new vice-president of the ADA is MR. R. D. HAMER (Aluminium Laboratories Ltd.). MR. HAROLD GOODWIN (Birmetals Ltd.) succeeds MR. G. W. LACEY as chairman of the executive committee.

MR. G. A. STEEL has retired from the board of the British Aluminium Co. Ltd.

MR. J. D. BROWN, who has been appointed engineering design manager in the chief engineer's department at I.C.I., Billingham, was engaged during the war on work connected with the development of the atom bomb. He started at Billingham in 1927 and was an engineer in the laboratories and ammonia works until 1932. From then until 1940 he was first a design engineer and then senior design engineer in the chief engineer's department. After visiting Canada and the USA he returned to Billingham in 1941 and two years later joined the 'Tube Alloys Section,' which worked on the development of the atomic bomb. He continued in this until 1945 and then, after a short period on engineering research he returned to design work in the chief engineer's department.

Mr. Brown has been succeeded as senior design manager in the oil design department by MR. B. R. MAY, who had been works manager at the Olefine Works, Wilton, since July, 1950. Mr. May started at Billingham in 1934 and after a short period in the chief engineer's department he was in the ammonia works until 1938. He then went to Mossend as a member of the engineering works services section. Going on to Dowlais on construction work, he was successively plant engineer, senior plant engineer and acting works engineer. He returned to the chief engineer's department as a design engineer in March, 1946, remaining there until taking up his appointment at Wilton.

Publications & Announcements

HYDROGEN peroxide is one of the more interesting products of the chemical industry and is remarkable for the rapid growth in its scale of production and variety of applications in recent years. The classical method of manufacture from barium peroxide has now been almost completely replaced by the electrochemical process. In recent years newer methods have been introduced, one of which is dependent on the alternate reduction and oxidation of an organic compound such as an alkyl anthraquinone. Just published by the Royal Institute of Chemistry is No. 2 in the series of Lectures, Monographs and Reports, 1954: 'Hydrogen Peroxide,' based on a lecture given by W. S. Wood to the London Section of the Institute on 17 November 1953. Mr. Wood, who is research manager of Laporte Chemicals Ltd., describes in detail the manufacture, properties and uses of this chemical of growing importance.

* * *

THE latest (March) issue of *The Technical Journal of the Brush Group*, published by the group's publicity department at Duke's Court, Duke Street, St. James's, London, S.W.1, contains a variety of topical technical articles and other features of interest. It serves admirably to illustrate the Brush Group's continuously developing programme of research, combined with efficient manufacturing techniques. The wide range of the articles is indicated by mentioning such titles as 'The Evolution of Electrical Power,' 'Parallel Operation of Diesel-driven Alternators,' 'Steelworks Locomotive Conversion' and 'Improved Balancing & Overspeeding Facilities for Turbo-alternator Rotors.'

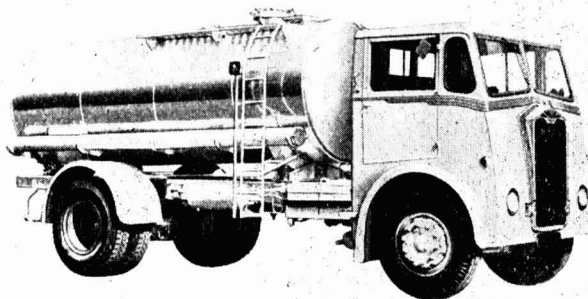
VERY well illustrated with striking photographs, a booklet has just been published by Marchon Products Ltd., Whitehaven, Cumberland. The manufacture of surface active agents and the valuable use being made of local raw materials are described.

* * *

TECHNICAL Circular T.C.898, just issued by the Quasi-Arc Co. Ltd., of Bilston, Staffordshire, from whom copies are obtainable, describes their DC arc welding rectifier type MR.375, the first metal rectifier welding plant introduced into this country and now installed in a number of leading shipyards and engineering works. It has a welding current range of 25-375 amps, and provides DC power for welding at a higher efficiency and instantaneous arc response. The circular sets out in detail the numerous advantages claimed for the MR. 375 welding rectifier, including characteristic volt/ampere curves and a table showing typical test results in power consumption as compared with motor generators. A complete specification of the MR.375 is also given, as well as a description of the portable current-selector unit which provides complete remote control.

