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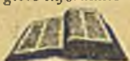

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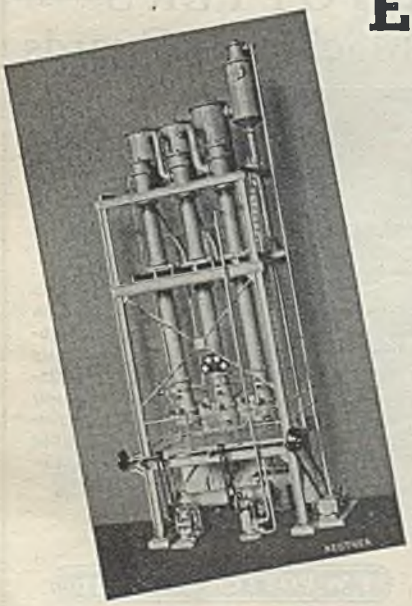

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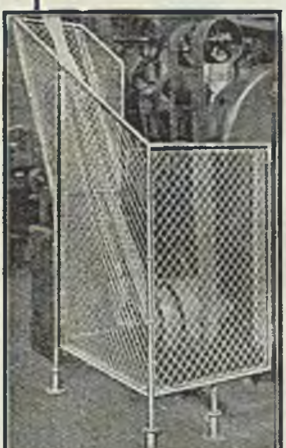

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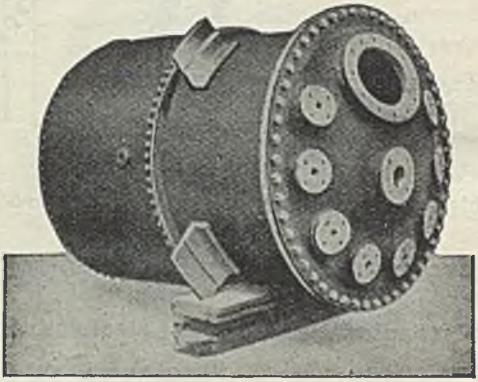

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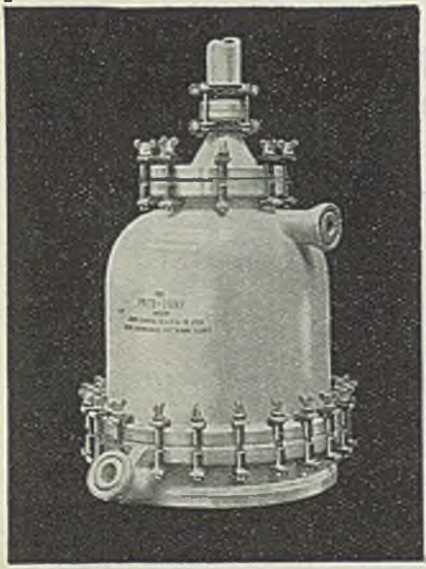

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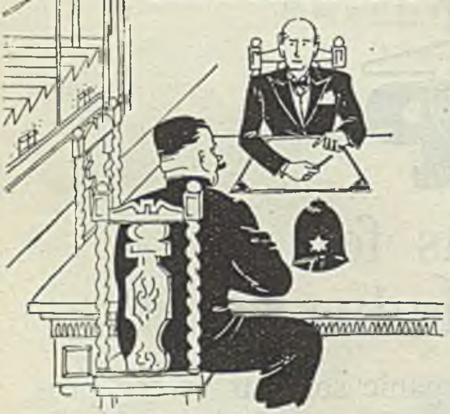

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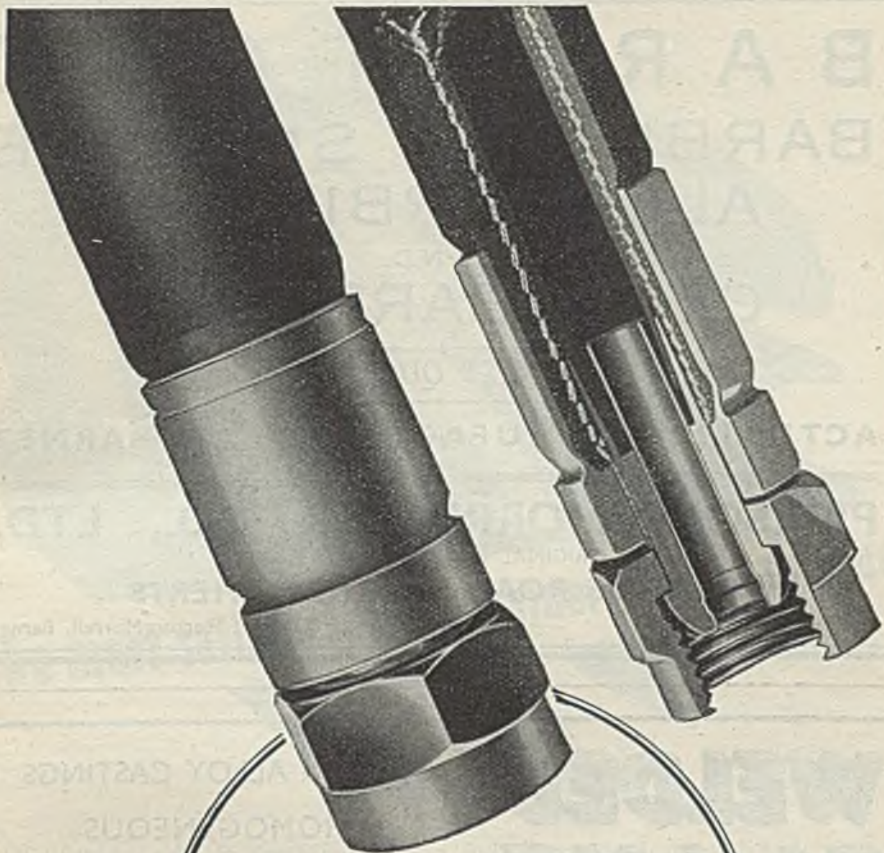

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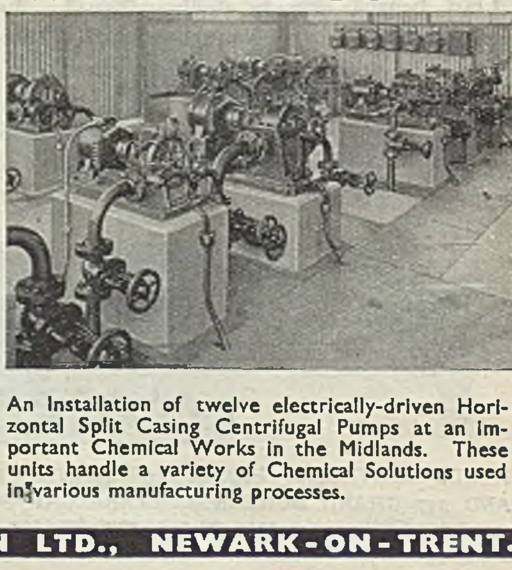

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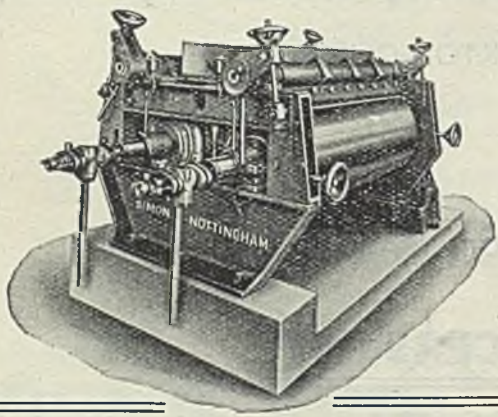

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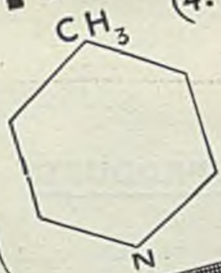

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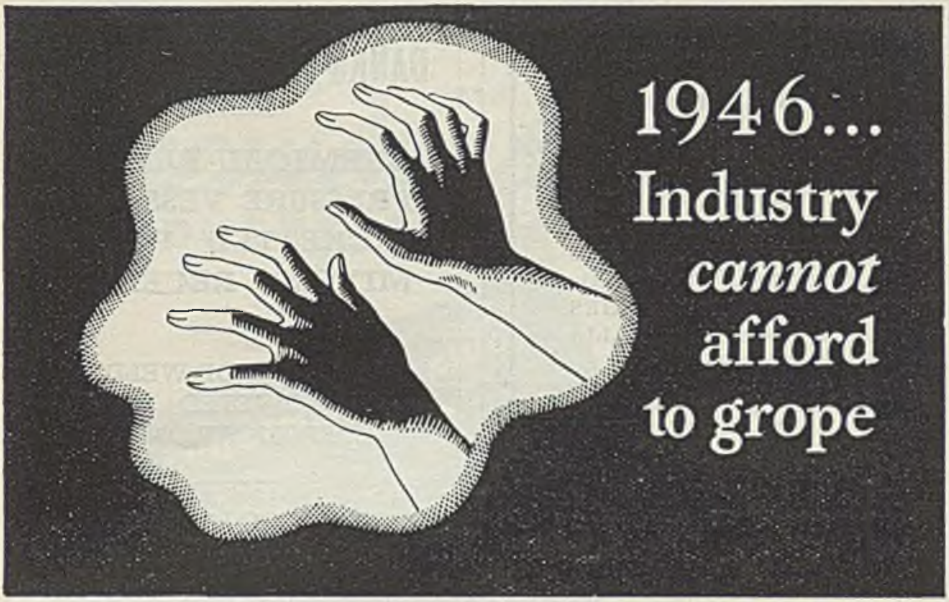

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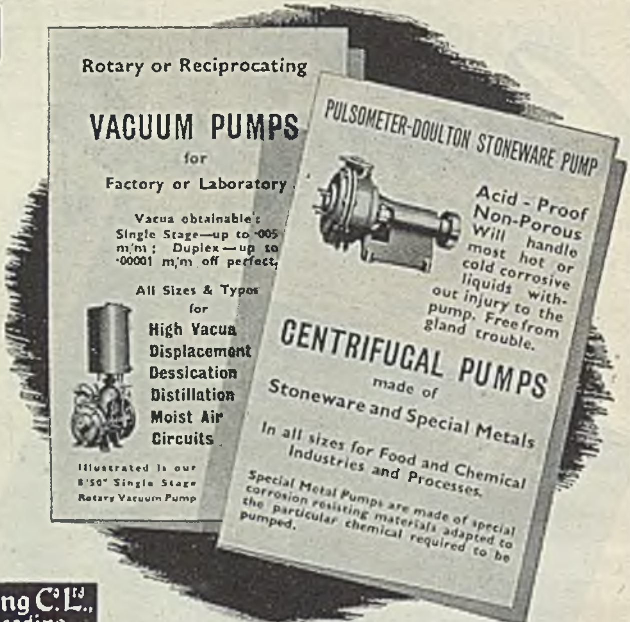

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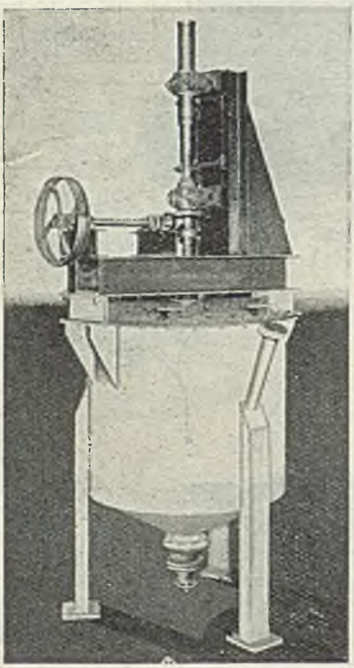

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The Chemist in Business

FOR some reason which we have never quite understood, the very natural desire of the individual to get on in life appears to be regarded to-day with some disapproval. The old-fashioned idea of making one's way in the world is regarded as outmoded. Why this should be is difficult to understand. It may be that the modern trend towards Trade Unionism, with its collective bargaining, is leading to a belief that progress in life should be on a herd principle, advancement being by groups according to age, by seniority, as in the Civil Service and other organisations, or by some other principle established at a higher level. It may be that the war through which we have just passed, in which everyone worked for the State and for the national survival, and none worked for himself; in which the youth of great intelligence might find himself a "Bevin boy" hewing coal, or the girl of refinement and education working hours a day in overalls tending a machine, has encouraged people to regard service to the State as the governing principle of life. We are quite sure that any such spirit is nothing more than a passing phase because it is against human nature. We do not believe that most men and women do their daily work because they wish to serve the State. They do it in order that they may eat and live. Because the right-minded human being likes to eat and live well, there is and will always be the desire to get on in life, and that ultimately is an individual problem. This passing phase of socialism will give place to the individualism of earlier days, for implanted firmly in the consciousness of everyone who is likely to be of value to the community is the desire to get on in life.

The chemist is essentially an individualist. He depends upon his brains for his livelihood and for whatever success he achieves in life. Not for him is the herd mentality, for he faces independent problems that require individual work for their solution. Hence, if the chemist desires to get on in life—and we believe that 99.9 per cent. of them have that desire—he has his fate in his own hands. If he works harder than other men, if he scorns delights and lives laborious days, he is already well on the way to success by worldly standards. But there is a little more to it than that.

It was with great pleasure that we read an address by Mr. William Peck on "The Chemist in Industry" to the Scottish section of the B.A.C. There is in his address concentrated horse-sense which we trust will be studied by every chemist when

On Other Pages

in due course the address appears in the Journal of the Association. Mr. Peck points out that education and training are essential for those who aspire to professional status and has indicated that the standards in America are, if anything, higher than in this country. They comprise two stages: (1) training in some specialised branch of knowledge; and (2) experience in the application of that knowledge. Neither of these is of much use without the other. The Percy Report, too, confirms this view: "Every technology is both a science and an art. In its aspect as a science it is concerned with general principles that are valid for every application; in its aspect as an art, it is concerned with the special application of general principles to particular problems of production and utilisation." The chemist who wishes to progress to higher positions, therefore, must have a firm grounding in the science of his industry and he must also possess skill in the art.

