The Chemical Age

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Notes and Comments

An Object Lesson

THE chemical industry may congratulate itself on having provided an object lesson on the way to weather an economic crisis. When the economic depression began the chemical industry did not follow the downward course of trade with the same rapidity as most other industries. It has been suggested that the reason for this is in the multiplicity of trades served by the chemical manufacturer and the vast diversity of his products. Sulphuric acid, for example, to instance one of the staple chemicals, is used by the manufacturers of steel, fertilisers, explosives, artificial silk, dyes, textiles, petroleum, tar products, accumulators, acids, insecticides, electroplated goods, fats, pharmaceutical preparations, and for many other purposes. The market for chemicals is vast. Moreover, no chemical manufacturer relies on one product alone but is ready to take up the manufacture of any product for which there seems likely to be a market. The chemical manufacturer, indeed, is one of the most adaptable of men, and is ever ready to consider new ideas and new processes. In that respect he is an object lesson to many industries.

The chemical industry is reaping the reward of this spirit of adventure. Employment among chemists is better than the times seem to warrant, and from all sides comes the tale of increased activities. It will be a thousand pities if the Government at this critical juncture fails to support industry and squanders the national money on palliatives.

Pure and Applied Science

A REMARK made by Professor Henderson in his presidential address to the Chemical Society deserves to be rescued from oblivion, and to be translated into action. "It is hoped," he said, "that senior authors of a series of papers which have appeared in the Journal will publish at suitable intervals a resumé of their work." Professor Henderson, perhaps unknowingly, has struck a particularly bright idea. Anyone—especially those engaged in the bustle of industrial life—who has been for any length of time a Fellow of the Chemical Society, must have been appalled by the impossibility of understanding even the justification for many of the papers published in the transactions of that body. We do not suggest that the papers are actually worthless—even though their worth may in the mass be expressed in terms of a periodically oscillating mathematical series; they must have individual merit or the committee would not have published them. What we do emphatically mean is that very few have either the time or the erudition to assess the value or the place in the mosaic of science of the majority of the contributions printed in the transactions. Who, for example, that is not actually working in that branch of chemistry will be stirred to enthusiasm, or even understand the real importance of a lengthy paper upon "The Conversion of r-Phenyl-α-naphthylglycollic Acid into Ketones," to take a title purely at random from an old volume of transactions? The fact is, of course, that many of the papers are fragments of a lengthy research conducted by the "principal author," and are thus only of importance in relation to the whole. Some, however, are not of this nature. We should, therefore, desire to expand Professor Henderson's suggestions as follows: Firstly, let every principal author publish periodically a paper describing his research and in that paper let him refer to the work of his collaborators. Much that is now published could be avoided by that means, but even if it was necessary to publish the less important fragments in full, the patterning of the mosaic would fit them into their place. Secondly, let every paper be prefaced by a short appreciation of the value of the results. Where the work was done at a university the professor or research assistant should be responsible for the note; where it is a private paper, the author, or one of the editors of transactions, should write the note.

We do not confine this suggestion to the Journal of the Chemical Society, nor yet to the work of pure scientists in general. There is quite urgent need for workers in the industrial field to do likewise. In our own recollection many a valuable piece of scientific work would have been lost and forgotten in the transactions of some learned body if the author had not subsequently described it in more practical language in the pages of the technical Press. That is one of the functions of the technical Press to which too little heed is paid. Many of those who can turn the work to advantage do not read the more learned publications and, even if they do, the practical significance of the results and ideas advanced is not often apparent upon the surface.

Statistical Methods in Industrial Practice

THE development within recent years of central research associations connected with our principal industries has allowed of the collection of data of works practice to an extent and of an accuracy far greater than was possible in the past when industry consisted largely of individual units only imperfectly associated the one with the other. The data of practice made available in his way has allowed of the use of a new tool of research by statistical analysis which, within the last few years, has given results of the greatest practical value. At a meeting of the North-Western

Section of the Institute of Fuel, held in Manchester on April 5, Mr. E.C. Evans, head of the research department of the National Federation of Iron and Steel Manufacturers, outlined some of the results obtained by statistical methods of investigation in the iron and steel industry.

Dealing first with the characteristics of coal as determined by its composition, he pointed out that a statistical examination for coal properties, made on the basis of the carbon and hydrogen content, showed that a number of the properties of coal could be correlated with the percentages of those two main constituents. Properties of a given coal with respect to hardness, coking power, flame temperature, and fusibility could in many cases be prophesied from its analysis. In the application of statistical methods to problems of industrial practice it was necessary to take into consideration a large number of complex factors, the exact effect of each of which would be extremely difficult to determine individually. Statistical methods, however, allowed of their analysis and their use in the examination of blast furnace problems, and had allowed of the determination of many of the factors involved in the attainment of high productive efficiency.

Problems of Costing

SIMILAR methods, adapted, of course, to meet the special conditions involved, have been applied to consideration of problems of steel production by the open hearth process. Factors governing efficiency have been determined; and the knowledge thus obtained in an investigation extending over a period of the last three years is already resulting in a marked increase of output and reduction in fuel consumption at a number of British plants. Statistical methods are also in use in rolling mill practice in the examination of the factors governing efficiency.

