The Chemical Age

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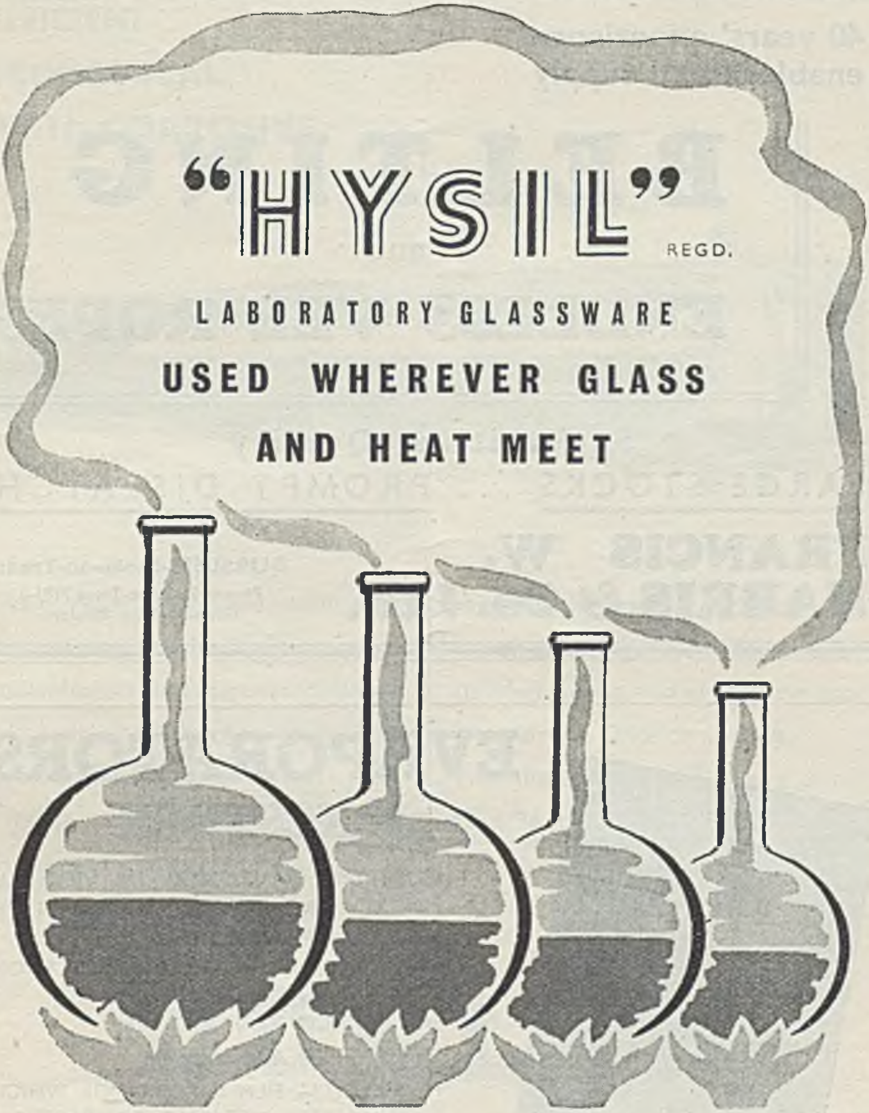
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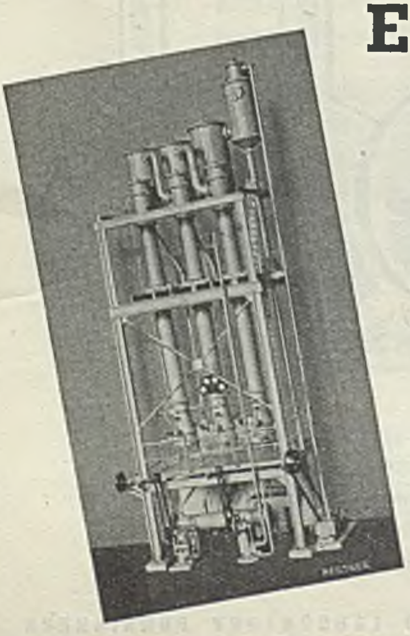

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Cast Iron

THE antiquity of cast iron is undoubted. Mr. J. G. Pearce, the Director of the British Cast Iron Research Association, in his address to the Royal Society of Arts, stated that there was evidence of its use in China so long ago as 500 B.C. China seems to have been the home of most of the arts, and it is an interesting historical question to consider why that ancient land no longer leads the civilised world. However it may have have happened, the iron industry reached Europe, where its history becomes even more uncertain. Some there are who declare that the art of making cast iron came from Germany to Britain; others will have it that the travel was in the reverse direction. Thus, T. S. Ashton (*Iron and Steel in the Industrial Revolution*) has pointed to the iron gravestone at Burwash in Sussex (dated 1352) and to the inner chamber of cast iron contained in cannon of the 15th century and has concluded: "It would thus appear possible that it was not Prussia—as has been claimed—but Sussex that saw the birth and early development of the art of casting, and that this took place before 1500, the approximate date usually assigned to it." Be that as it may, the historian in Ashton gets the better of his enthusiasm, and he concludes: "All that can be said with certainty is that in the days of Edward III most, if not all, of the iron used was the product of the bloomery or forge, while in the days of Henry VIII by far the greater part was smelted in the furnace and cast into finished articles, or into pigs that were subsequently fined into malleable bars at the forge."

The making of cast iron was thus among the earliest ferrous industries of Britain. It was not the earliest, of course, because it was preceded by the malleable iron made in the Catalan hearth and similar furnaces in which iron was produced in pasty form direct from the ore. If the temperature happened to be sufficiently high to melt the iron it would dissolve carbon and the product would be a mixture of cast iron and malleable iron. We can safely say that the cast-iron industry in this country is not less than 400 years old and may well be over 500 years old. This, in itself, provides problems. Old-established industries grow by practice and precept, not by the application of science, and therein they reach a stage at which the application of science becomes peculiarly difficult. We have lately been privileged to read an article in *The British Steelmaker*, written by Harry Brearley—still

On Other Pages

a name to conjure with in metallurgy—in which he discusses with a steelmaker of the old school the effect of science on metallurgy; so aptly does this conversation reveal the attitude of mind of the practical man, who for a time dominates all older industry and can be convinced only with great difficulty, that we shall make bold to quote a few sentences:

"I should like to ask you," said I, "how far you think steelmaking could have gone without help from the chemist."

"Quite a way."

"But Bessemer made no headway without the help of the chemist."

"He never tried." He added: "Your question, so far as it relates to Bessemer is—could his process be worked without the chemist? The answer is that it was, and is, so worked. The chemist operates on the steel after the ingots have been made, not during the making of them."

"You appear to have no great opinion of the chemists Bessemer brought to the steelworks."

"No disrespect to them; they were novices learning a new job and making mistakes. Their province was to stick composition labels on to casts of steel because composition was the handiest way of distinguishing one lot from another. As the chemists wore scientific gowns they were naturally asked to explain things they didn't understand, and some of them fell for the flattery. . . . The chemist is a great convenience, a valuable help in time of trouble, but he is not a downright necessity. . . . The chemist must not conclude that without his help the bulk processes of steelmaking would have stopped dead; they would have developed differently and not so far."

The steel industry was scientific by comparison with the cast-iron industry in those days. All the more credit to cast iron that it has risen from rule-of-thumb and has appointed scientific men to help it through the medium of the British Cast Iron Research Association. The result has been adequately described by Mr. Pearce as the application of the art of so adjusting composition, section of coating, and process of manufacture as to produce a metal of the required properties. A wide range of qualities is available: engineering grey iron castings may be obtained under national specifications with tensile strengths varying from 9 to 26 tons/sq. in.; malleable castings can be produced with elongations in tension varying from 3 to 20 per cent.; castings surface-treated for hardness may be produced up to 1000 Brinell. A wide variety of finishes may be applied to the material for technical and decorative purposes. A modern development is centrifugal casting for the production of pipes.

Although the coming of steel in 1855 deposed cast iron from its former proud position as the supreme structural material, the output to-day has risen to 2½ million tons a year. The modern foundry is a combination of the art of the moulder and core-maker with the science of the metallurgist, chemist, and foundry engineer, and requires skilled executive control. The older methods have been discarded for some purposes with considerable savings in cost of production. The industry has been profoundly influenced, not only by scientific and technical development, but also by continuous production methods used where castings of similar size and shape are to be made in quantity. Moulds and cores are made on machines; sand is fed to the machines by hoppers filled from overhead conveyors; assembled moulds are mechanically conveyed to the furnace, are filled, and conveyed again to the knock-out stripping station, where the castings are removed for cleaning. The sand is returned to a re-conditioning plant before being circulated again to the moulding machine.

Yet in spite of this move towards mechanisation, in spite of the wide range of available products secured by varying the structure of the metal—grey iron, white iron, austenitic iron, martensitic iron, acicular iron, chromium irons, silicon irons, and so forth—one feels that all may not be well with the industry. There is still much to be done. One feels, writing from the point of view of the disinterested outsider, that the industry may be too diffuse for modern conditions. There are no fewer than 1750 establishments widely differing in size and employing 100,000 people. Does not that imply too many small firms for successful operation under modern conditions? There is a marked difficulty in getting recruits for the foundry industry on the ground, we understand, that the work is regarded by pampered modern youth as dirty and unpleasant. The foundry is to-day a bottleneck in production for that reason. Should we be right in suggesting that the foundry trade is in need of concentration into fewer and larger units and that it needs above all redesigning in its engineering plant to lighten the labour and to make the work more attractive? As outsiders we make these suggestions with temerity. It is for the experts to correct us.

NOTES AND COMMENTS

Germanium

ONE of the most unusual metallurgical finds for more than half a century is germanium—a mineral of the carbon family that is rarer than gold. Existence of the element was predicted in 1871 by the Russian physicist Mendeléev, who constructed the periodic system of elements. He almost precisely foretold the atomic weight, density, and colour of the then unknown element and named it eka-silicon. Fifteen years later, Clemens Winkler actually isolated the element and found that it almost incredibly fulfilled Mendeléev's forecast. He renamed it germanium. It is described as a silvery element that occurs in minute quantities in zinc and lead ores, and although only approximately twice as heavy as aluminium, is hard enough to cut glass. It is not attacked by boiling concentrated hydrochloric acid. It is said that a very small percentage of germanium added as an alloy in aluminium and magnesium castings gives them very high resistance to fatigue and corrosion. A curious property of the element is that it expands as it cools. This factor would make it suitable for alloying gold or amalgam fillings for teeth as the fillings would close the minutest crevices and prevent further tooth decay. Another characteristic is that germanium imparts special refractive properties to optical glass. Camera, microscope, and other lenses having a trace of it would project images with sharper definition.

Segregation Process

SEGREGATION of germanium involves a seies of operations. The principal steps, explained in very simplified form, are as follows: Zinc concentrates are roasted in huge ovens to burn out the sulphides and form zinc oxides. These are burned slowly with salts and a semi-hard coal, and cadmium, germanium, and various amounts of a dozen and a half other metals are carried off in the dense fumes. The fumes are piped to a precipitator in which the metals are dissolved in sulphuric acid. Cadmium is then separated out, leaving a residue of high germanium content. This residue is oxidised in a furnace and then mixed with concentrated hydrochloric acid. Last comes distillation, which frees the germanium from every trace of the associated metals, so that when a nugget is caught in the bottom of a crucible at the end of the 10-day process, it is so pure that no contamination by foreign matter can be detected with the spectroscope.

Substitutes for Bauxite

ALTHOUGH supplies of bauxite were available to Germany and her allies in both France and Hungary, nevertheless, such was the need for aluminium and yet more aluminium during the war that both Germany and Japan made strenuous efforts to develop processes using more plentiful raw materials. Details of some of these efforts have been published in BIOS Report No. 167, which gives an account of the German application of a French process, known as the Séailles-Dyckerhoff, for the production of a suitable alumina-bearing material from industrial wastes such as coal ashes, coal-cleaning residues, and the like. Pilot plant had been set up at the Dyckerhoff cement works before the war, where the products of a rotary kiln were leached, originally with water, and later with a dilute alkali, which gave the required yield of alumina, the material being afterwards precipitated in the usual way. In due course two full-scale plants were set up, using colliery power-station ash, one near Berlin, the other in Czechoslovakia. Both, however, proved more expensive than the conventional Bayer plant, and the method was considered unlikely to be economic in normal times, even with material running as high as 40 per cent. alumina. The process is of interest, however, especially when compared with recent American attempts to obtain alumina economically from clay; and we hope to have the opportunity of discussing the various systems *in extenso* in a later issue.

Aluminium and Fruit

WHILE talking of ex-enemies and aluminium, it is interesting to recall a side-issue arising out of the working of the Italian aluminium reduction plants in the hilly northern regions of Mori and Bolzano. These plants are up to date in construction, using both pre-baked electrode and Söderberg electrode pot lines (*see* BIOS Report No. 126), but an unusual feature here is that all pots are enclosed and connected to an exhaust system. The reason for this is that protection is required for the large amount of fruit which grows in the district and which has been the staple industry of the locality for many years. This, incidentally, is a point worth considering when new industrial-agricultural areas are being planned in this (or any other) country. Both the plants concerned are owned by the Montecatini group, and recent advices from Italy indicate that although both were practically undamaged by the war, transport conditions were so bad last year that it was possible to use them only up to about 15 per cent. of their capacity.

