The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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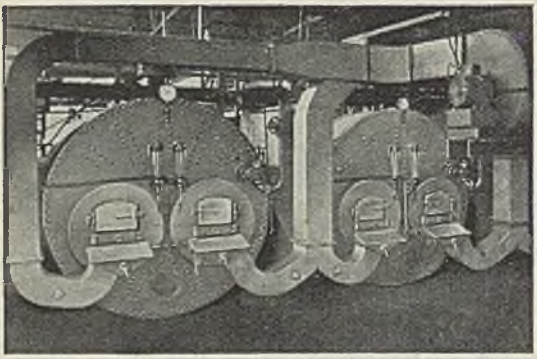

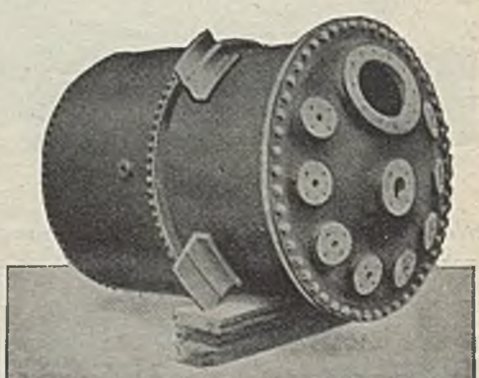

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Industrial Developments in the Empire

TWO contrasting pictures have lately been given of the industrial developments, actual or projected, within British Dominions. The tendency towards industrialisation is likely to be accentuated as a result of the war, for it will be clear by now to the political leaders of the countries concerned that war for the future is likely to be mechanised and that safety dictates some measure of industrialisation for any country that is not close to a powerful ally. The countries of the British Empire know well that they can rely on the rest of the Empire for help in time of need, but the great distances to be traversed may well have a decisive influence in causing the establishment of some industries for which there would not normally be economic justification. Apart from this question of policy, it is clear that unrestricted industrialisation is undesirable. It should be tied up with the general economic background of the country. There are types of industry suited to the raw materials and to the internal markets of the country, and there are others which can only be pursued at the expense of the country's main industries. The zeal shown in some directions appears to be not unlike that of the dog in Æsop's fable who dropped his bone in the stream because he mistook the reflection of it for a bigger and better one.

The *South African Mining and Engineering Journal* has a comment on this sort of development which has been widely quoted, and which is worth giving in full:

"South Africa has gone industry-crazy in the past two years, to the extent that it has indulged in wishful thinking and dreaming on an unprecedented scale. The insistence on developing industry appears to have overshadowed all considerations of prudence and commonsense, and sight has been lost of the significance of the country's primary industries. Gold, diamonds, and wool held their place in the world's markets without assistance; most of the rest of South Africa's industrial products have yet to show that they are capable of competing, in normal times, with the products of other countries. There are notable exceptions, of course, but they are not many. And it seems to be growing more and more apparent that protective measures, willy nilly, will be imposed to bolster up the flimsy façade of secondary industry to make it as imposing as possible in the world's sight. Fine, but who is going to pay the cost of protection? The people? Primary industry? The people

On Other Pages

can pay, up to a point, but not indefinitely. Primary industry can pay, but again only up to a point. And of the country's primary industries, only gold is capable of paying in worth-while measure."

Contrasting with this is a paper read by Mr. G. B. Gresford to the Royal Society of Arts on "Scientific Aspects of Australia's Industrial Development," in which the conditions for successful setting up of new industries are examined in the light of what has already been accomplished in that country. The basis of the paper is that the development of new industries and the re-establishment and improvement of existing ones will demand the application of scientific research on a scale hitherto undreamed of. The primary industry of Australia is wool. The pastoral industry is still by far the greatest in the country. The market value of all Australian pastoral products during 1939-40 was approximately £81 million, of which £62 million was from wool. Australian flocks, which in 1941 numbered 125 million sheep, produce more than one-quarter of the world's whole requirements of wool, and maintain an industry with a capital value estimated at £750 million.

Next in importance to the Australian pastoral industry is that of mining, which, since it involves the winning of products directly from Nature, may still be considered as a primary industry. In the year ending June, 1940, the value of mineral production from all sources in the Commonwealth was about £40 million. About £17½ million is represented by gold, a material for which the scientist has found little use and about which even the economist is doubtful. The remainder of the sum is made up mainly by coal, lead, silver, iron, zinc, and copper—all substances of established industrial significance.

What may be termed the secondary industries of Australia are based upon these two primary industries, making use of the products obtained from them. The need for fertilisers has caused the establishment of the manufacture of fertilisers, and therefore of sulphuric acid. Cotton, tobacco, sugar, and dairying are part of the pastoral industries. Arising from mining there are the production of coke and power, an important feature being the utilisation of the extensive brown coal deposits of Victoria. Lead-silver-zinc ores are produced and, together with iron, are the basis of an important metallurgical industry. In these industries there have been some scientific advances of the highest order which have had their repercussions all over the world.

In 1915 development was started whereby at the present time practically the whole of the lead concentrate produced is reduced to metal. About 60 per cent. of the zinc concentrate is reduced in Australia likewise. The problem of the separation of the lead from the zinc has been solved in Australia, and the work is thus described by Mr. Gresford. At the beginning of the war the main process used was the Minerals Separation Company's process which was developed from the American patent of Keller and Lewis in 1923. This patent was taken out for the use of alkyl sulphur derivatives of carbonic acid known as xanthates. It was found that potassium ethyl xanthate has pronounced collecting properties for the sulphide minerals, and the present high lead and silver recoveries in the flotation sections of the mines are due to this reagent. With new problems always arising, continuous experimental work has still to be undertaken. It is interesting to note that for the ten years before the war a group of Australian mining companies financed a small team working at the University of Melbourne on the fundamental physical chemistry of the flotation process. Iron ore holds only fourth place among the minerals mined in Australia, but is the basis of a considerable iron and steel industry. The author mentions a point new to us that steel is produced in the Commonwealth probably cheaper than anywhere else in the world—a tribute to the success achieved by Australian engineers.

Mr. Gresford's paper shows that nations who desire to become industrialised must start with a scientific basis. He points out that it is well known that modern secondary industry depends largely on scientific control for its maintenance and on scientific research for its development. This has been particularly well proved in Australia where, especially during the war, there has been a danger of being cut off from contact with overseas practice, with the consequent dependence on native scientific and technical resources. The manufacture of munitions, the maintenance of transport services, the production of textiles from wool and cotton, the manufacture of electrical equipment, lenses and optical instruments, paper, photographic materials, organic chemicals, paints, rubber products, and plastics—all these industries require the closest scientific control, and their establishment and successful development in Australia have been due in no small part to a realisation of this.

There are endless possibilities such as wool research, and the development of chemical industries based on farm products and on the fisheries. The manufacture of metallic magnesium has begun, and after much scientific investigation definite plans have been drawn up for starting an aluminium industry. The development and use of rarer metals like tantalum, columbium, beryllium, and zirconium is a promising field. Organic chemical industry on a large scale has hardly been started, and the investigation and industrial development of Australian plant products such as alkaloids and essential oils is another field that has scarcely been touched.

NOTES AND COMMENTS

Steel Industry Under Fire

WE cannot help feeling that Mr. Bevin was ill-advised to single out the British steel industry for attack on the ground of general inefficiency. Admittedly, most public political statements made at the present time are coloured by the desire to make electioneering capital; but we contend that there are many other major industries in this country which are more open to criticism than is the steel industry. The British Iron and Steel Federation has issued a rejoinder to Mr. Bevin which puts up a reasoned case for their craft. There is a type of mind which instinctively regards the words " price arrangements " as necessarily savouring of a plot to overcharge the consumer in the interests of the " big " producer. The Federation points out that the price arrangements to which Mr. Bevin made reference were set up at the Government's request with a view to restricting profits and to ensuring that the steel necessary for the war effort would be forthcoming. As we have seen, quite an appreciable amount of steel has been forthcoming from this " inefficient " industry.

Technical Progress

AS for comparisons with American industry, it is pointed out that the requirements of the British and the American steel trade are two very different things; and as to the prices charged, there have been factors affecting British industry from which American industry has been quite free. Incidentally, does Mr. Bevin really suggest that the methods of American " big business " would be acceptable over here? It is true that modernisation has been held up in the British steel industry for obvious reasons; it does not follow that its directors will be content to let technical methods stay as they are now that the opportunity to improve is at hand. We have noted the appointment of several technical directors on the boards of important steel companies; it is difficult to believe that these appointments were made without object.

Gas Goes to War

TEA for 10,000 workers ready in 8 minutes—a 5000-ton press for making a 20-ton torpedo tube. These contrasting production feats are but two among many in Britain's war effort made possible by the industrial application of gas. After six years of censorship these remarkable facts were disclosed by Mr. H. R. Hems, of the Birmingham Gas Department, at the annual meeting of the Institution of Gas Engineers in London on Tuesday. In the Sheffield area alone, where gas played a key part in producing gun forgings, armour plate for battleships, and stainless steel for surgical equipment, 12 thousand million feet or 60½ million therms were used in the peak year of 1942. Some of the largest users of all were firms under contract to the Admiralty who, to meet the urgent demand for ships and still more ships, were using gas at the rate of 3½ million feet per hour. One of the stranger products demanded for war purposes were mammoth bearings weighing 4 tons—some of the largest of their kind in Europe. A series of highly accurate temperature-control operations, all of which were conducted in special gas furnaces, were essential in their manufacture. Mr. S. E. Whitehead, president of the Institution, reviewing the wartime problems of gas undertakings, pointed out that since 1939 the annual sales of gas had increased from 314,200,000 ft. to 379,100,000 ft. in 1944 and the output of benzol had been doubled. But this additional output of gas was by no means evenly spread over the country. Many undertakings had suffered severe loss of output owing to evacuation and bombing, so that it was easy to imagine the enormous increases experienced by others. All these things added up to a very severe handicap and prompted the question, "How have we got through?" The answer lies mainly in the hard work and determination, and frequently in the gallantry, of gas engineers, their technical staffs, and employees.