Possibly one of their greatest fields of application is, as Mr. Evans pointed out, in costing. Costs of production vary widely, depending upon the capacity at which the plant is being operated, but statistical examination of costs and a comparison of actual cost with standard cost of production, taking into consideration the percentage capacity at which the plant is being operated, has proved to be of value in a number of individual cases. Work of this character is only possible by the co-operation of a large number of firms in an individual industry. Such co-operation has been secured in the iron and steel industry by control of investigations, by committees of technical officers each of whom is a specialist in the particular phase of manufacture concerned.

A New Function for Nitrogen

THE nitrogen hunger of the world, due primarily to the deficiency of combined nitrogen in the soil, is aggravated by the nitrogen hoarding proclivities of the earth, said Sir Frederick Keeble, when speaking at the Royal Institution recently. Low temperature is not the only condition which may lead the soil to withhold the nitrogen which plants need. Drought also may do it, as discovered in the course of experiments at the Jealott's Hill Agricultural Research Station. The experiment was being made in order to obtain a measure of the extra yield which results from supplying grass-lands with nitrogen. There was a severe summer drought and growth ceased. The drought lasted several weeks; when rain came, the grass which had had a nitrogen fertiliser began to grow again but the natural grass stood still for a week or more and the check caused by the drought was evident in the poorer growth made by the natural grass throughout the rest of the season. The experiment at Jealott's Hill showed that the use of nitrogen and mineral fertilisers doubles the yield of protein from grass. The increase in protein is accompanied by a corresponding increase of carotene —that simple compound of carbon and hydrogen which is suspected of playing an important part in the life of plants and is known to play an all important part in animal life. Introduced into the body of an animal, carotene is assembled in the liver, and that organ breaks it into halves and the halves, or some of them, are vitamin A, which encourages growth and builds up resistance to disease. Nitrogen grass should therefore supply a double allowance of carotene to the grazing milch cow; this it does.

A Glimpse into the Future

FOR some years now, the Jealott's Hill Agriculture Research Station has been drying nitrogen grass artificially and using it for the winter feeding of dairy cows. The dried grass has proved a perfect substitute for the cake—the concentrated food usually fed in winter to dairy stock. Home grown grass could therefore, in a large measure, replace imported feeding stuffs. In order to test the value of the milk produced by animals fed on this winter ration of dried grass, the milk was made into butter. Analyses made by Heilbron and Drummond and their colleagues showed that the butter was far richer in carotene than that made from milk yielded by animals fed on the ordinary dairy ration. The butter, itself, confirmed this conclusion, for whereas that from the milk of the cows fed on ordinary concentrates and hay or silqua was of the palest yellow colour, that from cows fed on nitrogen grass was of a deep primrose yellow and had the true appetising flavour associated with good butter. "The discovery that dried grass may result in the production of summer milk and butter during winter, and that these foods contain large amounts of carotene, provokes the audacious thinker to make a further step in his conjectures," added Sir Frederick. "May it not prove that that winter scourge of mankind, influenza, is encouraged by the insufficiency of vitamin A in the winter diet of human beings? Is it over-bold to suggest also that other and yet graver maladies may be fended off when mankind is secure all the year round of supplies of food lacking none of the vitamins, nor any of those obscure but essential minerals which as we are coming to know are essential to the maintenance of health? May it not prove that tuberculosis, for example, both bovine and human, is a deficiency disease and that its ravages are encouraged by the lack of vitamins which confer resistance to disease?" Winter comes, the cows go into the byre, little sunlight reaches them; winter rations of concentrates, poor in carotene, replace the fresh herbage rich not only in carotene but also in other vitamins. By the use of dried grass, however, this would be altered, for even in the absence of sunlight the cows would obtain their full measure of vitamin-producing bodies, and the goodness of summer milk and butter would be passed on throughout the year to those partaking of them.