* * *

CO-OPERATION between two Scottish companies, Albion Motors Ltd. and the Dalzell Electric Welding Co. Ltd., has resulted in the production of a road tanker of all-Scottish design and construction. Built by the Dalzell Co. and mounted on an Albion heavy duty maximum load chassis, powered with 125 bhp. oil engine, the tank is of stainless steel, insulated and over-sheeted with polished aluminium, and



One of the new road tankers built as a result of the combined efforts of Albion Motors Ltd., and the Dalzell Electric Welding Co., Ltd.

has 1,400 gallons capacity for the bulk haulage of milk. A unique feature is the Silentbloc mounting which allows more flexibility than the usual type of rigid mounting and thus relieves the tank of unnecessary strain. The vehicle is one of a number for export to Iceland.

* * *

'ONE AND ALL' is the motto of Tangyes Ltd., Smethwick, Birmingham, and 'One and All' is the title of their quarterly review, primarily intended for Tangye agents. The latest issue contains articles on gear cutting, axial flow pumps for circulation of chemical liquor, testing machines, fuel injection pumps, foundry research, BCIRA, and breaking tests for jacks.

* * *

ATTRACTIVELY produced, 'Hot-Metal Magic' is an interesting booklet published by Electro Metallurgical Co., a division of Union Carbide & Carbon Corporation. The story it tells is based on the experiences of the company, which has been producing ferro-alloys and alloying metals for more than 50 years. It gives a brief, non-technical picture of alloys and of many of the ways in which they are used. Copies of the booklet are obtainable on application to the company, at Room 308, 30 East 42nd Street, New York 17.

* * *

CASTABLE refractories offer many advantages over 'made-up' refractories, not least of which is their value in building walls, arches and linings in situations which normally necessitate the use of special refractory shapes. The scope for the use of castable refractories has been further extended by the introduction of the Morgan high temperature, light-weight, low heat storage concrete known as MI 22 Insulating Concrete. A leaflet describing this and its uses, etc., has just been published by the Morgan Crucible Co. Ltd., Battersea Church Road, London, S.W.11.

* * *

A NEW low-salt type of powdered 'Cello-size' hydroxyethyl cellulose is now commercially available according to a recent announcement by Carbide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corporation. The new material is a water-soluble, light-coloured, free-flowing powder containing 90 per cent hydroxyethyl cellulose. It is being offered in three viscosity types, designated Cello-

size WP-09 (viscosity of a 5 per cent solution is approximately 100 cps, at 20°); Cello-size WP-3 (viscosity of a 5 per cent solution is approximately 300 cps, at 20°); and Cello-size WP-300 (viscosity of a 5 per cent solution is approximately 30,000 cps, at 20°). Hydroxyethyl cellulose is widely used in the preparation of resin emulsions and rubber latices, where it acts as a thickener, stabiliser, and dispersant. Large quantities are used by the textile industry in processing sizes, printing pastes, and resin finishes. Cellosize also finds application as a thickener and binder in the paper, cosmetic, ceramic, and electroplating industries.

* * *

A PAMPHLET from L. Oertling Ltd., St. Mary Cray, Kent, describes the latest additions to the range of Releas-o-matic balances, which now total eight different models. The enormous increase in efficiency and rate of weighing obtained in the use of these balances is demonstrated.

* * *

WELL KNOWN by now, *Pyrethrum Post*, the official publication of the African Pyrethrum Research Council, maintains in Volume 3, No. 3, the high quality of its technical papers. Among a number of authoritative articles are papers on the estimation of 'false' pyrethrins, the influence of piperonyl butoxide and DDT on determination of pyrethrins, new assay methods, separation of pyrethrins by displacement chromatography, etc.

* * *

ARTICLES of direct or indirect interest to chemists appear frequently in *Penguin Science News* and in No. 32 there is a discussion of large molecules by Michaela Leitner; a description based on 'Britain's Atomic Factories,' the book published by HMSO in January; an article on the mass culture of *Chlorella*; and other matters.