Interpretation of Science

MUCH has been spoken and written in recent months about the necessity of " interpreting " science to the general public, and we agree that, with science in its present position in relation to social and economic factors which affect everybody, it appears desirable that everybody should have *some* idea of what science means and what scientists are doing. You can take a horse to the water, but you cannot make him drink: that old saw comes into play at once, with the question, do the people want to have science " interpreted " to them? Do they not prefer to remain in that delightful state of haziness about it, which requires no mental effort and leaves them in the position where, if anything serious goes wrong, it can be blamed on the scientists? Unfortunately, so far as concerns a large percentage of the British people, the answer is that that is exactly what they do prefer.

Starting from Scratch

THEY prefer the headline " Atom to be Nationalised!" to a reasonable and non-technical statement that research on nuclear energy must be reserved for scientists in Government employ. It's less trouble now, perhaps, but makes for more trouble in the future. Other peoples are prepared to spare a little mental energy from the task of calculating the odds. Quite casually, a copy of *France* came into our hands the other day. We may have been lucky, perhaps, but at any rate this number contained a contributed article on the creation of new chemical elements, with a brief and simple explanation and an interesting historical note; in a later column was an extract from *Le Figaro* reporting on the conversion into petrol of natural gas found in Southern France—two good examples of the interpretation of chemical science. Our " interpreters " start with a heavy handicap; what they must realise is that our methods of general education towards science are fundamentally unsound, and they will have to get over that hurdle first. We surmise that they will get little assistance from the popular Press.

Library Chemists

GLANCING through an American chemical journal last week, we came across an article with the challenging title " Wanted: More Library Chemists " (*J. Chem. Educ.*, 1945, *23*, 176). The author was Miss E. L. Schulze, a lady employed by an industrial chemical concern, and, among other things, she claimed that the job of library chemist was particularly suited to women in the industry. There seems to be quite an extensive American literature dealing with the duties and qualifications of library chemists, and Miss Schulze has some interesting things to say about the relations between these chemist-librarians and the workers in the research and development laboratories of industry. There may be some library chemists in industry in this country; we believe that I.C.I., for example, has a highly efficient service of the kind. Judging, however, from the queries which reach our office from all sorts and kinds of industrial chemists—and which we do our best to answer—not many of them possess even a library. In the same issue of the same journal is a list of what the *university* chemical librarian should be able to do for his professors and lecturers. It is a fairly tough programme, and requires much knowledge of chemistry, and of librarianship and administration as well. It is good to set a high standard, of course, but even if the industrial librarian fell short of the ideal in some respects, we feel sure that she (we say " she " advisedly) would be a great asset to many firms. The idea is worth pondering, at all events, and suggests a new line for women in industry.

French products, including potash, phosphates, plaster of paris, metallurgical and chemical goods, will be sent to Holland, under a recently-signed agreement, in exchange for agricultural products, linseed, benzol and coke.

Chemistry "Brains Trust"

B.A.C. London Section's Meeting

UNDER the auspices of the British Association of Chemists (London Section), a "Brains Trust" was held at Gas Industries House, 1 Grosvenor Place, London, S.W.1, on April 10. Questions had mostly been sent by post beforehand, but each member of the "Brains Trust" was given an opportunity of answering one or more questions "unseen."

The question master was Dr. F. W. Stoyle, B.Sc., Ph.D., F.R.I.C., while the members of the "trust" were Mrs. S. M. Tritton (deputising for Mr. F. G. Moore, of Herts Pharmaceuticals, Ltd., who was absent in Germany); Mr. R. Barrington Brock, of Townson and Mercer, Ltd.; Mr. J. Wilson, of the British Rubber Producers' Research Association; Mr. A. L. Bacharach, of the biochemical department, Glaxo Laboratories, Ltd.; and Mr. Norman Swindin, of Nordac, Ltd., representing the chemical engineers.

The proceedings opened with a short address from the chairman, Mr. A. J. Mills, who made an appeal for more members of the Section to volunteer for committee and sub-committee work—the Section did not "run itself," he said. He also gave the welcome news that Mr. Threlfall's recent paper on "Glass Tubing" (*see* THE CHEMICAL AGE, 1946, *54*, 211) would soon be published in full.

Dr. Stoyle, having introduced the members of the Brains Trust, reminded his audience that the questions themselves had not been seen by those who were going to try and answer them. A selection of the questions and answers follows.

Synthetic Rubber

A question sent in by Mr. Norman Sheldon: "It is said that war-time tyres, using synthetic rubber only, last for about a quarter of the mileage obtained with natural rubber. Is this likely to continue if synthetic rubber is used extensively?" was answered by Mr. J. Wilson as follows: "I think the first part is a mis-statement. They do claim now to get the same mileage from synthetic tyres, due to improvements in technique in building the tyre. No synthetic tyre will ever be in the same street, though, from a resilience point of view. The great difficulty with synthetic rubber is its big heat build-up. It is highly improbable that you will ever get synthetic rubber with such a low heat build-up as natural rubber."

Mr. E. V. Browett submitted the question: "Do the Brains Trust agree that the elements of chemical engineering should be included in the honours chemistry degree syllabus, as a knowledge of chemical engineering is necessary for a works chemist and is an advantage for a chemist doing research work?"

Mr. Swindin said that in his opinion it was a bit too early to include such a complex subject as chemical engineering in an honours chemistry degree. Chemical engineering was really applied physics in a field of commercial conditions, and these conditions were very important. To expect a young student to know them, at the moment, was premature. Mr. Barrington Brock said he had rather strong views on this subject. He agreed with Mr. Swindin that the applied physics side was very difficult in getting an honours degree, and he had seen several young chemists make absolute asses of themselves in the commercial subject. Many had no conception whatever of what went on in a factory. A system of apprenticeship would at least mean that many junior chemists would not make asses of themselves in the first six months. He also thought, however, that that had something to do with the attitude of the works foreman. Mrs. Tritton recalled that there had been a symposium on this subject, at which the point had been brought out very strongly that some knowledge of chemical engineering should be included in the syllabus for the honours degree. Even if one did not practise chemical engineering, just to have an understanding of the principles was so important for the chemist going into the works. Mr. Wilson said he would not teach chemical engineering to ordinary honours students. If a man had a flair for it he would have no difficulty in tumbling to it.

The Successful Consultant

Mr. D. Greensmith asked for the Brains Trust's views on the essential requirements, material or otherwise, of a successful chemical consultant. In reply, Mrs. Tritton said she thought this was a very unfair question. She did not know whether she was a successful chemical consultant. But she thought it would be well worth while to say why she became a consultant, and she hoped other chemists would follow her lines. She found that she was chief chemist in a small firm, and she thought if she could do that for them she could do it for herself. Mr. Bacharach's answer to this question was: "First, access to a good library; second, a good board-side manner; and third, an attractive receptionist."

Mr. Swindin thought a chemical consultant should be free from any form of business demands in any way, and that was very difficult. The consultant needed to develop a judicial attitude to the problem—this was of main importance—and he should have a very long experience. He must also know a good deal of Company Law and accountancy, neither of which had anything to do with chemistry. Mr. Barrington Brock claimed that one essential of success in chemical consultants should be a capacity to convince people in industry that the chemical consultants knew more than the people in industry did, whether that was so or not.

Mrs. Tritton expressed agreement with Mr. Brock, and thought the chemical consultant must have general knowledge, not necessarily in one industry. He must also have individuality and an inventive capacity; this made all the difference between a successful and an unsuccessful consultant. Mr. Swindin said a successful consultant was able to transfer from one branch of industry to another. He should be a sort of liaison officer in industry and if he was a good man he was fulfilling his function.

The Citizen's Diet

Mr. E. H. G. Sargent's question: "What steps should be taken to remedy the deficiencies in the diet of the average citizens?" brought forth some interesting replies. Mr. Bacharach said there was no such thing as the "average citizen," otherwise it would be so easy. He thought the chief steps to take would be to give him more money, and give him, or his children, a little more education. He did not think they were going to be able to change the dietary of the individual. What average family, he asked, once its income has reached a level at which it can satisfactorily feed, has the necessary knowledge and inclination to buy the best possible diet? If people were given enough money there would probably not be very much wrong with their diet. It was one of the few merciful dispensations of Providence that each taste knew what it required. Mr. Bacharach said he was not a subscriber to the Marie Lloyd theory that "a little of what you fancy does you good," but a few fancies in taste might do good.

Mrs. Tritton believed that institutional cooking should be more attractive, and Mr. Swindin asked: "Why can't you chemists take your chemistry home and apply science to cooking?"

Mr. Barrington Brock recalled an interesting work he had recently read in which work had been done in studying the food chosen by rats, if they were given free choice. The interesting part was that, under given conditions, the rats did choose the diet which did them most good; they all chose certain diets of less attractive food which tended to balance the diet. A very mixed diet might make more of the essential vitamins of value than if those vitamins were taken on their own.

Mr. Bacharach said it must be remembered that no doubt, however well-balanced the food, it did one no good if one refused to eat. The first stage in digestion was in the increase of saliva. Experiments on rats had to be transferred to man with the greatest of caution; man was a more complex animal. The experiments on rats on the food question were very flattering. Very ingenious experiments had brought to light remarkable phenomena. One scientist showed that it was perfectly possible to deceive rats in the matter of their diet. If he destroyed the vitamins in those foods, and provided the vitamins in other forms, the rats were deceived; they took the food in which the vitamins had been destroyed.

Mr. Wilson said that the Government policy throughout the war had simply been that, given enough calory sense, the only thing which mattered was calories. Experiments with rats showed that the reason one could not live on paraffin was because one could not emulsify paraffin in the alimentary canal. "If you emulsify paraffin, the rat will live and thrive on it." Mr. Bacharach very much doubted that the rat could live on emulsified paraffin. He knew of no mechanisation in the rat's liver which enabled it to do this. The question-master (Dr. Stoyle) said he hoped that what had been said on this question would not be allowed to get to the ears of Sir Ben Smith.

Impressing the Layman

The following question was from Mr. D. S. Corme: "What steps should be taken to impress upon the layman that science is as much his concern as the more generally accepted activities such as commerce?"

Mr. Bacharach: "Four steps—the Press, the film, the radio, and exhibitions."

Mr. Swindin: "Introduce as much science as possible into the schools, because children take kindly to science when put in the proper way. Children readily absorb facts of nature in a scientific form."

Mr. Bacharach expressed concern at what was nowadays reported in the daily papers on scientific matters. He thought the general public had got into the habit of accepting, as scientific data, stuff in the daily papers which was pure rubbish, and he was of the opinion that this must do an enormous amount of harm. He thought the best thing to do would be for the daily papers to have this matter vetted by a scientist before publication. Mr. Swindin said he thought the papers were doing this.

Mrs. Tritton said her own view was that there was a tendency to use more and more technical language in their meetings, and to make science less understandable to the layman. She thought the greater the simplicity the better it would be for the scientist and for the general layman in getting a scientific slant on a question.

Mr. Bacharach said there was to his mind a serious risk attendant on this perfectly correct insistence, on the part of scientists in general and chemists in particular, that the public should be made to understand what science is for and about. "The danger is," said Mr. Bacharach, "that we shall tell the public what material benefits we are able to bring, and the public will become more and more inclined to regard science and technology as identical. Scientists understand that behind all these things lies pure science, in which it will always be difficult to interest the layman." Mr. Swindin said this was an extremely important point. One of the most difficult things he knew was to interpret an abstruse mathematical or scientific point in common language. The people living to-day who could do that sort of thing could be numbered on the fingers of one hand; but it was possible to convey this abstruse knowledge in common language provided one had sufficient knowledge of the language, and imagination.

New U.S. Patents Bill

Comparison with Current British Proposals

by S. MITTLER, A.F.R.Ae.S., A.E.I.Mech.E.

A NEW Patents Bill, officially referred to as H.R. 5223, but better known as the Boykin Bill (fourth version) has received a favourable report in the Committee on Patents of the U.S. House of Representatives, but has still to be passed by the House and to be introduced in the Senate. According to unofficial information just received from the U.S., it is expected that the bill will be enacted as law before the adjournment of Congress in July. The Boykin Bill is, in some respects, the opposite number of the new Patent Bill in this country which, when enacted, will be referred to as the Patents and Designs Act, 1946*. Some sections of the American bill are of particular concern for the interests of British applicants and patentees, while others are rather of a domestic importance for U.S. inventors.

It will be remembered that the provisions of Section 4887 are particularly severe on foreign applicants; while missing the Convention period of one year for an application made in this country does not affect the validity of the patent, provided that the invention has not been published or is not in public use in this country before the actual filing date, the granting of the U.S. patent must take place in the corresponding case before that of the foreign patent application on which the priority would have been based—and, for that matter, before that of any foreign patent application filed more than twelve months before the application in the U.S., lest the U.S. patent be invalidated.