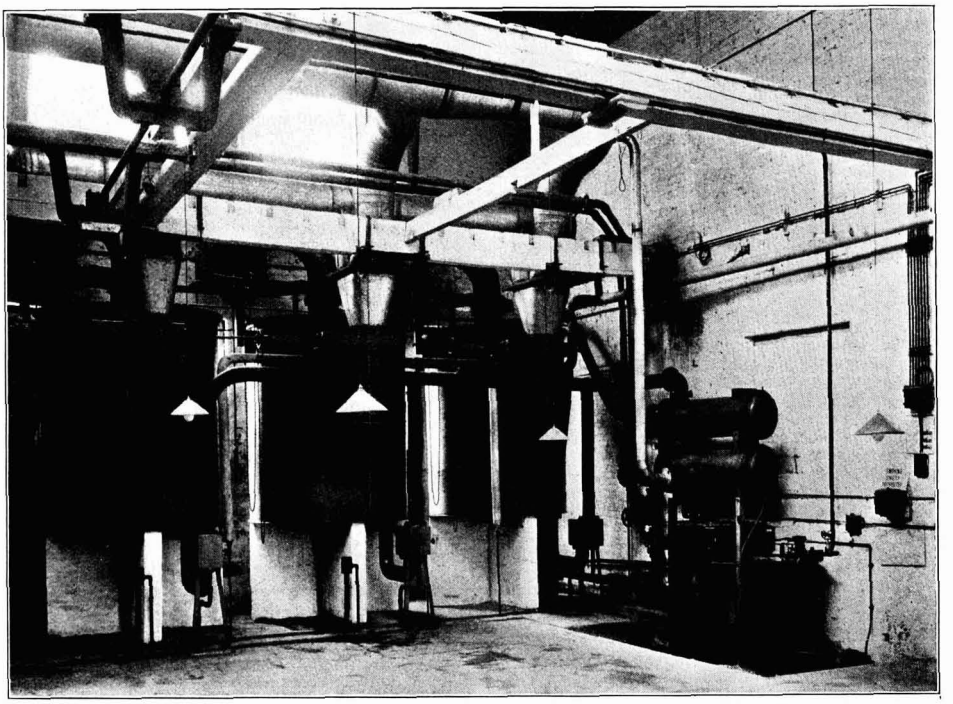
Industrial Solvent Recovery

The Activated Carbon System of Sutcliffe, Speakman & Co.

UNTIL within the last two or three years the use of activated carbon for solvent recovery in Great Britain lagged behind foreign development. This position, however, is now reversed, one of the distinct steps forward in the progress of solvent recovery being the starting up of a recovery plant at Hollinwood, Manchester, which operates upon the Activated Carbon System of Sutcliffe, Speakman and Co., Ltd. Here the solvent-laden atmosphere is conducted into a container so that it is filtered through a bed of activated carbon, where the solvent is completely absorbed, and the atmosphere, be it air or other gas, is completely stripped of its valuable vapours. The carbon in the container will take up a certain percentage of a solvent, depending upon (1) the power or adsorbing strength of the carbon, (2) the temperature of adsorption, and (3) the concentration of the solvent in the atmosphere being stripped. The percentage, given equal conditions, will always be the same for a given solvent, but will vary depending upon what solvent is in question. When the carbon is charged with the solvent close to break point, that is, to such a stage that (if continued) it no longer extracts the whole of the solvent, the gas or atmosphere is then diverted into a second container, whilst the solvent is being recovered from the first container.

Carbon has the property of adsorbing a solvent from an atmosphere even if of extremely low concentration, and it not infrequently happens that a low concentration is more readily dealt with than a high one. For combustible solvents in air, the concentration should preferably be below the explosive limit. Thus, for petrol or benzene a concentration of 0.5 per cent. should not be exceeded; concentrations of as low a petrol content as 1 part in 10,000 are, however, within the economic range. At Hollinwood, the concentration is of the order of 1 in 4,000. In the case of expensive solvents, the limit is simply one of cost of recovery as compared with the value of the substance being recovered. The recovery of the solvent from the carbon is generally effected by steam. Steam is turned into the container, and thereby drives out the solvent, which, with the steam, is condensed in a suitable condenser, to be followed by simple decantation or fractionation as may be required.

Activated carbon, as manufactured by Sutcliffe, Speakman and Co., Ltd., has the peculiarity of adsorbing the organic vapour at a remarkably high speed; this is of enormous value where large volumes of air or gas containing small quantities of solvent are to be treated. Plants are in operation where the contact time between the carbon and the solvent air is 0.25 secs., and even under these conditions the whole of the solvent is extracted. The accompanying photograph shows that two or more adsorbers are usually employed, so that whilst one ((or more) is being steamed, the others are in the process of adsorbing the solvent vapour, thus forming a continuous cycle. Cost of recovery is usually very small, varying from 1d. to 5d. per gallon, depending upon circumstances and the nature of the solvent. A non-miscible solvent is obviously cheaper to recover than a miscible solvent, as the former is separated from the condensed steam by simple decantation, whereas the latter requires to be fractionated to separate it from the water. This, however, is usually not difficult or expensive. During the past year Sutcliffe, Speakman and Co. have installed plants in this country, the total capacity of which is one and a half million gallons per annum, and several other large plants are under construction. In addition to being actual manufacturers of activated carbon, they have an engineering works specialising in this class of work, and are well equipped for manufacturing plants of this nature.



A Sutcliffe-Speakman Plant recovering Solvent from Waterproof Garment Material. This plant has a capacity of 50 gal. per hour

The Applications of Chlorinated Rubber

Tornesit and Anti-Corrosion Paints

THE surplus production and the low price of rubber have encouraged research into new applications in two different directions. On the one hand developments have been sought in those usages where the principal quality of rubber, its elasticity, is indispensable; on the other hand rubber has been used as a raw material for the preparation of new substances with properties different from those of natural rubber. The latter application is discussed in an article on Tornesit (chlorinated rubber) by J. H. Frydlender in an article in the "Rubber Age" translated from the "Revue des Produits Chimiques."