* * *

MELAMINE is now being manufactured by the British Oxygen Co. Ltd., Vigo Lane, Chester-le-Street, and various melamine-formaldehyde compounds suitable for the treatment of textiles are available from a number of resin manufacturers in the UK. The company's Technical Bulletin No. 4 describes the preparation of several compounds and their applications. Bulletin No. 5 describes similar applications in paper treatment.

Law & Company News

Commercial Intelligence

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

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, 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 or 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.)

LANGLEY ALLOYS LTD. (Bucks.) 5 April. Trust Deed dated 15 March, 1954, securing £289,718 debenture stock inclusive of £200,000 secured by a Trust Deed dated 22 August, 1947, etc.; charged on specified land at Langley (Bucks.) and a general charge. *£199,967. 6 April, 1953.

MONAX ENAMELS LTD., Ketley. 5 April, two mortgages, to Midland Bank Ltd., each securing all moneys due or to become due to the bank; respectively charged on Beveley Works, Ketley, with power trade machinery, etc., and The Beeches, Coven, nr. Wolverhampton, and fixtures. *£2,000. 13 May, 1953.

Satisfaction

BRITISH CELANESE LTD., London, W. Satisfaction, 10 April, of debenture stock registered 2 October, 1943, and 8 November, 1944, to the extent of £29,640.

Increase of Capital

The following increase of capital has been announced: BAKER RESEARCH LABORATORIES LTD., from £500 to £2,500.

New Registrations

Deskalex Co. Ltd.

Private company. (533,023.) Capital £100. Objects: To develop, market and exploit chemical preparations for the removal and prevention of scale in steam boilers, radiators and hot water systems, etc. Directors: Henry P. Scott, Daisy Scott and Joseph A. Scott.

G. H. Parsons & Co. Ltd.

Private company. (533,100.) Capital £5,000. Objects: To acquire the business of electro-chemical engineers now carried on at Stafford Street, Dudley, by G. H. Parsons as G. H. Parsons & Co. Directors: Geoffrey H. Parsons and Mrs. Betty Parsons. Reg. office: 25a Stafford Street, Dudley, Worcs.

Cumbrian Mouldings Ltd.

Private company. (532,743.) Capital, £100. Manufacturers of plastic articles and materials, synthetic resins and moulding powders, chemists, vulcanite and ivory turners, etc. Directors: Reginald Brien, Stanley T. Lenton and Franz M. Herzberg. Solicitors: Bristowe Cooke & Carpmael, 1 Cophthall Buildings, London, E.C.2.

J. Lowenstein & Co. Ltd.

Private company. (531,658.) Capital, £100. Merchants, dealers, importers, exporters, manufacturers and refiners of and brokers of all chemicals and minerals, and metals, etc. Directors: Julius Lowenstein, Bernard Cival and Ernst Herman. Reg. office: Greenwich House, 10-13 Newgate Street, London, E.C.1.

Ernest M. Fox Ltd.

Private company. (532,812.) Capital, £10,000. Manufacturing, analytical, consulting, pharmaceutical and general chemists, etc. Directors: Mrs. Lily Fox, Mrs. Doreen Cummings and Dennis G. Dove. Reg. office: 294 Balby Road, Doncaster.

Company News

Scottish Scientific Instruments

As from 1 June Scottish Scientific Instruments will be re-formed and known as Scientific Instruments (Glasgow) Ltd., with registered office at 1293 Argyle Street, Glasgow, C.3, where the premises of the present company are being altered to accommodate not only the office of the new company, but their scientific glass blowing department and a first-class repair service for laboratories. The new company will produce a completely new type of automatic balance requiring no external weights and intended specifically for the chemical industry. The company's main function, however, will be to manufacture testing

equipment for paper and textile laboratories. The directors will be Mr. C. H. Drewell, Mr. I. H. Duncan, Mr. A. O. Eyles and Mr. K. Apold.

Boots Pure Drug Co. Ltd.

The final equity dividend of Boots Pure Drug Co. Ltd. is being raised from 10 per cent to 12½ per cent, making 22½ per cent for the year ended 31 March last, compared with 20 per cent for the previous year. Untaxed group profits came to £3,195,410, an increase of £254,066. Before arriving at the group profits a deduction of £100,000 was made in respect of the endowment of two Chairs at Nottingham University, one in Pharmaceutical Chemistry and the other in Chemical Engineering.