Section 1 of the Boykin Bill extends the period for claiming priority rights which had not expired on September 8, 1939, or have arisen since that date, to twelve months after the passage of the bill. This applies to patents granted (which might have been invalid but for the new bill) and to applications now pending or filed within the above period. (Why a date five days after the actual outbreak of war in Europe was chosen is not quite clear. Was it perhaps because ordinary mail by which patent applications would be sent to the U.S. takes about five days from Europe?)

If a request for priority was not already made in writing, such request has to be made within six months of the passing of this bill. It must be accompanied by a certified copy of the original foreign patent application, by a sworn English translation, if such application was not, itself, in the English language, and in case the applicant of the basic foreign application was not himself the inventor (as prescribed for the applicant in U.S.), an affidavit by the applicant that such application was filed for his benefit and that such procedure is in accordance with the procedure in that foreign country. Public use, etc., or printed publication in the interval between the filing date of the basic foreign application and of the application in the U.S., shall not affect the validity of the latter.

No claims against the U.S. Government can be based on a patent obtained or validated under the new bill, and *bona fide* rights of U.S. citizens or companies who, before the passage of this bill, were in possession of any conflicting rights shall not be affected, and no action for infringement can be instituted against them.

The benefits of this Section (like those of others) are confined to the nationals of countries affording reciprocity to U.S. citizens or intending to do so within twelve months after the passing of the bill. As

* THE CHEMICAL AGE, 1946, *54*, 337.

a result of the bill, U.S. nationals will soon obtain an extension of priority in France. This will probably lead also to an extension of the period under the Anglo-French agreement.

Communicated Inventions

Section 2 is concerned with inventions communicated before April 8, 1946, to the U.S. Government (or to a person or company authorised by it) under an agreement with a foreign government. Patent applications made for the subject matter of such communication by the communicant shall not be invalidated by the public use, etc., or publication of the invention in consequence of the communication if effected in the interval between the date of communcation and of filing the patent application. U.S. Courts and the Commissioner of Patents shall have power to call upon the government department concerned for information about such communication which can be refused on security grounds only.

Application for a patent under this Section is to be made within twelve months of the passing of this bill, and unless sufficient information has been given to the Commissioner to identify the invention communicated with that applying for patent, such information in writing and under oath must be given within six months of the date of the new bill.

Payment of Fees

Section 3 empowers the Commissioner of Patents to extend any period that had not expired on September 8, 1939, or which began after that date, for the payment of a fee or for taking of any action, by a period not exceeding twelve months after the termination of the circumstances which had prevented punctual payment, and in no case later than twelve months after the passing of this bill. However, no interference proceedings shall be reopened where the final hearing before the Examiners of Interferences has taken place.

The following sections are more important to U.S. inventors or manufacturers than to foreign patentees: Section 4 maintains the right of user of an invention commenced before the passage of the bill or before the belated payment of a fee or taking of an action under Section 3 with the exception of the user of a communicated invention which comes under Section 2. Section 6 legalises foreign patents applied for by U.S. citizens without the necessary authorisation from the Commissioner of Patents, provided that such authorisation is subsequently applied for. Section 7 gives the same effect to a patent application executed by an agent, provided that a duplicate of it, duly executed by the applicant, is filed within twelve months of the passing of the bill. Section 8 legalises the certification of patent documents by the consular officers of a government acting in the interest of the U.S. Government. Section 9 extends the benefits of dating an invention from its "conception" instead of from the first filing date in a patent office to a person domiciled in the U.S. or serving with U.S. forces.

The later sections are again more of an international importance: Section 10 limits the period of a patent obtained under the moratorium of Section 1 to 20 years from the filing date of the basic foreign patent application, and to 17 years (the period of an ordinary U.S. patent) from the date of grant of that foreign patent. Section 11 deprives nationals of enemy countries of the right to take legal action for infringement of their U.S. patent rights after September 8, 1939, up to the passage of the bill, by persons acting on behalf of, or under contract to, the U.S. Government or an allied government. Sections 12 and 13 maintain and modify the provisions of the U.S. Trading with the Enemy Act concerning patents, trade marks, etc., and Section 14 excludes nationals of countries which have been at war with the United States since September 8, 1939, from the benefits of the Act.

The new Boykin Bill corresponds to the new British Patents Bill as regards inventions communicated under a government agreement. It provides for the long overdue extension of the period for claiming Convention priority which is particularly important because of the peculiarities of the U.S. patent law, and for the extension of time for payment of fees, etc. It is less elaborate as far as enemy patents and patent applications are concerned, but agrees with the British bill in the principle of excluding enemy nationals from the benefits of the Act. In this respect it goes beyond the British bill in so far as the latter is limited to German and Japanese nationals, whereas the U.S. bill does not differentiate between countries that were at war with the United States.

UNILEVER EXPORTS

To further the development of their export trade, Lever Bros. & Unilever, Ltd., have amalgamated the export interests of their associates in the U.K. by the formation of a new organisation under the name of Unilever Export, Ltd.

The new company will deal with the export of all proprietary and specialty lines sold by the associates of Lever Bros. & Unilever, Ltd., and will have the support of the organisations of all the overseas associated companies of the concern.

The directors of the new company are: Mr. J. L. Heyworth (chairman), who is a director of Lever Bros. & Unilever, Ltd.; Mr. A. M. Knox; Mr. J. P. Wattleworth; Mr. D. E. Budgett-Meakin; and Mr. A. T. Ball.

The Manufacture of Per-Compounds

New Process Developed in Holland

IT has long been known that in the autoxidation of various metals small amounts of peroxide are also formed, especially in the case of amalgams, *e.g.*, of iron, nickel, or tin. References to this in the literature are fairly frequent, and W. Machu has collected quite a few of them in his book *Das Wasserstoff und die Perverbindungen* (Vienna, 1937). Hitherto this has been of considerable academic interest, but little in the way of practical application had been achieved. Claims in a recent Dutch patent (1944) for a new method of manufacturing hydrogen peroxide and other per-compounds by a special amalgam method seem to indicate some progress in a technical direction.

Machu points out that very small amounts of peroxide are formed in the autoxidation of numerous substances, including many metals and also organic compounds. With some metals it occurs only with an amalgam, and the amount as a rule does not exceed 1/5000 of the water present. In the presence of both water and air, peroxide formation takes place with several metals at temperatures of about 100°C., and while addition of sulphuric acid assists such formation the presence of alkali is definitely inhibitive. In Sect. VII of his work Machu describes in some detail the historical development of the mechanism and theory of autoxidation, with special reference to the early work of Schönberg and Traube and the nature of catalysed deoxidation.

Earlier Work

Over 50 years ago attempts were made to apply autoxidation to the production of hydrogen peroxide in order to lower costs, *e.g.*, in Rosenblum and Rideal's patent (B.P. 12274/1897, assigned to Commercial Ozone Syndicate, Ltd.), and to the autoxidation of organic compounds. An alkali amalgam was used by I.G. Farben (Fr. P. 790497/1935) for the manufacture of alkali peroxides. In this case hydrazobenzol in alcoholic solution is oxidised, the resulting peroxide removed, and the azobenzol again reduced with sodium amalgam. Traube, one of the principal early workers in this field, also used amalgams in the production of hydrogen peroxide by anodic reduction of oxygen, *e.g.*, with a gold wire amalgam as cathode. Reference should be made also to some of the early Henkel patents (German) Nos. 273,269, 276,540, and 283,957, in which an amalgam of copper or silver was employed as cathode. The same firm's Ger. P. 283,894 claims a process for the manufacture of perborates, in which an aluminium or zinc amalgam in aqueous solution of boric acid or of alkaline borates is subjected to autoxidation in the presence of an alkaline earth hydroxide, especially calcium hydroxide, through continuous supply of oxygen or oxygen-containing gases under pressure.

The Dutch Claims

In the recent Dutch patent referred to above, in the name of the N. V. Kon. Ned. Zoutindustrie of Boekelo, Holland, the well-known manufacturers of heavy chemicals, claim is made for the use of an alkali amalgam for the production of per-compounds in the presence of water or liquids containing water together with a supply of oxygen. Peroxide concentrations are thus obtained, suitable for working up, without the necessity of removing hydrogen peroxide from the reaction medium or employing oxygen, or oxygen-containing gases, under pressure. By this means, too, an alkaline hydroxide is formed as by-product which is of value either in itself or after conversion into other compounds such as soda crystals or sodium bicarbonate; or it may be utilised in combination with the hydrogen peroxide to form a bleaching preparation; or again, and perhaps better still, it may be worked up into perborate, percarbonate, or benzoyl peroxide. Owing to the relatively high concentration of the peroxide the intermediate formation of a difficultly soluble per-compound is unnecessary. Moreover, the alkali amalgams are readily available, being produced in large quantities in the electrolysis of alkali compounds with a mercury cathode. The use of these amalgams in this manner is said to be particularly advantageous; but they may be obtained in other ways, *e.g.*, by dissolving alkali metal in mercury.

The peroxide formed may be decomposed through reduction by the amalgam and/or by spontaneous or catalytic decomposition; and this reduction, of course, increases with peroxide concentration. The process therefore needs strict control and the establishment of optimum conditions, such as rapid working and the choice of the most suitable alkali metal. Three of the most important factors are: concentration of alkali metal in the amalgam; oxygen concentration in the liquid; and degree of movement of liquid and amalgam in respect to each other.

The mercury should be largely in excess in the amalgam, averaging about 50,000 atoms to one atom of alkali metal. By increasing oxygen concentration and/or accelerating movement of reactants, a greater proportion of alkali metal can be used. Increase in oxygen concentration is advantageous also for other reasons, especially if supplied under pressure.

Addition agents are of considerable importance, *e.g.*. cyanides, fluorides, borates, carbon monoxide, etc. These are well known as stabilisers of peroxide (*cf.* Machu, *loc. cit.* 187-192, and later references including patents relating to stability of per-compounds). The *p*H of the solution may also be adjusted by addition of acids which may at the same time assist the process in other ways, such as boric, carbonic, or sulphuric acid. The process may well be carried out in a cycle by wholly or partially removing the products formed and making suitable additions to the solution. Oxygen may be supplied as such or as constituent of a gas mixture. Several examples are given, *e.g.*:

1. Potassium amalgam from electrolytic cells, diluted if necessary with the circulating mercury to a content of about 0.0003 per cent. potassium, is brought at 0°C. into close contact with water wherein oxygen is continually being dissolved. There is formed, with a yield of about 60 per cent. based on the KOH produced, a solution containing 27 g. hydrogen peroxide and 150 g. KOH.

2. Sodium amalgam with 0.004 per cent. sodium is dropped through a column of water cooled to 0°C. The liquid is maintained saturated with oxygen under pressure of 25-30 atm., and contains in addition a few tenths of a mg. of phenol and about 1 g./lit. sodium fluoride. The yield is 70 per cent., with a content of 22 g. NaOH and 6.5 g. H_2O_2 per 100 g. water.

Chemical Defoliation

A New Aid to Agriculture

APPLICATIONS of chemicals to agriculture are legion, and a recent report from the U.S. ("For Instance," 1946, No. 19; published by the American Cyanamid Company) gives some interesting data on the utilisation of calcium cyanamide for defoliation. The principal field of utilisation of this new process has been the stripping of the leaves from cotton plants to ensure rapid and more uniform ripening of the cotton bolls. Shortly before harvesting the cotton fields are dusted with calcium cyanamide which, in combination with the dew, kills the leaves. After a few days the leaves are cast off but damage does not extend to the stem and roots of the plant. The bolls left exposed then ripen rapidly and uniformly.

Easier Harvesting

A number of distinct advantages are secured by this new development. First, the crop may be harvested by a single picking instead of the usual two or three pickings at intervals. In addition, the amount harvested daily by hand labourers is almost doubled. Moreover, the free access of air and sunshine to the lower bolls on the plant is specially valuable in wet seasons and is claimed to eliminate losses by rotting which formerly amounted to as much as 50 per cent. of the crop. Defoliation is also expected to yield improvements following upon the wider adoption of machine harvesting. The leaves of the plants have a tendency to clog the machines and to stain the cotton, so that defoliation increases the speed of harvesting. Finally, damage to the crop by the army worm is minimised, the removal of the leaves reducing the multiplication of the worms and preventing fouling of the cotton. Attack by the pink boll-worm has also been reduced by the application of this process.

The success of the defoliation process on cotton crops has led to its wider application. Soya beans, in particular, have responded well to treatment, particularly the heavy cropping varieties maturing late in the autumn. Harvesting of these crops has to be carried out so late in the year that subsequent sowings of winter grain are hardly possible. Defoliation, carried out at any time after the seeds lose their green colour, causes rapid loss of moisture without reduction of yield or quality, the seeds becoming sufficiently dry for harvesting at the early crop premium prices. In addition the sowing of winter grain may be safely carried out afterwards. Outdoor tomato crops have also benefited considerably, as defoliation enables the later trusses to ripen before the early autumn frosts cause loss of good green fruit.