The halogens, in particular, react with rubber, transforming it radically, and among the various derivatives thus prepared chlorinated rubber has acquired a special importance. The chlorination of rubber is an old discovery. But it was not until 1930 that the manufacture of chlorinated rubber on an extensive scale became important. When the product had been used experimentally in anti-corrosion paints by the Mannesmann-Rohrenwerke and given satisfactory results, chlorinated rubber, which has been given the trade name "Tornesit," began to find steadily increasing uses. For use in anti-corrosion paints chlorinated rubber has to satisfy many difficult conditions, especially in properties connected with its application, adhesion, flexibility, and stability as a paint. The viscosity of chlorinated rubber, the thickness of the layer which it forms, and its stability vary with the degree of chlorination. The technical difficulties in developing the manufacture of a product of uniform quality have consequently been difficult, the more so as caoutchouc is a typical colloid at the starting point.

The Preparation of Tornesit

The preparation consists in treating with chlorine a solution of the rubber in a solvent indifferent to chlorine, such as carbon tetrachloride or a mixture of hexachlorethane and carbon tetrachloride. The solution is placed in a reaction vessel fitted with a reflux condenser and brought to a temperature of 80 to 110° C. before passing chlorine in. When test samples show that the mass has reached the desired state the supply of chlorine is cut off and heating continued until no further hydrochloric acid is disengaged from the vessel. The reaction product is isolated by precipitation or preferably by distilling off the solvent. Cooled on a plate it forms a limpid flexible film. If precipitated by means of alcohol or spirit, it can be obtained in transparent filaments. The reaction should be commenced with the hot solution.

Tornesit is practically insoluble in water, spirit, and mineral oils. Spirit boiling at 70 to 85° C. dissolves only traces. The chlorination of rubber lowers very considerably the viscosities of solutions prepared from the product. A one per cent. solution of caoutchouc has a relative viscosity (in relation to the solvent used) of 30 to 40, measured in an Ostwald viscometer, and solutions containing only a few per cents. of caoutchouc will not flow. This is not the case with Tornesit from which solutions can be prepared of quite high concentration and good mobility. This fact is of considerable importance in making varnishes. Tornesit is entirely inert towards acids and alkalies of all concentrations, towards water and salt solutions, and towards gases and vapours (except those of solvents), at ordinary temperatures or at raised temperatures below that of decomposition of Tornesit. Thus, hydrofluoric acid, concentrated nitric and hydrochloric acids, sulphuric acid, and strong 50 per cent. caustic soda have no action on Tornesit and the same is true of sodium sulphide, hypochlorites, potassium chromate, and of gases like oxygen, chlorine, and sulphur dioxide. These are qualities of interest not only for anti-corrosion paints but also in the general chemical industry where the search for materials resistant to chemical agents is by no means at an end. Tornesit is an electrical insulating material and becomes electrified by friction. Its tensile strength is 296 kg. per sq. cm. and its breaking elongation only a few per cent.

The rigidity of Tornesit can be modified by softening agents such as diethyl phthalate, trircetin, triresylic phosphate and also by oils such as linseed oil or poppy seed oil. Raw rubber may be added also as a softener.

From its great resistance to chemical agents Tornesit is obviously indicated as an excellent material for the preparation of anti-corrosion paints and the protection of mortars. According to the investigations of Mauermann, Tornesit coatings very effectively protect conduits, vessels, and all other constructions of iron, against atmospheric attack. They are not useful against attack by Tornesit solvents, aniline, or water saturated with hydrogen sulphide. Before applying the Tornesit coating it is necessary to clean the metal thoroughly with acid, followed by a neutralising alkaline wash. When gas pipes and pipes for carrying the acid residues from benzol purification are in question, an internal coating of Tornesit is useless as it would be attacked by the hydrocarbons present in coal gas and benzol wash liquors. In such cases a formaldehy-dephenol synthetic resin is used for internal protection.

Protection against Rust

So far as the problem of protection against rust is concerned the following indications are satisfactory: It is sufficient simply to apply a 30 per cent. solution of Tornesit in one of the solvents noted previously. After a short time the solvent evaporates and a brilliant, transparent, durable film is formed. In many cases, however, it is quite advantageous to soften the Tornesit with a plastifier, or oil, and to add resins and pigments. Among softening agents those preferred are tricresyl phosphate, Palatinol, Sipalin, linseed oil and wood oil. Among resins, chief use is made of synthetic resins. Pigments may be indifferently mineral or organic, for they are quite unaffected by Tornesit.

A Tornesit varnish of suitable composition will protect iron against sulphur dioxide. It is even possible to protect iron against the attack of aqua regia. The Tornesit varnish film is very resistant to water and does not swell, so that the protection obtained is quite waterproof. For example, Tornesit paints will entirely protect ships and all other iron structures against the action of water. These coatings do not resist excessive heat, Tornesit commencing to decompose about 135° C. They dry rapidly, in from 30 minutes to a few hours, and can thus serve as substitutes for nitro-cellulose varnishes. In equivalent applications they have the advantage of being harder, impervious to light, and non-inflammable. When they contain drying oils they are superior, in respect of length of life and durability, to copal varnishes. Compositions containing Tornesit can find applications in the manufacture of plastic materials, of thin sheet, of filaments, of artificial leathers, and of floor coverings; and being non-inflammable, it lends itself to the fire-proofing of curtains, screens, and other inflammable materials.