The career of the chemist after his graduation generally covers about forty years and this career can be divided into several stages. Before graduation and throughout the whole of his working life he is acquiring a sound foundation in science and he must keep himself abreast of current developments. The professional man, above all others, can never afford to sit back and consider that he knows enough to be going on with. After leaving the university, his career begins. The first half of this is divided by Mr. Peck into two periods, the period of establishment and the period of growth. What will be the ultimate fate of any individual chemist depends on the use he makes of these two periods. The period of establishment is one in which the academic atmosphere is exchanged for the industrial and in which human relations become very important. As Mr. Peck puts it, "one learns that the success of a process depends less on theoretical chemistry, but more on the type of packing used in a pump or on the material from which the plant is constructed. It becomes apparent that experiments in industry do not give the predictable results obtained in college experiments."

One of the greatest difficulties at this stage is to get the right start. Mr. Peck points out that the selection by the newly graduated chemist of the firm in which he is to work is very important indeed, because he must get work with a firm which will give him chances of obtaining experience and opportunities for advancement. Unfortunately the chemist is rarely able to pick and choose, and he has not sufficient knowledge and experience of the industry to be able to make a good choice. We feel that a great deal of the discontent so often expressed by chemists is due to a bad start in this respect. It is a matter on which the B.A.C. might well be of great assistance to their members. In the ultimate event, however, it depends on proper recognition for the chemist and on the realisation by employers generally that staff are not content to do a good day's work for a definite sum of money as pay, but require something more than this, which ultimately adds up to advancement into positions of greater responsibility. Mr. Peck rightly points out that the most efficient firms are not necessarily the best ones to start with, and that a less efficient firm may offer more opportunities for technical work with rapid advancement.

The young chemist, at this stage, even if he has made the right start, will have to adapt himself to industry. He will find that instead of occupying his time in advanced chemistry, in researches which will lead to publication of results in the transactions of learned bodies, he will have to help a labourer on the night shift to dismantle a choked valve, he will have to spend his time in routine analysis often of an elementary type, and he will find that a greater interest is taken in the regularity with which he attends to his work than in the knowledge of abstract chemistry which was so highly prized at his university. Many young chemists become disillusioned by this treatment; and it is important for seniors to advise their juniors that the conditions we have just described are normal to any industry and are part of the training. The young chemist must show that his character is to be relied on; if he does his work, whatever it may be, conscientiously and without complaining, he will find himself well on the way towards entering the second stage. He must show that he is able to work with all ranks, superiors and inferiors alike, so that an atmosphere of mutual regard prevails. He must settle difficulties himself wherever possible, and in doing this he will show his superiors that he is self-reliant. It is quite clear that Mr. Peck would agree with us that the chemist can never be regarded as part of the herd, but should stand on his own feet as an individual.

Following this preliminary stage there

comes what Mr. Peck describes as the period of growth. The chemist, having shown that he can do his daily work conscientiously and well, must now proceed to take an interest in economic principles, in trade knowledge, and in the art of writing reports that are clear and readable. Without a realisation of the laws of economics, no one can hold down a position of importance in an industrial organisation. An understanding of costs, prices, and profits is a fundamental part of the direction of industry. So also is the realisation that theoretical efficiency is not necessarily economic efficiency. The acquisition of trade knowledge must play a high part in this stage. It entails a study of the industry in which one's firm operates, the particular branch of the industry in which one's firm finds the most opportunities, and the detailed studies of such factors as products, costs, prices, earnings, duties, customers, and competitors. It may be all empirical knowledge but it is a requisite for promotion to an administrative position. The chemist, during this period, should have gained breadth and depth of experience, not only in the art of application of fundamental principles to the processes carried out, but also in less tangible matters, such as labour relations, public relations, and trade conditions.

All this may seen a long way divorced from the high ideals of pure science with which the young chemist left his university laboratory. But they are the fundamentals of the art which, by his choice of an industrial career, he has decided to practice. When the two stages here mentioned are complete the chemist has become of mature professional status. His future will depend on his calibre. It would, in our view, be in the last degree foolish for chemists as a body, and for chemists of high calibre in particular, to embrace any principle of collective bargaining for salaries and working conditions, except for the period of the first of the formative stages that have been described. We congratulate Mr. Peck on an exceedingly interesting and thoughtful paper on a subject of the greatest importance to all chemists everywhere.

NOTES AND COMMENTS

Nationalised Gas

SO the gas industry is to be the first of the great public utility services—if we exclude the Post Office—to be nationalised. Mr. Shinwell made the official announcement of this step at the annual luncheon of the Institution of Gas Engineers, held in London on Tuesday last week, and the terms in which he announced it—the now famous "lock, stock and barrel" sentence—leave no room for doubt about what is going to happen. Needless to say, the industry, which, as the *Gas World* says, has been "built up by the skill and service of men operating under the mainspring of private endeavour," does not take very kindly to the notion. The blow was intensified, rather than softened, by the Minister of Fuel's would-be conciliatory avowal that the intentions of the Government were honourable. It would be astonishing indeed if their intentions were anything else; and it is symptomatic of the general feeling of distrust and suspicion that such a statement should have to be made at all. Yet however honourable the intentions may be, the process of implementing them is sure to be a painful one. The intricacies of Parliamentary procedure are bound to make the change-over a long-drawn-out affair, tending certainly towards a slackening of effort, if not a complete paralysis, at a time when industrial effort is a matter of national urgency.

Critical Co-operation

ADDED to that, there is no guarantee that nationalisation is going to lead to greater efficiency in the industry or greater security for those employed in it. In another place in the *Gas World*, Mr. R. H. Studholme explains what the issue means to consumers, to owners, and to employees, using the Coal Industry Nationalisation Bill by way of analogy. He does not hesitate to point out the defects of the industry —for example, the weakness of "integration" as compared with "amalgamation" —but he rightly rejects the descriptions "dilapidated" and "disease-ridden" applied to it by various members of the Government, such epithets having been employed doubtless with the idea of creating the right atmosphere. None the less, nationalisation is decreed, and the industry must continue to function. In the circumstances, we believe that the suggested attitude of critical co-operation will be the most constructive in the long run. It is of highest importance to the chemists that the gas industry should be healthy, as its by-products are an important source of their raw material. Coal, steel, and gas—all of which are under the hammer—very closely affect the operation of the chemical industry; and though Mr. Morrison said, at the recent Labour Party conference, that they had not yet decided whether to nationalise "such large concerns as Imperial Chemical Industries," it is obvious which way the wind is blowing. We shall watch the "lock, stock and barrel" procedure with the keenest of interest.

Cornish Tin Industry

IT is welcome news that the Ministry of Fuel and Power is shortly appointing a Departmental Committee to examine the the position of the Cornish tin-mining industry and to make recommendations as to its future. For many years before the war, the output of tin from Cornish mines went down and down and by 1939 it had reached the low point of about 2000 tons a year. Production has continued to decline, notwithstanding the spending of large sums of public money during the war, not only on prospecting in the county, but on investigating schemes for reopening old shafts, or sinking new ones, and for increasing alluvial production. These activities led only to disappointment. The East Pool and Agar mines, which had been in operation for more than a century, ceased operations last year, and to-day tin comes from two mines only, production being at the rate of about 1100 tons a year. To this must be added 2-3000 tons from alluvial production. The Ministry of Supply buys the whole of the tin from Cornwall at present, on a "cost-in-contract" basis, which means that the price paid for each consignment is related to its cost of production, plus a percentage for profit. The price paid by the Ministry is believed to exceed £300 per ton.

A Pharmaceutical Jubilee

CONGRATULATIONS to the National Pharmaceutical Union on celebrating its silver jubilee. Since it came into being in January, 1921, as the Retail Pharmacists' Union, with the purpose of conserving the business interests of proprietor pharmacists, it can look back with pride upon a record of achievement. From small beginnings it has grown until now it covers every conceivable interest of the chemist in retail business and the sphere of its influence in pharmacy has increased considerably. Its activities have likewise grown and one of its latest is, perhaps, one of its most significant—the establishment of a Business Purchase and Guarantee Fund, which enables members to buy for themselves private businesses which otherwise might fall into the hands of the multiple stores or co-operative societies. This joint effort in a sturdy bid to maintain independence deserves every commendation. The silver jubilee was fittingly celebrated the other day with a dinner in London, when the guests, numbering more than eighty, included Dr. Charles Hill, secretary of the British Medical Association; Mr. J. C. Young, president of the Pharmaceutical Society; and Mr. H. N. Linstead, M.P., a past president.

Technicians and Reconstruction

EARLIER this year the Association of Scientific Workers held a conference in London, to which delegates came from all parts of the globe, some in the modern way by air. The conference was arranged to give scientists and others an opportunity of "thinking aloud" of the ways in which science can assist the welfare of mankind and it was an undoubted success. Now comes news of a somewhat similar project—an International Technical Congress, which is to be held in Paris from September 16 to 21. The purpose of the congress is to emphasise the important part which engineers and other technicians must play in the period of post-war reconstruction, and to stress the necessity for collaboration among technicians from the different nations. Papers for discussion are being contributed from many European countries, besides the U.S.A. The subjects cover a wide range, and the method of presentation takes the form of reports on recent progress and developments in such fields as plastics, construction, etc., as well as more abstract matters, such as the position of the technician in the political structure. Mr. Robert Lowe, 82 Victoria Street, London, S.W.1, is the organising secretary for Great Britain.

How Canada's contribution to the technology of TNT speeded the output of this vital explosive is told in the most recent issue of *C.I.L. Oval*, published by Canadian Industries, Ltd., Montreal.

Colloidal Carbon in Industry

Present-day Knowledge Surveyed at Royal Society of Arts

AN almost complete survey of present knowledge concerning colloidal carbon was given by Major W. H. Cadman, of the Anglo-Iranian Oil Co., Ltd., in a paper read before the Royal Society of Arts, on May 29. Dr. R. P. Linstead, F.R.S., Director of the Chemical Research Laboratory, D.S.I.R., presided.

Major Cadman stressed the importance of colloidal carbons in present-day industry, pointing out that it was only a few weeks ago that a shut-down of some of the rubber factories in which these materials are used was only just prevented by the timely arrival in this country from the United States, of an urgent shipment, part of which was for the first time carried in a large passenger liner, the *Queen Mary*. Colloidal carbons, continued the author, are ultra-microscopic in size, and are so-named because they possess the characteristic properties of colloids. They are not pure carbon, but contain a high percentage by weight, which may vary from 85 to 99 per cent.

In the early days of rubber tyre manufacture, zinc oxide was mostly used as a reinforcing agent, the amount of carbon black added being but 3 parts to 100 parts of rubber in order to produce black tyres. It was about 1910 that the Silvertown Company discovered that carbon black made by the incomplete combustion of hydrocarbon gases, in which the soot was collected by allowing the flames to impinge on a relatively cold surface, had an exceptional toughening action on rubber. The American rights for the new Silvertown cord tyre were soon acquired by B. F. Goodrich, and taken to the United States. As a result of this discovery made in England, the American production of colloidal carbon increased rapidly from 3000 tons in 1900 to more than 500,000 tons in 1945.

Furnace Black for Synthetic Rubber

It was from 1912 that carbon black became an essential ingredient for tyre compounding, and took the place of zinc oxide as a reinforcing agent. For compounding natural rubber, the channel process blacks were effective. With the introduction of synthetic rubber, however, and the entrance of Japan into the war, the carbon black position was radically changed, because the supply of natural rubber was cut off. It was then found that channel blacks were difficult to process when compounded with synthetic rubber, whereas the soft furnace blacks could be used more easily. For this and other reasons the demand for furnace blacks increased, and additional furnace plants had to be constructed to meet the growing requirements of the synthetic rubber industry. By the end of 1945 the production of furnace black had risen to about 50 per cent. of the total black production in the United States, which was then estimated to be 1235 million lb. per annum. A standard nomenclature for the different grades of black was adopted at the suggestion of W. B. Wiegand, chairman of a committee set up in the United States in 1943 by the Office of the Rubber Director to eliminate the confusion which had arisen from conflicting designations.

Electronic Particle Measurement

The particles of colloidal carbon are so tiny that they cannot be seen individually in the most powerful microscope. The diameter of each particle is less than that of the wave-length of light. It was not until these particles were examined by the electron microscope that their true shape was revealed, and direct measurement of particle size became possible. The coarser type of black with the largest particle size is represented by Thermax, a medium thermal black, which has practically no reinforcing effect in rubber. Furnace blacks with an average particle-size of about 83 μ appear in the semi-reinforcing region, but there are other furnace blacks now being made of about half that particle-size. The fully reinforcing channel or impingement blacks have a particle-size in the neighbourhood of 25 to 30μ, while the channel blacks used for pigments in paint manufacture fall in the lowest or colour region of the spectrum and are so very small that they are difficult to disperse in rubber.

Carbon black possesses an enormous surface, which ranges from 1 to 12 acres per lb. Exactly what happens when it is compounded with rubber remains to be discovered. The reinforcement is roughly proportional to the amount incorporated, up to about 40 per cent. by weight. The optimum loading ranges have been found to be: (a) up to 24 per cent. by weight for maximum toughness and liveliness as required in solid rubber tyres; (b) from 24 to 65 per cent. for maximum wear resistance and energy absorption as required in tyre threads and rubber footwear.

The raw material which is by far the most extensively used in the production of colloidal carbon is natural gas, supplied by the petroleum industry mainly in the United States. Up to 1939 production in countries other than the U.S. was almost negligible. In England materials are also available for the production of colloidal carbon. Reckitts, of Hull, started making carbon black at

Middlesbrough as early as 1908 by an impingement process, the raw material being coke-oven gas enriched with benzol and later with naphthalene. This plant had a capacity of 150 tons per year, and three years later was followed by the erection, by the same firm, of a 500 tons-per-year plant at Thornhill, near Dewsbury, the first to use rotating plates. The raw material ultimately employed was coke-oven gas, stripped of benzol of 450 B.Th.U., and enriched by carburetting with naphthalene. The yield was less than 1 lb. per 1000 cu. ft. of gas.

Another attempt to produce colloidal carbon comparable with the best imported American blacks, using raw material available in England, was made in the early years of the war at the D.S.I.R. Chemical Research Laboratory, Teddington. Here preheated coal gas, enriched by the vapours of liquefied tar, pitch, or petroleum residue, was passed through a heated burner tube to be burnt in a controlled supply of air, the flames impinging on a slowly revolving horizontal roller which could be cooled by circulating water or air through it. The carbon black was removed from the roller by wire brushes. Yields up to 50 per cent. by weight of the crude oil were obtained.

There are three companies operating lampblack plant in the United Kingdom, using creosote oil or other coal-tar products as raw material. The total product of lampblack is about 10,000 tons per year.