Chemistry in the Stalag

STUDIES of chemistry, among other subjects, have relieved the sordid monotony of confinement in prison camps, and we are indebted to Mr. F. L. Whelen, the well-known lecturer on international relations, for a pleasing anecdote of life in internment which is somewhat out of the ordinary run. Mr. Whelen was caught in Paris by the German onrush in 1940, and being distinctly *persona non grata* to the Nazi authorities on account of his Liberal opinions, was duly interned, with other holders of British passports, in the Fort de Romainville and later in the Stalag at Drancy, east of Paris. Here the British Empire was represented by men of all races—black, white, brown, and yellow—from every quarter of the globe, but the tallest and finest physical specimen in the camp was a black man from the Gambia. He was also a clever and cultured man, and somewhat surprised his fellow-prisoners one evening by delivering a lecture in English on "Modern Developments in Chemistry." This is a shrewd blow for those who, even to-day, still go about complaining that the British Empire is a pitiless machine for exploiting the "subject races." It is a real testimonial to the spread of useful education through the Empire that a native of the Gambia, which has long been regarded as one of the "Cinderellas" of the Colonial Office, should have enlightened his brothers in misfortune about what is going on in the chemical world. *Ex Africa semper aliquid novi.*

Australian Metals

IT is probable that, outside the circles immediately concerned, too little acknowledgement has been made of the effort on the part of Australia to replace from her lesser-known mineral wealth some of the supplies of which Axis seizure robbed the Allied powers. Actually, it was a near thing. There had for some years been a tendency in Australia for the "small activities" in mining to be abandoned, and for manpower to drift to manufacturing centres. This tendency was arrested by Government action, and some of the results of this action are summarised in a note in a recent issue of *Chemical Engineering and Mining Review.* For example, tungsten exports to Britain have reached over 2000 tons since the war began, and are valued at about £750,000, and since the Japanese invasion of Burma, Australian production has increased fourfold. Tantalum concentrates, up to 60 per cent. grade, are being extensively exported, and have played a big part in the development of radar. During the war years, Australian output of zinc has increased by 27 per cent., while tin production has been raised to a pitch sufficient to meet the needs of both Australia and New Zealand. One of the few relatively important ore-bodies of base metals located since the war is at Mount Isa, in Queensland, where a copper deposit was discovered with a reserve amounting to nearly ten times the average pre-war output of 17,000 tons a year. Bauxite production is still in its infancy, but the Commonwealth Government has proposed to devote £3,000,000 up to the end of 1945, towards the establishment of an Australian aluminium industry. It will be interesting to see whether these advances can be maintained when, eventually, the pre-war channels of supply are once again undammed.

Raw Materials for Plastics and Synthetic Rubbers—II

Some Economic Points — Calcium Carbide

by D. D. HOWAT, B.Sc., Ph.D., F.R.I.C., A.M.I.Chem.E.

(*Continued from* The Chemical Age, *June* 9, 1945, *p.* 502)

FROM these considerations one conclusion is inevitable, a planned and scientific utilisation of our coal resources is absolutely essential in providing at least a substantial part of the raw materials for the plastics and synthetic rubber industries. No reasonable case may be advanced that it is essential to provide all raw materials from our own indigenous resources, but the best utilisation of our resources is an inescapable responsibility. Assuming that 40,000,000 tons of coal are carbonised yearly both in retorts and coke ovens, Scott[10] estimates that the maximum availability of chemical products from that tonnage of coal to be as follows:—

Benzene	280,000 tons
Toluene	69,000 tons
Styrene	4,000 tons
Indene	9,500 tons
Naphthalene	80,000 tons
Tar acids	65,000 tons

Each new development in plastics, synthetic rubbers, dyes, pharmaceutical preparations, and synthetic drugs has underlined the key importance of benzene, phenol, cresylic acid, toluene, and naphthalene, some of the by-products of coal carbonisation. Yet in actual fact a combination of several factors has hitherto limited the quantities of aromatic hydrocarbons utilised by the chemical industry.

Benzol Recovery

Until just before the war quite a substantial percentage of the benzol, from which pure benzene may be obtained by azeotropic distillation[11], was not recovered from town gas. Capital expenditure on the scrubbing plant and on the carburetted water-gas plant, imperative to maintain the legal calorific value of the stripped gas, made benzol recovery an unattractive proposition in smaller plants. In 1936, the Falmouth Committee[12] estimated that a further 35,000,000 gallons of crude benzol could have been recovered. During that same year 32,000,000 out of the 80,000,000 gallons actually recovered were exported, mainly to the U.S.A. Therefore, of a potential total of 115,000,000 gallons of crude benzol available only 48,000,000, or 41 per cent., were actually utilised in this country.

Further, owing to its "anti-knock" value, the benzol produced found a ready market as a blending constituent for motor fuel. In this field the amount of refining necessary is considerably reduced, while the price commanded by the product is regulated by that of imported motor spirit on which duty is paid. As a result, the prices charged to the chemical industry for supplies of this important raw material are enhanced by approximately the amount of the duty on imported fuel (9d. per gallon at present). According to the report of the Hydrocarbon Oil Duties Committee,[13] the effect of this procedure is to increase the average price of derivatives from benzol by 1d. per lb., an increase significant and often serious in the export market.

As a result, the total consumption of benzol by the chemical industry in the years immediately preceding the war was a relatively small proportion of the total production. Figures given in the Hydrocarbon Oil Duties Report[13] show that, in 1928, 84,000,000 gallons of crude benzol were refined to produce 54,700,000 gallons of motor benzol, 5,000,000 gallons of industrial grades of benzol, 3,400,000 gallons of toluol and 1,000,000 gallons of xylol. In addition, a proportion of coal-tar naphthas was used in chemical manufacture, making an annual total of some 10,000,000 gallons of refined aromatic hydrocarbons used in the chemical industry.

To illustrate the leeway we have to make up here in Britain, our total consumption of about 30,000 tons (10,000,000 gallons) of aromatic hydrocarbons in the chemical industry (this presumably includes the quantities used for the manufacture of phenol) may be compared with a consumption of 100,000 tons of benzene and phenol in the manufacture of phenolic plastics *alone* in the U.S.A. in 1943. Obviously, such a position is completely unsound and augurs ill for the large-scale development of plastics and synthetic rubber industries in this country.

A More Hopeful Outlook

Two factors make for a more hopeful outlook: first, the quantities of benzol being recovered are steadily increasing (since 1940 there has been a 20 per cent. increase in benzol recovery in this country). In addition to recovery at coke-oven plants, 95 per cent. of the town gas produced at plants carbonising over 5000 tons of coal annually is now being treated for the recovery of benzol. Second, the Hydrocarbon Oil Duties Committee[13] has recommended the payment to chemical manufacturers of an allowance of 9d. per gallon in respect of indigenous hydrocarbon oils used by them as raw materials in chemical synthesis. Such a concession will surely act as a stimulus to the chemical industry in the near future to embark on a planned programme of developing a large-scale plastics industry, to say nothing of other possibilities in dye production, pharmaceuticals, and synthetic drugs.

In other respects, the raw material position is unsound for the expansion of synthetic chemical industries. Naphthalene, particularly valuable for the manufacture of phthalic anhydride for the alkyd resins, is another extremely important raw material. Scott[10] has predicted a world shortage of naphthalene unless yields from coal are improved and oil aromatisation developed. Apparently the value of this chemical is not fully recognised in Britain, as Jones[11] reports that only one-third of the naphthalene present in coal tar is being extracted by current processing methods. Further, considerable quantities were exported, $350,000 worth going to the U.S.A. in 1937. Cresylic acid is firmly established as a plastics raw material, over 9000 tons of cresols and cresylic acid being absorbed in the manufacture of phenolic plastics alone in the U.S.A. in 1943. Exports of cresylic acid from this country to the U.S.A. in 1937 were worth almost $1,000,000, representing probably one to one-and-a-half million gallons.

A Synthetic Chemical Industry

Although such exports are probably of value in the sum total of our foreign trade, they represent the loss of valuable raw materials. There appears to be no very good reason why the raw materials could not be absorbed in a synthetic chemical industry established in this country. The establishment of a large-scale industry of this type in Britain would result in a number of very worth-while advantages. Briefly, these are: increased employment, the supply of the home market, a surplus of goods available for export, a stimulus to the engineering industry in the design and execution of the plant, and, finally, the provision of a training-ground for younger chemists and engineers in a completely new industry.

So far as the immediate future is concerned, the urgent need is for the expansion of the synthetic chemical industry in this country to ensure the adequate utilisation of those raw materials at present available. Assuming that the recommendations of the Hydrocarbon Oil Duties Committee are accepted and the necessary allowance of 9d. per gallon granted to the chemical manufacturer, a very strong case may be made for controlling the disposal of the available supplies of these essential aromatics and hydrocarbon oil materials. If markets are competing for the supplies available—and this would appear to be more than likely—then the only solution will be, first, to formulate a scheme for allocation of the existing supplies and then to provide means of augmenting these supplies.

If the United States and German production of benzene is about 1,000,000 tons annually, then our supplies, even at the present maximum availability, are not adequate for the industrial expansion we hope for in the near future. Augmented supplies of methane, benzene, phenol, and naphthalene will become imperative and plans should be formulated now and set on foot at the earliest possible moment to effect the expansion.

More Carbonisation

Increased carbonisation of coal is the most obvious means of raising the yield of these compounds. While the adoption in this country of a policy of full employment will undoubtedly stimulate the demand for both coal gas and metallurgical coke for the iron and steel trades, the possible expansion along those lines is not unlimited. Although, unfortunately, low-temperature carbonisation does not produce any substantial quantities of benzol, a very strong case may be made for the adoption of this process on a really large scale both as a source of chemical raw materials and to provide a smokeless domestic fuel. All the available evidence shows that smoke and soot from the domestic fire is responsible for 65 to 85 per cent. of the atmospheric pollution in cities.

Of the total of 40,000,000 tons of coal burned for domestic purposes, probably about half is consumed in the large cities. To provide the equivalent quantity of smokeless semi-coke would involve treating 24 to 28 million tons of coal in low-temperature carbonisation plants. To obviate hardship among the lower-income groups of the population, provision would require to be made to allow all householders to purchase an agreed minimum quantity of this fuel at the price of coal. Any quantities bought in excess of this amount would be charged at market prices. A Government subsidy of probably about £8,000,000 would be necessary for the successful operation of this scheme. When compared with the annual loss of £50,000,000 caused by atmospheric pollution (given by the report of the Parliamentary and Scientific Committee), this subsidy would earn high dividends not only financially but in improved health and amenities.