SODIUM WIRE EXTRUSION

Most sodium presses in use before the war were of foreign origin. Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2, have now produced one in which many improvements are incorporated. Known as the Nalik Press (the name being derived from the chemical symbols for sodium, potassium, and lithium), it has a stove-enamelled body, to eliminate corrosion, and can be attached to the bench in a few moments by means of a single bolt. The one-piece die and mould and the floating plunger are of stainless steel. Fuller details are given in the firm's leaflet, G.T.1353.

Metallurgical Section

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The Microscope in Metallurgy

I.—General Considerations

by L. SANDERSON

ALTHOUGH the microscope is a familiar instrument, its use in metallurgy is of special importance, and in order that its development and application may be fully understood, an indication of its fundamental principles must first be given. Briefly, then, it is primarily comprised of two lenses, one behind the other. The foremost of these lenses is closest to the object to be examined, and is termed for this reason the *objective*. The second lens has the function of providing additional enlargement of the object, and being nearest to the eye, is termed the *eyepiece*. In Fig. 1 it will be seen that the objective, A, is a lens having a very short focal length, so that the focal point does not lie on the object, C_1-C_2, but before it. Consequently, at C_2-C_1 the object appears both enlarged and *inverted*. The eyepiece, B, is located in such a manner that it lies a little within the main focal point F. Consequently, the observer sees at C_4-C_3 a virtual and enlarged image for the reason that the eyepiece acts in the same way as an ordinary magnifying glass. It is, however, possible so to focus the microscope that the eye receives rays that are parallel. This is done by regulating the location of the image C_2-C_1 so that it is coincident with F, and its purpose is to throw less severe a strain upon the eye.

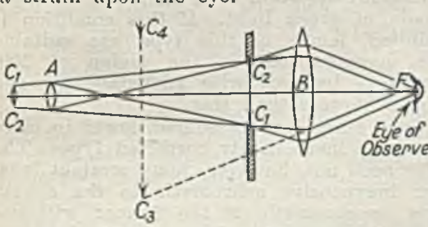

Fig. 1. Principle of the microscope.

The metallurgical microscope, however, is not used solely for purposes of observation by the eye. A record, static and capable of being stored and referred to when required, may be needed, in which case a sensitive photographic film is substituted for the human eye. In such instances C_2-C_1 is caused to lie externally to F. This means that the eyepiece will produce a real image of C_2-C_1, just as this image was produced by the objective. The new, magnified image may then be thrown on to a ground-glass screen readily, and the operator can make the necessary focal adjustments before actually photographing.

When the instrument is used simply for observation with the eye, the total magnification may be calculated with reasonable

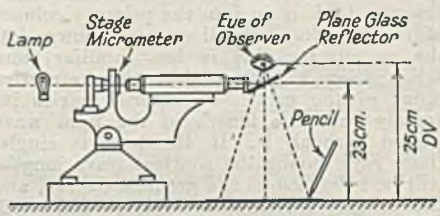

Fig. 2. Method of directly measuring magnification.

accuracy by use of the formula $\frac{t}{l} \times \frac{Dv}{e} = M$, where t is the length of the barrel of the instrument, Dv is the distance of distinct vision (250 mm.), l is the focal length of the objective, and e the focal length of the eyepiece. The first factor in this equation, $\frac{t}{l}$, may be termed the objective magnification, while the second factor, $\frac{Dv}{e}$ is the eyepiece magnification. It should be noted, however, that the above definitions are not applicable to continental instruments, which employ a different system.

There are, of course, occasions when the total magnification figure is required to be more exact than can be expected from this method of calculation. It then becomes essential to make direct measurement of the magnification with the aid of a stage micrometer. This is a piece of glass or metal, flat, polished on the surface, and ruled with a number of lines 1 mm., 1/10 mm., and 1/100 mm. apart. The objective lens is caused to focus on a range of these lines with spacing corresponding to the magnification it is desired to measure. A microscope cover glass is then mounted over the eyepiece at an angle of about 45°.

In Fig. 2, when the observer's eye is directed as indicated, the virtual image of the markings on the micrometer seems to issue from the piece of paper on the work-table. The most appropriate lines are then indicated with pencil, and their distance apart measured directly with a centimetre rule, from which the magnification is calculated. The plane glass reflector above the eyepiece is unnecessary in photomicrograph work because the image is thrown on to the ground-glass screen, where direct measurement may be carried out.

Defects of Lenses

Lenses are liable to a number of defects, among which chromatic aberration is one of high importance. The fact that a beam of white light passed through a transparent prism is broken up into the primary colours of the spectrum is well enough known, but the reason for this is less familiar, and arises from the fact that the refractive index of the prismatic material varies inversely with the length of the light wave passed through it. If the lens is single, those rays having the shortest wave lengths will be refracted to the greatest degree, and the longest waves will be least refracted. This means that the light, on issuing from the prism, does not converge upon one point but on a number of points forming a brief linear spectrum along the axis, as indicated in Fig. 3. This is the true *primary* spectrum. The result, seen in certain cheaper lenses, is that if a point of white light is focussed on to a screen, it will be found to possess a coloured rim, making for difficulty in faithfully observing the image.

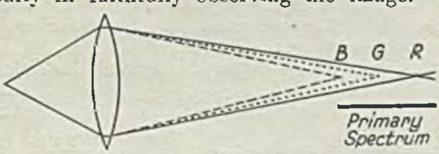

Fig. 3. Chromatic aberration in the objective.

This defect is corrected by using two lenses or more made of different kinds of glass, dissimilar in refractive index and also in their refractive indices for red and blue light. This difference is known as the *dispersion*. The effect of thus combining lenses is that it becomes possible to make both blue and red rays converge on the same point, as if the spectrum had been doubled over where the green band appears, and consequently abbreviated. Such a shortened spectrum is termed *secondary*. The system is known as *achromatic objective* and can be employed for low- and medium-powered instruments, but in practice a green filter is employed in order to lessen the intensity of the blue and red rays.

Even more abbreviation of the spectrum is required, however, when the microscope is high-powered and the work important. This is achieved by means of the *apochromatic objective*, and the type of spectrum produced is known as *tertiary*. The lens is made up of crown glass, flint glass, and fluorite, and this again makes the spectrum much shorter.

Another type of lens defect is spherical aberration. When a beam of light is transmitted through an ordinary plain lens, those rays that go through the centre focus on a point farther away than that on which the marginal rays focus. The result is that the observer sees an indistinct image. One method of overcoming this difficulty is to employ a series of lenses at appropriate intervals. This method will prove efficacious in all instances except where high-power lenses are used, when it becomes necessary to employ correcting lenses of hemispherical or hyperspherical type placed in front. This will minimise spherical aberration, but will give rise to a slight degree of chromatic aberration, and this is, in turn, remedied by suitable disposition of the rear lenses.

Spherical aberrations are based on a single colour, normally green, with wave length of 5500 A.U., occupying that portion of the spectral band which is most readily received by the human eye.

The simplest form of objective used to-day is the achromatic, designed so as to provide reasonable spherical correction for a single chosen colour, and a single doubling-back of the spectral band. In order that this type of objective may give its best result, it is essential that the object under investigation shall be given the right shade of green light. If this condition is fulfilled, lenses of this type are suitable for magnifications in the region of 500, and may be used with advantage at even higher powers than this.

Such lenses are, of course, lower in price than the more highly corrected types. The user need not, however, jump straight from the inexpensive achromatic to the expensive apochromatic if the former will not serve his purpose. There is an intermediate type known as the *semi-apochromatic*. In this the two major types of aberration are less than with the achromatic because the system is constructed with higher precision, while there are two (sometimes one) fluorite lenses incorporated in it. To obtain maximum efficiency with this type of objective, it is necessary to employ compensating eyepieces.

The apochromatic objectives, as will have been gathered, have the greatest degree of correction. It should be noted, however, that the final images produced by the red rays slightly exceed the blue in length. This is a defect needing correction, which can be achieved by use of a compensating eyepiece, which enlarges the red image less than the blue. The error is termed *chromatic difference of magnification*.

Consideration of the eyepiece necessitates examination of Fig. 4. The diagram marked *A* in this shows a type of eyepiece in which the field lens brings the primary image into the plane of the stop.

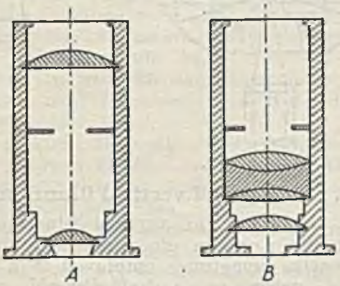

Fig. 4. Types of eyepiece.

This makes no noteworthy difference to the magnification, but it extends the field of vision and helps in correction. The eye lens in this system is simply a magnifying glass. In type *B* each one of the lenses is above the stop, so that the entire system functions as a magnifying glass on the image at this position.

It is important to note that these two types may be subdivided each into two further groups: (ac), those in which the eyepiece is of type *A normal*; (ad), those of type *A compensating*; (bc), of type *B normal*; and (bd) of type *B compensating*. Most normal eyepieces are, however, of type *A*. To distinguish between them, hold them to the eye and look at the sky or a well-lighted surface: the normal type will be seen to have a blue ring, whereas the compensating will have a red ring at the farthest edge of the field. The compensating type must be used with the apochromatic and semi-apochromatic objectives so as to minimise the chromatic difference of magnification between blue and red rays.

The *projection* eyepiece is usually of type *A*, but it has an eye lens of achromatised type contained in a movable cylinder within the outer tube, as indicated in Fig. 5. It will be seen that the converging rays from the objective are transmitted so as to focus on the plane of the diaphragm. The operator places the camera in such a position that it will produce the requisite magnification The location of the eyepiece is so regulated that a clear image of the diaphragm is thrown sharply on the screen of the camera. Consequently, the objective operates at a fixed tube value regardless of the extent to which the camera bellows is lengthened. To make them easier to use, projection eyepieces are often engraved with a scale indicating the various settings of the camera.

It is important that the metallurgist

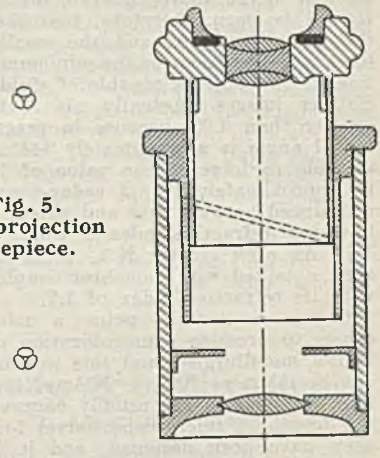

Fig. 5. The projection eyepiece.

should appreciate that the ability of a microscope to bring out differences of structure in metals is governed less by the actual magnifying power than by the *numerical aperture*, usually indicated as N.A. This term is best defined by the formula N.A. $= n \sin U$, where n is the refractive index of the medium between object and objective; U is $\frac{a}{2}$, a being the apical angle of the cone of light taken by the objective. The ability of the instrument to differentiate structures is known as its resolving power, which is the least distance separating two objects at which they are still visible through the lens as two distinct images.

For reasons connected with the wave-motion of light it is impossible for a lens to form a point image of a point object. What is seen in such a case is a bright spot of light in the centre of a series of diffraction rings (*see* Fig. 6). These make up a disc known as the Airy disc, and it is possible to work out its radius for whatever lens or wavelength may be desired. Let us now suppose that two point objects very near to each other are being studied. By constructing a curve of intensity to indicate the comparative illumination, it will be made apparent that the two images with their centres separated by a distance equal to the disc radius have this separation appearing as a darker zone. This darker zone appears for no other cause than this.

In order to compute the least amount of

separation, a formula must be employed, *viz.*, $h = \frac{.61\ \lambda}{n \sin U}$, where h is the minimum separation, and λ is the wavelength of light used. We have seen, however, that $n \sin U$ corresponds to the numerical aperture of the instrument, so that N.A. can be substituted in the above equation for $n \sin U$. It will be seen, therefore, that the larger the value for N.A. and the smaller that for λ, the less becomes the minimum separation of two objects capable of yielding two distinct images. Actually, $\sin U$ is never greater than 0.95, because in practice the apical angle is approximately 144°. It is possible to increase the value of N.A. up to approximately 1.4 if cedar-wood oil is introduced between lens and object, this oil having a refractive index of approximately 1.5. An even greater N.A. value (1.6) has been obtained with monobromonaphthalene, with its refractive index of 1.7.

Beyond a certain point a microscope ceases to produce a magnification of value to the metallurgist, and this working limit can be taken as 1000 × N.A. of the objective. Objectives are usually engraved with the length of microscope barrel for which they have been designed, and it is inadvisable to employ them for any other length than this. In Britain the range of barrel

Fig. 6. The Airy disc.

lies between 150 and 250 mm. Continental objectives are designed for infinite range.

The means of illuminating the object must now be considered. There are two principal types, known respectively as bright field and dark field. In the latter, the light entering the objective is not directly reflected; the only light entering is that scattered by unevennesses in the object's surface. There are drawbacks to this method, as slight unevennesses of surface throw shadows; and furthermore, the employment of high-power objectives together with short operating distances renders almost impracticable the introduction of illumination through external agency between objective and object. It is therefore bright field illumination that is of most importance to the metallurgist.