Processes of Manufacture

The Channel Process is an impingement process, in which natural gas is burned in fan-shaped smoky flames in a limited supply of air. The Thermal Process is an intermittent cyclic process by which natural gas is cracked or thermally decomposed in furnaces either packed with chequer firebrick or refractory flues. The Furnace Process is continuous and burns natural gas or other hydrocarbons in a limited supply of air in free flames inside a large horizontal or vertical firebrick furnace. A recent development in the manufacture of furnace black is the utilisation of natural gas enriched with heavy oil residues, or "tank bottoms."

As a reinforcing agent for rubber, lampblack is inferior to both carbon black and acetylene black— the latter made in Canada and often known as Shawinigan black—but it is superior to carbon black in other respects. The colloidal and physical properties of the various blacks are most important in determining whether a particular grade is suitable as a pigment for ink or paint, or for compounding with rubber. The chemical composition alone is no guide to its reinforcing effect in rubber, nor to its physical behaviour in any other respect. As a general rule, a low volatile content indicates a pure carbon.

Concluding his paper, Major Cadman said there were several special and novel uses for colloidal carbon. It was mixed with concrete for colouring highways grey, thus deadening the glare of the sun's rays. In conjunction with liquid oxygen it gave explosives much used for demolition work and blasting. It has also been found that colloidal carbon is a valuable aid in grinding cement, as addition of small percentages to the clinker increases the ultimate fineness of the cement. Another recent development is in the impregnation of paper used for insulating material on high voltage electric cable, the carbon being incorporated in the paper pulp. Paper incorporating colloidal carbon also finds use as black wrapping for screening light from packed photographic paper and plates. In Alaska a distinctly novel use has been to hasten the melting of ice, and so enable water traffic to be opened up more quickly.

Swedish Chemical Industry

War-time Developments

IN a recent survey, the head of the Swedish Chemical Industries' Office, Mr. Berndt Löfström, outlined the considerable expansion of the Swedish chemical industries that took place during the war. The most marked development, he said, had occurred in the field of organic chemistry. For instance, the production of artificial resins on the basis of sulphite spirit and cellulose had been taken up by a number of Swedish firms, and the production of pharmaceuticals had reached such a scale that Sweden had been able to assist her neighbours as well as other countries with a large number of medical supplies. Moreover, Sweden is self-supporting in saccharin and acetylsalicylic acid, which are now produced as by-products at the Bofors Works.

As regards metals, the speaker stated that, as the supplies from abroad ceased, Sweden had had to increase her production of copper from the Boliden mines very considerably, while the same company also started the production of nickel and lead. The output of aluminium could also be extended to cover Sweden's own needs after the development of suitable methods for the exploitation of Swedish raw materials. Drilling for salt, which has been going on in Southern Sweden for a couple of years, had so far yielded poor results, said Mr. Löfström, although a depth of nearly 2 km. had been attained. However, it was hoped to find water with a higher salt content after further investigation. The output of chlorine and alkali had tripled, an expansion having been necessary in order to supply the growing cell-wool industry with some of its raw materials.

Minerals in Greece

Post-War Condition of Installations

SOME account of the position of the stocks and installations in the mineral-producing centres of Greece to-day, the first to be published since the war, is contained in a recent report of the U.S. Bureau of Mines (1946, 22, No. 2), which gives a description of the effect of enemy occupation on the Greek metal industries.

Bauxite

When the Germans occupied Greece, the Société Anonyme Mines de Parnasse sold the mines, installations, and existing stocks of bauxite to the German company Hansa Leichtmetall A.G. for 230 million drachmas. The Germans began working the deposits in 1942 and continued the exploitation for 2½ years. All the bauxite produced was shipped to Germany and Norway. About a year after the Germans left, Greek partisans blew up the installations, destroyed the shafts and the 8-km. ropeway from Topolia to Itea, and in other ways caused the mines to be shut down. It is believed that loading facilities at Itea are undamaged.

According to information received from the owner, no efforts were made to operate the Scalistiri mines at Eleusis during the occupation. Hansa Leichtmetall tried to force the sale of these mines, but by manipulations and evasions of one sort or another it was possible to stave off the Germans. However, 25,000 tons of ore at the loading wharf were seized by them. Exports of bauxite from Greece in 1940 amounted to 137,245 metric tons, of which 20,950 went to Britain, and 8400 to the U.S.A.

Chromite

The four principal producers of chromite in Greece are the Société Union Minière, which owns one of the most important mines at Xinca, north-west of Lamia; A. Apostolidas, with properties near Isagli; S. Papassotiriou, with the Burinos mine near Kozani; and P. Vryonis, with the Vavdos mine near Salonika, both the last two being in Macedonia. All these mines were damaged and sacked during the war and new equipment is necessary before operation can be resumed. Of the aggregate Greek chromite export in 1940 (32,118 metric tons), 26,281 went to the U.S.A., and 3427 to Britain.

Nickel

The only important Greek nickel mine is at Kokkino, inland from Larymna, and is owned and operated by the Société Internationale des Mines. Before the war, plans had been made to construct a plant in Greece to treat the ore, which contains 2.25 per cent. Ni. Krupps obtained an option to work these mines and did so until the contract expired in 1937. The Italians then obtained the contract and worked the mines until the war broke out. Greek workers were then so successful in sabotaging the mines that the annual production is said to have dropped from 50,000 to 10,000-15,000 metric tons.

After the collapse of Italy, the Germans took over the mines, using small sailing craft to transport the ore from Larymna to Salonika, and the railway thence through Bulgaria to Germany. The Germans later got control of a large Bulgarian vessel to ship the ore from Larymna direct to a Bulgarian port. When Greek partisans discovered the ship and its intended use, they attacked the mines, destroying all shafts and ending production. As the ore is too low-grade for export at present and large capital is needed for rehabilitation, it is not considered advisable to reopen the mines until a market is assured.

Virtually all the ore was exported to Italy from 1938 to 1943; until then Germany took most of the shipments. Production in 1939 totalled 53,456 tons; stocks on hand are estimated at 3500 tons.

Molybdenum

Traces of molybdenite are found in many places in Greece, but no real prospecting has been carried out except south of Gevgeli in north-west Macedonia, where during the war Krupps invested large sums in a flotation plant and other buildings, and built a small hydro-electric plant. No work is being done there now, though the machinery is intact. The mines are held under trusteeship by the Government. These deposits, the richest so far located in Greece, are said to contain about 1 per cent. MoS_2.

Gold

The two established alluvial gold areas in Greece are along the Galiko and Struma rivers, both in north-east Macedonia. It is said that 30 million cubic yards of gravels averaging 4 grains of gold per cu. yd. have been proved along the Galiko. Before the war, Northern Greece Goldfields Co. installed a dredge with a daily capacity of 5000 cu. yds., which operated for three months and produced 750 gms. of gold daily. The company has a 50-year lease for exploiting the deposits, which are close to rail transport. In order to resume operations, a general overhauling of machinery is necessary. The total amount of gold produced was 52 kg.

Electroplating During the War—II

Stopping-Off and Anodising

by E. A. OLLARD, A.R.C.S., F.R.I.C., F.Inst.M., and E. B. SMITH

(*Continued from* The Chemical Age, *June* 8, 1946, *p.* 638)

STEEL parts that require hard surfaces can be treated by case-hardening, nitriding, or some similar process to obtain a hard skin. In many cases this requires to be done over only a part of the article, that is to say, the article is required with part of its surface hard and part soft. Since the process of hardening involves a high temperature, that portion of the surface which is not to be hardened cannot be protected by such stopping-off media as are used in electrodeposition; and it is general practice to deposit on this portion a thin layer of some metal, *e.g.*, copper or tin, which prevents the hardening agent from coming into contact with the surface. Usually, the surface is ground after hardening, and the stopping-off material removed.

Electrodeposition for Stopping-off

For various mechanical reasons it became necessary to nitride the surface of a sleeve, while for metallurgical reasons it was decided to apply this nitrided surface to only that part of the bore which was subject to wear. This meant protecting the other part against the action of the ammonia used for nitriding. One of the best protections against such action is a dense coat of tin of about 0.0003-5 in. A coat of 0.0003 in. properly applied will give the necessary protection, though a badly applied coat of twice this thickness will permit some penetration of the ammonia. During nitriding the sleeve is subjected to a temperature of more than twice the melting-point of tin, so that the coating of tin must be sufficiently thin not to run off the tinned surface on to the surface which is to be hardened. As the ammonia is usually circulated by fan, drops of tin, if formed, would get blown about, usually on to bare parts.

With these facts in mind, something in the nature of an automatic plant was seen to be desirable, the more so in view of war conditions, which meant working with a staff almost all of whom had never seen an electroplating plant. The process was simplified. The sleeves were received from the production line free from rust, but with a coating of oil. This was removed in a hot bath containing 1½ oz. per gallon of caustic soda, sodium carbonate, and sodium cyanide. The jig to protect the part of the bore to be nitrided was then inserted and located by means of the block on the bench (Fig. 6). The special carrier was attached and the whole suspended in a cold cleaner. After swilling in cold water the whole was placed in the plating tank. An electric buzzer sounded until the jig was pushed far enough in to engage the travelling gear (Fig. 7). The sleeve moved along at a predetermined speed and, when the traverse was completed, rang an alarm bell until removed. The sleeve was removed from the plating tank and swilled in cold running water. The hanging gear and jig were removed and the sleeve was rinsed in hot water and blown dry, and finally inspected. Any tin that might have crept under the stopping-off jig was removed with a piece of teazed-out stick, moistened with a mixture of litharge and saturated caustic soda solution.

One of these simple automatic plants, worked by two untrained women under a shop foreman, delivered one sleeve every two minutes. Of the scores of thousands of sleeves plated by this plant there was not one scrap and no surplus of tin. After the nitriding, an appreciable amount of the tin was recovered by a reverse process, using another tank and solution.

Anodising

A great deal of the structure of an aeroplane is made from aluminium and it is desirable to have efficient method of protecting this, particularly on those machines which have to operate in a marine atmosphere. The most efficient way of protecting aluminium is undoubtedly by means of anodic oxidation, that is to say, the formation of an adherent coating of aluminium oxide on the surface. This is usually done by making the article the anode in a suitable solution under suitable conditions. A number of solutions can be used for this purpose, but the two most popular from the production point of view are the chromic acid (Bengough Stuart) and the sulphuric acid.

The chromic acid solution is the original solution used for this purpose. It is generally of about 3 to 5 per cent. chromic acid and is used in a steel tank, either the tank itself being used as the cathode or stainless steel sheets suspended in it. The work is made the anode and the voltage gradually raised, from about 10 v. at the start, to about 60 v., over a period of some forty minutes. This treatment forms a firmly adherent coating of aluminium oxide on the surface of the aluminium, which coating, besides being insulating, protects the aluminium against corrosion The coating may be made more resistant by sealing it in hot lanoline or some other suitable material, and, if desired, it can first be dyed to give it a characteristic colour. Pure aluminium and certain aluminium alloys can be treated quite satisfactorily in this way, but alloys having a high content of copper or silicon do not anodise satisfactorily.

The sulphuric acid process is somewhat similar except that the solution has to be used in a lead-lined bath, the lead lining of which is made the cathode. The voltage in this case is usually maintained steady at about 16 v. and the treatment time is of the order of 20 minutes. The film in this case does not show the high insulating properties of the chromic acid film and the current through the article, instead of falling practically to zero during treatment, is maintained at a steady value. After treatment the film can be dyed; it gives a more trans-

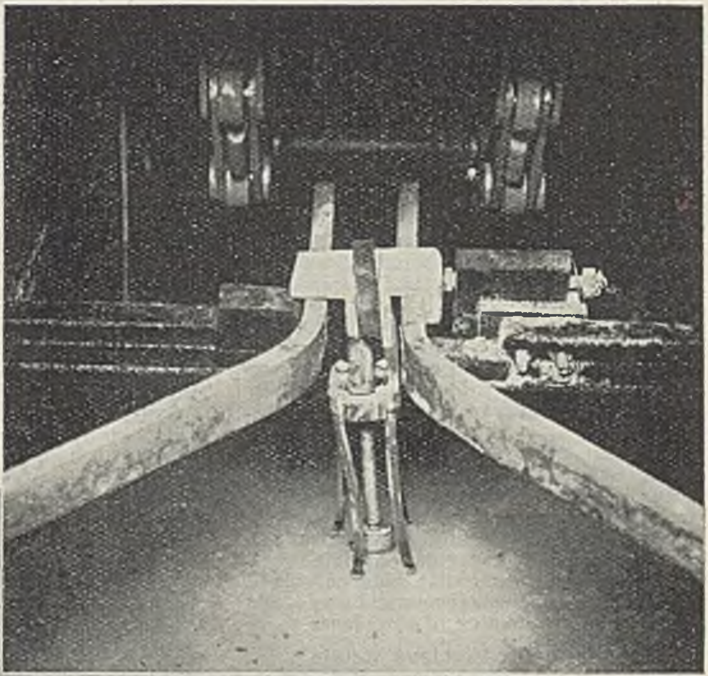

Fig. 7 (right). Cylinder liner set up for entering the plating barrels, showing anode and cathode bar and special holder which makes contact on both bars. This holder is made so that it cannot be put in the wrong way owing to a stop on the plant which engages with one side of the holder.

Fig. 6 (left). Cylinder liner showing block for registering rubber stopping-off sleeve, and also holding jig for central anode.

lucent colour than the chromic acid film, in appearance resembling a lacquer rather than a paint. The film may afterwards be sealed by boiling in hot water or by drying out and dipping in lanoline or other suitable material. After sealing it is highly resistant to atmospheric corrosion.

While the sulphuric acid process has certain advantages, particularly for articles that have to be dyed, it is not very suitable for protecting articles which are formed by riveting, etc., or which have other portions in which the solution might be trapped, since the sulphuric acid will corrode the aluminium, whereas the chromic acid will not. If, therefore, there is any difficulty in rinsing out the article after treatment, the chromic acid process is to be preferred. Anodising is sometimes used to assist in the inspection of the article, since it tends to show up any small cracks, etc., and for this purpose the chromic acid process is desirable as the film is more easily seen; any small cracks will absorb chromic acid, which can be readily noticed after withdrawal from the solution and rinsing.

In certain cases it was found desirable to colour aluminium articles an outstanding colour, *e.g.*, little rivets of different alloys were anodised and dyed different colours so that they could be readily identified on the assembly lines. The process of dyeing, apart from the purely decorative point of view, was found to be advantageous and was much used in the manufacture of aeroplanes.