Detailed figures for the yields of other products of low-temperature carbonisation are not available, but on the published results of an American plant with an output of over 500,000 tons of coke annually, a yield of 400,000 tons of motor spirit would be obtained, together with 1,500,000 tons of tar and light oils. Tars produced by this process have a higher content of tar-acids than high-temperature by-product tars and might yield 10,000 to 15,000 tons of phenol and

20,000 to 30,000 tons of cresylic acid. The tar itself produced by this process may be easily hydrogenated, yielding substantial quantities of motor spirit, and, during the process of refining, quantities of unsaturated hydrocarbons of the utmost value in plastics manufacture. Reference to this point is made in a later section of the discussion.

According to figures given for American practice, gas yields were 3000 cu. ft. of gas at 950 B.Th.U. per cu. ft. per ton of coal treated. On a purely thermal basis, gas generated from the quantities of coal treated would be equivalent to the entire heat value of 2,500,000 tons of coal. When burned for power generation or other purposes, this quantity of gas would probably give the same heating effect as 4 to 4½ million tons of raw coal.

Olefines

Another outstanding feature of the gases produced by low-temperature carbonisation is the high olefine content. Ethylene, propylene, and butylene—the C_2 to C_4 hydrocarbons of the oil refineries—are all present in these gases. Some figures from American sources[14] indicate that, the total olefine content is about 4.2 per cent., comprising approximately equal proportions of ethylene, propylene, and butylene. These olefines are among the most important raw materials of the new synthetic chemical industry and have been largely responsible for the extraordinary advances in synthetic chemistry in the U.S.A. Although quantities of ethylene are present in town gas and coke-oven gas, the quantities of the higher olefines, propylene and butylene, are almost negligible. Low-temperature carbonisation gases therefore offer a convenient source of these higher olefines, which cannot be obtained at present in this country in any other way. Some consideration is given in a later section to the question of using gases derived from coal carbonisation as a source of olefines, and it may suffice to state here that the possible yield of olefines of the C_2 to C_4 group from the low-temperature carbonisation gases could be raised to 200,000 tons. These facts are sufficient to indicate something of the value of the low-temperature carbonisation process and of the benefits that would follow its adoption on a large scale.

Closely allied to the utilisation of coal as a source material is the development of a national scheme for harnessing hydro-electric power. Manufacture of calcium carbide—one of the most useful intermediates in the whole realm of synthetic chemistry—is possible only when cheap supplies of hydro-electric power are available. Ordinary text-book figures for the consumption of electric energy in the manufacture range from 1½ to 3 kWh per lb. of carbide produced.[15] Even if, under the best conditions, a steady consumption of 1½ kWh is secured, electric power from coal-fired stations is not cheap enough to allow this valuable chemical to be produced at prices competitive with these prevailing in, say, the U.S.A., Canada, or Norway. At present, the price of 80 per cent. carbide in the U.S.A. is 2½ cents (say 1⅛d.) per lb. With electric power from coal-fired stations at ¾d. per kWh in Britain, the cost of electric power alone, even in the most efficient plants, is 1⅛d. per lb. In view of these facts, great significance attaches to the present interest in the development of hydro-electric power in Britain, as evidenced by the publication of the Reports on Hydro-Electric Development in Scotland[16] and on the Severn Barrage Scheme.[17]

Hydro-Electric Schemes

The immediate plan proposed by the Cooper Committee[16] involves the development of schemes capable of supplying 4000 million units annually with an installed generator capacity of 450,000 kW. That this figure is capable of considerable expansion is shown by Lord Airlie's estimate that the approximate potential annual average output from the area covered by the recently constituted North of Scotland Hydro-Electric Board amounts to 6274 million units yearly, a figure believed to be conservative. In the Severn Barrage Scheme[17] the proposals involve the installation of 32 water-wheel alternators each with a capacity of 25,000 kW, while the maximum total output at spring tides will be 800,000 kW. Allowing for the usual transformer and transmission losses, the total energy from the Severn Scheme will be 2107 million kWh per annum until 1970. In deciding to eliminate pumped storage facilities on the Severn Scheme, the Vaughan-Lee Committee suggests that the intermittent and variable power output from the total operations should be coupled to the "grid" system. By regulating the output of coal-fired stations in conjunction with the Severn output, a supply may be obtained varying in accordance with the daily system demand. The Committee is of the opinion that this system will prove superior to the pumped storage scheme and may be adopted because of the demand for such large quantities of power and energy. From the two schemes now before the Government for consideration, an annual output of 6107 million units should be obtained from the 1,250,000 kW of generating capacity.

Working with the most efficient plant, electrical power consumption per ton of carbide produced is about 3300 kWh. An output of 250,000 tons of 80 per cent. calcium carbide could be secured by the annual expenditure of 825 million kWh, or 13.5 per cent. of the total power production from these two new schemes, or 39 per cent. of the power from the Severn Scheme. According to the findings of the Cooper Committee,[16] it is reasonable to suppose that quite a substantial percentage of the total power made available from hydro-electric sources will be allocated to the electro-chemical and electro-metallurgical industries: "industries," in the words of the report, "which depend upon the availability at low cost of large quantities of electricity derived from hydro-electric sources." In view of this, an allocation of 13.5 per cent. of the total for the manufacture of such a vital product of the electro-chemical industry as calcium carbide does not appear unduly high.

Even assuming the development of hydro-electric schemes to harness a substantial proportion of the water-power resources of the country, the question of the price of the power available must be carefully considered, for the manufacture of calcium carbide is usually included among the cheap power industries, *i.e.*, among those industries in which the cost of electric power represents a substantial percentage of the cost of the finished product. In Table II the cost of electric power is shown as a percentage of the selling price of the calcium carbide with different power rates, together with the actual cost of electric power per ton of product.

TABLE II

Selling price of 80 per cent. calcium carbide = £13 per ton.
Total electric power consumption to manufacture ~ 3300 kWh per ton.

Electric power costs in pence per kWh ...	0.10	0.15	0.20	0.225	0.25	0.275	0.30	0.50	0.75
Cost of electric power per ton of carbide produced	£1/7/6	£2/1/3	£2/15/0	£3/1/10	£3/8/9	£3/15/7	£4/2/6	£6/17/3	£10/7/6
Cost of electric power as percentage of selling price	10.5	16	21.0	23.7	26.4	28.7	31.7	52.8	70.8

In compiling this table, the selling price of calcium carbide has been assumed to compare closely with the U.S. price of $50 per ton. One of the notable points emerging from the table is the dominant part played by electric power cost in the price of the finished product. According to the calculations of the Severn Barrage Scheme, the price of electric power at the reception points will be 0.275d. per kWh. As indicated, with power at this price a sum of £3 15s. 7d. will be required for each ton of carbide produced, representing 28.7 per cent. of the selling price of the finished product. A noteworthy fact is that a reduction of one-tenth of a farthing in the cost of power would permit a saving roughly of 7s. per ton of carbide; and a reduction of 2.3 per cent. in that part of the selling price represented by electric power consumption. A saving of 7s. per ton amounts to £87,500 on the total estimated production of 250,000 tons of carbide, but the reduction of the cost of a kWh from 0.275d. to 0.25d. will represent a loss of £218,000 on the revenue of £2,100,000 derived from the sale of 2100 units annually. The paramount importance of interest rates on capital is shown by the fact that a reduction from 3 to 2.55 per cent. interest on the £47,000,000 Severn Scheme would enable the power to be sold at exactly a farthing per unit, while a reduction to 2.10 per cent. would enable a further reduction to 0.225d. per unit. The effects of these power price reductions is very marked as shown in Table III (below), to which aluminium and magnesium have been added as representing two other major products associated with the introduction of hydro-electric power schemes.

These figures give some idea of the absolute necessity of cheap power in the electro-chemical and electro-metallurgical industries, and, underlying all, the predominant part played by interest rates on the final cost of the unit of power from hydro-electric schemes. On this point it is impossible to agree with the doleful statement in a recent editorial in this journal[18] "that any hopes of obtaining electricity cheap enough to enable electro-chemical industries to be developed in this country have been finally shattered by the Severn Barrage Scheme Report." At this stage in the industrial history of Britain will any Government or responsible body of industrialists suggest that the development of industries essential to national security, prosperity, and full employment should be determined solely by the requirement of 3 per cent. interest on capital loans? Every effort must be made

TABLE III

Table Showing Effect of Rates of Interest on Capital Charges in Severn Scheme against Cost of Unit of Electric Power

Capital Involved: £47,000,000.

Rate of interest on capital ...	2.1	2.55	3.0
Actual annual amount paid as interest ...	£987,000	£1,198,500	£1,410,000
Interest payments as percentage of total annual cost of operation of scheme ...	50	54.3	58.8
Cost of current to buyers in pence per kWh ...	0.225	0.25	0.275
Effect of reduction in interest charges in reducing the cost of electric power required to manufacture one ton of			
(*a*) Calcium carbide ...	£0/14/0	£0/7/0	—
(*b*) Aluminium ...	£4/15/10	£2/7/11	—
(*c*) Magnesium ...	£4/3/4	£2/1/8	—

to effect a reduction in the cost of power to less than ¼d. per unit. Only so will the products of these industries be able to compete both in the home and world markets with exports from the U.S.A. and Canada.

A noteworthy development of the present war has been the establishment of a calcium carbide industry in this country. According to Levinstein,[8] the Continental cartel controlling the production of calcium carbide gave cut prices to a few large consumers in this country. This action, apparently, effectively prevented the introduction of the industry here. With the outbreak of war, and particularly because of the Nazi occupation of Norway, supplies of carbide to Britain were drastically cut. Two plants, one of large capacity, have been built in this country, Levinstein estimating the annual output at 200,000 tons. Production of calcium carbide is very large in the United States, while in Germany, it was estimated, 600,000 tons were made annually, Gibb[19] suggesting that one-fifteenth part of the entire German chemical industry was devoted to the manufacture of calcium carbide. With a world production of 3,000,000 tons, a figure expanding steadily, it is obviously time to establish the industry here in Britain on a sound basis.