Hickson & Welch (Holdings) Ltd.

An interim dividend of 3½ per cent (less tax) on the ordinary shares of the company has been declared by the directors of Hickson & Welch (Holdings) Ltd. in respect of the year ending 30 September next. This compares with 3 per cent last year.

Morgan Crucible Co. Ltd.

The board of the Morgan Crucible Co. is planning to make marketable part of the company's Ordinary capital which is at present privately held, it is reported. It is proposed to convert half of the 'B' Ordinary stock (now totalling £800,000), and the whole of the £158,000 'C' stock, into 'A' stock—the one Ordinary issue quoted on the Stock Exchange. Doulton and Co. hold the 'C' stock, while the 'B' is owned by present and retired directors and staff. All three classes rank *pari passu* for dividends and voting. There is at present £1,502,000 of 'A' stock in existence.

Pest Control Ltd.

For the year to 30 September last Pest Control Ltd. (now a subsidiary of Fisons Ltd.) is not paying an ordinary dividend. The group loss was £40,805, struck after tax of £18,604, compared with a profit of £55,448 for the previous year, after tax of £38,118. The last dividend payment made by the company was 10 per cent on account of 1949-50. It was stated last month that holders of more than 98 per cent of the ordinary shares had accepted the offer of one Fisons £1 ordinary share plus 2s. 6d. in cash for every six ordinary 5s. shares held.

Reckitt & Colman Holdings Ltd.

The directors of Reckitt and Colman Holdings announce that they have deferred

declaration of an interim ordinary dividend solely because of certain technical difficulties connected with the acquisition of outstanding preference and ordinary stocks in Reckitt and Sons and J. and J. Colman. As soon as these difficulties have been overcome, it is stated, the directors intend to declare an interim in respect of 1954 of 2 per cent on the ordinary. It is expected that the declaration will be made by the end of June and that the dividend will be payable in August. The company was formed in December last to effect and complete the amalgamation of Reckitt and J. and J. Colman.

Sturtevant Engineering Co. Ltd.

'Another very successful year' for the Sturtevant Engineering Co. Ltd. was alluded to in the statement by the chairman, Mr. G. R. Thursfield, which was circulated in connection with the recent annual meeting. The profit for the year ended 31 December last, before providing for depreciation and tax, amounted to the record figure of £723,549, compared with £630,960 for the previous year. Many improvements and additions had been made to the company's plant during the year and two new bays were in course of erection at the Manchester works. This extension, which would probably be completed before the end of the year, would be very helpful in dealing with the increased output.

The International Nickel Co. of Canada Ltd.

The report of the International Nickel Company of Canada Ltd., and subsidiaries for the three months ended 31 March, issued by Dr. John F. Thompson, chairman of the board of directors, shows net earnings in terms of US currency of \$16,046,937 after all charges, depreciation, depletion, taxes, etc., equivalent after preferred dividends, to \$1.06 per share on the common stock. In the three months ended 31 December, net earnings were \$12,441,846, equal to \$0.82 a share on the common, and in the first quarter of 1953 net earnings were \$15,590,551, or \$1.03 a common share.

Timothy Whites & Taylors Ltd.

The directors of Timothy Whites & Taylors Ltd. recommend a final dividend of 12 per cent, less tax, on the £1,133,517 ordinary capital, making, with the interim dividend of 9 per cent, a total of 30 per cent for the 53 weeks to 2 January last. This compares with a final dividend of 22½ per cent.

making a total of 35 per cent for the year ended 27 December, 1952, paid on £566,758 ordinary capital, equivalent to 17½ per cent on the present capital. Trading profit and sundry income of the group, subject to audit, rose from £1,257,365 to £1,373,558, and after tax at £654,994, against £572,973, group net profit of £432,547 compares with £420,952. It is proposed to create a new revenue reserve, to be known as development reserve, by the transfer of £242,733 from the capital reserve of excess profits tax post-war refunds.