Plating with Precious Metals

During the war enormous strides were made in the development of electrical instruments, *e.g.*, radar. The components of these instruments called for very special properties and it was often necessary to coat the surface with some highly conducting material, such as silver, in order to obtain the required electrical properties. Also it is often desirable to plate contacts, switch parts, etc., with platinium or rhodium in order to ensure that these keep bright and function satisfactorily. It can be definitely stated that many of the modern electrical instruments could not have been satisfactorily produced without the aid of electrodeposition, and only those who have been closely associated with this work know the full extent to which electrodeposition processes have been put. Unfortunately, many of these activities are still on the secret list and it is not possible to give details here.

Pickling of Bullets

Although the process of pickling metals in acid to remove scale, etc., is not actually an electrodeposition process, such operations are usually carried out in the plating shop and the plant involved is very similar to those used for plating processes. During the war huge quantities of bullets were required and these had to be pickled to remove the scale formed during fabrication. Ordinary methods of hand-dipping were too slow and special automatic barrelling plant was therefore evolved for this purpose (Fig. 8). Such processes, although comparatively simple by nature, were none the less necessary in order to maintain a supply of munitions, and it was even necessary to design special plant, etc., to deal with the quantities required. While such plant is naturally specific to the nature of the work, there is little doubt that the ideas evolved can be adapted for ordinary outside applications and find a place in post-war activities.

Summary

We have dealt above with some of the principal applications of electrodeposition

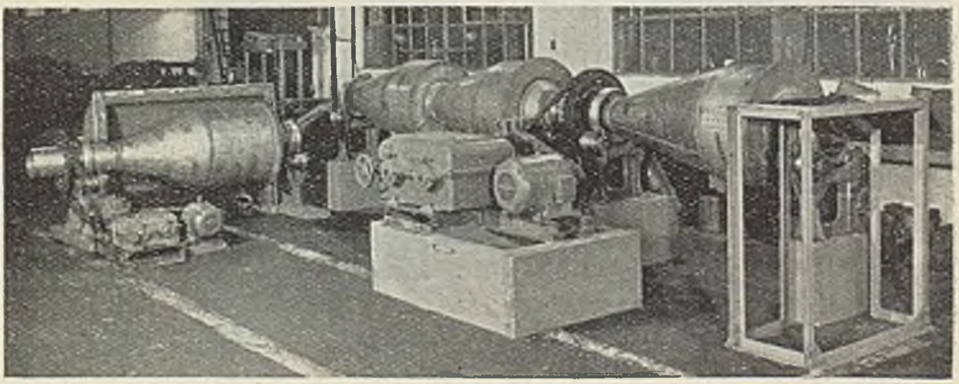

Fig. 8. Automatic barrels for pickling bullets. The stainless steel drums have a worm fitted inside so that the bullet cases can be fed continuously through the barrels. When working, these drums are partly submerged in the appropriate solutions, bullets being fed from one to another so as to give the required circle.

during the war. It will be seen from these that the processes described played an important part in the war effort and that without them we should probably not have developed the modern type of high-speed aeroplane or have provided it with the necessary instruments to enable it to carry out its deadly function efficiently. It must be remembered, however, that a certain amount of credit is due to the electrochemists, without whose assistance the above processes could not have been evolved. Not only has the electrochemist developed the processes instrumental in the production of articles concerned, but he has also supervised these same articles during their period of service and, on studying the various corrosion problems involved, has managed to increase their life very greatly so that they are able to give much longer service. For example, the flying period of which the air engine is capable without overhauls was increased in some cases by several hundred per cent., this in itself being an achievement which played an undoubted part in the ultimate victory.

ACKNOWLEDGMENTS

For the illustrations to the above article acknowledgments are made as follows: Fig. 1. Electrochemical Engineering Co., Ltd.; Fig. 2. Metal Finishes. Ltd.; Figs. 4, 5, 8. Canning & Co., Ltd.; Figs. 6, 7. D. Napier & Son, Ltd.

Public Relations

Address to Paint Manufacturers

AT the Summer Meeting of the National Federation of Associated Paint, Colour and Varnish Manufacturers of the United Kingdom, held at Scarborough on May 28-31, a challenging paper on "Public Relations" was presented by Mr. Norman J. Campbell, Director of the Federation. After an amusing introduction, in which he suggested it was perhaps unfortunate that at the start-off of their annual summer voyage, they should set sail on "Public Relations," because "any ship of the Relationship class is a poor vessel, requiring the most careful and expert handling even in the calmest weather," he classified the public, with whom they had to have relations, into three main categories: (1) the General Public; (2) the Industrial Public—other industries which are dependent upon the products of the paint industry for the finishing of their own products; (3) the Trade Public, including contractors, etc., and paint manufacturers who are not members of the Federation.

The importance of good relations with other manufacturers, Mr. Campbell maintained, could not be over-emphasised. Indeed, it might be regarded as a rather unfortunate condition that there were at least three trade associations representing paint manufacturers. These were in addition to the Paint Materials Trade Association, which was mainly a price-fixing organisation. It was suggested that the National Paint Federation, as the oldest-established association on the manufacturing side, should lead in any endeavour to secure the greatest possible unity among manufacturers. "The fact that we are the National Federation," Mr. Campbell said, "imposes on us, more than on any other of the associations of manufacturers, the heavy responsibility of viewing the paint industry as a whole. In its recent approach, with the Paint Manufacturers and Allied Trades Association, to the Government with regard to the shortage of raw materials, the Federation put forward the case as affecting the whole industry and not merely its own members."

It should not be regarded as a sign of weakness on the part of the National Paint Federation that it should enter into negotiation with the other associations in order to explore the possibilities of bringing about a greater spirit of unity among paint manufacturers. When the various associations combined to speak with one voice, great weight was added to what they said, and it was not an exaggeration to state that unless there were the best possible relations among the manufacturers in the industry as a whole, any attempt to cultivate goodwill in a larger sphere would be seriously handicapped.

Relations with Users

What had been stated with regard to the relations between the Federation and paint manufacturers applied to a considerable extent to the relations between paint manufacturers and the other side of the industry. It would be unreasonable to expect the manufacturers and the users always to see eye to eye. The problems confronting the users varied and were not the same as those with which the manufacturers were faced, but both sides served the public, and a close liaison between the two sides had much to commend it.

The best channel for reaching and impressing the public was probably the editorial columns of newspapers. This was particularly true under present conditions, when, on account of the shortage of raw materials, manufacturers were not concerned to increase sales of paint. What was needed was the goodwill of the public who used their products, having in view the time when they should wish them to buy more paint.

The public was entitled to be informed of the difficulties facing the industry, because: (i) it was in the last degree unlikely that the Government would do what the industry thought essential to make increased supplies of raw materials available, without strong pressure of public opinion; and (ii) the lack of paint and the difficulties of securing skilled service would tend to make an uninformed public blame manufacturers for conditions for which they were not responsible.

Who is to Handle Public Relations ?

The work of public relations was an exact occupation: more harm than good was likely to be done if it was entrusted to a novice. Such work could be undertaken either by an outside agency which specialised in public relations work, or by a public relations officer on the staff. It might be suggested that a whole-time public relations officer would be inclined to become parochial in his outlook, because he would be dealing with only one industry, whereas if he were a member of the staff of an outside organisation tackling a great variety of work, he would be better able to consider his problems from the point of view of an outsider. On the other hand, in an industry such as the one in which they were mainly interested, providing, as it did, many diverse problems, some of which arose unexpectedly and demanded, from the public relations aspect, to be dealt with immediately, it might be necessary, in order to achieve the best results, to have a man who would devote himself exclusively to the work.

Qualifications of a P.R.O.

It was probable, however, that sooner or later a whole-time public relations officer would be required, and accordingly it seemed desirable to set out some of his qualifications and duties.

(1) He must have been a close student of human nature and, while not necessarily a psychologist, must appreciate the value and use of psychology.

(2) He must have had such experience in journalism and of newspapers generally as would enable him to choose his newspapers carefully.

(3) He must be able to decide whether and when it was desirable to get the editor or a journalist on the staff of a newspaper to put matter as his own, rather than to publish over the signature of someone prominently connected with paint manufacture.

(4) He must be able to produce brochures and other publications that would have an appeal to the public, and know the proper use of types, blocks, etc.

(5) He must appreciate that, however great his ability, his work would require "window dressing." His propaganda must be attractively served to newspaper men and others invited to accept it.

(6) He must keep a continuous and careful check on all published statements affecting the industry and be able, immediately when necessary, in the case of inaccurate or misleading information, to have it corrected.

(7) He must be willing to work behind the scenes, since his appearance in the limelight would, at least on many occasions, defeat the object in view.

It was probably pertinent to observe that many other national organisations, and most Government departments, now had whole-time public relations officers. The tendency of the present time emphasised the importance of publicity and propaganda, and any trade or industry which neglected those essential matters would in time lose its position in the industrial economy of the country. If they were to hold their own with other industries, they must regard public relations as an essential function of the Federation, and be willing to spend what was necessary in order to carry out that function efficiently.

Shares for Workers

Mr. Charles Brotherton's Gifts

MR. CHARLES BROTHERTON, chairman of Brotherton and Co., ammonia distillers, Leeds, Wakefield, etc., is presenting £200 of the ordinary stock of the company to every employee with 25 years or upwards in the service of the company. In announcing this, Mr. Brotherton has written: "We have for many years been associated together in the service of the company and I hope that you will accept this gift as an appreciation on my part of the association. From now onwards you are directly interested in the prosperity of the company." Nearly 100 employees will benefit, so that the gift represents at least £20,000 on face value alone.

Mr. Brotherton is already well known for his habit of giving away money. Every employee of the firm had an extra £1 in his pay packet the week Mr. Brotherton's first child, Ann, was born, in 1939, and six months later Mr. Brotherton set up the Charles Brotherton Trust of £250,000, from which a yearly income of £10,000 is derived for educational and medical charities in Leeds, Birmingham, Wakefield, Liverpool, York, and Bebington. Recently, he gave £50,000 to provide and equip the Brotherton Wing at Leeds Infirmary for private patients.

Products ranging from air receivers to steel chimneys are illustrated and described in *Industrial Plant and Buildings*, an attractive brochure issued by Whiteley-Read Engineers, Ltd., Basford, Nottingham.

SAFETY FIRST

Industrial Plant Safety

A Retrospect

by JOHN CREEVEY

WHEN processes of chemical manufacture on a commercial scale first began to find a place in industrial activity, it was to be expected that there would be a series of disastrous happenings by virtue of the hazardous nature of certain chemicals and from the early developments in using high temperatures and some degree of pressure. Yet, looking back upon such records as have survived, it appears that the early days of chemical industry were tolerably safe in comparison with later progress, even when the relative dimensions of operations are allowed for. Of course, it is true that the introduction of newer products often in a condition of semi-stability, as well as the vastly wider utilisation of pressure for directing the course of some recognised reaction, have both had a tendency to increase the accident frequency. Yet many other factors have equally well contributed: for instance, the more diverse nature of the personnel employed, the greater stress on the need for exceptionally good maintenance demanded by increased production, and the exacting necessity for control of plant so that reactions should proceed in the desired direction when alternatives are possible with a narrow margin of physical factors.

Safe Working Essential

Perhaps it is only within the last thirty years that safe working has been very much stressed as essential for the welfare of an industry. I do not mean that the subject was previously ignored, but rather that its wider aspects alone received attention. There were Factory Acts already in existence, and although Lord Althorp's Factory Act of 1833 is notable chiefly for the fact that it set legal limits to the working hours of women and children, yet from the point of view of the chemical industry we must regard this Act as being the start of Government intervention to secure safer conditions, since its provisions were enforced by the appointment of factory inspectors with power of entry into the factories. Yet entirely apart from the causes which brought this Act on to the Statute Book, it has to be admitted that the appointment of factory inspectors was largely at the suggestion of some of the better disposed among the employers themselves. As pointed out by G. M. Trevelyan, in his *English Social History* (1944), the better employers wanted the Government to prevent the worse employers from undercutting them by defying this Act as they had defied earlier laws.

Without going into the history of Factory Acts, and such statutory rules and orders as have from time to time been made for controlling working conditions with a bias towards the attainment of safety, it can be safely assumed that greater interest in promoting safety measures from the aspect of the employer came equally from the desire to avoid loss of man-hours, with consequent disturbance of the normal routine of a factory leading to increased costs and a reduction in ultimate profits. Nevertheless, there were certain employers who evinced a greater consideration for the general welfare of their employees, and who instituted training for the sole purpose of making employees safety-minded. Pressure from Workmen's Compensation Acts also made compensation payable for injury sustained by workpeople engaged in their duties, and this touched the pockets of the employers still further to such an extent that it was a wise insurance to see that safety measures were adopted wherever the likelihood of accident arose from easily removable causes.

As for common accidents, there arose greater co-operation between fellow workers, who began to realise their individual responsibility towards each other, a step which made much progress when due publicity, by means of posters for display about the works, was accorded to common accidents and their causes. The plant designer, for his part, also devoted more attention to means for eliminating accident causes which were likely to be due to features of design and construction, and he was often able to turn a hazardous operation into a reasonably safe one, provided that employees had proper knowledge of chemical materials and processes and were conscientious workers. But even when plant has been properly designed from the safety aspect, and processes are controlled with full appreciation of the consequences of any divergence from a recognised safe course, and when personnel are carefully selected and trained for their particular work, the human element still remains.

Carelessness

Just what proportion of accidents is strictly due to carelessness on the part of plant personnel, or is to be regarded as arising from sheer negligence, it is difficult to say without analysing all the available facts, but that proportion is certainly high. The habitually careless worker has necessarily to be removed from any job where he constitutes a constant menace to fellow workers (let alone himself), yet it must not be overlooked that carelessness often results from environment, with particular stress laid upon conditions under which work is done. Good supervision wherever chemicals are in use does much to prevent the extension of carelessness on the part of employees. There should always be a certain degree of tidiness in any plant which is to operate in an efficient manner, so as to avoid conditions which normally hinder good working. For instance, drums must be properly stacked, irrespective of whether they are empty or full; waste material must be removed for proper disposal before it accumulates unduly.