Carbide for Plastics

Although Levinstein's estimate of British production of carbide is probably a bit high, it is known that almost the entire tonnage is used for welding and cutting. Clearly a considerable expansion is called for to meet the demands of the plastic and synthetic rubber industries. Additional capacity of about 250,000 tons with the production of 85,000 tons of acetylene appears to be urgently required to meet post-war developments in plastics and synthetic rubber. Such an expansion is economically possible only if hydro-electric schemes are put in hand on a really large national scale. Obviously there is no time for delay; the erection of hydro-electric works is a lengthy business, and if British plastics and synthetic rubbers are compelled even to a small degree to mark time for a period of years, the subsequent growth and expansion may be too late to capture world markets. At the most conservative estimate the hydro-electric capacity required in Britain is at least 1,250,000 kW. Work directed to this end should be begun without delay. A steady expansion of the programme should be aimed at and a target figure set for 2,000,000 kW.

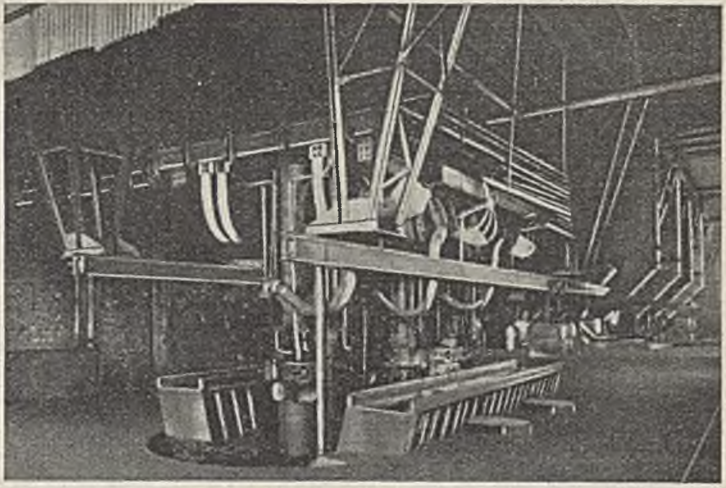

Fig. 6. Three-phase electric furnace for the manufacture of calcium carbide with three "in-line" Söderberg continuous self-baking electrodes.

Modern Carbide Plant

A tribute must be paid to the high standards obtaining in the carbide industry set up in Britain during the war. Built and owned by the Ministry of Supply but managed by a private firm, the larger plant is a model of its kind. Lay-out and buildings are good and spacious, transport and handling facilities are adequate. Fitted with the very latest types of rotary pulverised-fuel-fired kilns, the lime-burning plant is highly efficient, giving a very good performance in coal consumption per ton of lime burned. A well-equipped plant prepares the "carbonaceous-mix" to form the continuous electrodes in the electric furnaces. Three-phase electric furnaces, of the "smothered arc" type are used for smelting, each furnace being fitted with 4-ft. diameter Söderberg electrodes. One of the more recent and far-reaching advances in electric furnace technique, the Söderberg continuous electrode, has been widely adopted in several furnace processes. Essentially the method consists in making the casing of the electrode of thin steel sheet, a plastic mixture of pitch, anthracite, and coke being fed into the steel casing. As the electrode is fed downwards into the furnace, the heat conducted from the arc bakes the plastic filling to a hard solid core. A water-cooled steel cradle supports the electrode and enables it to be raised and lowered in accordance with the electric load requirements. Power is fed through flexible cables connected to a ring of water-cooled shoes bolted around the electrode just below the level of the cradle. The entire core of the electrode is moved bodily down through the cradle and ring of shoes by means of steel ribbons welded to the outer casing. Such movement of the electrode is necessary only once in two or three days to compensate for the burning away of the tip of the electrode in the actual furnace hearth. A photograph of a carbide furnace equipped with these electrodes is shown in Fig. 6. Very high efficiency has been obtained from these furnaces, and the consumption of electric power per ton of carbide produced is low, comparing very favourably with installations in Canada and the U.S.A.

Fundamentally, the manufacture of calcium carbide is a simple operation requiring only coke, lime, and electric power. In Britain, coke and lime are easily obtainable, but as the average consumption of coke is about 0.9 ton per ton of carbide produced, the price of coke during the war has imposed an additional burden on the cost of production. Such a handicap is not the crippling disadvantage represented by the high costs of electric power. Cost of power, as already demonstrated, is the crucial feature. Established under the stress of war, this new and urgently-needed industry in Britain has functioned efficiently; its future expansion should therefore not be jeopardised nor an additional burden laid on synthetic chemical industries by cripplingly high electrical power rates.

(*To be concluded*)

Oil of Patchouli

Record of Research in Mysore

OIL of patchouli is the subject of a monograph, by M. N. Subha Rao and M. Nagesa Rao, recently published by the Mysore Board of Scientific and Industrial Research, Bangalore. According to a foreword by Mr. S. G. Sastry, formerly Director of Industries and Commerce in Mysore, the distillation of patchouli on a large scale in the Government Soap Factory, Bangalore, started about 1920, and owes its origin to the successive supplies of adulterated patchouli oil delivered in Mysore by certain British and Continental firms.

The bulk of the world's patchouli comes from the Dutch East Indies and Malaya, with small amounts from the Seychelles and Madagascar. Total world production may be put at 75,000-90,000 lb. per annum; exports from the Dutch East Indies in 1937 (the last recorded year) were 58,146 lb. Distillation was carried out mainly in Europe, and to a certain extent in Singapore and Java.

The authors have studied the botany and cultivation of the plant, and have appended a bibliography and extensive details of the distillation of patchouli obtained from various sources. Little, however, is yet known about the chemical composition of the oil, though it has been found to contain 52-57 per cent. of a sesquiterpene alcohol, $C_{15}H_{26}O$, which occasionally separates from the oil after long standing. Its m.p. is 56°C., and it is strongly lævorotatory. Dutch East Indian authorities are quoted as having detected also the presence of benzaldehyde, eugenol, cinnamic aldehyde, a ketone, and two bases not yet identified.

Polyvinyl Alcohol in Ceramics

A U.S. Development

LACK of skilled labour in war time has made it imperative to develop a simpler method of producing ceramics. Research carried out by the laboratory of Lenox, Inc., Trenton, N.J., and reported in the *Ceramic Age* (1945, *45*, 4, 199), shows that the modification of the casting slip composition is the best approach to the problem. After evaluating numerous slip modifiers, both natural and synthetic, it was established that the solid synthetic resin, polyvinyl alcohol, met nearly all requirements.

One year's production experience has shown that, by adding polyvinyl alcohol $(-CH_2-HCOH-)_x$ (Du Pont grade RH-393) to the casting slip in amounts of less than 1 per cent. by weight, chinaware of high quality can be produced by inexperienced labour and that the number of operations can be reduced from 31 to 20 with sigficant increases in production.

Partially hydrolysed polyvinyl alcohol (Du Pont grade RH-623) added to a special steatite body, in amounts of less than 3 per cent. by weight, improved the quality of the composition and permitted extrusion at low pressures with no tendency for the body to stick or drag on the die. By virtue of its binding and lubricating properties, the use of polyvinyl alcohol produces extruded articles of greatly improved dry strength with surfaces completely smooth and free from blemish.

Favourable preliminary results with polyvinyl alcohol as a deflocculant in glaze compositions, as a medium for printing of colours, and as a vehicle for spray colours has led to plant trials of the resin in these applications.

SAFETY FIRST

Illumination and Common Accidents

by JOHN CREEVEY

THE lack of attention to the matter of illumination at chemical and allied works is sometimes surprising. Provided that there is sufficient light, either natural or artificial, for a job to be done, that is often considered sufficient; the interconnecting parts of the works are left to take care of themselves. Yet the advantages of good illumination cannot be overstressed. In the first place the provision of bright and cheerful surroundings indoors does a great deal towards attaining greater cleanliness, with more order and neatness in the immediate surroundings. Added to this, there is less eye-strain for employees, with a consequent notable reduction in accidents, especially of the common types. With better illumination supervision of employees is much easier, and conditions which help to cause accidents may be spotted reasonably quickly and rectified.

Adequate proof of the ease with which accident-causing conditions come into prominence may be obtained by making a tour of inspection of any works at the end of a busy period, first doing the tour with only half the available lights in use, and then repeating the tour under all the artificial light available. It is really surprising how the eye will see things which are not there, and miss others which are, and how the feet will feel a little insecure at times when shadows fall across their path rather unexpectedly, and also how the eyes begin to tire and the alertness of mind gets a little dull.

A Specialist's Job

Artificial lighting of factories is a job which should always be handed over to the specialist, for the adequate lighting of interiors can never be attained by the mere use of so much candle-power; that candle-power must be distributed correctly, and distributed in varying proportion according to situation, here and there altered to suit the nature of features, such as fixed benches or machinery. The lighting expert has photographs which prove that his work is not as simple as might appear, for the relative dimensions of a room can provide unexpected effects from lights which are placed illogically; different kinds of machinery also have their own peculiar way of creating shadows, which are often emphasised when that "machinery" is of the nature of chemical plant with interlacing pipework and bulky vessels with a curved exterior surface.

Even in some chemical laboratories, where the lighting of the benches would seem to be quite a simple affair, it will be surprising how poor it really can be with the lights placed just a little too high or too low, simultaneously ignoring the general dimensions of the room and the light-reflecting or light-absorbing feature of the surface of the walls. In some modern laboratories, artificial lighting has reached a high degree of efficiency; and yet when you go into parts of the works over which those laboratories exercise analytical control, it may be surprising how poor the lighting really is in some situations, simply because nobody has complained and the work done there is not so very exacting. Permission to inspect the accident records at such a works will disclose a notably high proportion of common accidents, all or most of which are primarily due to the bad illumination. And artificial illumination is not alone to be blamed; the available natural illumination can also be bad, for which architect or builder is responsible. In war time, when bomb-blast walls were often erected in vital positions outside doorways and windows, or to protect a particular piece of plant, there has been ample proof forthcoming as to how easily the natural lighting of part of a building can be marred.