Bleaching Materials in India

Increased Imports

FOR a country ranking third in the manufacture of cotton cloth in the world, India consumes an inconsiderable quantity of bleaching chemicals. This is explained by the fact that of the total output of piece goods only a small portion is of fine weave, it being probable that less than one-fifth of the domestic production requires bleaching. Although output of piece goods, grey, bleached, and coloured has increased steadily and represents a gain of nearly 150 per cent., importation of bleaching chemicals has risen from 75,628 cwt. (of 112 pounds) in 1913-14 to 131,367 cwt. in 1931-32, an increase of only 73 per cent. Aside from cotton mills, bleaching chemicals are used principally in the manufacture of paper and as deodorants.

So far the production of indigenous bleaching chemicals is unimportant. Imports are mostly in the form of chlorinated lime coming from England and Germany. A highly concentrated bleaching powder from Germany is popular with cotton mill operators.

Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

A Fine Piece of Public Work

SIR,—In their striking appeal on behalf of the Advertising Association for active public interest in the forthcoming Advertising and Marketing Exhibition, Major J. J. Astor and Sir William Crawford are doing much more than forwarding the interests of the advertising profession. The whole world is alive to the immediate necessity of reviving trade and industry, and among the many official and unofficial movements having this object in view, I know of none containing more promise than the Advertising and Marketing Exhibition. The unemployment scourge arises not from any inability to manufacture or any inability or unwillingness to work, but altogether and entirely from the absence of adequate consumption.

I will not trespass on your valuable space with observations on consuming power, effective demand, currency, credit and all the other problems that arise in this connection, except to point out that the making of goods is the only natural source of purchasing power. Our economic troubles would disappear if we possessed the desire and knowledge from which purchases arise and the liberty to move and exchange our goods and services. Liberty is a matter for the politicians. Desire and knowledge are matters for the advertising profession. The politicians are struggling to give us the one, and the Advertising and Marketing Exhibition is the finest piece of work yet planned to provide us with the complementary qualities necessary for world recovery. I venture to express the hope, therefore, that the public generally will regard this exhibition not merely as an isolated trading effort, but as one of the finest pieces of public work undertaken in our time.—Yours faithfully,

ERNEST J. P. BENN.

Technical Education

SIR,—In a leader in THE CHEMICAL AGE of April 8 you referred to the fact that the London County Council has raised the fees in polytechnics and technical institutes, and it is now learnt that other authorities are contemplating a similar step in accordance with a suggestion by the Board of Education. There are two sides to this question of raising fees in a time of depression. On the one hand, the action will act as a spur to that type of student who assesses the value of anything by what he has been made to pay for it, and who retains this attitude even in his estimation of the worth of educational courses. Teachers in the institutions concerned have grown accustomed to this type and no longer express surprise on hearing that a student is reluctant to pay in fees what he would be quite willing to spend on repairing a motor cycle, for example.

On the other hand there are students to whom a fee of one pound is a great sacrifice, such is the state of their resources. And, what is more distressing to hear, it is in this class that talent is displayed which is second to none. Teachers are unstinting in their praise of such students, for it requires both stamina and strength of mind on the part of a youth hard at work until 6 o'clock in the evening to enable him to snatch a hasty meal and to give his mind to an evening of concentration. The case of the unskilled worker or labourer in a chemical works is typical. His education has been cut short at fourteen by the necessity to earn a wage, however small; he has been in attendance at an evening institute for two years of continuation classes; and he is now faced with the problem of keeping up with the pace of classes composed of students with more favourable environments in the day. Moreover, although we are constantly reminding him that education means self-improvement and is never wasted, that it will yield benefits sooner or later, the youth has his doubts. Will his overseers recognise the increase in his worth as an employee when he has qualified by attaining certain standards of chemical knowledge and skill? What is this standard to be, and how is it to be assessed? Will the technical college examination results alone make or mar the assessment of his value? If this be the case, it is going to be a gamble when an examination week coincides with a week of extra heavy duties in his daily routine. Too often has been seen the tragedy of a conscientious worker in term time coming to grief in college examinations owing to lack of foresight on the part of his employer.

Some youths in this position decide that nothing less than an external degree of London University or the Associateship of the Institute of Chemistry will serve their purpose. It is almost impossible to exaggerate the difference between proceeding to a degree *via* a full-time course at a University or college and the slow but hard path followed by the evening student, who not only gives up three evenings of a week of work to attendance at classes, but also sits indoors at week-ends to write his notes and to study. For the appending of three letters behind his name he gives up those fleeting hours of youth's leisure, ignoring the words of the poet who warns him that "the days of our youth are the days of our glory." Perhaps this sacrifice will be borne in mind by those employers who give preference to the full-time University student, to the detriment of those who have had to find their way with the help of the midnight lamp.—Yours faithfully,

A.I.C.

Industrial Sieves and Screens

A New British Standard Specification

A BRITISH Standard Specification has been issued for square mesh woven wire and round hole perforated plate sieving materials for industrial purposes. This specification provides for the more commonly used forms of woven wire and perforated plate and has a wide industrial application, covering as it does the fine woven wire sieving material used in biscuit making, gold mining, brewing, etc., up to the heavy forms used in the coal mining and quarrying industries.