Workers' Requests

Any desire on the part of workers for better and cleaner conditions must be attended to when a process is recognisably a dirty one. The complete elimination of a dirty process may be difficult to achieve, but much can be done to reduce the amount of dust and dirt, and the splashing of liquid. Alongside this, the worker becomes less likely to lapse into carelessness if he is provided with convenient facilities for washing and eating, and for resting in the intervals of normal duties. He does not demand extreme comfort, but at least a pleasant environment for his duties and likewise the means to divest himself of the works atmosphere at the end of each shift. Colliers appreciate the present-day facilities for taking a bath to remove the dirt and grime of the mine, yet it is not so long since they would all return home with obvious indications of the nature of their work, and had often to take their bath in no better situation than their own back-yard.

Improving Environment

Better environment and improved amenities when working in contact with chemicals have therefore come to be regarded as a ready means of reducing accidents. Those chemical works which have fostered better working conditions are already beginning to reap material benefits from their expenditure of money towards this end. A boiler house need no longer be the place it was 20 or 30 years back, and most certainly a modern crushing and screening plant may be operated without the former attendant disadvantage to health. Ventilation, illumination, sanitation, and the like, are all to be considered as amenities which increase the efficiency of a works, and in due turn reduce the causes of accidents; the share they take in attaining an accident-free record is no insignificant one. It is only in the best environment that other material improvements, such as the installation of a conveyor to reduce manual handling, really increase the general efficiency. Moving machinery is always likely to constitute a menace when the environment does not emphasise the presence of common hazards, irrespective of precautions specially adopted for guarding moving parts.

Probably at no time more than the present has there been a special need to improve the environment of industrial premises. Post-war expansion of industries, and the recruitment of labour which will be quite new to industry—even allowing for the transfer of those workers who were familiar with its war-time aspects—make it needful to do all that is possible to reduce the causes of accidents in general as well as in particular. But even with better working conditions it does not necessarily follow that accidents will be prevented unless there is constant education in safety matters; and this may have to be conducted on somewhat intensive lines if that training is to keep pace with new developments in processes and in the agencies by which processes are carried out.

Scarcely a week passes without some improvement in equipment for the benefit of those who operate chemical plant or are normally handling chemicals. The works manager or safety officer should be quick to obtain details of any "better way" which has become available. The old method of handling acid in glass carboys, for instance, gave place to a better way where acid was used in bulk. The new method of storing acid in specially-made chemical stoneware vessels, from which distribution to various parts of the works is effected by gravity or by aid of air pressure, was an outstanding instance of improvement for removing some of the hazards of acid handling.

Circulation of Information

Adequate knowledge of the causes of accidents helps greatly to avoid a repetition. For this reason it is good and proper for industry to co-operate in circulating information about the circumstances of an accident, rather than to hide the facts. Safety officers should be encouraged to visit outside works and there study such safety methods as have been adopted in the light of past experience. In a village, an outbreak of fire is a matter of concern to all the inhabitants, who gather to render what assistance they may. The analogy should apply in every industry, with a common concern for the welfare and safety of the workpeople at rival works; in the chemical industry, indeed, there is already a notable degree of co-operation towards attaining this end.

So far as co-operation among the workpeople themselves is concerned, they should be encouraged to put forward suggestions, from their experience, of conditions which tend to become hazardous, and for the provision of better environment and amenities in tasks which, in contact with chemical processes, may not always be too pleasant.

Japan's Chemical Industries

Significant Production Changes

(from a Special Correspondent)

ACCORDING to the latest advices received from Japan, production of chemicals has remained generally at a low level in recent months. However, the output of certain important materials, especially of fertilisers, increased appreciably during the early spring. Basic heavy chemical manufacture runs at about 23 per cent. of present production capacity and at about 18 per cent. of estimated minimum requirements. In the fertiliser sphere, a thorough and continuous attempt is being made to increase output, and allocations of coal and of sulphuric acid indicate a further general increase. It appears that lack of transport and of liquid funds are the most serious obstacles, but the latter is expected to be reduced considerably as a result of discussions in progress between the occupation authorities and Japanese officials.

Industrial Chemicals

The critical salt shortage, felt in industry and households alike, continued; production in February was about 12 per cent. of the 108,000 tons considered to be the monthly minimum requirement, with the result that allocations for domestic purposes were not met. In the soda industry, limited production was resumed by three of the four existing Solvay process plants. Eighteen of the country's 35 electrolytic plants in working condition reported limited operations. Principal gains occurred in the production of hydrochloric acid, bleaching powder, liquid chlorine, and other chlorine products. Production of small quantities of commercial explosives and accessories continued under authority of the Supreme Commander and an increase was envisaged for the first half of this year. Production of ethyl alcohol declined by about 50 per cent. as compared with January owing to the depletion of raw material stocks which are being used for food purposes. The following table gives a picture of the production rates of certain important chemicals:

	Present rate (tons p.a.)	Per cent. of present capacity	Per cent. of minimum needs
Soda ash	18,600	6	21
Caustic soda	15,400	4	9
Salt	158,000	22	12
Ammonium sulphate ...	253,000	49	18
Sulphuric acid—			
(100% contact) ...	86,000	11	14
(62% chamber) ...	245,000	31	31
Hydrochloric acid ...	7,800	4	10
Benzene	1,910	3	15
Toluene	24	0.3	0.8
Dyestuffs	198	0.5	5

It is perhaps not generally realised in this country that a considerable expansion occurred in Japan's optical industry during the war. Before 1936, optical glass was made on a limited scale only, annual output amounting to about 13 short tons. A moderate increase took place until 1939, in which year output aggregated 92 tons. After Pearl Harbour, production increased materially every year; it amounted to 251 short tons in 1942, and reached a war-time high of 475 short tons in 1944, valued at over 223,000 yen. Needless to say, only about 4 per cent. of this was allocated to civilian needs.

The present stock of optical glass amounts to about 300 short tons, valued at over 15,700,000 yen, a quantity equal to the production of 1936-1940, inclusive. Some production facilities have been destroyed by fire during the war, but sufficient equipment still exists to produce 330 short tons per annum, provided that coal and raw materials are made available. Because of these large stocks, no production is going on at present.

Glass and Ceramics

In the manufacture of sheet glass, since Japan's pre-war production was second only to that of the United States, there is an extremely large production capacity. Production was controlled by two concerns, the Mitsubishi Chemical Industrial Co., Ltd. (formerly Asahi Glass Co.), and the Nippon Plate Glass Co., Ltd., with plants at Amagasaki, Makiyama, and Tsurumi, and Wakamatsu and Yokkaichi, respectively. One plant was operating in December, 1945, with a monthly rate of output of 30,000 cases (of 100 sq. ft.); another restarted work in January with a capacity of 20,000 cases per month, and the three other plants were scheduled to resume production in April and May. The industry's present estimated capacity totals 150,000 cases per month, while monthly potential output totals nearly 500,000 cases.

In 1938 Japan had 1080 glassware factories with a combined output of over 506,000 tons. In order to conserve raw materials and to concentrate on essential production lines, the plants were rationalised in 1941 and 1943 and their number reduced to 180, with a total annual capacity of 156,300 tons. Monthly output totals at present 1500 tons, while the market for this year is estimated to absorb over 180,000 tons, including 150,000 tons of bottles and containers.

In the field of ceramics, 6500 units operated in 1938, making a wide assortment of products needed both at home and abroad. Most of these plants were small family businesses, employing less than five workers. Many were either closed down during the war or had been turned over to war production. Equipment has deteriorated and little of it is in a condition to be used again immediately. The refractory industry also is operating on a very limited scale. Present capacity is estimated at 118,500 tons monthly, but in December, 1945, a mere 12,523 tons of products were manufactured, including over 10,000 tons of fireclay. While Japan produced and exported in former years appreciable quantities of vitreous enamelware, including chemical ware, production is at present confined to household items only.

Match Production

Of the 68 major pre-war match manufacturing companies, only 34 remain. Fourteen of the largest plants were destroyed by fire as a result of bombing, and 20 units have been closed down. However, some of the latter companies are rebuilding their plants in anticipation of an early resumption of manufacture. The trend of production has been steadily downward in recent years: output fell from 415,000 match tons before the war (a match ton is equal to 600 small boxes of matches), to 187,500 match tons in 1944, and declined further to 99,000 in 1945.

Parliamentary Topics

By-Product Plants

In the House of Commons last week, Mr. Harold Neal asked the Minister of Fuel and Power whether he had any statement to make concerning the future public ownership of coal by-product industries; and Major Peter Roberts asked whether the Minister had any further statement to make with regard to nationalising carbonisation and other utilisation plants.

Mr. Gaitskell replied that he was not in a position to make any further statement.

Major Roberts wanted to know how that statement could be reconciled with the statement made by the Minister recently at Bolsover, that carbonisation plants were not to be brought into the nationalisation net; to which Mr. Gaitskell replied that the Minister was not then in a position to make a full statement about carbonisation and by-products plants.

Mr. Jennings: How much longer must these industries suffer this uncertainty?

Mr. Gaitskell: Not for long.

Oil Control Order

Mr. J. Lewis asked the Minister of Food whether waste machine oils with a castor oil base were subject to the Oilseeds, Vegetable Oils and Fats and Marine Oils (Control) Order, 1939.

Mr. Strachey: Whether an oil of the mixed character described falls within the scope of the Order can be determined authoritatively only by a Court of Law in the light of evidence as to the constitution of the oil.

Scientific Workers' Salaries

Mr. Watkins asked the Minister of Agriculture whether he would raise the salaries of scientific workers in his research stations to a higher level than £250 per annum, to ensure the recruitment of efficient men.

Mr. T. Williams: The salaries of qualified scientific workers in the research stations for which my Department is responsible are already generally in excess of £250 per annum, and the scales are now being reviewed in the light of the proposals in the White Paper on the Scientific Civil Service.

Colonial Yeast Factories

Mr. Dodds-Parker asked the Secretary of State for the Colonies whether he was satisfied with the progress made by the Colonial Food Yeast Company, in Jamaica; and in which other colonies he intended to set up further yeast factories.

Mr. George Hall replied that the Colonial Food Yeast Company's factory in Jamaica began production of food yeast on a limited scale about a month ago, but production had been interrupted owing to technical difficulties which had been investigated and which it was hoped would be overcome in the very near future. The erection of a factory in Mauritius was under contemplation if circumstances proved favourable, and certain preliminary investigations had been undertaken.

TEXTILE INSTITUTE CONFERENCE

Visitors from the U.S.A., Ireland and all parts of Britain will be among those attending the first post-war conference of the Textile Institute at Scarborough from Thursday, June 13, to Tuesday, June 18. It is seven years since the last such conference was held, and it is appropriate that the conference is to have as its general subject "Developments in the Textile Industry during the War Years." The subject will be covered in more than a score of papers which are to be presented and discussed. Papers of particular interest to chemists and chemical engineers are being presented as follows: June 14: Mr. R. A. Bettridge (Tufnol, Ltd.): "Textile Development and its Application to Laminated Fabrics"; Mr. J. H. Jarman (Tufnol, Ltd.); "The Engineering Aspects of Laminated Plastics." June 15: Professor J. B. Speakman and Dr. A. K. Saville (Leeds University): "Some Physical Properties of Nylon"; Dr. Traill (I.C.I., Ltd.): "Protein Synthetic Fibres."

Personal Notes

LIEUT.-COL. F. J. GRIFFIN has taken up his duties as general secretary of the Society of Chemical Industry.

DR. E. A. GUGGENHEIM, F.R.S., has been appointed professor of chemistry at Reading University.

MR. G. R. KNOX MAWER is the new president of the Pharmaceutical Society of Great Britain, and MRS. J. K. IRVINE, who has been elected vice-president, is the first woman to become an officer of the Society.

PROFESSOR EDWARD DODDS, who is Professor of Biochemistry at London University and was the discoverer of stilboestrol, the drug used in the alleviation of certain types of cancer, has been awarded a prize of £1000, given by Mr. C. L. Mayer, of New York, for his work on cancer.

MR. G. S. WOOD and MR. R. F. STAGG have been appointed local directors of Thos. W. Ward, Ltd., Albion Works, Sheffield. Each is a son of a joint managing director, the former of Mr. G. Wood, who is also deputy chairman of the company, and the latter of Mr. F. R. Stagg

DR. J. J. SLEIGHTHOLME has been elected chairman of Manchester section of the Oil and Colour Chemists' Association, with MR. F. FANCUTT as vice-chairman. MR. D. M. WILSON, retiring chairman, has taken over the hon. secretaryship from Mr. H. H. Hebblethwaite, who, although re-elected, has since resigned on medical advice.

Lever Brothers & Unilever and Lever Brothers & Unilever N.V. announce that MR. RUDOLF JURGENS, who reached the retiring age shortly after the outbreak of the war, but continued on the board of the Dutch company throughout the German occupation of Holland, and on the liberation of that country was reappointed to the board of the English company, has resigned his directorship in both companies.

Having completed the task of winding up the London Shellac Research Bureau and of reporting upon the state of shellac manufacture and bleaching industries in Germany, DR. B. S. GIDVANI has now relinquished the post of Director and Lac Information Officer. He is taking a short holiday in India and expects to return to this country in September to start a private consulting practice on resins, plastics, paints, varnishes and allied products.

DR. T. HOWARD BUTLER, who was appointed a vice-chairman of the executive board of the British Tar Federation in January, as leader of the representatives appointed by the Association of Tar Distillers, and has since occupied the chair in the absence through illness of Mr. A. E. Sylvester, has been appointed chairman of the board for the current year. Mr. Sylvester, who leads the British Gas Council representatives, has been appointed a vice-chairman.

MR. R. J. HANNAY, B.Sc., F.R.I.C., works manager of the Bollington Printing Co., Bollington, near Macclesfield, has been appointed dyestuffs adviser to the Association of British Chemical Manufacturers as from August 6. Mr. Hannay will work from the office of the Dyestuffs Control, Arkwright House, Parsonage Gardens, Manchester, in conjunction with Mr. Whitehead, the technical adviser appointed by the Colour Users' Association. The A.B.C.M. has recorded its indebtedness to MR. P. GUTHLAC JONES, who came out of retirement when Mr. C. H. Heap died in April, 1941, in order to help the dyestuff makers during the war period.

Obituary

MR. WALTER H. WATSON, of Darwen, who died on June 4, aged 71, was until his retirement in 1944, vice-chairman of Wallpaper Manufacturers, Ltd., and managing director of the Darwen and district branches. He entered the firm in 1888 and was for a time Paris representative.

DR. HOWARD W. STARKWEATHER, news of whose death on May 18 reached us last week, was well-known in the American chemical industry. Latterly he directed research in the fields of elastomers and fine chemicals in the Jackson Laboratory of E. I. du Pont de Nemours & Co., Wilmington, Delaware.