Some Points of Detail

I am not going to say anything about the recommended minimum, in terms of foot-candles, which is desirable for the illumination of interior spaces; in the literature of the lighting engineer you will find figures for yards, storage spaces, corridors, passageways in workrooms, and stairways, and for working situations with need of different degrees of discrimination of detail. But there are certain points which must be emphasised. For instance, while the lighting of a passageway in a workroom may be adequate at 3 to 2 foot-candles, the same passageway needs from 6 to 4 foot-candles if there are present the exposed parts of moving machinery, or hot pipes, or any such danger as a live electric current. As to discrimination of detail, by all means let indicating instruments have their individual source of illumination close at hand, but remember that the addition of generally bright surroundings makes it easier to continue reading accurately over a shift of several hours' duration, which under adverse circumstances is not always possible. It must also be remembered that not only do elderly persons need more light than others, but that their eyes tire more quickly when there is lack of general brightness in the immediate surroundings.

In the last article I stressed the point that common accidents are often caused, or at least made more likely, by a certain tiredness of brain primarily due to bad ventilation. So, too, it may be with bad lighting; not necessarily inadequate lighting so much as really bad lighting, with the trouble known as glare. The glare coming from natural lighting has sometimes to be reduced by use of refracting or diffusing glass in windows and skylights, and may even demand a rearrangement of machinery and benches, or the adoption of some corrective means. In the presence of glare, the eyes are not comfortable, and apart from any direct impairment of vision they do not respond to changes as quickly as they should.

There is a variety of causes of glare in artificial lighting. For one thing, the source of the light may be too bright, having a candle-power too high for the area which needs to be illuminated; in other cases the light may be too powerful for general comfort of the eyes, or more truthfully, the total candle-power passing in the direction of the eye is too great, irrespective of the fact that it may be only just adequate for illumination. Glare is also caused by pronounced contrast between the light-source and its darker surroundings.

There is also to be considered the duration of exposure of the eye to the source of light, which is noticed when a person mounts a flight of stairs and with a slight upward glance sees a succession of lights in direct line with the eye; going down the same stairs the eye sees the same lights from a different angle, due to individual shading. Similar cases of glare occur in the case of a long corridor, down the length of which there is a succession of lights. A man passing along such a corridor, or suddenly turning to right or to left to go through a swing door, derives little or no advantage from the provision of glass panels in that door as a safety measure in avoiding collisions with another person about to open the door. When the swing doors do not open direct upon the corridor, but are set back in a sort of alcove to a depth of say four or five feet, it will be found that even this short distance allows the eye to recover before reaching the point where there is danger of collision.

Proper maintenance is essential for natural as well as artificial lighting. Not only is it necessary to keep lamp bulbs and switches in good condition, with shades and reflectors always clean and properly adjusted; it is equally important for skylights and side windows to be kept clean; and this applies particularly to situations where natural lighting is used for stairways, and at any point where there is a hoist operating. In the case of a large works it is desirable that the maintenance department responsible for lighting should have means by which the degree of illumination at any particular point can be measured. Only by actual measurement is it possible to safeguard against the combined effect of different causes of deterioration. The lamps may be in perfect order, thanks to rigid maintenance, and yet the slowly changing colour of walls and ceilings can make a notable change in the efficiency of the lighting; the discoloration of walls proceeds slowly, and may not be noticed until it has reached a serious stage.

Industrial Safety Gleanings

National Safety Congress

A PROVISIONAL programme has been issued for the industrial sessions which are to form part of the National Safety Congress, organised in London by the Royal Society for the Prevention of Accidents. The whole congress lasts from June 18 to 25, the first three days being taken up by Road Safety sessions. The Industrial sessions will be held on June 22-25, beginning with an opening address at 10 a.m. (free), followed by a session on Post-War Trends in Industrial Accident Prevention (admission 10s.) or a free discussion on Group Activities, all at the Institution of Civil Engineers. The afternoon will be devoted to a technical session (2 p.m.) on the Guarding of Horizontal Milling Machines (admission 10s.) at the Industrial Museum, Horseferry Road, or a free demonstration (2.30 p.m.) of Purposeful Physical Training in Industry, organised by the Central Council of Physical Recreation at the Conway Hall, Red Lion Square. Free tickets for the latter are obtainable on application (the earlier the better) to the General Secretary, C.C.P.R., 58 Victoria Street, S.W.1, *not* to RoSPA.

On June 23 will be held the first annual meeting of the Industrial Safety Officers' Section of RoSPA (members only; 10 a.m.); in the afternoon there will be a discussion (2 p.m.) at the Institution of Civil Engineers on the Influence of Training on Accident (admission 10s.). On the Saturday evening (time and place to be notified) there will be a reunion dinner of safety officers who have attended courses at Oxford or Llanfairfechan, and on June 25 at

10 a.m., they can enjoy a refresher course, in the form of a Brains Trust (question master, Sir Wilfrid Garrett) at the Industrial Museum, starting 10 a.m. (fee for dinner and course, 20s.).

A dinner and cabaret are also being held at the Savoy Hotel on June 21, following the annual general meeting of RoSPA at 5 p.m. The fee for this is 40s.; all inquiries, entrance fees, etc., should be addressed to Mr. H. E. Winbolt, manager, Industrial Section, Royal Society for the Prevention of Accidents, 52 Grosvenor Gardens, S.W.1.

Hazards from Nitro Bodies

While many accidents in industry could be traced to negligence on the part of the victim, with chemicals, however, the victim was not always the responsible party, said Mr. O. R. Lineham, of Imperial Chemical Industries (Explosives Group), Ltd., in Glasgow, when addressing a meeting of the Glasgow and District Industrial Accident Prevention Group on "Chemical Hazards." Speaking of industrial diseases caused by nitro bodies, like T.N.T. and tetryl, he said that a good deal could be done to prevent them by workers attending to personal cleanliness. The great danger with such chemical hazards was not the normal worker, but the few people who were susceptible to certain chemicals. While one person could wallow in materials, another might only have to touch it to get dermatitis.

Fog-Free Goggles

A new fog-free, dust-free goggle has been designed in the U.S.A. by the Welsh Manufacturing Company. The main feature is that in this goggle, normal breathing has been harnessed to provide a natural ventilating pump. Normal breathing sweeps a complete change of air, about once every second, through flow channels in the frame and across the inner face of the big single plastic lens. This action removes moisture from within the goggle before it can condense as fog or frost on the lens. The air intake ports contain felt filter pads which are replaceable, to filter out dust and flying particles, thus affording further protection for the eyes.

Protective Sleeves

Protective sleeves made of fabric coated with vinyl resin have been added to the line of industrial clothing manufactured by the B. F. Goodrich Company. The sleeves are of lightweight, pliable material, black outside and olive drab inside, with length of between 16 and 17 in. They are particularly valuable for workers who need protection against oils, most acids and alkalis.

LETTER TO THE EDITOR

DDT and Gammexane

Sir,—The recent correspondence in your issues of May 5, 19 and 26 comparing the above substances has shown some confusion in terms which Mr. Rogerson has done well to correct. In support of his efforts to define more exactly the various substances named, it should be remembered that DDT is a commercial commodity made in hundreds of tons, and Gammexane is a recrystallised laboratory preparation extracted from the commercial commodity 666 (more generally known as benzene hexachloride). Any comparison would therefore be more usefully made from a practical viewpoint between DDT and 666.

DDT was first introduced as an insecticide on the commercial scale by Geigy in Switzerland in 1940 (Swiss Pat. 226,180/1939), and benzene hexachloride by Laboratoires Lebas in France in 1943 (*Bulletin de l'Académie de Médecine*, December 21, 1943). Both DDT and benzene hexachloride are therefore comparatively new introductions, so that much work still remains to be done before exact comparisons may be drawn between the properties of these two interesting products in all their aspects as to insecticidal action, strength, smell, toxicology, etc.

Although a great deal of independent investigation has been done here and in America, and in Switzerland, on DDT, and Dr. Slade's interesting lecture in Liverpool described the I.C.I. work on benzene hexachloride and Gammexane, there has been very little published work describing investigations on benzene hexachloride by independent observers.—Yours faithfully,

G. A. Campbell
(The Geigy Company, Ltd.),
T. F. West
(Stafford Allen & Sons, Ltd.).

RAYON IN FINLAND

Finland's first rayon plant was located on the Karelian Isthmus but was lost to the country when that area was ceded to the U.S.S.R. In February, 1941, it was decided to establish a new plant at Valkeakoski. Production of staple fibre was begun in the autumn of 1943 and that of rayon in September, 1944. At the end of January, 1945, the viscose plant, staple-fibre and rayon spinning plant, carding plant, power station, and repair shops were in operation. When completed, the plant will have a daily capacity of 20,000 kg. of rayon and of 700 kg. of staple fibre. A new firm organised last December was scheduled to begin construction this spring of a rayon plant a Kokkola. Production will be confined to yarn, with an annual capacity of 1,825,000 kg.

New Control Orders

Cadmium

THE Control of Non-Ferrous Metals (No. 18) (Cadmium) Order, 1945 (S. R. & O. 1945, No. 643), which came into force on June 8, varies the Control of Non-Ferrous Metals (No. 6) (Cadmium) Order, 1941, by exempting from the operation of the maximum price provisions cadmium (whether virgin or secondary) in the form of ingots, sticks, or rods, which is delivered or intended to be delivered outside the United Kingdom or on board ship for export from the United Kingdom. Inquiries concerning this Order should be addressed to the Joint Controllers, Non-Ferrous Metals Control, Grand Hotel, Rugby.

Zinc and Lead

The Control of Non-Ferrous Metals (No. 17) (Copper, Lead, and Zinc) Order, 1945 (S. R. & O. 1945, No. 642), which came into force on June 11, increases the maximum prices for lead by £5 a ton, for zinc, zinc sheets, and rolled zinc (boiler plates) by £5 10s. a ton, and for zinc oxides by £4 15s. a ton. This is the first increase in the prices of unwrought lead and zinc since December, 1939.