Market Reports

LONDON.—Apart from seasonal influences activity on the industrial chemicals market has been well sustained, and there has been a good flow of new business for forward delivery. Prices are steady and a firm undertone prevails in most sections of the market. Among the acids there has been a good demand for acetic, formic and oxalic, while fair quantities of hydrogen peroxide and formaldehyde are being called for. The current demand for the solvents exceeds available supplies. Firm conditions are again reported from the coal tar products market and there is an outlet for most products. The creosote oils are moving well for export, and there has been a fair call for cresylic acid. The pyridines, benzols, toluols and xylols continue in steady request.

MANCHESTER.—Traders on the Manchester market for heavy chemical products during the past week have experienced a steady flow of delivery specifications for a wide range of materials for use in the cotton textile bleaching, dyeing and finishing trades, while the woollen and rayon branches are also maintaining a good demand. Fresh inquiries have been coming through at a fairly satisfactory rate. Steady to firm price conditions are reported in almost all sections of the market. The demand for fertiliser materials continues on seasonally quieter lines, but a steady movement of supplies of most of the light and heavy tar products has been maintained.

GLASGOW.—Following a quiet opening, trade brightened during the course of the week and closed with a good overall demand. Prices have been more or less steady, although copper salts were again slightly increased. Certain sections of the

trade have reported a falling off but generally speaking business has been quite good. With regard to export, there have again been numerous inquiries for a wide range of chemicals.

Next Week's Events

MONDAY 24 MAY

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 6 p.m. Second Cantor Lecture on 'The Chemistry of Leather,' by Dr. H. Phillips.

TUESDAY 25 MAY

Society of Instrument Technology Ltd.

London: Manson House, Portland Place, W.1, 6.30 p.m. Annual general meeting, followed by 'Gadgets Evening.'

WEDNESDAY 26 MAY

Royal Institute of Chemistry

London: Mond Nickel Co.'s Refinery, Bashley Road, 2.15 p.m. Visit by London Section.

Institution of Chemical Engineers

Birmingham: The University, Edgbaston. Graduates' & Students' Section (Midlands Section). Symposium and exhibition, 'Applications of Plastics to Chemical Engineering.'

THURSDAY 27 MAY

Royal Institute of Chemistry

Wembley: General Electric Co.'s research laboratories, 2 p.m. Visit by London Section.

Royal Society

London: Burlington House, Piccadilly, 4.30 p.m. The Croonian Lecture, 'Mucins & the Protection of the Body,' by Sir Howard Florey.

Institute of Fuel

Birmingham: James Watt Institute, Great Charles Street, 6 p.m. Midland Section annual general meeting.

Institute of Metals

London: 4 Grosvenor Gardens, S.W.1, 5.30 p.m. Dr. W. Boas: 'Lattice Defects & Energy Stored in Deformed Metals.'

Scientific research in Norway has been allocated £900,000 from last year's State football pool profits.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

A. BOAKE, ROBERTS & CO., LTD., require the services of **PLANT CONTROL CHEMISTS** of varying seniority. The duties will include the running of Chemical Plants under the supervision of Factory Managers, and the posts demand academic qualifications and plant experience.

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CHEMICAL ENGINEER. The Civil Service Commissioners invite applications for a permanent and pensionable appointment as Principal Scientific Officer at the Chemical Research Laboratory, Teddington.

The officer appointed will be required to initiate research in chemical engineering and to build up and lead a team of research workers in this subject.

Candidates must have been born on or before 31st December, 1922. They must have a First or Second Class Honours degree with high qualifications and research experience in chemical engineering; exceptionally, a candidate without the degree but with outstanding relevant experience may be admitted.

Inclusive annual remuneration for a 45½ hour week £1,241-£1,570 (men); £1,107-£1,395 (women). Exceptionally a starting salary above the minimum may be granted according to qualifications and experience.

Further particulars and application forms from **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, 30, OLD BURLINGTON STREET, LONDON, W.1**, quoting No. S4332/54. Completed application forms must be returned by 17th June, 1954. 1418/180/WP/5/54.