It will be seen from Fig. 7 that light enters from the side of the instrument directly over the objective. By means of a vertical illuminator it is reflected through the objective on to the object, and on being given back, enters and traverses the objective and the vertical illuminator, so producing an image at the top of the instru-

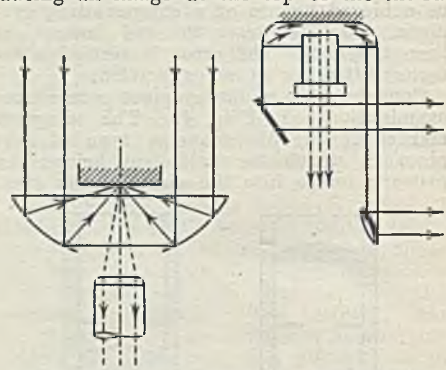

Fig. 7. Types of vertical illumination.

ment barrel. The vertical illuminator is commonly a plane glass reflector, but an alternative sometimes employed is a right-angled prism or a half-silvered mirror. These alternatives have, however, drawbacks that should be noted.

When an objective has its aperture lessened by bisection with a prism, it produces an image of each point in the form of an ellipse approximately double the length of the circular aperture disc. In consequence, the resolution in one direction is cut down to one-half, but is not influenced in the direction at right angles. This does not matter unless high magnification is employed, but is then a serious disadvantage.

The plane glass reflector is a bad vertical illuminator, wasting much of the light it receives by reflection back to the source of light, but it does permit the operator to make use of the full N.A. of his objective. Unless the glass employed for the vertical illuminator is extremely thin, there is a probability that double images will be produced, especially with low magnification.

(To be continued)

LUXEMBOURG STEEL

The iron and steel industry of Luxembourg is finding great difficulty in restarting, according to foreign Press reports. The Arbed steelworks (Aciéries Réunies Burbach-Eich-Dudelange) were seriously damaged both by air attack and by German looting. The coal mines of Eschweiler, in the Aix-la-Chapelle basin (which belonged to Arbed), are not yet workable, but an allotment of 40,000 tons a month from the Ruhr has been made to the Luxembourg factories. Provision of transport, however, is still an unsolved problem.

The U.S.A. Tin Position

No Relaxation of Control Likely

CONTROL of tin in the U.S.A. is not likely to be relaxed, for the prospects of additional new supplies this year are not good and present stocks must be carefully spread.

Stocks on January 1, 1946, were 91,623 tons, as compared with 107,202 tons twelve months before. Stocks this year included 68,026 tons on Government account (32,536 conc. and 35,490 pig) and 12,140 tons for Treasury, together with a Navy reserve not available for allocation. The privately owned stocks include 14,951 tons of pig. Consumption in 1945 was about 6000 tons less than in 1944, chiefly due to reduced military needs.

For the first time since 1942, tinplate regained its lead as chief consumer, while use in bronze production is falling back to the normal peace-time rate.

Prospects for supplies are not confirmed beyond July 1, 1946. Up to that date the U.S. will probably receive 15,000 tons concentrate and 6650 tons of metal. During the second half of the year the C.P.A. (Civil Production Administration) has not reckoned on more than 15,000 tons conc., and 6650 tons metal.

Only relatively small tonnages were found in the Far Eastern areas, and Government reports show that production of conc. in Malaya in 1946 will not exceed 12,300 tons. Output in the Dutch East Indies will also be very small owing to unsettled conditions. In Bolivia and the Belgian Congo production will be much less in 1946 than in 1945. Supplies from foregn sources therefore cannot greatly exceed 42,000 tons for 1946. Balance between available supplies and demand is not indicated until some time late in 1947 or 1948.

Secondary Pig Tin

Production of secondary pig tin declined 22 per cent. last year, reflecting greater use of lighter coatings, *e.g.*, electrolytic instead of hot dip; also a decline in tin-can collections. Imports declined from 36,550 tons in 1944 to 33,529 tons in 1945. The latter included 25,984 tons from Bolivia and 7401 tons from the Belgian Congo. Based on present restrictions, consumption of virgin pig in 1946 is estimated at 65,000 tons, compared with 58,620 tons in 1945. With an estimated new supply of 42,000 tons, this means a deficit of 23,000 tons, or a withdrawal from stocks at the rate of 2000 tons per month. The net reserve stock at the end of 1946 is estimated at only about 15,000 tons.

In regard to Dutch production, this is to be increased. Output of Banka and Billiton tin this year, largely as a result of American assistance, is expected to be somewhere between 6000 and 10,000 tons. With further help from the U.S.A., production from those two areas should reach the level of 30-40,000 tons annually; and it is hoped to reach those figures about the middle of 1947 on the assumption that four new dredges will be in operation about that time. Two of these are being built in Holland and two by the Bucyrus Erie Co., of South Milwaukee, Wis., on behalf of a Dutch concern, Mining Equipment Co., of New York, at a cost of 3.7 million dollars., to be shipped in December, 1946.

The restoration of the tin properties in British Malaya is also going forward, and the necessary equipment is being shipped from the United Kingdom.

Metallurgy of Zirconium

An American Survey

PRIOR to an investigation of the use of zircon sand as a raw material for making zirconium metal and alloys, the Bureau of Mines, Washington, has released a publication combining the most useful information on the metallurgy of corrosion-resistant zirconium metal and describing its extraction, production, alloys, and compounds, and various uses.

The Bureau's current report, compiled from numerous patents and publications, and containing a bibliography of more than 200 reference works, is intended as an aid to the industry in the commercial development of zirconium, according to Dr. R. R. Sayers, Director of the Bureau.

Zirconium metal, easily drawn into wires and rolled into thin sheets, is used widely in electronic tubes, as well as in electrical condensers, X-ray filters, lamp filaments, spot-welding electrodes, flares, photo-flash bulbs, and ammunition primers. Many valuable alloys are formed by mixing zirconium with other metals. Zirconium-copper alloys harden upon aging and are good conductors of electricity, and zirconium-magnesium alloys have good mechanical properties and excellent corrosion resistance. Alloys of zirconium with iron and silicon have improved hot-working properties, better surface characteristics, and greater impact strength.

Another recent publication of the same Bureau deals with concentration of manganese ores by selective flotation of calcite, tabling sized fractions and magnetic separation of calcite, fluorite, and pyrolusite.

Research in Tin

Progress Reported from Greenford

THE latest report from the Tin Research Institute (Fraser Road, Greenford, Middlesex) covers the work of the Institute in the years 1942-44 on each main application of tin, as well as the bearing on future developments of the research work now in hand.

An interesting indication of the entrance of tin into the decorative field is that contained in the details about the alloy "Speculum," which challenges silver, nickel, and chromium as a brilliant electroplate finish. The other constituent of Speculum is copper, and the Romans who gave the alloy this name were only able to cast it into massive plaques for use as mirrors; now it can be electroplated over any common metal. Bronzes have been intensively studied and great improvements in quality of chill castings have resulted. The new methods require no special apparatus and the Institute is prepared to demonstrate them in firms' own foundries.

Tinplate has also benefited from research, which has found how its resistance to rust and tarnish can be improved by a quick immersion in a chemical bath; and among the many interesting illustrations in the report is a photograph of cast-iron boxes used in the manufacture of penicillin. After failure by conventional tinning methods, these boxes were sent to the Tin Research Institute and tinned satisfactorily by the fused salt process.

Thin electro-coatings of tin on steel have been found to provide a good key for paint and to delay its weathering. The report suggests that thin tin coatings are not costly to apply and are likely to prove more efficacious than "phosphating" or an additional undercoat of paint.

Non-Ferrous Metals

Latest Scrap Prices

THE Minister of Supply has issued a list of selling prices of non-ferrous scrap metals. The prices relate to Ministry of Supply depots and are subject to sufficient supplies being available. They apply until the end of July and the list is published without prejudice or commitment. Inquiries regarding the list should be addressed to: Directorate of N.F. Metals (Scrap Disposals Dept.), Berkeley Court, S.E. Wing, Glentworth Street, London, N.W.1. (Tel. WELbeck 6677).

The following is a summary of the prices per ton of the various classes of scrap listed: Copper—scrap, £64 10s. to £67; turnings, £57 10s. Zinc—scrap, £31 10s. Brass—ingots, £57 10s.; scrap, £49 10s. to £56; turnings, £45 to £46; 70/30 metallics, £41; 60/40 rod swarf, £40; 60/40 broken down fuse scrap, £47; 90/10 gilding metal scrap, £60 10s. to £62 10s.; 95/5 cap metal webbing, £63 10s. Scrap bullet envelopes—cupro nickel, £74 10s.; gilding metal, £52 10s.

ALLOYS IN GAS TURBINES

Findings on the composition and treatment of certain alloys for use in gas turbines operating at 1500°F. are described in a report released by the Office of the Publication Board, Department of Commerce, Washington. The report covers three years of research at the "Boston Tech.," where the following materials were tested for both rupture and creep: 37 low-carbon forging grades of high-temperature, high-strength alloys of nickel-chromium-iron base type; 80 cast alloys of the same type with generally much high carbon content; 37 cast alloys of the "Vitallium" type with small composition variations. Metallographic and X-ray examinations of the alloys were also made for various treatments, as well as studies of heat-treating variables on the rupture life and ductility of the alloy systems. Optimum preheat temperatures for the best all-round alloy performance were determined. The report (143 pages) may be ordered from the Office of the Publication Board (Ref. O.P.B.-PB-16135; photostat $11.00; microfilm $2.00).

QUALITY CONTROL SYMBOLS

In view of the increased use of quality control methods in industry, both in this country and abroad, and of the consequent increase in the interchange of ideas upon these methods of inspection, it is considered desirable to adopt a British Standard List of Nomenclature and Symbols before attempts are made to secure international agreement. In order to obtain the views of British industry upon this subject to guide it in preparing a draft list, the British Standards Institution has issued an extensive questionnaire to manufacturers and others.

Belgian Fertilisers

Shortage of Potash

SUPPLIES of nitrogenous and phosphatic fertilisers are sufficient to cover the requirements of agriculture in Belgium, according to a statement of the Ministry of Agriculture. The only shortage this season will be in potassic fertilisers, supplies of which lie outside the control of the Belgian Government. Production of nitrogenous fertilisers has been pushed to the maximum possible, while it has been possible to obtain a certain quota from Great Britain through the Combined Food Board's quota system.

Belgian production of phosphatic fertilisers has been aided by the import of iron ores, mineral phosphates, and pyrites, and has exceeded the quantity allotted to Belgium under the international scheme. Belgian agriculture has been able to dispose of a quantity of basic slag greater than the pre-war average output. Exports, however, have practically been limited to an agreement signed with Holland in 1944, the quantities supplied being a condition of Belgium's receiving seed potatoes. Exports of superphosphates so far have been extremely small, amounting to only some 10 per cent. of the quantities placed at the disposition of Belgian agriculture. Large quantities still remain in stock, transport being limited owing to the shortage of closed wagons. The Ministry has asked fertiliser dealers to communicate to it as a matter of urgency the names of producers of phosphatic fertilisers who have refused or who refuse to accept orders for the supply of Belgian farmers.

The optimistic statement of the Ministry of Agriculture is, however, somewhat belied by the action of the Ministry of Economic Affairs, which, while removing all regulations on the home trade in phosphates, has prohibited all exports *sine die*, " the needs of Belgian agriculture not being sufficiently covered in phosphatic fertilisers."

In potassic fertilisers, Belgium is entirely dependent on imports. Considerable allocations of German and French potash have been made to her, but up to the present none has been received from Germany, while imports from France have only reached 25,000 tons of pure potash, or half the total allocation. Under the international agreement, however, the full allocation need not be delivered until June 30. In any case, no country has received larger supplies of French potash than Belgium. Some comment has been caused by apparent Belgian exports of potassic fertilisers, but the Ministry of Agriculture points out that these were in fact merely transit transactions on behalf of French interests, as Antwerp remains the great transit port for French potash.

Parliamentary Topics

Underground Gasification

APPENDED are a few more questions of chemical interest; raised in the House of Commons before the Easter recess.

Mr. Peter Freeman asked the Minister of Fuel and Power whether he intended to issue instructions to the National Coal Board to make experiments with the gasification of underground coal in suitable industrial areas; and whether his department had first-hand information of gasification of coal carried out in other countries.

Mr. Shinwell said that in view of the importance of this matter a working group composed of representatives from his Ministry, the Fuel Research Organisation, and the Geological Survey was set up, at the end of 1944, to examine all aspects of this process, including the selection of suitable sites, the choice of the system to be employed, and the scale of experiments. The group was also examining all available information about operations carried out in other countries. He would see that the National Coal Board was kept in touch with the results of the investigations.

Slag and Heather Bricks

Mr. Leslie asked the Minister of Works whether he had considered certain scientific discoveries whereby bricks declared suitable for building purposes could be produced from slag and heather.

Mr. Tomlinson was not aware of any process whereby bricks could be produced economically from slag and heather, but said he would be glad to consider details of any process of this nature which Mr. Leslie could send him.