The Order also abolishes the maximum prices for hard spelter, zinc dross, flux skimmings, and certain descriptions of copper scrap, brass scrap and swarf, and gunmetal scrap and swarf. It effects no change of importance in the licensing of the acquisition or disposal of the non-ferrous material concerned, but it provides for the exemption from the operation of the maximum price provisions of scheduled materials which are delivered outside the United Kingdom or on board ship for export from the United Kingdom.

New maximum prices per ton (delivered, buyer's premises) are: Good soft pig lead (foreign), £30, duty paid; good soft pig lead (Empire and domestic, including secondary or resmelted lead), £30; lead of the quality known as "English," £31 10s.; G.O.B. zinc (foreign) £31 5s., duty paid; G.O.B. zinc (domestic, including secondary and resmelted zinc), £32; "Prime Western" and debased zinc, £32; refined and electrolytic zinc, £32 15s.; zinc, of not less than 99.99 per cent. purity, £34 5s.

New maximum prices per ton, ex works, are: Zinc sheets (No. 10 gauge and thicker, delivered in lots of 5 tons or more), £43 2s. 6d.; rolled zinc (boiler plates), £41 2s. 6d.; zinc oxide (delivered buyer's premises in lots of not less than 2 tons); red seal, £36 5s.; green seal, £37 15s.; white seal, £38 15s.

Holders of licences to purchase lead and zinc metal (as sold by the Control) granted on or before June 10, 1945, may, on application to the Joint Controllers, Non-Ferrous Metals Control, Grand Hotel, Rugby, cover themselves by purchases, where they have not already done so, against such licences up to and including June 24, at the maximum prices ruling on June 10.

Export Control

The Export of Goods (Control) Order, 1945 (S. R. & O. 1945, No. 576), which came into force on June 11, cancels all previous Export Control Orders and sets out the export licensing position to date. It reduces substantially the list of goods requiring export licences and removes the remaining countries from the list of territories to which the export of *all* goods is controlled.

The following list includes the items of interest to the chemical and allied industries from Export of Goods (Control) Orders hitherto in operation which are affected by relaxations made in the new Order.

(Group 4) Abrasive manufactures (as listed); grinding or polishing compositions, etc.; (Group 5) Adhesives and cements, etc., asbestine, bentonite, diatomaceous earth, felspar, graphite, etc., manufactures of asbestos, etc. (as listed), pumice, etc., sand, silica, etc., Sheffield lime, etc., tripoli and polishing compositions, etc.; (Group 6/1) Cemented carbide metal, ferro alloys, etc.; non-ferrous metals, etc.: arsenic, beryllium, chromium, cobalt, iridium, molybdenum, osmiridium, osmium, palladium, rhodium, ruthenium, silicon, tantalum, titanium, tungsten, vanadium; ores, etc.: aluminium, bauxite, cryolite, iridium, iron, iron pyrites, lead, magnesium, molybdenum, nickel, osmiridium, osmium, radium, tantalum, titanium, tungsten, uranium, vanadium, zinc.

(Group 6/4) Agitating, etc., machinery; autoclaves, boilers, etc.; briquetting plant, centrifugals, etc.; crushing, etc., machinery; dairy machinery, etc.; dies, etc.; digesters, driers, etc.; emulsifiers, fans, etc.; hardness-testing machines, hydraulic machinery, injectors, etc.; machinery, etc., used in the manufacture of artificial silk; machinery, used for washing mineral products; screening, etc., machinery; tar-spraying machinery, welding electrodes, and many other types of machinery; (Group 7) Transparent cellulose wrappings, etc.; wood flour; (Group 12/1) Glass and glassware, etc. (as listed); glass, optical, etc.

(Group 13) Acriflavine, adrenaline, etc., aesculin, aloes, aloin, aluminium oxide, etc., aluminium sulphate, ammonia, ammonium bicarbonate, ammonium carbonate, ammonium chloride, ammonium perchlorate, etc., arabinose, areca nuts, asparagine, balsam of Peru, balsam of Tolu, bile acids, etc., bleaching powder, etc., borax, boric acid, bromides, etc., calcium acetyl salicylate, calcium silicide, cantharides, cantharidin, carbachol, carbon bisulphide, carbon tetrachloride, catalysts containing nickel, cerium compounds, chloramine T, chlorine, etc., chloroform, colocynth, columbium, compounds, desoxycorticosterone acetate, diacetin, digitalis leaf, etc., diphenan, α-α-dipyridyl, dulcitol, edestin, euflavine, fluorine compounds (inorganic), fluorspar, fusel oil, galactose, glycerine, hexyl alcohol, hyoscyamus, indigo, etc., ispaghula, jaborandi leaves, jalap resin, etc., jointing compositions, etc., leptandra, leptazol, lobelia, etc., lobeline, magnesium carbonate, magnesium chloride, etc., male fern, etc., manganese dioxide, metaldehyde, methyl salicylate, methyl violet, mixtures of manganese dioxide, etc., mixtures containing lead tetraethyl, mixtures of potassium hydroxide, etc., molybdenum compounds, papain, parahydroxydiphenyl, phosphorus, etc., podophyllin resin, potassium ferricyanide, potassium ferrocyanide, potassium telluride, proflavine, progesterone, psyllium seeds, raffinose, reduced iron, santonica, santonin, senna, slippery elm bark, sodium acetate, sodium aluminate, sodium ferrocyanide, stibophen, stramonium, sulphite lye, suprarenal cortex, etc., tantalum compounds, testosterone, etc., thyroid, trichlorethylene, trypsin, etc., tungsten compounds, vanadium compounds, ventriculus, etc., water-treatment compositions, etc., wild cherry bark.

Machinery and Plant

The Machinery, Plant and Appliances (Consolidation) Order, 1945 (S. R. & O. 1945, No. 631), which came into force on June 11, revokes the Machinery, Plant and Appliances (Control) Orders Nos. 1 to 9, and consolidates the existing provisions. The following are the principal changes: (1) Supplies of controlled goods for export are subject to control, so that supplies, both for home and export, can be authorised under a single and simplified procedure; (2) licences to export issued to manufacturers under the Export Control Orders have effect for the purposes of this Order; (3) the Schedule of Controlled Goods has been curtailed by the cancellation of certain classes, notably Class 64 (machinery for washing lubricating oil) and Class 72 (plant for removing hardness from water). Control of Class 22 (plant for preparing or processing food, etc.) has been limited to exclude machinery of hand-operated types.

NON-FERROUS METAL PRICES

The Minister of Supply has issued a list of selling prices of non-ferrous scrap metals, applying at Ministry of Supply Depôts subject to having sufficient material of that particular quality available. The list relates to the period June 11-September 11, and is published without prejudice or commitment. Inquiries regarding this list should be addressed to: N.F. Metals Control (Scrap Disposals Dept.), Euston House, London, N.W.1 (EUston 1260).

The following is a summary of the prices per ton of the various classes of scrap listed: Copper turnings £48, braziery copper £53 10s., copper scrap £55 10s.-£57 10s., cupro-nickel scrap £70 10s.-£75 10s.; lead scrap £25 15s.; zinc scrap £24; brass 70/30 turnings £37-£42, scrap £46 10s.-£49, ingots £51, metallics £34; brass 60/40 swarf £30 10s., metallics £27, scrap £38; brass 85/15 scrap £50 10s.-£52 10s.; 90/10 scrap £51 10s.-£53 10s.; 95/5 scrap £54 10s.; gunmetal £72 10s.-£77; nickel silver £50 (10 per cent.)-£63 (20 per cent.).

Parliamentary Topics

Awards to Inventors

IN the House of Commons last week, Mr. Ellis Smith asked the Chancellor of the Exchequer whether it was the intention of the Government to set up at an early date a commission to deal with awards to inventors, as was done after the last war, and whether he would give an assurance that the interests of the man with the first idea, or who was responsible for developing a known invention, would be properly safeguarded.

Sir J. Anderson: Proposals for the appointment of a Royal Commission will be put forward in the near future. With regard to the last part of the question, it will be proposed that the Commission should be given powers similar to those of the Royal Commission which heard claims of this character after the last war; these powers will enable the Commission to obtain all the evidence which they consider necessary for the proper adjudication of claims, including evidence relating to such matters as referred to in the question.

Patents Extensions

Mr. Parker asked the President of the Board of Trade whether he was aware that many patents had lain idle during the war owing to lack of raw materials and other facilities for their exploitation; and whether arrangements would be made for an extension.

Captain Waterhouse: Under Section 18 of the Patents and Designs Act, a patentee who has suffered loss by reason of war restrictions may apply to the Court for an extension of the term of his patent. Recommendations for simplifying the prescribed procedure have been made in an Interim Report of a Departmental Committee (Cmd. 6618) which is now under consideration.

Personal Notes

Mr. A. G. Clausen, the well-known London consulting refrigerating engineer, has been appointed manager of the refrigerating department of Peter Brotherhood, Ltd., Peterborough.

Lord Trent, chairman and managing director of Boots Pure Drug Co., has been unanimously elected chairman of the Council of the Industrial Welfare Society in succession to the late Sir Charles Craven.

Mr. P. E. Stanhope, F.R.I.C., branch manager, Robinson & Co., Ltd., Ramsbottom, and Dr. P. P. Townend, lecturer in the department of Textile Industries, Leeds University, have been elected Fellows of the Textile Institute.

Colonel C. M. Croft, J.P., M.I.C.E., F.C.S. (Wandsworth Gas Company), has been elected president of the Institution of Gas Engineers in succession to Mr. S. E. Whitehead (Southampton Gas Company). Dr. Harold Hartley (Birmingham) is the new vice-president.

Mr. James C. Young, of Young & Harrison, Ltd., dispensing chemists, London, has been elected president of the Pharmaceutical Society of Great Britain. Mr. G. R. Knox Mawer, Wrexham, is the new vice-president, and Mr. H. C. Shaw, Walton, Stone, Staffs, was reappointed treasurer.

Mr. Herbert E. Hill, A.R.I.C., A.A.C.I., who has been appointed Government Analyst in Tasmania, is a native of England but was educated at Perth (W.A.) Technical College and the University of Western Australia. After a period in England with the Ministry of Munitions in 1917-19, he entered the service of the Western Australian Government, and since 1934 has been in control of the Commonwealth Food Control Laboratory.