Referring to the brief obituary notice of DR. E. B. R. PRIDEAUX in our issue of May 18, a Nottingham correspondent has sent us some further particulars of his interesting and distinguished career. Born in Barbados in 1878, Dr. Prideaux was educated at Canterbury College, New Zealand, and married Annie, daughter of Mr. Rowland Bramwell, of Auckland, N.Z. He came to England in 1901, and worked at Nottingham University College from 1914 until his death.

His research work was catholic and covered many aspects of chemistry. On the inorganic side he interested himself specially in fluorine, selenium, tellurium, bismuth, zirconium, sulphur, and phosphorus, and his work on the *Theory and Use of Indicators* was embodied in a well-known volume. On the physical side he worked on dissociation constants, on diffusion and membrane potentials, and on electrophoresis, and he contributed to modern theories of molecular structure. Latterly he devoted much study to the combination of fatty acids with nitrogen bases, to the analysis of nitrotoluenes, and to the determination of alkaloids, and, in a rather different vein, to the corrosion of cement.

Digest of Statistics

Chemical and Allied Figures

ALL-ROUND increases in production and consumption figures for the chemical and allied trades are recorded in the recently-published fifth issue of the Monthly Digest of Statistics (H.M.S.O., 2s. 6d. net). All figures given below are in thousand tons.

Sulphuric acid production, which fell from 153.9 in December, 1945, to 141.4 in February, rose sharply in March to 165.1, and production of superphosphate, which dropped from 98.4 in January to 77.2 in February, went up in March to 88.1. Compound fertiliser production also showed a significant increase: in December, 1945, it was 97.9 and in March 138.3.

Consumption of pyrites, which dropped from 17.4 in January to 16.5 in February, rose in March to 19.1—the highest figure for more than a year. Consumption of sulphur for the manufacture of sulphuric acid was 16.8 in March, as against 14.1 the previous month, this again being a higher figure than for several months. Spent oxide consumption, which totalled 14.9 in February—the lowest figure for a year—increased to 16.6 in March, while sulphuric acid consumption, which in February was 148, leapt to 169, the highest it has been for two years. The consumption of phosphate rock for fertilisers went up to 68.6 in March, after being 64 in February, and superphosphate consumption at 128.1 in March was higher than it has been for more than two years. Another marked increase was in the consumption of compound fertilisers, the March figure of 217 comparing with 164.2 in February. Basic slag consumption went up from 47.3 in February to 52.9 in March.

Stocks of pyrites rose from 70 in February to 84 in March, but stocks of sulphur for the manufacture of sulphuric acid dropped from 49.3 in February to 39.3 in March, and sulphuric acid stocks declined, too, from 90.4 in February to 87.8 in March. Stocks of spent oxide increased from 131.3 in February to 132.7 in March. The decline in stocks of ammonia (excluding ammonia produced in by-product factories and converted directly into ammonium sulphate) continued: in February they were 5.87, and in March 4.49.

Iron ore production dropped in April to 244, after being maintained at 256 in March (the same figure as for February), but production of pig-iron rose from 147 in March to 149 in April. Virgin aluminium consumption in March was much the same as in February, the respective figures being 2.59 and 2.58.

The estimated number of people employed in the chemical, explosives, coke ovens and by-products works (figures in thousands), continues to go down. In February it was 233.4 and in March 228.3; of the latter figure, 83.4 were females.

Pulverised Fuel

Forthcoming Conference

THE Institute of Fuel is arranging a conference on pulverised fuel for May, 1947. The purpose is to get together full up-to-date information on the preparation and use of pulverised fuel, including its advantages and disadvantages compared with other forms of fuel. It is hoped to cover the whole field, including steam raising, cement kilns, metallurgical and other furnaces, and details of developments in pulverised fuel practice, not only in this country, but in America, France, Germany, Australia and elsewhere. The aim is to make available independent authoritative information on all aspects of pulverised fuel production and firing, and, through the experience of present users, to assist manufacturers in the development of design of pulverised fuel equipment.

The Conference will provide authoritative information for the use of the Ministry of Fuel and Power and the National Coal Board in their deliberations upon the most efficient preparation of coal for the market. It will also indicate problems to which research in this field might be directed with advantage, although the primary aim of the Conference is to deal with essentially practical problems in the use of pulverised fuel. The Pulverised Fuel Conference Committee is under the chairmanship of Mr. B. Samuels, of the Institute of Fuel, and is representative of all sections of industry likely to benefit.

LACTIC CASEIN PRICES

A revised schedule of selling prices for lactic casein sold by the Board of Trade through the agency of the Lactic Casein Importers' Association, Ltd., 23 St. Swithin's Lane, London, E.C.4, came into effect on June 1. Prices per ton (net, ex warehouse), for lots of one ton or over, are as follows: 90-mesh, £185; 60-mesh, £180; 30-mesh, £180; soluble, £190. For lots of under one ton, the price is £5 more in each case.

There has been a great increase, in recent years, in the processing of highly corrosive liquids and gases at high or fluctuating temperatures. In many instances it was found that acid-resisting chemical stoneware was the only available material that would withstand the corrosive attack that occurs, yet, on the other hand, the resistance of standard chemical stoneware to thermal shock is relatively low in comparison with other materials. Doulton & Co., Ltd., Lambeth, London, S.E.1, have devoted much research to this problem and new stoneware produced as a result of this is described and illustrated in the latest section (Section 4) of their Chemical Stoneware Catalogue.

General News—From Week to Week

The Paint Industries Club annual golf competition, which has not been held since 1939, has been revived and will be held at Moor Park, near Rickmansworth, Herts., on June 25.

Uni-Seco, Ltd., is the new name of the company formerly known as Uni-Seco Structures, Ltd. The registered address (25 Upper Brook Street, Park Lane, London, W.1), the constitution of the company and all other relevant matters continue unchanged.

Among the grants under the Colonial Development and Welfare Act, 1945, made to the Colonial Empire in April for development, welfare and research, and totalling £546,434, the largest, for £152,160, goes to Nigeria for oil palm research.

The Bristol Section of the Oil and Colour Chemists' Association closed its 1945-6 session on May 31, when Mr. E. V. Colman opened an interesting discussion on "What the Decorator wants from the Paint Chemist." Mr. W. G. Wade was in the chair.

When fire broke out in an Edinburgh factory owned by Messrs. J. & J. Cunningham, manufacturers of sulphuric acid, artificial manures, etc., firemen had to use breathing apparatus while quelling the outbreak. The heavy fumes came from 200 tons of sulphur and 180 tons of spent oxide.

A committee has been set up to report on the organisation of the salt-glazed pipe industry. It includes four representatives each from the employers' and workers' organisations, Sir Wilfrid Garrett, formerly Chief Inspector of Factories, Mr. A. T. Green, of the British Refractories Research Association, and Mr. A. Haselden, of the Ministry of Supply.

The silver jubilee of the National Pharmaceutical Union, which occurs this year, was celebrated by a dinner at the Dorchester Hotel, London, on May 29, presided over by Mr. H. Steinman, chairman of the N.P.U. A cheque for £4650 and an illuminated album from the members were presented to the hon. secretary, Mr. G. A. Mallinson, in appreciation of his services.

The I.C.I. scheme to erect important research laboratories and a tall administrative block in extension of their works at Morley, Wilmslow, Cheshire, is meeting with opposition from the local Council, who fear a threat to the district's green belt. The Council is willing to consider single-storey research buildings, but the company points out that such a restriction would involve the abandonment of the scheme and might lead to the closing of the existing installations at Morley. Discussions are now in progress on the question of possible alternative sites.

The Unity Mill, Belper, was bought by the Hexoran Co., Ltd., a Manchester chemical firm, for £5450, at a recent public auction. It is stated that the firm would move to Belper because the present factory was unsatisfactory and it had not been found possible to obtain alternative premises in the Manchester district.

A well-produced souvenir booklet has been issued by British Titan Products Co., Ltd., to mark the placing of foundation stones by Mrs. H. S. Tasker and Mrs. C. J. Stopford on the site of the company's new factory on Grimsby's new industrial estate at Pyewipe on May 29. Initially, the factory will employ about 300.

A provisional Board, which was appointed by the Secretary for Scotland last December to consider the possibility of setting up a seaweed factory in the Western Islands, has now recommended that a more limited experiment should be introduced in the first instance. The Scottish Office is giving careful consideration to this experiment.

The Ministry of Supply Advisory Service on Rubber has issued a report (Circular No. G.4) on "Utilisation of Synthetic and Natural Rubber Waste," based chiefly on researches initiated by the Controller of Chemical Research and Development, Ministry of Supply, and carried out by the Research Association of British Rubber Manufacturers.

Sir Henry Tizard, K.C.B., F.R.S., President of Magdalen College, Oxford, Dr. C. J. Mackenzie, President of the National Research Council of Canada, and Dr. B. F. J. Schonland, President of the Council of Scientific and Industrial Research, South Africa, are among the distinguished scientists who will receive honorary degrees from the University of Cambridge at a Congregation on June 24.

As a result of the recent annual election, the council of the Electrodepositors' Technical Society to hold office for the session beginning in September next is constituted as follows: *President*, Dr. S. Wernick. *Immediate past president*, Dr. J. R. I. Hepburn. *Vice-presidents*, Dr. H. J. T. Ellingham, Dr. G. E. Gardam, Mr. F. L. James. *Hon. treasurer*, Mr. F. L. James. *Deputy hon. secretary*, Mr. S. W. Baier. *Ordinary members of the council*, Dr. J. E. Garside, Mr. R. A. F. Hammond, Mr. H. Silman, Mr. A. Smart, Mr. A. W. Wallbank. *Faraday Society representative*, Dr. A. Hickling. *Ex-officio members*, Mr. N. A. Tope (chairman, Midlands Centre), Mr. R. C. Davies (hon. secretary, Midlands Centre), Mr. E. A. Ollard (hon. secretary, Standards Committee).

Foreign News

Rationing of common salt in Italy has recently ended.

Chile's first quota of assistance to UNRRA will include 10,000 tons of nitrate of soda, besides food.

A further iron-ore deposit has been discovered in the U.S.S.R. on the border between Karaganda and Semipalatinsk regions of Soviet Central Asia.

The International Petroleum Company has been authorised by the Peruvian authorities to carry out oil exploration work in the Piura and Lambayeque zones.

Representatives of U.S.A. financial interests are reported to be negotiating with the Chilean Government regarding large-scale manufacture of wood-pulp in Chile.

A Copper Sales Corporation has been formed in Chile with the purpose of stimulating and co-ordinating the activities of small copper producers. A scheme has also been put forward for the construction of a smelting and refining plant in North Chile.

The Egyptian Chamber of Deputies is to consider a new bill dealing with the working of mines and quarries. It regards mines, subsoil and surface minerals as State property and provides for the establishment of a Mines and Quarries Council. The working of mineral deposits will require a licence from the Ministry of Commerce and Industry.

The Combined Tin Committee has announced additional allocations for the first six months of 1946, totalling 9476 long tons. These include 2350 tons to the U.S.A., 2840 to France, 1070 to Canada, and 640 to India, the balance being distributed among other European, Middle Eastern, and Latin American countries.

Action is to be taken by the Commonwealth Government to secure control over Australian uranium deposits by discussion and arrangement with the States. Efforts will be made also to co-ordinate and direct investigation and research into the resources, processing and utilisation of radio-active minerals.

After an interval of seven years, the annual French Congrès de Chimie is to be revived this year, and the 20th Congress will be held in Paris on September 22-28. It will be remembered that the 19th Congress came to an unhappy end, preparations for its celebration in Warsaw having been fixed for the end of September, 1939.

The Belgian iron and steel industry's operations were hampered in April by insufficient deliveries of coal and coke from the Ruhr. Output was about 160,000 tons, with 47 blast furnaces in operation. Order books are reported to be full and many companies have to decline export orders at present.

In Czechoslovakia, the National Chemical Works, Dynamit-Nobel, Bratislava, has been formed as a so-called national concern, embracing four chemical and rayon works. In the magnesite industry, the Slovak National Magnesite Works have similarly been created from four industrial units.

Extensive iron ore deposits have been discovered near Bello Horizonte, north-east of Itabira, Brazil. The Monte Caué, a mountain in this district, consists entirely of hematite. This discovery means that Brazil now claims more than 22 per cent. of the known iron deposits of the world.

The Dow Chemical Company, Midland, Mich., has announced the immediate resumption of magnesium production at the company's sea-water plant at Freeport, Texas, which has been closed since the end of the war. It is expected to reach full capacity by mid-summer.

The U.S. War Assets Corporation has announced that it will sell or lease the Government-owned magnesium plant operated during the war by the Dow Chemical Co. The latter has planned a reconversion programme, involving an expenditure of $15,000,000 at its own plant at Freeport and will include the Government plant if it succeeds in acquiring a lease on it.

A pessimistic view of the future of the mercury market is contained in the annual report of the Stabilimento Minerario del Siele, Italy's second largest mercury producer. A marked decline in purchase is considered inevitable, while stocks are said to be very high. Italy's mercury industry is especially hampered by high production costs, increasing wages and taxation.

Using the most modern type of equipment, Zinc Corporation Ltd. will drill for natural gas on an area of 8000 sq. miles east of Lake Frome in Western New South Wales. If gas of suitable quality and in adequate quantity is found, a pipeline will be laid to Broken Hill. At present power for the three large mines at Broken Hill is supplied from a central power plant equipped with diesel engines using fuel oil.

Forthcoming Events

June 17. Electrodepositors' Technical Society. Northampton Polytechnic, St. John Street, London, E.C.1. 5.30 p.m. "Question Box" meeting.

June 19. North-Western Fuel Luncheon Club. Engineers' Club. Albert Square, Manchester, 12.30 p.m. Mr. A. C. Hartley: "Operation PLUTO."

June. 20. Chadwick Public Lectures. The Chelsea Physic Garden, Swan Walk, Chelsea, S.W.3, 4 p.m. Dr. Ellen M. Delf: "Plants in the Service of Mankind."

June 21. Society of Chemical Industry (Manchester Section). Central Library, St. Peter's Square, Manchester, 6.30 p.m. Professor H. Mark: "Molecular Structure and Mechanical Properties of High Polymers."

June 24. Association of Austrian Chemists, etc., in Great Britain. 69 Greencroft Gardens, London, N.W.6, 7.30 p.m. Professor Gross: "Production of Metals by Distillation."