NEW TRADE MARK

Cinema-Television, Ltd., Worsley Bridge Road, London, S.E.26, announce that a new Trade Mark has been adopted by the company, and will in future appear on all their products including photo-electric cells. It consists of the word " Cintel " prominently displayed in an ornamental circle on a squared screen, as illustrated herewith. New products of the company lately announced are a detector for locating buried pipes, metal embedded in wood, etc., also a production line of timers and chronometers, including a millisecond timer and the microsecond and decimal counter chronometer. Inquiries should be made to their address.

A CHEMIST'S BOOKSHELF

AMERICAN CHEMICAL INDUSTRY. Vols. II and III: The World War 1 Period, 1912-22. By Williams Haynes. Pp. xliii + 440 and xv + 606. New York: Van Nostrand, 1945. $8.

The author of these two impressive volumes tells us in his introduction that he is concerned with showing that American chemical industry has its roots in the 17th century and that the impression of many Americans that it came from Germany during the First World War is erroneous. He plans a survey of the whole field, but the second and third volumes have appeared first because they deal with events still within memory, many of the participants in which were able to give him first-hand information. The overlap on the war period on each side he justifies by saying that the modern development of the industry began with the election of Woodrow Wilson and closed with the passing of the Fordney-McCumber tariff in 1922. After five chapters dealing with the political and economic background, he treats of nitrates and the nitrogen problem, potash, phosphate products, sulphur, metals and minerals, drugs, the alkali industry, alum, pigments, insecticides, alcohol, solvents, fertilisers, coal-tar chemicals, and fine chemicals, with a number of chapters of general and political outlook. The field covered is, therefore, as extensive as could be inferred from the size of the books.

The account contains a large amount of personal material. We are taken behind the scenes in the chemical industry and politics of the time. The great men are introduced to us, and their portraits appear in profusion. The decisions of the executive at their luncheons and dinners, their telephone calls, even, are almost miraculously preserved for posterity, and the author has been fortunate in obtaining comments from many of them which he includes in footnotes. We have all suspected that things were done in this way, and it is flattering to our judgment to find that we were, in the main, correct. The only question which arises in the mind of a reviewer as to this side of the book is: who will want to read it? The scientific chemist will not, since he finds it dull and uninspiring; the business men will not have the patience or time for the task, unless perhaps they may dip into the volumes; perhaps it is the politician, the American politician (since the material has no promise of service to anybody of interest to our own), who will find it useful. He may even read it aloud to the Senate.

When he gets to materials, Mr. Haynes is informative and detailed. His sources, carefully assembled at the ends of the chapters, are mainly trade journals, and he has culled much of interest in the history of chemical industry. He has also had an eye on the reports of political events which bore on his topic. He presents some very interesting and useful statistics. The style of the book is at times diffuse and colloquial, which makes it tiring to read for those who have little leisure, but when he gets down to his facts the author is mostly concise and really interesting. The sections on the nitrogen industry, for example, are quite outstandingly good. In them he tells us, among other things, that the famous T.N.T. + Ammonium Nitrate explosive really originated in the analysis of dud German projectiles filled with it. The chapter on the synthetic dye industry contains some interesting particulars of the propaganda methods of the German dye firms, and the difficulties of starting the American industry. In the chapter on chemistry in industry, similarly interesting information is given on the collaboration between university workers and industry; and this is worth the attention of academic chemists, one of its results being, as the author says: "the rehabilitation of the laboratories of our educational institutions, which was to give this country the most complete, up-to-date, chemical training facilities in the world." The lead of America in scientific and technical publications is also well emphasised.

The reviewer cannot claim to have read these books from cover to cover. He has turned over page after page, and read those parts which interested him. In these he has found much which he was glad to know, and he thinks others, who will be more interested in other parts of the book, will do the same. The author has devoted an immense amount of work to his book, and although in the reviewer's opinion he might have done better to have missed out some material, other readers may think differently. The book is one which a chemical library would do well to have, and the name and subject indexes to each volume should facilitate its use. The first volume, dealing with the early period will, as the author says, be much more difficult to write, but it should be interesting, and it is to be hoped that it will appear in due course. For the present, let us congratulate the author and publishers in producing such an authoritative work.

J. R. PARTINGTON.

The annual report of the A.S. Hafslund, the main Norwegian producer of carbide, states that production in 1945 was maintained during four months only, owing to lack of raw materials. Recent inquiries established that sales possibilities in the company's former overseas markets had considerably diminished. The same might be said for the ferro-silicon produced by A.S. Hafslund.

Personal Notes

MR. C. AUGUSTUS CARLOW, chairman of the Fife Coal Company, Ltd., has been elected an honorary member of the American Institute of Mining and Metallurgical Engineers.

MR. G. W. WAGG, southern sales manager for Vitax Fertilisers, Ltd., has been appointed general sales manager of the company, and took up his new duties at Burscough Bridge on May 1.

DR. E. A. RUDGE, Ph.D., F.R.I.C., A.M.I.Chem.E., head of the department of science at West Ham Municipal College, E.15, has been appointed Principal of the College from May 1.

MR. H. HARDING has been appointed managing director of Thomas Moscrop & Co., Ltd., oil, chemical and paint merchants, Bolton. He started work for the firm at the age of 11 in 1893 at a salary of 5s. per week, and has since served in every department.

DR. HUGH NICOL, F.C.S., F.R.I.C., has left the Imperial Bureau of Soil Science to take up duty as Professor of Agricultural Chemistry at the West of Scotland Agricultural College, Glasgow, in succession to Dr. Robert Stewart, who has taken up an appointment with Fisons, Ltd.

MR. HARRY JEPHCOTT, deputy-chairman of Joseph Nathan & Co., Ltd., received a special tribute from the chairman, Mr. Alec Nathan, at the company's annual meeting on April 26, for conceiving, carrying out, and bringing to successful fruition the large and modern penicillin production unit operated by their subsidiary, Glaxo Laboratories, Ltd., at Barnard Castle, Co. Durham.

Obituary

MR. EDWARD HUBERT CUNNINGHAM-CRAIG, F.R.S.E., F.G.S., who died at Beaconsfield, Bucks, on April 24, aged 72, was a consulting geologist well known for his work on oil. A native of Edinburgh, he served on the Geological Survey in 1896-1907 and then acted as geological adviser to the Burmah Oil Co. and other petroleum companies. In 1918 he was technical adviser to the Committee on the Production of Oil from Cannel Coal. He contributed extensively to the technical literature of oil-finding and was joint author of a treatise on British mineral oil.

Penicillin Development

Glycerine as Source of Carbon

WHILE progress in the production of much more powerful grades of penicillin is reported from the U.S.A., research in India appears to have resulted in an improved method of manufacture by the use of glycerine as carbon source in place of sugar.

In a letter to *Nature* recently, Drs. S. L. Mukherjee and B. C. Sarkhal, research department of Albert David, Ltd., Calcutta, state that hitherto a modified Czapek-Dox medium with glucose as the sole source of carbon was used by Clutterbuck and others in the earlier work in 1932. Since then other modifications of this medium have tried to enhance growth of mould or increase yield of penicillin. In all these changes sugar or other carbohydrate has been chosen as the principal source of carbon. In the author's experiments with different synthetic media, they have observed that glycerine can effectively replace sugar. This has an important bearing on commercial production as glycerine is much cheaper than either glucose or lactose. If it could be suitably adopted for large-scale manufacture it would reduce considerably the cost.

The following glycerine medium (A) was used in all their experiments: 3 g. sodium nitrate, 0.5 g. potassium chloride, 0.5 g. hydrated magnesium sulphate, 0.01 g. hydrated ferrous sulphate, 1 g. potassium dihydrogen phosphate, 10: Bacto-Peptone; 20 or 40 c.c. glycerine, according as 2 per cent. or 4 per cent. v./v. was desired, and distilled water to make one litre. Very satisfactory results were obtained if, instead of distilled water, a 1000 c.c. extract derived from 100 g. of wheat bran was used; 200 c.c. of this medium was employed for each sowing bottle. The organism used was a culture of *Pen. notatum* G.C.419 supplied by Dr. B. Mundkar from the collection of the Imperial Agricultural Research Institute, Delhi. Anti-bacterial activity was recorded in duplicate in standard nutrient broth medium with commercial *A. Staph. aureus* strain in the usual manner. It has also been noticed that by increasing the concentration of glycerine to more than 4 per cent. v./v. in the medium does not increase the anti-bacterial titre. Details of this work will be published later.

The Jamaica Government is considering the policy to be adopted on the development of Jamaican bauxite deposits. Actual operations must, however, await the enactment of mining legislation, and steps are being taken to enact such legislation as soon as possible.

Reconstruction of the chemical works of the Produits Chimiques de Tessenderloo, Belgium, is proceeding apace. According to *Chimie et Industrie* the trisodium phosphate plant is now in action, and the plant for manufacturing acid calcium phosphate is on the point of restarting at full strength.

General News——From Week to Week

The Minister of Food announces that there will be no change in the present prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period ending June 22, 1946.

According to the *Financial Times*, it is thought in London metal circles that the Ministry of Supply has now contracted for sufficient copper from Empire and Chilean producers to cover U.K. requirements until the end of the year.

The British Colour Council women's wear colour ranges for Autumn and Winter, 1946, just issued, still show comparatively few colours, but they are skilfully chosen to suggest an unlimited variety of colour combinations.

Messrs. George Scott & Son (London), Ltd., and Messrs. Ernest Scott & Co., Ltd., announce that their new address is 110-120 Chandos House, Palmer Street, Victoria Street, London, S.W.1. Their telephone number, ABBey 2121-3, is unchanged.

H.M. Stationery Office has reprinted the text of "A Report on the International Control of Atomic Energy," which was issued in Washington by the U.S. State Department on March 28. Copies of the reprint are available at H.M.S.O. for 1s.

A remarkably clear and concise account of The Development of Penicillin in Medicine is given by Sir Howard Florey, and Dr. E. Chain in the publication of that title, issued by the Smithsonian Institution, Washington, as Publication 3797 (to be included in their Report for 1944).

So successful were the refresher courses in paint technology held recently under the auspices of the London Section of O.C.C.A., that one course is being repeated by request. This will be held at Borough Polytechnic only on May 28, June 4, 11, 18 and 25, each lecture being from 6.30 p.m. to 8 p.m.

Telephone service with the following countries is available to all subscribers in Great Britain and Northern Ireland: Belgium, Denmark, France, Holland, Italy, Luxembourg, Norway, Portugal, Sweden, Switzerland, Argentina, Australia, Bermuda, Brazil, Canada, Ceylon, Cuba, Egypt, India, Kenya, Mexico, Newfoundland, New Zealand, Palestine, Northern Rhodesia, Southern Rhodesia, South Africa (including South-West Africa), the Anglo-Egyptian Sudan (Khartoum and Omdurman only), Tanganyika, Uganda, and the United States of America.

The Treasury has made the Safeguarding of Industries (No. 2) Order, 1946 (S.R. & O. 1946, No. 606), effective from May 1, exempting from key industry duty, until August 19, 1946, sealed cylindrical X-ray tubes having two windows; camphene; carbamine; and urea.

In the Kelvin Lecture, delivered on April 25 to the Institution of Electrical Engineers, Professor M. L. E. Oliphant predicted that the first general use of atomic energy would most likely be through the by-products, the artificial radio-active substances, which could find a use in chemistry, metallurgy, and medicine.

A factory for making nylon polymer is to be built at Billingham-on-Tees by I.C.I., Ltd. The factory, covering 40 acres, will go into production within two years, and provide regular employment for 550. During the war, I.C.I. made great strides in nylon research; the results, originally devoted to the war effort, are now being diverted to general commerce.

The Distillers Company, Ltd., has offered to provide Cambridge University with an annual grant of £1000 for three years in the first instance for research in the field of polymerisation under the direction of Professor R. G. W. Norrish; and the Dunlop Rubber Company, Ltd., has offered to make available the sum of £350 a year for seven years for the assistance of work on molecular construction under the direction of Dr. G. B. B. M. Sutherland.

The coming-of-age of the Textile Institute as a chartered body was celebrated by a luncheon in Manchester on April 24. An appeal was opened for £50,000 to finance a development scheme, aiming broadly at raising the number and the standards of technologists in the industry. At the luncheon the president, Mr. T. H. McLaren announced that £8750 had already been subscribed to the fund by firms who had been approached.

The Gas Light and Coke Company has planned a large programme of expenditure on its 13 works in the London area, which will take about five years if materials and labour are available, and will cost several million pounds. A high proportion of new gas-making plant will be introduced, making possible an increased efficiency in using coal. In spite of the expenditure involved the company is getting statutory powers to reduce the price of gas. The new prices will be published as soon as these powers have been obtained.

Stewart, Goodall & Dunlop, Ltd., manufacturing chemists, of Edinburgh, announce that from May 1 all correspondence should be addressed to their new factory at 121a Princes Street, Edinburgh (Telephone 34831-2). Goods consigned or returned empties should be addressed to their goods entrance: 129 Rose Street, South Lane.

Foreign News

U.S.A. native sulphur production in February totalled 286,316 long tons, nine shipments totalling 264,490 long tons.