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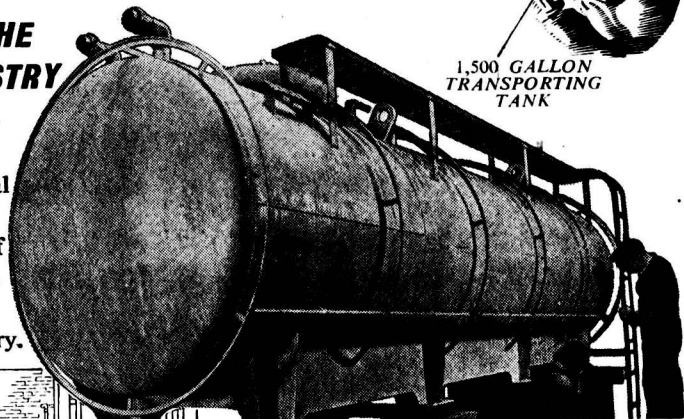
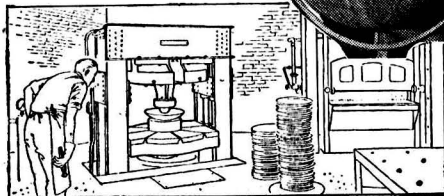
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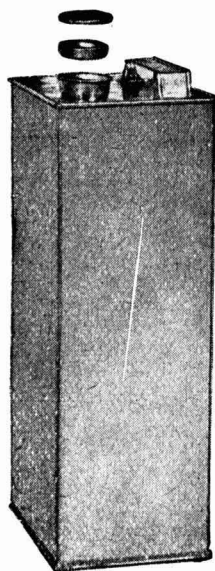


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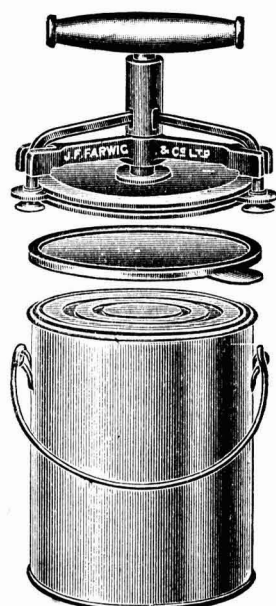
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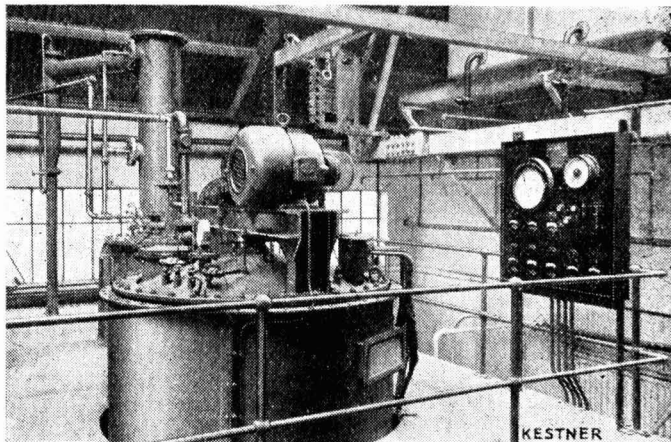
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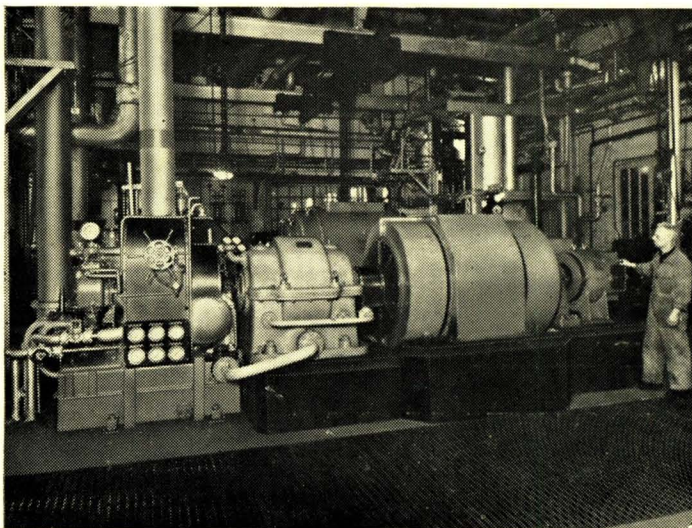
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