New Companies Registered

Refinery Equipment and Speciality Co., Ltd. (411,909).—Private company. Capital £10,000 in £1 shares. Designers and manufacturers of engineering appliances of all kinds and, in particular, plant for the chemical industry, petroleum refining, etc. Directors: F. Wheatcroft, A. Morrison. Registered office: Research Laboratories, Godstone Road, Whyteleafe, Surrey.

International Penicillium Products Company, Ltd. (411,764).—Private company. Capital £8000 in 7000 6 per cent. non-cumulative preference shares of £1 and 2000 ordinary shares of 10s. each. Manufacturers, sellers, buyers, and dealers in penicillium notatum living hyphae productions or similar or kindred products, including the grant or assignment of licences in respect of such productions; chemists, druggists, etc. Directors: F. Fyles, E. Horner. Registered office: Spencer House, South Place, Moorgate, E.C.2.

Chemical and Allied Stocks and Shares

STOCK markets again showed cheerfulness. British Funds tended to be higher with a further upward move in leading industrials and business in other sections was inclined to increase. Shares of companies connected with the chemical and kindred industries participated in the general trend and were favoured, together with shares of companies in other industries outside the Government's nationalisation plans. The nationalisation groups generally were dull and uncertain. Colliery shares have been unresponsive to a number of dividend increases, while iron and steels continued under the perplexities aroused by the Government's proposals. Home rails, however, although again lower on balance, attracted a little buying interest at the lower levels.

Imperial Chemical were good at 44s. 10½d. in response to the view that the 8 per cent. dividend basis of recent years should at least be maintained in future. Levers rallied slightly to 56s. 9d., and Turner & Newall at 92s. recorded a strong advance. United Molasses moved up to 58s., British Match to 50s. while awaiting the dividend announcement. Distillers have been active around 129s. Increased attention was given to shares of companies connected with plastics, Thomas De La Rue rising to £12 on higher dividend hopes, while British Xylonite were £8⅛, British Industrial Plastics 2s. shares 9s. 3d., and Erinoid 13s. 6d. Dunlop Rubber further advanced, changing hands at over 71s. before the annual meeting.

Greeff-Chemicals Holdings 5s. ordinary remained firm at 12s. on further consideration of the past year's results; but elsewhere Goodlass Wall at 28s. 3d. failed to recover the reaction which followed the dividend announcement, although the latter was in accordance with most expectations. B. Laporte were firm at 96s. 4½d. on the acquisition announced by the company. Fisons have been more active around 61s. 6d., and in other directions, dealings ranging from 19s. 4½d. to 19s. 10½d. were shown in Imperial Smelting. British Aluminium further strengthened to 42s. 6d., Borax Consolidated were 49s. and General Refractories attracted up to 25s. 1½d. Murex, at 75s., also moved higher. A further rise to 48s. 1½d. was recorded in Blythe Colour 4s. ordinary. British Glues & Chemicals 4s. ordinary were 14s. 7½d., Metal Box £5⅝, and British Oxygen changed hands over £5 awaiting the dividend announcement. Triplex Glass 10s. ordinary continued in demand, rising further to 46s. 6d. on higher dividend hopes and recognition of the strong balance-sheet position; issued capital is entirely in ordinary shares, there being no preference shares or debentures.

Among iron and steels, Allied Ironfounders 58s., Babcock & Wilcox 65s. 3d., Colvilles 24s. 1½d., Davy Engineering 39s. 6d., and South Durham Steel 24s. 6d., became firmer. On the other hand, United Steel further receded to 22s., Dorman Long to 24s. 1½d., Guest Keen to 41s. 3d., Hadfields to 26s. 9d., and Staveley to 46s. Shipley, at 31s. 9d., eased slightly despite the increased dividend. Textiles were unsettled by the lower profits reported by Bleachers. Shares of the latter fell back to 14s. 6d., while Bradford Dyers eased to 26s. 7½d., and Calico Printers to 23s. 9d. Courtaulds, however, at 56s. 6d., rose with leading industrials, Coats were 63s. and British Celanese (36s.) also moved higher on balance.

Talk of the prospect of resumption of interest payments has maintained activity in German Potash bonds, the 7 per cents. being 59½ and the 6½ per cents. 59. Associated Cement have further advanced to 70s. 6d. under the influence of the higher profits recently announced, while British Plaster Board changed hands at close on 38s. Boots Drug were 60s. 3d., Sangers 33s. 3d., Beechams deferred 25s. 7½d., and Griffiths Hughes 60s. 4½d. Leading oil shares were helped by the higher Shell payment, but earlier gains have not been fully held.

Prices of British Chemical Products

FOLLOWING the Whitsun break, a quiet opening was expected in the London chemical trade, but the market seemed to tend to activity and a steady demand for most of the industrial chemicals has been in evidence. Contract deliveries are going forward and a fair volume of new inquiries has been in circulation. Price conditions throughout the market remain steady, with the undertone decidedly firmer. Continued pressure for supplies of bichromate of soda is reported, while in the potash section there is a scarcity of offers for yellow prussiate. Oxalic acid is a firm market on a restricted demand, while citric acid and tartaric acid continue to be in good call. In the coal-tar products section business is again restricted by a scarcity of stock supplies. A persistent export demand for the higher grades of cresylic acid is reported, and there has been a steady demand for the benzols and xylols. The quoted rates for anthracene oils are firmer.

Manchester.—In consequence of the Whitsuntide holidays, which are widely observed in and around Manchester, operations in the chemical-using industries in this part of the country during the past week have been seriously restricted and this has been reflected in trade on the chemical market itself. New inquiries have been on a much smaller scale and actual additions to order-books for the alkali and other leading heavy chemicals have been relatively unimportant. The general expectation is, however, for an early revival of buying interest in connection with both home and overseas business, and the lull is not likely to extend beyond the end of the present week.

Glasgow.—Little change can be recorded in the volume or nature of the business transacted on the Scottish heavy chemical market during the past week. There is still very considerable demand for fertilisers in the export market, with which shippers are quite unable to cope. All other classes of raw materials and chemicals have been well represented in inquiries, and little change has taken place in price levels. Spot and contract business for the home market remain steady.

Price Changes

Rises: Aluminium sulphate; charcoal; chromic acid; copper oxide; creosote; lead acetate; lead nitrate; litharge; mercuric chlorid; oxalic acid (Manchester); pitch; potassium permanganate; pyridine; sodium hyposulphite; sodium nitrate; sodium phosphate; toluol (pure); whale oil; zinc sulphate.

Falls: Naphthalene; methylated spirit.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £47 10s.; 80% pure, 1 ton, £49 10s.; commercial glacial, 1 ton, £59; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r. Manchester: £16 to £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. Manchester: £11 5s. to £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—Manchester: £35 10s. per ton d/d.

Ammonium Carbonate.—£37 10s. to £38 per ton d/d in 5 cwt. casks. Manchester: Powder, £38 10s. d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Ammonium Persulphate.—Manchester: £5 per cwt. d/d.

Antimony Oxide.—£110 to £117 per ton.

Arsenic.—Per ton, 99/100%, £26 10s. for 20-ton lots, £31 for 2 to 10-ton lots; 98/99%, £25 for 20-ton lots, £29 10s. for 2 to 10-ton lots; 96/99% white, £21 15s. for 20-ton lots, £25 15s. for 2 to 10-ton lots.

Barium Carbonate.—Precip., 4-ton lots, £19 per ton d/d; 2-ton lots, £19 5s. per ton. bag packing, ex works.

Barium Chloride.—98/100% prime white crystals, 4-ton lots, £19 10s. per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £18 15s. per ton d/d; 2-ton lots, £19 10s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s.

B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£22 to £24 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5⅝d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Carbonate.—Manchester: £6 10s. to £6 12s. 6d. per cwt. d/d.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Sulphate.—£32 5s. per ton, f.o.b., less 2%, in 2 cwt. bags.

Cream of Tartar.—100 per cent., per cwt., from £13 17s. 6d. for 10-cwt. lots to £14 1s. per cwt. lots, d/d. Less than 1 cwt., 2s. 5½d. to 2s. 7½d. per lb. d/d.

Formaldehyde.—£27 to £28 10s. per ton in casks, according to quantity, d/d. Manchester: £28.

Formic Acid.—85%, £54 per ton for ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 19s. 6d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—11d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d per lb., according to quantity.

Lactic Acid.—Pale tech., £60 per ton; dark tech., £53 per ton ex works; barrels returnable.

Lead Acetate.—White, 57s. to 60s. per cwt., according to quantity.

Lead Nitrate.—About £53 per ton d/d in casks. Manchester: £51.

Lead, Red.—Basic prices, per ton: Genuine dry red lead, £60; orange lead, £72. Ground in oil: Red, £73; orange, £85 Ready-mixed lead paint: Red, £76; orange, £88.

Lead, White.—Dry English, in 8-cwt. casks, £72 10s. per ton. Ground in oil, English, in 5-cwt. casks, £83 10s. per ton.

Litharge.—£57 10s. to £60 per ton, according to quantity.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride—Solid (ex wharf), £22 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt lots, 9s. 1d.; smaller quantities dearer.

Mercurous Chloride.—10s. 1d. to 10s. 7d. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. per gal.; pyridinised 64° O.P. 100 gal., 3s. 1d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—62s. 6d. to 65s. per cwt. £65 5s. per ton in ton lots, packed in free 5-cwt. casks. Manchester: £4 to £4 2s. 6d. per cwt.

Paraffin Wax.—Nominal.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 7¾d. per lb.; ground, 8¼d. per lb., for not less than 6 cwt.; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £57 per ton for 5-ton lots, £57 10s. per ton for 1 to 5-ton lots, all ex store; hydrated, £51 per ton for 5-ton lots, £51 10s. for 1 to 5-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P , 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 7d. to 1s. 11d. per lb. d/d.

Soda, Caustic. — Solid 76/77%; spot, £16 7s. 6d. per ton d/d.

Sodium Acetate.—£42 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 6½d. per lb.; anhydrous, 7¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, nominal.

Sodium Hyposulphite.—Pea crystals 19s. per cwt. (ton lots); commercial, 1-ton lots, £17 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 11d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metaphosphate (Calgon).—11d. per lb. d/d.

Sodium Metasilicate.—£16 10s. per ton, d/d U.K. in ton lots.

Sodium Nitrite.—£22 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £25 per ton d/d for ton lots. Tri-sodium, £27 10s. per ton d/d for ton lots (crystalline).

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£4 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 12s. 6d. to £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £19 2s. 6d. per ton, d/d, in drums; crystals, 30/32%, £12 7s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 to £16 5s., according to fineness.

Sulphuric Acid.—168° Tw., £6 2s. 8d. to £7 2s. 8d. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt., for 10 cwt. or more, £15 8s.; 5 to 10 cwt., £15 9s. 6d.; 2 to 5 cwt., £15 11s.; 1 to 2 cwt., £15 13s. Less than 1 cwt., 3s. 1d. to 3s. 3d. per lb. d/d, according to quantity.

Tin Oxide.—Nominal.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £45 15s.; green seal, £44 15s.; red seal, £43 5s.

Zinc Sulphate.—Tech., £25 per ton, carriage paid.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 5d. to 2s. 6d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£44 to £49 per ton, according to quantity.

Chromium Oxide.—Green, 2s ped lb.

India-rubber Substitutes.—White, 6 3/16d to 10¼d. per lb.; dark, 6 3/16d. tc 6 15/16d. per lb.

Lithopone.—30%, £26 5s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate.—Imported material, 11% nitrogen, 48% phosphoric acid, per ton d/d farmer's nearest station, £20 15s.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in February, £10 0s. 6d., in March-June, £10 2s.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 15s. per ton; granulated, over 98%, £10 14s. per ton.

Coal Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 5¾d. to 8d. per gal., according to quality, f.o.r. maker's works. MANCHESTER, 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £7 2s. 6d. to £10 per ton, according to m.p.; hot-pressed, £11 10s. to £12 10s. per ton, in bulk ex works; purified crystals, £25 15s. to £28 15s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 75s. per ton f.o.r. suppliers' works; export trade, 120s. per ton f.o.b. suppliers' port. MANCHESTER: 75s. 6d. to 77s. 6d. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 14s. 6d. to 18s. 6d. per gal.

Toluol.—Pure, 3s. 1d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 1d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £24 to £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—June 12.—For the period ending June 29 (June 22 for refined oils), per ton, naked, ex mill, works or refinery, and subject to additional charges according to package: LINSEED OIL, crude, £65. RAPESEED OIL, crude, £91. COTTONSEED OIL, crude, £52 2s. 6d.; washed, £55 5s.; refined edible, £57; refined deodorised, £58. COCONUT OIL, crude, £49; refined deodorised, £49; refined hardened deodorised, £53. PALM KERNEL OIL, crude, £48 10s.; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, (per ton c.i.f.), in returnable casks, £42 5s.; in drums on loan, £41 15s.; in bulk £40 15s. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62. WHALE OIL, crude hardened, 42 deg., £84; refined hardened, 46/48 deg., £85. ACID OILS: Groundnut, £40; soya, £38; coconut and palm-kernel, £43 10s. ROSIN: wood, 32s. to 45s.; gum, 44s. to 54s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

Inventions in the Chemical Industry

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

Applications for Patents

Removal of moisture from powder.—Borden Co. 14014.

Condensation products.—Borden Co. 14177.

Liquefied fuel gas utilisation.—Compagnie Française de Raffinage. 14083.

Alkylation processes. Compagnie Française de Raffinage. 14206.

Lubricants.—Compagnie Française de Raffinage. 14207.

Catalysis.—Compagnie Française de Raffinage. 14208.

Condensation products.—Distillers Co., Ltd., and L. Dennis. 14051.

Corrosion-resistance of metals.—R. F. Drysdale, R. W. Parker, and Walterisation Co., Ltd. 14440, 14441.

Polyvinyl chloride compositions.—A. Duerden, C. P. Herd, and I.C.I., Ltd. 14195.

2-Chlorofuran.—E.I. Du Pont de Nemours & Co. 14389.

Aerosols.—E.I. Du Pont de Nemours & Co., and J. L. Keats. 14192.

Aerosols.—E.I. Du Pont de Nemours & Co., and F. C. McGrew. 14191.

Sulphamic acid.—E.I. Du Pont de Nemours & Co., and E. J. Tauch. 14390.

Organic compounds.—E.I. Du Pont de Nemours & Co., O. W. Cass, and H. B. Copelin. 14193.