The American Mining Congress has asked for a legislative increase in the ceiling price of copper, lead, and zinc, through an amendment to the Price Administration Extension Bill.

Argentina's imports of chemicals, oils and paints in 1945 amounted to 145,500 metric tons, valued at 127,751,000 pesos. The United Kingdom and U.S.A, occupied the foremost position among suppliers.

The French Ministry of Colonies estimates the ground-nut crop from French West Africa this year at about 270,000 tons, or 30,000 tons more than in 1945. Of the total, 251,000 tons will be supplied by Senegal alone.

More than eight tons of DDT were used recently in defeating an epidemic of relapsing fever in the coastal province of Kenya. Strenuous efforts by the Medical Departmentment kept deaths down to 400, out of a total of 1500 Africans affected.

According to statistics published by the Banco Central de Chile, nitrate production in Chile last year amounted to 1,339,608 metric tons compared with 976,808 tons in 1944, showing a reaction from the declining tendency noted since the peak year of 1940.

The first Balkan insulin factory has been erected in Belgrade from equipment received from Hungary in part reparations. Only crude insulin is being made now, but the manufacture of the pure product will start as soon as possible.

A Danish trade agreement with Holland provides for the exchange of Danish pharmaceutical products, etc., to the value of 53 million kroner, for Dutch chemical products, etc., to the value of 37 million kroner, the balance serving for the resumption of interest and amortisation payments on Danish loans made in Holland.

The National Research Council of the U.S. Government has announced the publication of a comprehensive index of scientific medical and technical books published in the United States from 1930 to 1944. Five thousand copies of the volume are being distributed to U.S. embassies, legations and libraries throughout the world.

The State Institute of Optics at Leningrad is reported to have produced its first batch of electronic microscopes, giving a magnification of 25,000 diameters. The microscope is combined with a device allowing three-dimensional photography.

The Russians are reported to have almost completed the dismantling of the large synthetic-oil factory at Police (Pölitz) at the mouth of the Oder. Though heavily bombed by the British and American Air Forces, much of the machinery was in good condition.

Bogus penicillin, based either on dextrose or on yellow face-powder, is being retailed in large quantity on the Berlin black market, according to a special correspondent of *The Times*, and was fetching as much as £375 per ampoule. It is reported that ten members of a gang who have been manufacturing the " penicillin " were arrested on Good Friday.

The output of copper bars in Chile last year was 462,100 tons against 489,712 tons in 1944, while that of copper ores, concentrates, etc., was again relatively small at 8101 tons. The production of iron ore, which ceased almost completely in 1943 and 1944 owing to the loss of ships, reached 278,877 tons in 1945, and further expansion is stated to depend mainly upon the shipping situation.

Discussions on magnesium technology, held recently at the Battelle Memorial Institute, Columbus, Ohio, are expected to have a profound effect on the use of magnesium as a primary structural material. They are reported to have pointed the way to commercial production of low-impurity magnesium castings, and towards the lowering of the inflammability of magnesium, the reduction of corrosion, and improved welding and forming techniques.

Production of synthetic fuel at the reconstructed Leuna works, Merseburg, is in full swing, following the signature of a delivery agreement with the Russian Military Government. Output of ammonium sulphate has now reached over 10,000 tons a month, and the company's field of activities has been extended to include a new chemical yeast, "Tromadine," and a new alcohol substitute, " Leuna-Methanol " (claimed to replace potato spirit). The firm is currently employing over 20,000 workers, and expects to take on 5000 more during the next few weeks.

Forthcoming Events

May 5. Association of Austrian Chemists, etc., in Great Britain. 69 Greencroft Gardens. London, N.W.6, 11.30 a.m. Dr. L. Janossy: " Cosmic Rays."

May 6. Society of Chemical Industry (London Section). Rooms of The Chemical Society, Burlington House, Piccadilly, S.W.1, 6.15 p.m. Annual general meeting.

May 7, 8 and 9. Electrodepositors' Technical Society. Imperial Hotel, Birmingham. Annual conference. May 7. 2.30 p.m., Mr. A. W. Hothersall: "Electroplating in the U.S.A."; 3.30 p.m., Dr. C. L. Faust: "Electrolytic Polishing"; 7 p.m., dinner. May 8. 10 a.m., Dr. E. G. West: "Electroplating on Aluminium," and Mr. P. Berger: "Defects in Electroplating Solutions and their Remedies"; 1.30 p.m., lunch (at Joseph Lucas, Ltd.); 2.30 p.m., visit to Shaftmoor Lane works of Joseph Lucas, Ltd. May 9. 9.15 a.m., visit to Rylands Bros., Ltd., Warrington.

May 8. Royal Society of Arts. John Adam Street, Adelphi, London, W.C.2, 1.45 p.m. Dr. A. S. Parkes: "Hormones."

May 8. North-Western Fuel Luncheon Club. Engineers' Club, Albert Square, Manchester, 12.30 p.m. Col. W. A. Bristow: "Fuels and Nationalisation."

May 8. British Ceramic Society (Building Materials Section). Queen's Hotel, Leeds. Spring meeting. 9.45 a.m., council meeting; 10.15 a.m., general business; 10.30 a.m., experiences of team which visited Germany; 12 noon, Mr. B. Butterworth: "The Absorption of Water by Clay Building Materials and Related Properties, Pt. II"; 12.45 p.m., luncheon; 2.15 p.m., visit to Farnley Iron Co.'s brickworks or Leeds University Department of Coal Gas and Fuel Industries.

May 9. Oil and Colour Chemists' Association (Manchester Section). Engineers' Club, Albert Square, Manchester, 6 p.m. Twenty-second annual general meeting.

May 10. Bedson Club. King's College, Newcastle-on-Tyne, 5.30 p.m. Sir R. H. Pickard: "Whither Chemistry?" (63rd Bedson Lecture.)

May 10. Institution of the Rubber Industry. Grand Hotel, Birmingham, 5.30 p.m. Mr. A. Healey: "The Future of the Rubber Industry" (first Annual Foundation Lecture).

May 10. Society of Chemical Industry (Plastics Group and Birmingham and Midlands Section). Chamber of Commerce, New Street, Birmingham, 6.30 p.m. Mr. D. W. Harbour: "Some Solubility Relations in Phenol Formaldehyde Resins."

May 11. Institution of Factory Managers (North Midlands branch). Royal Victoria Station Hotel, Sheffield, 2.30 p.m. Cdr. Irvine, R.N. (retd.): "Man and Management."

May 13. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 4 p.m., National Road Tar Committee; 6 p.m., National Pitch Committee.

May 14. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 10 a.m., National Creosote Executive Committee; 2.15 p.m., A.T.D. Executive Committee.

May 14. Institution of Chemical Engineers and the **Chemical Engineering Group.** Rooms of the Geological Society, Burlington House, Piccadilly, London, W.1, 5.30 p.m. Mr. D. J. Pull: "Instrumentation in Plant Control."

May 15. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 9.45 a.m., A.T.D. general meeting; 11.30 a.m., N.C.C. (all subscribers); 2.30 p.m., B.R.T.A. extraordinary general meeting, followed by council meeting.

May 16. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 9.30 a.m., Pitch Supply Association; Pitch Marketing Co., Ltd.

May 16. Institute of Fuel (East Midland Section). Gas Department, Parliament Street, Nottingham, 5.15 p.m. Annual general meeting, followed at 6 p.m. by joint meeting with National Smoke Abatement Society, etc. Mr. S. N. Duguid: "Prevention of Industrial Smoke."

May 17. British Association of Chemists. Central Library, St. Peter's Square, Manchester, 2. Prof. P. M. S. Blackett: "The Social Implication of Recent Discoveries Regarding Atomic Energy." (Annual B.A.C. Lecture.)

Company News

Pinchin, Johnson & Co., Ltd., report net profit for 1945 totalling £418,066 (£475,636). Ordinary dividend, 15 per cent. (10 per cent.).

Lewis Berger & Sons, Ltd., paint manufacturers, are increasing their interim ordinary dividend from 6 per cent. to 8 per cent. for the year ending July 31 next.

Horace Cory & Co., Ltd., chemical colour manufacturers, announce net profit for 1945 totalling £2673 (£1565). Ordinary dividend, 10 per cent. (nil).

New Companies Registered

Dyett & Muir, Ltd. (408,527).—Private company. Capital, £500 in £1 shares. Chemists and druggists, etc. Director: H. R. D. Piper. Registered office: 3 and 4 Clements Inn, W.C.2.

R. J. Lines, Ltd. (408,578).—Private company. Capital, £1500 in £1 shares. Consulting, analytical, manufacturing and general chemists, etc. Directors: D. F.

Burlingham; Mrs. G. D. Burlingham; E. R. Atkinson. Registered office: Royal Parade Pharmacy, Hunstanton, Norfolk.

Bardo Manufacturing Company, Ltd. (408,713).—Private company. Capital, £600 in £1 shares. Manufacturers of and dealers in plastics, chemical materials, etc. Subscribers: G. H. Davis; U. M. Evans; R. Sleigh. Registered office: 60 Brewery Road, N.7.

Amalgamated Export & Import Co., Ltd. (408,610).—Private company. Capital, £1000 in £1 shares. Importers, exporters and dealers in merchandise of all kinds, including chemicals, etc. Director: E. Herst. Registered office: Bond Street House, 14 Clifford Street, S.W.1.

Edmund Jones, Ltd. (408,636).—Private company. Capital, £2000 in £1 shares. To acquire the business of wholesale and retail chemist carried on by Louisa M. Jones at 60 Miles Bank, Hanley, Stoke-on-Trent. Directors: Mrs. L. M. Jones; E. Corner. Registered office: 60 Miles Bank, Hanley, Stoke-on-Trent.

Acorn Anodising Company, Ltd. (408,710).—Private company. Capital, £5000 in £1 shares. Electro-metallurgists, electro-chemical engineers, electro-depositors and platers, iron, steel and non-ferrous metal and wood workers, engineers, chemical manufacturers, etc. Directors: H. Musgrave; D. C. Thomson; P. R. W. Smith; P. Shaw. Registered office: Carlisle Road, Colindale, N.W.9.

Chemical and Allied Stocks and Shares

THE recent strength and activity of stock markets gave way to a more cautious attitude induced by a disposition to await international developments. Sentiment was also affected by suggestions that U.S. approval of the loan to Britain may be delayed. British Funds lost a small part of their strong advance, and although still higher on balance, leading industrials have not held best levels recently recorded. Iron and steels continued under the influence of nationalisation and lost further ground, although, in a few instances, prices recovered a few pence. Reflecting the view that the basis of nationalisation compensation may be better than had been feared in the market, Cable & Wireless ordinary and preference stocks were both higher on balance, and there was moderate recovery in home rails. Selling in markets has not been heavy when judged in relation to the recent rise of values, but buyers are now adopting a waiting attitude.

In accordance with the prevailing trend, chemical and allied shares have not held best prices recorded in the past few days, but in many cases were again higher on balance, stimulated by the further rise to 43s. in Imperial Chemical, which remained under the influence of the past year's profit figures. B. Laporte, on higher dividend hopes, were good with a further rise to 93s., while Turner & Newall have been in demand up to 90s. Borax Consolidated were 47s. 3d., and British Oxygen showed a further rise to 93s. 9d. Dunlop Rubber were 58s., and British Aluminium rallied further to 39s. 3d. Lewis Berger rose to 127s. on the interim dividend increase, and other paint shares were favoured, Pinchin Johnson being 43s. 3d. following the meeting, with International Paint 127s. 6d., and Goodlass Wall 10s. ordinary 29s. 4½d. Electric equipments continued to attract, English Electric being 65s. on the Marconi deal, while General Electric were 101s., and Associated Electrical 65s. 3d.

In iron and steels, Guest Keen rallied to 41s. 3d., after declining further to 39s. 9d., while United Steel at 22s. 3d, Tube Investments £6 3/32, and Thomas & Baldwins 10s. 6d. were also above lowest levels reached following the Government's decision to nationalise various sections of the industry. Stewarts & Lloyds were 50s. 6d. after 50s., but generally prices in this section were again lower on balance. Textiles have been favoured and modern gains predominated, Bradford Dyers being 27s., Bleachers 14s. 7½d., Calico Printers 25s., Courtaulds 54s. 3d., and British Celanese 35s.

De La Rue eased to £11⅛, but elsewhere, British Industrial Plastics 2s. ordinary were favoured on E.P.T. abolition calculations, and rose further to 8s. 9d., while Erinoid 5s. ordinary have been dealt in up to 12s. 7½d. Fisons continued to respond to the prospects of the fertiliser industry and changed hands up to 59s. Cooper McDougall & Robertson were higher at 36s. 3d. Greeff-Chemical Holdings 5s. shares changed hands around 11s., and Monsanto Chemicals 5½ per cent. preference have marked 23s. 9d. Blythe Colour 4s. shares were good at 40s. In other directions, Wm. Blythe 3s. shares changed hands at slightly over 13s. British Lead Mills were 11s. 1½d. on the full results, while British Alkaloids 1s. shares continued active with dealings up to 11s. 6d.