Mr. H. Warren, M.Sc., has been appointed managing director of the British Thomson-Houston Co., Ltd. He came from Bristol University to the company (in the testing department) in 1911, was appointed to the engineering staff in 1913, and in 1923 collaborated with the late R. C. Clinker in instituting the B.T.-H. research laboratory. In 1929, Mr. Warren became chief of the research laboratory, and in 1938 he was elected to the board as director of research, later to be appointed director of research and engineering. Mr. Warren has been for many years in charge of the company's technical education and training system; he has fostered a close relationship with the universities, and with the Rugby College of Technology and Arts, and has been associated with numerous technical committees. He is a vice-president of the Institute of the Plastics Industry, and of the Midland Centre of the Institute of Physics.

Obituary

Mr. W. H. Grieve, chairman and managing director of Lightalloys and a director of the Manganese Bronze and Brass Company, died last week in London, aged 65.

Mr. Charles Gordon Fergusson, who died on June 6, was a vice-president of the Lautaro Nitrate Company and the Compañia Salitrera Anglo-Chilena.

Mr. R. C. Wild, who died on May 25, aged 75, was well known as an analytical and consulting chemist, specialising in metals, coal-gas, and water analysis. After a period in private practice, he became, in 1915, gas examiner for Erith, and he held similar appointments at Bexley, Dartford, etc., continuing in this activity after his retirement a few years ago. He became an Associate of the Royal Institute of Chemistry in 1899, and a Fellow in 1902.

Mr. David Owen Evans, M.P., who died suddenly in London on June 11, aged 69, had been chief administrative director of the Mond Nickel Company, and later was vice-president of the International Nickel Company of Canada. In 1929 he carried through the great nickel merger, which brought almost all the nickel resources of the world into British hands. He had also been chairman of the Copper Development Association. He was designated for the honour of knighthood in last week's Dissolution Honours list.

Viscount Exmouth—the Rt. Hon. Charles Ernest Pellew, Bart., seventh holder of the title—who died at Hindhead, Surrey, on June 7, aged 82, had for 14 years (1897-1911) been Adjunct Professor of Chemistry at Columbia University, New York, where he had previously served for five years as demonstrator in chemistry and physics. In 1915-17 he was a chemist with the Maxim Munitions Company, and in 1917-19 with the Alaska Products Company. In 1922, his father, a naturalised American, succeeded to the viscounty at the age of 94, but the late viscount, his eldest surviving son, was readmitted to British nationality.

We deeply regret to announce the death, as the result of an accident in London on June 6, of Mrs. Mary A. Blagden, the wife of Mr. Victor Blagden, president of the British Chemical & Dyestuffs Traders' Association. Many readers of The Chemical Age will recall Mrs. Blagden's graciousness in the part of hostess at Oxted in the annual tennis tournaments of those happier days; and a far wider circle will remember with gratitude her unfailing kindness and benevolence. The chemical industry as a whole extends its heartfelt sympathy to Mr. Blagden in his irreparable loss. A memorial service will be held at 11.30 a.m. on June 27 at St. Mark's, North Audley Street, W.1.

General News—From Week to Week

Authority from the Molasses and Industrial Alcohol Control is no longer necessary, as from June 1, for quantities of not more than 60 gallons of: acetic acid, acetic anhydride, acetone, amyl acetate, amyl alcohol, butyl acetate, butyl alcohol, ethyl acetate, or fusel oil.

The postal service to Holland has now been extended to the whole of that country. The service is still restricted to non-illustrated postcards and letters not exceeding 1 oz. in weight on personal matters or on business matters limited to ascertaining facts and exchanging information.

Among the 34 factories allocated to civilian production by the Board of Trade last week, two will be devoted to chemical products: that at Sellafield (Cumberland), allocated to Courtaulds, Ltd., for the production of cellulose acetate yarn; and one at Dundee to B. X. Plastics, Ltd., for plastic moulding powder.

"Hints to Business Men" is the title of a series of booklets published by the Department of Overseas Trade. The following countries have, so far, been included: Australia, the Belgian Congo, the Central American Republics, Cuba, the Dominican Republic and Haiti, Egypt, Eire, Iraq, Mozambique and Angola, Portugal, Madeira and the Azores, Spain and the Canary Islands, Turkey, the United States of America.

The latest edition of "600," the house magazine of George Cohen, Sons & Co., Ltd., and associated companies, is its usual bright self. The present number contains an interim summary of the companies' war production record, as well as some remarkable figures concerning the long service of the group's employees. One family can boast 150 years' combined service between three of its members, and, since 1934, 86 presentations for 25 years' service have been made.

All employees of Lorival Plastics are to get an extra week's holiday with pay in addition to their 1945 summer holiday. The directors and management of United Ebonite and Lorival, Ltd., Little Lever, Bolton, have conveyed to the workpeople their appreciation of the contribution which all have made to the war effort. Among a wide variety of plastic and rubber components which Lorival Plastics have supplied for aircraft, electrical equipment, telecommunications and ammunition can be mentioned plastic grenade parts, telephone line insulators, battery boxes, and aircraft control pulleys. In size the products have ranged from battledress buttons to large submarine battery containers standing 3 ft. high and weighing 80 lb.

The Sir Henry Fildes Medal of the Institution of Factory Managers will be awarded this year for the best essay submitted on the following subject: "Training for Factory Management: practical, administrative, which should be first, and why?" Essays, not to exceed 5000 words, are to be typed and to reach the general secretary not later than September 17. The senior group (entrants over 27 on January 1, 1945) will compete for the medal. The junior group will compete for a commendation signed by the president of the Institution.

A plan for the interchange of research staff with the Universities has been announced by the L.M.S. Railway. Some members of the railway's research staff, which at present consists of some 70 graduates dealing with engineering, metallurgy, chemistry, physics, paint, and textiles, will, it is intended, be seconded each year to do fundamental research, and possibly some teaching, in their special fields in university laboratories. At the same time the universities will be invited to send members of their staff to the research laboratories at Derby to work on applied problems.

Foreign News

Considerable quantities of aniline dyes will shortly be purchased by Spain abroad, principally from the U.S. and Great Britain.

The Canadian Government has completed negotiations with the Dow Chemical Co. of Canada for the erection of a plant near Sarnia for the production of styrene plastics.

Production of wolfram in Queensland for 1944 amounted to 122 tons valued at £45,815, compared with 73 tons worth £27,613 in 1943. New lodes adjacent to old workings have been opened up in the Wolfram Camp and Bamford areas.

Synthetic rubber will not be made in Australia, stated the Commonwealth Rubber Controller, Mr. C. S. Butt, who has recently returned from America, where he has been investigating the production of synthetic rubber.

The Canadian Government has granted export permits to the Aluminium Company of Canada for the shipment of 3,500,000 lb. of aluminium ingots to Spain. The latter is reported to be placing orders in Canada for 20,000,000 lb. yearly.

The Chilean Government is to sign agreements for the annual sale of 600,000 tons of nitrate to various European and American countries. Sweden, one of the main customers concerned, proposes to exchange in trade against machinery, paper and cellulose.

An application of war surplus material to peaceful purposes is found in the sale of 125 tons of chloride of lime, by the Canadian War Assets Corporation, to the Canadian Red Cross, to be employed in cleaning up some of the unsavoury spots left in Europe as legacies of the conflict.

The Dominion Bureau of Statistics reports that Canadian exports of certain items during the first quarter of 1945 were valued as follows ($000): chemicals, 31,612 (in 1944, 24,443); non-metallic minerals, 12,788 (13,424); non-ferrous metals, exclusive of gold, 105,624 (79,152).

Technical and pure acetanilide are being made in Canada for the first time. Production at a new plant is expected to be sufficient to meet the Dominion's needs and to provide a surplus for export. Canada has been importing about 200,000 lb. of acetanilide annually from the United States.

Calcium carbide can now be sold without previous licence in France, but priority is to be given to the railways and transport in general, to the food industries, and to public works. Consumers must not buy more than three, and in some cases one month's supply at a time.

United States sulphuric acid production increased from 8,605,000 short tons in 1943 to 9,260,000 short tons last year. By the chamber process, 3,240,000 short tons were produced, while the contact process accounted for an output of 6,019,000 short tons. The latter figure includes oleum or acid in excess of 100 per cent. strength.

The Standard Chemical Company of Canada has organised a new wholly-owned subsidiary, Maritime Industries, Limited, to establish a plant near Amherst, Nova Scotia, for the manufacture of salt. A plant capable of producing 120 tons per day of high-grade salt is to be constructed. Extraction will be through boreholes drilled on the property.

The pyrethrum crop of Rio Grande do Sul, Brazil, is estimated at 1250 to 1300 tons for the season October, 1944, to June, 1945. Production this year is 15 per cent. lower than that of 1943-44, which has been reported at 1500 tons. A pyrethrum-packing house will be established at Taquara, the centre of production.

At the Mellon Institute, Pittsburgh, during the year ended February 28, 94 industrial research fellowships have been in operation, employing 474 scientists and engineers. Important fellowships established in the period are dealing with catalysis in relation to the synthetic rubber programme; with the development of corn products, notably zein and corn proteins; with water-pollution research, with special reference to the wastes from paper and pulp mills; with frictional materials; and with structural glass.

The oil-from-coal pilot plant in Northern France, capable of an annual production of 15,000-20,000 tons of motor fuel, cannot be operated at present because of the coal shortage. However, to judge from French Press reports, output of the shale-oil plant at Autun amounts to some 10,000 tons.

Glen Davis shale oil undertaking, in New South Wales, produced 4,000,000 gal. of crude oil and 1,000,000 gal. of petrol in 1944, according to the Australian Commonwealth Minister of Supply. Owing to drought in the last six months of the year, it had not been possible to run the cracking plant to process the crude oil into petrol, thereby considerably curtailing the output.

About 85 per cent. of the current U.S. tyre production for military lorries and aeroplanes was based on synthetic rubber and at least 15,000,000 passenger cars rolled on the same material. After the war it is likely that the ultimate combination for tyres will involve use of both synthetic and natural rubber, possibly with natural in the carcass and synthetic in the tread.