Organo-siloxanes.—J. G. Fife. (Corning Glass Works.) 14108.

Treatment of water.—J. P. Fraser. 13859.

Fluid-control valves.—Girling, Ltd., and W. Hogg. 14303.

Primary alcohols.—W. W. Groves. (Ciba, Ltd.) 13932.

Aqueous dispersions.—Imperial Chemical Industries, Ltd. 14194.

Dyestuffs.—F. Irving, and I.C.I., Ltd. 13918.

Degreasing hides, etc.—K. McLaren, and I.C.I., Ltd. 14196.

Metal compositions.—Mallory Metallurgical Products, Ltd. 14018.

Condensation products.—P. May. (Sandoz, Ltd.) 14190.

Sulphur removal.—J. Miles, and J. Miles & Partners (London), Ltd. 13832.

Lubricants.—N.V. de Bataafsche Petroleum Mij., and M. van Loon. 13951.

Cellulose threads, etc.—N.V. Onderzoekings-Instituut Research. 14082.

Carotin material.—N.V. Philips Gloeilampenfabrieken. 14024.

Water-insoluble layers.—N.V. W. A. Scholten's Chemische Fabrieken. 14070.

Coating of zinc, etc.—National Smelting Co., Ltd., and J. D. D. Harding. 13907.

Settling tanks.—J. C. Séailles. 14094-97.

Fertilisers.—Soc. Krebs & Cie. 13947.

Welding apparatus.—H. D. Thompson. 13804.

Wood cements.—J. N. Thompson. 14355.

Alloys.—Vandervell Products, Ltd., J. E. Salmon, and H. R. Perkins. 14038.

Metallic coatings.—A. C. Vivian. 14203.

Arc welding.—Welding Supplies, Ltd. (Elektriska Svetsnings A/B.) 14456.

Metal alloys.—Westinghouse Electric International Co. 14037.

Alkyl esters.—Winthrop Chemical Co., Inc. 13893.

Complete Specifications Open to Public Inspection

Removal of solid carbonaceous deposits.—S.A. Air Liquide pour l'Etude et l'Exploitation des Procédés Georges Claude. November 8, 1944. 30869/45.

Finishing ferrous metal surfaces.—American Chemical Paint Co. November 14, 1944. 11277/45.

Copolymers of dimethyl styrene.—American Cyanamid Co. November 14, 1944. 12766/45.

Chemical processes and apparatus.—British Celanese, Ltd. November 11, 1944. 29944/45.

Resinous polymerisation products.—British Thomson-Houston Co., Ltd. June 23, 1942. 9949/43.

Processing soluble dimethyl silicon gums.—British Thomson-Houston Co., Ltd. November 8, 1944. 29455/45.

Modified methyl polysiloxane compositions.—British Thomson-Houston Co., Ltd. November 9, 1944. 29457/45.

Wrought gray iron welding rods and method of making the same.—Chicago Hardware Foundry Co. November 13, 1944. 16485/45.

Drawing of metal tubes.—Cie. Générale du Duralumin et du Cuivre. February 19, 1944. 8836/46.

Insect-repellents or insecticides.—N.V. Chemische Fabriek Rids. September 7, 1942. 8448/46.

Diaryl paraffins and their production.—Dominion Tar & Chemical Co., Ltd. November 14, 1944. 6593/45.

Nuclear substituted dimethyl styrenes and their production.—Dominion Tar & Chemical Co., Ltd. November 14, 1944. 6594/45.

Polymerisation of dimethyl styrenes.—Dominion Tar & Chemical Co., Ltd. November 14, 1944. 6595/45.

Refining of fats.—E.I. Du Pont de Nemours & Co. November 13, 1944. 30164/45.

Compositions comprising acrylonitrile polymers and copolymers and shaped

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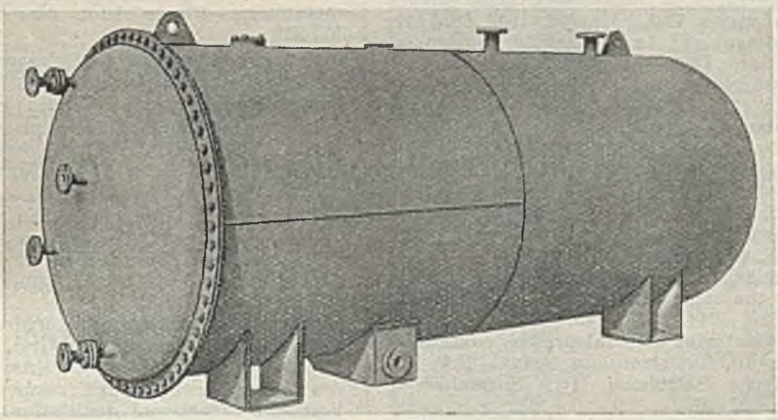

Illustration shews M.S. Rubber Lined Tank for Hydrochloric Acid

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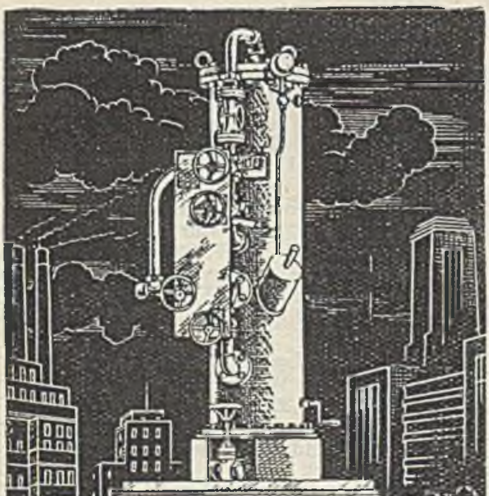

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articles produced therefrom.—E.I. Du Pont de Nemours & Co. November 10, 1944. 30165/45.

Production of chromium powder.—Electro Metallurgical Co. November 11, 1944. 20911/45.

Manufacture of fluoroacetic acids and alkali metal salts thereof.—Imperial Chemical Industries, Ltd. May 19, 1943. 9664/44.

Treatment of wool-washing effluent.—Industrial Development Corporation of South Africa, Ltd. November 14, 1944. 5950/45.

Sulphuric anodising—Jack & Heintz, Inc. November 9, 1944. 27505/45.

Pesticidal and pest-repellant compositions.—E. Kolb, and L. Gindraux. June 2, 1943. 7182/46.

Horizontal coke ovens.—Koppers Co., Inc. November 8, 1944. 14438/45.

Chemical compounds and process for preparing the same.—Merck & Co., Inc. November 10, 1944. 28741/45.

Manufacturing mineral greases containing barium and/or strontium soaps.—N.V. de Bataafsche Petroleum Mij. November 4, 1944. 9857/46.

Artificial resins and the preparation thereof.—Pittsburgh Plate Glass Co. March 16, 1940. 8609/46.

Plastic bituminous material.—Soc. Anon. Louvroil-Montbard-Aulnoye. October 27, 1944. 8458/46.

Saccharification of cellulosic materials.—S.A. Usines de Melle. November 10, 1944. 28855/45.

Polymeric materials.—Wingfoot Corporation. September 16, 1943. 4142/44.

Water-resistant film.—Wingfoot Corporation. November 13, 1944. 7862/45.

Complete Specifications Accepted

Process for the preparation of esters of leuco dyestuffs of the anthracene series.—Cie. Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Réunies Etab. Kuhlmann. January 22, 1940. 577167.

Hard copper alloys.—M. Cook, W. O. Alexander, and I.C.I., Ltd. April 21, 1941. 577,170.

Manufacture of glycols and polyhydric alcohols.—H. Dreyfus. May 2, 1940. 577,277.

Manufacture of organic sulphur compounds.—E.I. Du Pont de Nemours & Co. August 11, 1939. 577,279.

Process for improving the properties of iron alloy castings.—W. H. Hatfield, and J. F. Bridge. April 12, 1940. 577,133.

Synthetic linear condensation polymers.—Imperial Chemical Industries, Ltd. September 3, 1942. 577,205.

Bi-metallic heat-sensitive devices.—F. Miller. September 12, 1944. 577,303.

Cooling towers.—F. G. Mitchell. November 6, 1944. 577,308.

Moisture-proofing coating compositions.—M. F. Monbiot. May 5, 1944. 577,256.

Cast iron grit.—Mond Nickel Co., Ltd.—December 10, 1942. 577,289.

Distilling apparatus.—D. J. Munro. June 30, 1944. 577,162.

Method of producing dies by powder metallurgy.—Plasco, Ltd. March 24, 1943. 577,249.

Centrifugal pumps.—Pulsometer Engineering Co., Ltd., and L. G. Pilkington. September 14, 1944. 577,164.

Production of food from plant leaves.—R. E. Slade, D. J. Branscombe, W. E. Gaunt, and I.C.I., Ltd. May 5, 1941. 577,172.

Process of desulphurising iron pyrites ash.—S.A. des Manuf. des Glaces et Produits Chimiques de Saint-Gobain, Chauny et Cirey, and G. C. Ory. January 5, 1940. 577,281.

Manufacture of aromatic hydrocarbons.—Standard Oil Development Co. April 26, 1940. 577,171.

Process for the purification of organic liquids by fractional distillation.—Standard Oil Development Co. December 17, 1941. 577,241.

Manufacture of aromatic hydrocarbons.—Standard Oil Development Co. May 3, 1940. (Addition to 577,171.) 577,282.

Production of modified drying and semi-drying oils and varnish oils.—A. H. Stevens. (Raybestos-Manhattan, Inc.) May 11, 1943. 577,202.

Alkylation of hydrocarbons.—Texaco Development Corp. December 24, 1942. 577,292.

Shellac modified resins.—W. W. Triggs. (American Cyanamid Co.) March 1, 1943. 577,182.

Production of ammonium nitrate.—F. J. Wilkins, and I.C.I., Ltd. August 20. 1941. 577,179-80.

Fume condensation.—Younghusband, Barnes & Co., Ltd., and C. W. A. Mundy.—April 24, 1944. 577,196.

Manufacture of styrene polymers and interpolymers.—R. G. R. Bacon, D. B. Kelly, and I.C.I., Ltd. Nov. 27, 1942. 577,317.

Polymer dispersions.—R. G. R. Bacon, H. Taylor, L. Wood, and I.C.I., Ltd. Jan. 12, 1944. 577,326.

Manufacture of amidines.—Boots Pure Drug Co., Ltd., P. Oxley, D. A. Peak, and W. F. Short. May 9, 1944. 577,478

Liquid-level indicating devices.—M. L. Bramson. Aug. 17, 1944.—577,447.

Atomisation, gasification or nebulisation of liquids.—J. N. Davies. Mar. 28, 1944. 577,365.

Process for rendering nylon fabrics water-repellent.—C. Dunbar, G. Landells, C. A. Norris, R. J. Smith, and I.C.I., Ltd. Feb. 21, 1944. 577,433.

Interpolymers of unsaturated orthosilicates and orthoborates.—E.I. Du Pont de Nemours & Co. Aug. 24, 1939. 577,456.

Alkylation of aromatic hydrocarbons.—Gas Light & Coke Co., A. R. Morcom, W. B. S. Newling, and J. H. G. Plant. March 17, 1942. 577,314.

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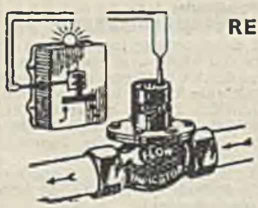

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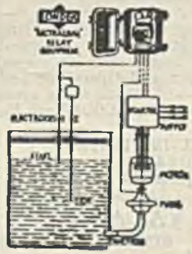

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1,100 gal., 10 ft. by 6 ft. by 3 ft. deep; riveted $\frac{5}{16}$ in. plate.
300 gal., 6 ft. by 4 ft. 3 in. by 2 ft. deep; riveted ¼ in. plate.

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300 gal., 4 ft. by 3 ft. by 4 ft. deep; welded ¼ in. plate.
150 gal., 4 ft. by 3 ft. 3 in. by 2 ft. deep; welded $\frac{3}{16}$ in. plate.
100 gal., 3 ft. by 2 ft. 6 in. by 2 ft. 6 in. deep; welded ¼ in. plate.

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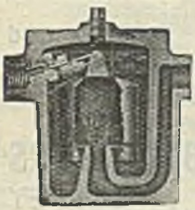

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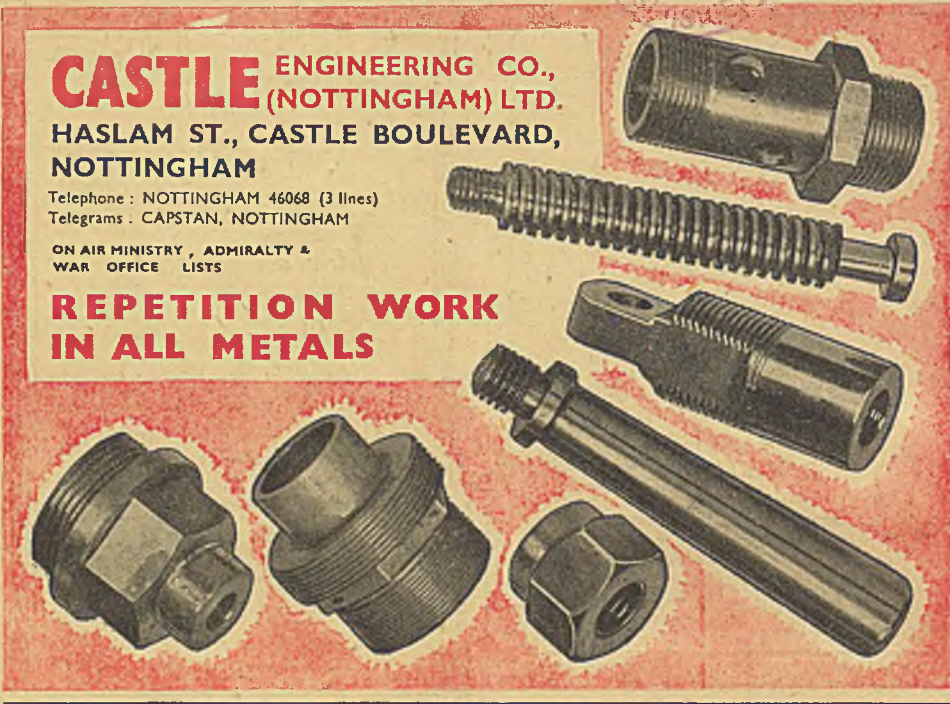

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