So far as woven wire is concerned it has been found necessary, to meet the needs of industry, to include two series of woven wire which are characterised by (1) clear mesh sieves in which the size of the aperture is expressed in inches or fractions of an inch, and (2) the number of meshes per linear inch, this series containing sieves ranging from 300 meshes to the inch down to four meshes to the inch. It has been found practicable to standardise perforated plate other than those having round holes staggered at 60°. Two series of perforated plates have been provided, a heavy series with holes from 3 in. to 1/16 in. diameter, and a light series with holes from 1 in. to 0.029 in. diameter.

In consequence of the great variety of lengths and widths used in industry, it has not been found practicable to standardise overall dimensions of woven wire or perforated plates. Woven wire is generally stocked in widths of 24 and 36 in., with a selvedge on both sides, and in certain meshes in widths of 21, 22 and 40½ in. for supply to particular industries. The material used in the manufacture of woven wire depends on the purpose for which it is required. It cannot, therefore, be standardised, but is normally stocked by makers as follows: Steel, up to 90 mesh; copper, up to 100 mesh; brass, up to 200 mesh; phosphor bronze, up to 300 mesh.

It has been found impracticable at the present stage to lay down tolerances for the standard sizes of apertures either for woven wire or perforated plate. The co-operation of both manufacturers and users is invited in this matter, so that the revision of the specification in this direction may be possible after one or two years' experience has been gained. Any information as to rapid methods of measuring the aperture size of woven wire cloth, and as to results obtained upon material supplied under this specification should be sent to the offices of the Institution.

Copies of the specification (B.S.S. No. 481-1933) can be obtained from the British Standards Institution, Publications Department, 28 Victoria Street, London, S.W.1, price 2s. 2d. post free.

Investigation of Atmospheric Pollution

A General Improvement in 1932

ACCORDING to the "Report of the Investigation of Atmospheric Pollution," issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, 5s. net.) the interest taken by local authorities in studying atmospheric pollution in different localities has been well maintained, in spite of the financial difficulties of the times. Sixty municipal authorities, three industrial undertakings and one agricultural institute have taken part in the observations. During the year ninety deposit gauges were in operation. Referring to the conclusions to be drawn from results obtained with these gauges, the report remarks:—"The fact that the deposit obtained at one town is higher than in another seems sometimes to be held to justify an unqualified statement that the atmosphere in the first town is more heavily polluted. The deposit gauge results afford a most valuable indication of the degree of pollution in a particular area, and of whether it is rising or falling (assuming as is usually the case, the gauges are kept in the same spot over a period of years). They should not, however, be made the basis of further deductions without a careful weighing of the circumstances, especially in cases where, for example, only one gauge is used in towns of considerable size."

Improvements in Purity of Air

An attempt has been made to get a single figure representing the degree of improvement or the reverse in the atmosphere of the country, based on the results of stations where a general average figure of atmospheric pollution for several years is available. Taking the 47 observing stations where it is possible to calculate averages for the last four or five years, 80 per cent. show an improvement, with the statistical method adopted, in the deposit of sticky, oily matter and 86 per cent. an improvement in the total solids deposited, including tar and animal, vegetable and mineral dust. Certain stations have definitely improved the condition of their atmosphere. Taking the figures for the year under review alone, the report indicates a reduction in all components of the deposit, including, besides the solids, sulphates and chlorine and ammonia compounds, at Glasgow (Richmond Park and Victoria Park), Leeds (Hunslet), Marple, Newcastle-on-Tyne (Westgate Road), Rochdale (Electricity Works), and Wakefield (Clarence Park).

In London the abnormally high deposit of tar at Golden Lane observed in the previous year was repeated. Though the actual annual deposit has decreased from about 7.3 tons per square mile to 5.5 tons, it is still nearly 3½ times greater than the average deposit for the past five years. At Golden Lane other components of the deposit have decreased. Of the nine London stations, three show an increase in the tar deposit, three no change and three a reduction for the year under review.

Some General Results

The maximum annual deposit of tar found in any one gauge was at Ashington, High Market, in Northumberland, and reached the figure of 22.3 tons per square mile. The minimum, 0.36 tons per square mile, was obtained at Whitley, Dewsbury. The deposit of carbonaceous matter other than tar, which includes soot, animal and vegetable dust blown up from the ground, decreased at 33 stations. The maximum annual deposit found at any one place was 137.16 tons per square mile, and was found at Burnley. The corresponding minimum was 12 tons at Leicester, Western Park. Deposits of chlorine compared with the general average decreased at 42 stations. The origin of the chlorine deposit is uncertain, but it is probably due to wind-borne sea salt, and its deposit is therefore more dependent on weather conditions than on the emission of combustion products. The deposit of ammonia shows a reduction at 32 stations and an increase or no change at 16. The sulphate deposit—another product of the burning of coal—shows a decrease at 35 stations against their previous general average, and an increase at 11.