The natural gas deposits in the Haute Garonne, South-Western France, are now supplying 50,000,000 cubic metres yearly. The gas is partly used for motor propulsion and partly instead of town gas. Toulouse is now using natural gas for this purpose, and other towns will be supplied after an extension of the distributing network has been carried out.

Considerable progress has now been made in planning a $1,500,000 oil-shale demonstration plant to be built near Rifle, Colorado, as part of the United States' synthetic liquid fuels programme. The plant, which will be operated jointly with the oil-shale research and development laboratory at Laramie, Wyoming, will examine processes for the utilisation of oil-shale as an auxiliary source of liquid fuels and lubricants.

Five new plants for the production of 100-octane aviation petrol are scheduled for construction and proposals for several more are under consideration, according to Petroleum Administrator Ickes. The former include one for the Texas Co., at Lockport, Ill., two for the Standard Oil Co., of Indiana at Whiting, Ind., and Sugar Creek, Mo., one for Leonard Refineries, Inc., at Alma, Mich., and one for the Shell Oil Co. at Houston, Texas.

In Nyasaland, a further investigation of the Mlanje bauxite deposits was made in 1944 and the exclusive prospecting licences granted to the Anglo-American Corporation for this area and for the Sumbu coalfield were renewed for another year. Agreements were concluded regarding their development when conditions permit. The special mining lease granted to the Gifter Corundum Company at Tambani was also renewed for another year.

Cuba's industrial-alcohol industry operating in connection with the sugar industry, showed substantial expansion in 1944. At the close of the year, 57 distilleries were in operation, compared with 27 in 1943 and 23 in 1942. Production amounted to 51,000,000 gallons in 1944, compared with 27,000,000 in 1942 and 8,750,000 in 1939. Heavy export demand for industrial alcohol resulted in large shipments.

Tasmania's Premier announced that after negotiations between the Government and a syndicate, a new company, called Thermaelectric Industries, Ltd., would be registered with a capital of £250,000. It will operate on an area of about 20 acres at Ulverstone and will manufacture silicon carbides, fused alumina, graphite and fused silica materials, all required in the manufacture of abrasives.

A new publication of Sunvic Controls, Ltd., Stanhope House, Kean Street, Aldwych, London, W.C.2, describes their "No-Loss" Energy Regulators for A.C. or D.C. control, and lists the various applications available. Compared with a variable resistance, the energy regulator, which effects control by periodically switching power on and off, is generally cheaper and less bulky, and it is applicable to any load up to its rated capacity. A special advantage is that the energy regulator is substantially independent of mains voltage fluctuations, up to about 20 per cent., thus enabling the input to be adjusted with greater nicety than would be possible by means of resistance control. Two types of this regulator are available, one for industrial purposes (type TYB), the other for laboratory use (type TYJ), the latter with a rapid time cycle necessary only when very close control is desired. The publication, No. R12(a), is illustrated with circuit diagrams showing numerous possible applications, is obtainable from Sunvic Controls on request.

Company News

Permutit Co., Ltd., announces an ordinary dividend of 10 per cent. (same), together with a bonus of 2½ per cent. (nil), for 1944.

Lever Bros. and Unilever, Ltd., have given notice to redeem, on October 1, the whole of the outstanding 4 per cent. consolidated debenture stock of £1,784,753.

Associated Plastics, Ltd., Smethwick, have increased their nominal capital beyond the registered capital of £100, by the addition of £900 in £1 ordinary shares.

Greeff-Chemicals Holdings, Ltd., report a net profit, for 1944, totalling £20,938 (£20,646). A dividend of 5 per cent., and a bonus of 2 per cent., making again 10 per cent., have been declared.

Fullers' Earth Union, Ltd., reports a net profit, for the year to March 31, of £3241 (£2816). The dividend is 5 per cent. (same).

The British Drug Houses, Ltd., report a trading profit, for last year, of £467,219 (£388,528). Taxation is £403,257 (£329,168). Net profit totals £37,159 (£36,423). The dividend announcement appeared in The Chemical Age on May 26.

Boots Pure Drug Co., Ltd., reports a net profit, for the year to March 31, of £554,138 (£533,834), including £97,872 (same) from retail subsidiaries. Income tax absorbs £412,500 (£428,000). A final dividend of 12½ per cent., brings the total rate up to 32½ per cent. (30 per cent.)

The British Oxygen Company, Ltd., announces that acceptances exceeding 93 per cent. have been received in respect of the recent provisional allotment to stockholders of 1,000,000 4 per cent. cumulative second preference shares of £1 each at par. The balance of the shares not taken up by the stockholders has been placed privately.

Commercial Intelligence

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

Mortgages and Charges

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

LEEDS METAL SPINNING CO., LTD.—(M., 16/6/45.) May 23, series of £4000 debentures, present issue £2900; general charge. *£5100. March 13, 1945.

Chemical and Allied Stocks and Shares

APART from a general advance in gold mining shares on the higher price of gold, stock markets have been quiet, although firm, with British Funds well maintained, and small gains ruling among industrial shares. Imperial Chemical have been steady at 38s. 7½d., with Turner & Newall 81s. 3d., and Dunlop Rubber changing hands around 50s. Greeff-Chemicals 5s. ordinary were maintained at 9s. on the results and unchanged dividend, and elsewhere Goodlass Wall 10s. ordinary moved up to 22s. xd. on the raising of the dividend from 7 per cent. to 9 per cent.

Both Lever & Unilever and Lever N.V.

rose to 47s., reflecting the decision to redeem the 4 per cent. debentures of the first-named and also expectations that official news will be forthcoming shortly of the war-time earnings of the Dutch company. British Glues & Chemicals 4s. ordinary at 10s. 6d. remained firm, awaiting the results, and B. Laporte were 87s. 6d., but elsewhere British Aluminium eased to 43s. 10½d. British Oxygen, however, moved up to 86s. 3d. on the success of the preference share offer. Tube Investments strengthened to £5 17/32 on recognition of the wide peace-time uses of the company's steel tubes and kindred products. Stewarts & Lloyds deferred at 55s. 6d. were better, also Dorman Long at 27s. 3d., and, awaiting the results, Guest Keen have been firm at 37s. 3d., while Projectile & Engineering rallied to 28s. Allied Iron at 50s. 7½d., and Ruston & Hornsby at 52s. 6d. reflected a disposition to await the financial results.

In other directions, Gas Light & Coke became firmer at 22s. 6d. Pease & Partners 10s. shares strengthened to 10s. 10½d. on the higher profits. De La Rue at £10¾ responded to the increased earnings shown by the preliminary statement and the unchanged 40 per cent. dividend. Other shares of companies interested in plastics received more attention, British Industrial Plastics 2s. shares being dealt in up to 7s., with Erinoid 5s. ordinary 11s. 9d., and Catalin 5s. shares strengthened to 7s. Lewis Berger moved up to 115s. 6d., this well-known paint company also having plastics and kindred interests. Wall Paper Manufacturers deferred at 44s. regained an earlier small decline. Textile shares were responsive to the higher yarn prices, Fine Spinners rallying to 23s., with Bradford Dyers 24s., and Bleachers 13s. 6d. Courtaulds, among rayons, firmed up to 55s. British Drug Houses were active up to 37s. on the results and new capital proposals. This is a case where a company has contributed substantially to the war effort, but where, owing to the unfair incidence of E.P.T. it has been impossible to build up adequate resources for post-war expansion. Burt Boulton were 27s. 3d., and Cellon 5s. ordinary again 26s.

Boots Drug at 57s. responded to the higher dividend. Timothy Whites at 42s. were steady, Beechams deferred were 19s. 10½d., and Sangers 5s. ordinary 30s. 6d. Amalgamated Metal shares strengthened to 18s. 10½d., while Imperial Smelting remained at 13s. 9d., and General Refractories at 16s. 4½d. A rise to 43s. was shown in United Molasses, which have remained under the influence of the results and chairman's annual statement. The units of the Distillers Co. firmed up to 116s. 3d. after an earlier small decline, good results again being expected from this successful company: possibly the chairman's speech will give further details of the scope for expansion of the company's varied and widespread interests. Triplex Glass moved higher at 41s. on the motor companies' announcement of production plans. United Glass Bottle shares were 77s.

British Chemical Prices

Market Reports

TRADING conditions in the London general chemicals market have been moderately active, the movement in most sections being on a steady scale. A fair amount of fresh inquiry has been reported both for home and export account and the price position throughout the market remains steady. In the soda products section there is a good call for bicarbonate of soda and soda ash, while supplies of chlorate of soda and bichromate of soda are fully absorbed. Nitrate of soda and hyposulphite of soda are firm and in good request. So far as the potash products are concerned, careful distribution of available supplies of some products is enabling essential requirements to be covered, and a good demand is reported for the pharmaceutical and technical grades of permanganate of potash. There is little to report from the coal-tar products secion, where a moderate trade is passing and contract deliveries are going forward steadily.

MANCHESTER.—Price changes on the Manchester market for chemical and allied products during the past week have been few in number, but those that have been reported have been towards substantially higher levels, notably in the white and red leads and in the toluols and other light tar products. In the market for heavy chemicals, including those for the textile and allied trades, the movement of contract supplies has been fully maintained at around its recent level, and there has also been a fair call for deliveries to most of the other leading industrial users. A moderate weight of new business during the past week has included some bookings for shipment. A quiet export trade in tar products has also included French and other Continental orders for pitch and road tar.

GLASGOW.—In the Scottish heavy chemical trade during the past week home business remained steady with no actual changes to report in prices. Export inquiries are being received regularly.

Price Changes

Lead, Red.—Basic prices, per ton: Genuine dry red lead, £45 10s.; rutile, £45 10s.; orange lead, £57 10s. Ground in oil: Red, £59; orange, £71 10s. Ready-mixed lead paint: Red, £63 10s.; orange, £70 10s.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d: white seal, £38 15s.; green seal, £37 15s.; red seal, £36 5s.

EDUCATIONAL

SERVICING

AUCTIONEERS, VALUERS, Etc.

SITUATIONS VACANT

None of the advertisements below relates to a woman between 18 and 41 unless such a woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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