British Drug Houses transferred around 64s., Beechams deferred were good at 24s. 7½d., Sangers 31s. 3d., and Boots Drug 5s. ordinary 60s. Triplex Glass kept steady at 42s. 6d., and United Glass Bottle have advanced to 80s. 6d. on E.P.T. abolition considerations. British Glues & Chemicals 4s. shares showed firmness at 14s. 3d. Oils fluctuated, but Canadian Eagle Oil were prominent, advancing to 33s. on the possibility that the company may change its domicile in order to avoid double taxation.

Prices of British Chemical Products

THERE have been no outstanding features in the London market for general chemicals during the past week and contract deliveries to the chief consuming industries have been maintained on a good scale. Inquiry for new business is fairly widespread and the substantial export demand shows no sign of abating; consequently, buying for immediate delivery is difficult to negotiate in most sections of the market. Quoted prices show little alteration, but the tendency is for values to be firmer. In the coal-tar products market pitch continues firm, mainly on home trade demand, while cresylic acid is a good market.

MANCHESTER.—Fresh export inquiries covering rather substantial quantities of heavy chemicals have been dealt with on the Manchester market during the past week, but shippers are not finding it easy to arrange early parcels. Home trade industrial users are pressing for contract deliveries of the alkalis, mineral acids and other heavy products, as well as of a fairly wide range of lighter materials, and a steady flow of replacement business is reported. Sulphate of ammonia and other fertilisers, including superphosphates and the compounds, are being taken up in good quantities.

GLASGOW.—Business in the Scottish heavy chemical market has been somewhat quieter during the past week owing to the Easter holidays, but at the same time home and export orders and inquiries continue unabated. It is anticipated that export business will be stimulated by the relaxation of a number of controls and great interest has been shown recently in formaldehyde, sulphur, toluol, copper sulphate, and zinc oxides. Prices remain firm.

Price Changes

Rises: Aluminium sulphate; chromic acid; copper oxide; lead acetate; lead nitrate; litharge; mercuric chloride; oxalic acid (Manchester); potassium permanganate; sodium hyposulphite; sodium nitrate; sodium phosphate; zinc sulphate; creosote; pitch; pyridine; toluol (pure).
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.—£15 to £16 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. £85 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, 7⅝d. per lb.; ground, 8⅛d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. 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, 7½d. 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, £20 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, in March, £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, 5⅝d. to 8d. per gal., according to quality, f.o.r. maker's works. MANCHESTER, 6¼d. 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. — May 1. — For the period ending May 5 (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, refined deodorised, £53; refined hardened deodorised, £58. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62. WHALE OIL, crude hardened, 42 deg., £51 10s.; refined hardened, 46/48 deg., £52 10s. 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

Insecticides.—J. Hyman. (United States, Jan. 26, '46.) (Cognate with 8475.) 8476.

Fluorohydrocarbons.—Imperial Chemical Industries, Ltd. (United States, March 21, '45.) 8739.

β - Naphtha-selenazole compounds.—Kodak, Ltd. (United States, March 31, '45.) 8400.

β - Naphtha-selenazole compounds.—Kodak, Ltd. (United States, Oct. 26, '45.) 8401.

Polymeric materials.—L. Leben, A. H. Little, and Imperial Chemical Industries, Ltd. 8973.

Peroxide compositions.—V. Leonard. (United States, May 24, '45.) 8409.

Metal desurfacing methods.—Linde Air Products Co. (United States, May 1, '45.) 8557.

Powder dispensers.—Linde Air Products Co. (United States, May 9, '45.) 8558.

Polymeric materials.—A. H. Little, and Imperial Chemical Industries, Ltd. 8975

Treatment of Alloys.—London Electric Wire Co., & Smiths, Ltd., and A. B. Ashton, 9099.

Iron ore manufacture.—G. Malecki. 8731.

Magnesium compounds.—Marine Magnetism Products Corporation. (United States, Aug. 26, '44.) 8987.

Paint compositions.—Metals Disintegrating Co., Inc. (United States, May 19, '45.) 8760.

Resinous products.—Monsanto Chemical Co. (United States, March 23, '45.) 9151

Anti-corrosion oils.—N.V. de Bataafsche Petroleum Mij., and W. David. 8691.

Smokeless powder.—E. P. Newton. (Hercules Powder Co.) 8708.

Cellular glass.—Pittsburgh Corning Corporation. (United States, Oct. 10, '45.) (United States, April 24, '45.) 8761, 9109.

Obtaining vitamins from fish oils.—Pittsburgh Plate Glass Co. (United States, May 26, '45.) 9110.

Glyceride oils.—Pittsburgh Plate Glass Co. (United States, Sept. 7, '45.) 9111.

Concentration of vitamins.—Pittsburgh Plate Glass Co. (United States, Oct. 31, '45.) 9112.

Artificial resins.—Pittsburgh Plate Glass Co. (United States, March 16, '40.) 8609.

Fluid-pressure indicators.—Power Jets (Research & Development), Ltd., and R. P. Probert. 8479.

Hydraulic press plants.—Precision Developments Co., Ltd., G. Olah, and F. J. Box. 9033.

Drum, etc., closures.—T. H. Risk. (United States, March 19, '45.) 8504.

Insecticides.— W.E. Ripper. 8809.

Cyclonite.—E. Roberts. 8778.

Surface coating devices.—Schori Metallising Process, Ltd., and C. F. Lumb. 8538.

Coating explosive materials.—J. Shackleton, F. H. Seeley, A. A. Atkins, W. H. Gibson, A. E. Delph, and E. Cotterill. 8656.

Face masks.—Siebe Gorman & Co., Ltd., Sir R. H. Davis, and R. W. G. Davis. 8949.

Alumina.—Soc. d'Electro-Chimie, d'Electro-Métallurgie et des Aciéries Electriques d'Ugine. 8547.

Pyrazine.—Soc. des Usines Chimiques Rhône-Poulenc. 9196 : (Cognate with 9196.) 9197.

Treatment of powdered material.—Spencer (Melksham), Ltd., F. S. Winckworth, and B. D. Milne. 8667.

Polymeric materials.—J. C. Swallow, D. K. Baird, and Imperial Chemical Industries, Ltd. 8970.

Oxazolones.—Therapeutic Research Corporation of Great Britain, I. M. Heilbron, A. H. Cook, and J. A. Elvidge. 9159.

Carbon dioxide storage.—W. W. Triggs. (Specialities Development Corp.) 8747.

Complete Specifications Open to Public Inspection

Treatment of chlorinated rubber derivative.—Firestone Tyre & Rubber Co. Sept. 20, 1944. 27714/45.

Hydrazino-1,3,5-triazino derivatives of substituted phenylarsenic compounds.—E. A. H. Friedheim. Feb. 3, 1942. 2657/43.

Manufacture of azo dyestuffs capable of being chromed.—J. R. Geigy, A.G. Sept. 20, 1944. 24251/45.

Centrifugal mixers.—V. Gruber y Cia., Lda. Sept. 26, 1944. 24339/45.

Formation of layers of organic polysulphide polymer plastics.—International Latex Processes, Ltd. May 13, 1943. 8608/44.

Colloidal solutions for use in the graphic arts and for the protection of metals.—Laurent, A.R.M. Sept. 7, 1942. 2032/46.

Method for the production of esters of diols and triols of cyclopentane-polyhydrophenanthrene series.—Levens Kemiske Fabrik. Jan. 29, 1942. 2261/46.

Method for the production of such glucosides of polyoxy compounds with cyclopentane-polyhydro-phenanthrene ring system as have at least one free oxy group in the sterine-skeletons.—Levens Kemiske Fabrik. May 29, 1941. 2262/46.

Preparing reaction products of halogen hydracids with alcohols. N.V. Chemische Fabriek Naarden. May 5, 1941. 2211/46.

Resinous products from castor oil and production of same.—Shell Development Co. Nov. 24, 1942. 19726/43.

Discharging of vessels containing gas or a metal vapour.—Sirco, A.G. Sept. 26. 1944. 15647/45.

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Production of branched chain hydrocarbons.—Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett, G. I. Jenkins, and J. Habeshaw. March 4, 1942. 576,086.

Production of polymeric materials.—R. G. R. Bacon, S. G. Jarrett, L. B. Morgan, and Imperial Chemical Industries, Ltd. Dec. 9, 1942. (Addition to 573,270.) 576,160.

Protective coating of dyestuff powders.—C. E. H. Bawn, E. G. Cockbain, and Imperial Chemical Industries, Ltd. Dec. 9, 1942. 576,100.

Artificial fertilisers.—J. R. Booer, and F. W. Berk & Co., Ltd. March 29, 1944. 576,185.

Production of 1:5-pentanedoil.—J. G. M. Bremner, R. H. Stanley, D. G. Jones, A. W. C. Taylor, and Imperial Chemical Industries, Ltd. Nov. 4, 1942. 576,098.

Production of 1:5-pentanediol.—J. G. M. Bremner, R. H. Stanley, A. W. C. Taylor, D. A. Dowden, and Imperial Chemical Industries, Ltd. April 28, 1942. 576,087.

Manufacture of compositions containing aromatic derivatives of trichloroethane.—W. Bridge, and Imperial Chemical Industries, Ltd. April 12, 1944. 576,231.

Reaction products of aldehydes and bis-(diamino triazinyl) cyanoalkylene disulphides.—British Thomson-Houston Co., Ltd. March 17, 1942. 576,163.

Manufacture of fluorinated derivatives of methane.—J. H. Brown, W. B. Whalley, and Imperial Chemical Industries, Ltd. April 4, 1944. 576,189.

Manufacture of fluorinated derivatives of aliphatic hydrocarbons.—J. H. Brown, W. B. Whalley, and Imperial Chemical Industries, Ltd. April 4, 1944. 576,190.

Cementing of polymethyl methacrylate surfaces.—J. S. Byers, A. Burness, and Imperial Chemical Industries, Ltd. Aug. 3 1943. 576,164.

Solidifying normally liquid hydrocarbons.—D. M. Clark. (Safety Fuel Inc.) Feb. 8. 1944. 576,180.

Manufacture of artificial rubber-like materials.—R. B. Drew, K. R. Dutton, and British Glues & Chemicals, Ltd. Dec. 10, 1943. 576,228.

Acid-resisting materials and articles made therefrom.—H. Dreyfus. Dec. 21, 1942. 576,131.

Extraction of mercury from its ores and concentrates.—A. C. H. Faurie. May 17, 1943. (Divided out of 572,578.) 576,242.

Rust-preventive hydrocarbon compositions.—J. G. Fife. (Shell Development Co.) May 29, 1942. 576,089.

Production of nitro-paraffins.—K. W. Gee, and Imperial Chemical Industries, Ltd. Sept. 28, 1942. 576,129.

Yellow azo dyestuffs.—N. H. Haddock, C. Wood, and Imperial Chemical Industries, Ltd. May 8, 1944. (Sample furnished.) 576,234.

Aluminium alloys.—H. C. Hall, and T. F. Bradbury. April 6, 1944. 576,230.

Method of purifying electrolytes.—H. W. K. Jennings (Hudson Bay Mining & Smelting Co., Ltd.) Sept. 20, 1943. 576,135.

Manufacture of halogenated hydrocarbons.—D. G. Jones, M. Phillipson, and Imperial Chemical Industries, Ltd. Dec. 7, 1942. 576,099.

Impregnation of synthetic linear polyamide filaments with one-stage phenol formaldehyde resins.—L. Leben, and Imperial Chemical Industries, Ltd. Dec. 18, 1942. 576,102.

Catalysis.—Lummus Co. Aug. 26, 1941. 576,220.

Plasticising compositions.—Mathieson Alkali Works. Oct. 3, 1942. 576,136.

Distillation of heat-polymerisable materials.—Mathieson Alkali Works. Dec. 1, 1942. 576,138.

Production of nickel or cobalt in the form of flake.—Mond Nickel Co., Ltd. May 17, 1943. 576,144.

Production of organic halogen compounds.—J. R. Myles, F. S. B. Jones, and Imperial Chemical Industries, Ltd. June 27, 1941. 576,119.

Non-detonating deflagrating explosive compositions and delay combustion train devices obtained therefrom.—R. C. Payne, E. Jones, J. S. Flanders, and Imperial Chemical Industries, Ltd. Dec. 23, 1942. 576,107.

Complex esters and their polymers.—Pittsburgh Plate Glass Co. Oct. 15, 1940. 576,083.

Condensation products and polymerisation products thereof.—Pittsburgh Plate Glass Co. June 16, 1941. 576,153.

Controlled oxidation of alicyclic hydrocarbons and of their derivatives.—Shell Development Co. Jan. 30, 1943. 576,229.

Manufacture of *p*-amino-benzene-sulphonyl-guanidine.—Soc. of Chemical Industry in Basle. Cognate applications 17645/42, and 17646/42. Dec. 16, 1941. 576,222.

Process for the alkylation of olefines with isoparaffins.—Standard Oil Development Co. Aug. 2, 1941. 576,156.

Intermediate explosive primers.—J Taylor, H. R. Wright, and Imperial Chemical Industries, Ltd. July 29, 1942. 576,219

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