The mysterious abnormal deposit of sulphates at Ravenscourt Park observed in the previous year was again repeated. In the previous year the deposit increased 290 per cent. over the average for the previous five years, the actual annual deposit being estimated at 8.8 tons per square mile. In the year under review it was 8.72 tons. The report describes this condition as unusually bad, but no explanation of its cause has yet been discovered.

Records with the automatic filter have been made at 13 stations. The presence of smoke fog, judged in this way, means that approximately over 2.16 lb. of suspended dirty impurity was present in a cube of air of 100 yards side, that is, in one million cubic yards.

In the last ten years, there has been little improvement in the purity of London air. For example, during the year 1921-22 the average deposit of total solids over London was 284 tons per square mile, including a deposit of sulphates of 25 tons. During the current year the average of the London stations was 281 tons per sqare mile for total deposits, including sulphates 41 tons. Since 1921-22 the total deposit has varied very little. On the other hand, the deposit of sulphates has, if anything, increased, and sulphur salts in the air, or sulphuric acid, are believed to be one of the predisposing causes of condensation fog, which often accompanies smoke haze and aggravates it. The sulphur acids or salts, acting as nuclei of condensation and, in the case of sulphuric acid at any rate, being highly hygroscopic, tend to bring about condensation fog under conditions which might, in their absence, not result in fog.

Sulphur in the Air

Barnsley, Birmingham, Cardiff, Huddersfield, London, Newcastle-on-Tyne, Salford and Sheffield are investigating the concentration of sulphur pollution in the air. The two highest concentrations were found at Barnsley in November, 1931 (1.5 parts of SO_2 in a million) and Salford, Regent Road, in February (1.63 parts per million). The highest average concentration was at Barnsley in November, and amounted to 0.42 parts per million. An examination of the influence of weather conditions on the sulphur concentration shows that at Watson House, London, for example, the amount of sulphur in the air on foggy days was twice that on fine days. The report refers to a new method for estimating sulphur which has been developed at the Building Research Station, Watford. This method is intended to be especially useful for determining the effect of any concentrated source on the general level of pollution in the neighbourhood.

Poison Gas in Warfare

The Problem of Control

DR. J. E. MYERS, Senior Lecturer of Chemistry at Manchester University, gave an address on "The Use of Poison Gas in Modern Warfare" to members of the Soroptomist Club, at a luncheon in Manchester recently. Dr. Myers said that the idea of poisoning people in warfare was not a new one, but that in medieval fights, lime was thrown into the eyes of the contestants. Poisoning, he said, had greatly developed as a weapon during the last war. Chlorine was the first substance to be used and this was not manufactured specially for the purpose, but was taken from the normal products of chemical manufacture. Gradually the substances used for attack became more deadly; chlorine was followed by phosgene. Mustard gas was being developed when the war ended.

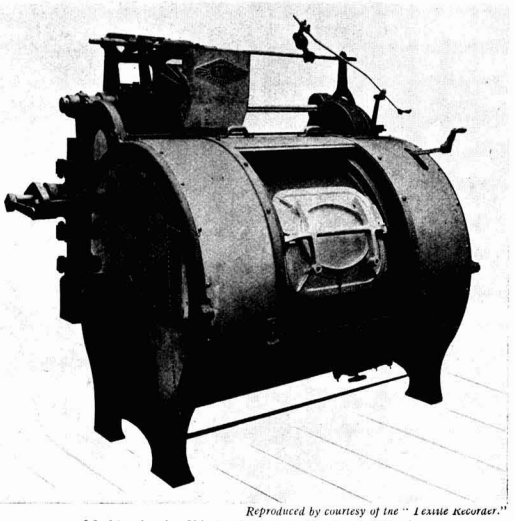
Dr. Myers said it was not so much the military use of gases, but their effect on the civil population that was most terrifying. Familiarity with poison gases had not made him oblivious of their deadliness, but it had not driven him to panic. The weapon was dangerous enough because of its accessibility, but its danger was not to be exaggerated. There were works, however, whose business was to manufacture substances for primary reasons which could be converted into poison gases without difficulty. In spite of the conventions against these materials, there could be no definite agreement that they would not be used in warfare, unless either nations should decide not to have wars, or the people who had the knowledge to produce such materials should agree not to produce them.

The Chlorinating Treatment of Woollen Goods

A New Machine with Several Novel Features

THE felting and shrinking of wool fabrics are ascribed to various causes, one of the later theories being that they are due partly to the colloidal nature of the wool fibre, and partly to the entanglement of the scales. Any treatment which partially destroys the epithelial scales will, therefore, reduce the shrinkage and felting properties of the fabric, and this factor is made use of in the chlorinating or unshrinkable treatment of wool. The process most commonly in use is that in which the woollen goods or fabric are treated with acid and bleaching powder or sodium hypochlorite solution of the required strengths in large wooden tubs, the goods being stirred at intervals with poles. The stirring part of the process can be eliminated by using paddle machines, as employed for hosiery dyeing, but with either of these, or with the laundry washing type of machine, there is always trouble with chlorine fumes, while owing to the rapid action of the chlorine on the wool fibre, it is impossible to get regular treatment and level results.

To overcome these defects D. and J. Tullis, Ltd., have introduced a machine specially designed for the chlorination of woollen knitted goods. This machine embodies a number of important improvements, which have given satisfactory results. The rate of addition of the chemicals is under control of the operator, and as the machine is closed when in operation, the workers are not exposed to any danger from chlorine gas.



Reproduced by courtesy of the "Textile Recorder."

Machine for the Chlorination of Woollen Knitted Goods

The machine comprises a rotating drum, mounted on a pair of hollow trunnions, one of which is used as a duct for the supply of chemicals, while the other is used as an exhaust for the air or any traces of free chlorine gas. An overhead tank is connected by a pipe with the first trunnion for the supply of acid, chlorine and neutralising liquors. This trunnion is also connected to the interior of the shell, by means of conduits, between which and the interior of the shell, are interposed perforated plates, disposed radially to the shell, which function as beaters and spray the liquors added during the process. The inside of the tank, pipes, shell and beaters are covered with hard rubber or vulcanite, as after experimenting for some years no metal was found satisfactory for all parts of the process. Stainless steel, lead, monel metal and regulus metal were among the many tested, but all had faults which debarred their use. A liquid drain valve is fitted to the cylindrical shell, opposite one of the beaters, for rapid emptying. The exhaust trunnion is connected to the atmosphere by means of a hose pipe, which further carries any traces of free chlorine gas into the drain; it is also connected to the interior of the machine by way of a ventilating pipe disposed radially to the shell. A doorway, which can be closed by a tight fitting door, when the machine is in operation, permits of access to the interior of the shell or drum, which is rotated by spur gearing. Reversing gear allows for the number of revolutions being the same in either direction.

To carry out the process, the goods are introduced into the shell, the door is clamped tight, and the requisite amount of liquor is run down from the overhead tank. After rotating for a few minutes to mix the goods and acid thoroughly, and to ensure perfect penetration and absorption, which are assisted by the reversing motion of the shell, the hypochlorite solution is then slowly added to the rotating shell. The rate at which the chlorine acts on wool is governed by the strength of the solution, so that by regulating the addition of the hypochlorite it is possible to ensure more even treatment, otherwise difficult to obtain owing to the preferential absorption of the chlorine by the outside fibres. The action of the chlorine is also regulated by the amount of acid present, and just enough is used to set free the chlorine. Tests of the water liquors can be made to show the excess acid which has been used and also if all the chlorine has been absorbed. It has also been found by increasing the chlorine concentration that the number of damaged fibres is increased, and that the small additions of hypochlorite liquor to the goods in the weak acid solution makes for more level results as well as lower percentages of damaged fibres. Moreover, there is no need to rinse after chlorinating when using sodium hypochlorite instead of bleaching powder, so that there is also a saving of time as well as an improvement in the handle of the goods.

When all the chlorine is absorbed, which takes about ten minutes, the waste liquor is run off and the de-chlorinating liquor (bisulphite of soda) is added from the overhead tank. After de-chlorinating the goods are rinsed and neutralised with ammonia or soda ash liquor. The quantities of neutralising and de-chlorinating liquors can be regulated by testing the waste liquors, so that too great excesses are not used.

After prolonged tests under practical conditions this machine has been found to give much more regular results than the old methods. The chlorine is practically all absorbed by the fabric so that conditions are healthier for the operatives. Besides there is a saving in the amounts of chemicals used. There is no danger of the rotating action of the machine causing felting as the cushioning of the liquids keeps the stitch of knitted goods open and assists penetration while the reversing action makes for level results. About 350 to 400 lb. of knitted goods per day of eight hours can be finished in each machine.

Heavy Chemical Production in Greece

RANKING first in value and second in tonnage output among Greek industries, the Greek soap industry must import its requirements of alkalies since these are not produced locally. The second largest industry in value and first in tonnage is the heavy chemical and fertiliser industry, represented by one enterprise, the Hellenic Chemical Products and Fertilisers Corporation. This concern operates several mines and the largest industrial establishment in Greece, at Piræus. The firm's output of heavy chemicals in 1930 was as follows (in metric tons):—Sulphuric acid, 27,100; nitric acid, 560; hydrochloric acid, 748; sodium bisulphate, 1,083; iron sulphate, 363; sodium sulphate, 735.

Prevention of Accidents in Industry

The Work of the National Safety First Association

IN view of the special interest which all industrial undertakings are giving to voluntary accident prevention work, the Industrial Welfare Society and the National "Safety First" Association are now co-operating to provide industry with all the essential information and material which their many years' experience has proved to be a valuable aid to success. This service has recently been improved and augmented and its price reduced. It is produced under the supervision of committees of representatives from member-firms and of experts. The Association exists in order to link together all those firms and organisations which are prepared to co-operate in accident prevention work, to provide a clearing-house for the collection and dissemination of the most up-to-date information on the subject and to supply posters and other accident prevention material at the most economical rates.

Accident Statistics—1932

The International Labour Office has approved as a tentative standard, a method of compiling accident statistics for industry. The use of the formulæ enables comparisons to be made not only between one firm and another, but between groups of firms in different countries. The figures below are a representative collection from members of the National Safety First Association. The formulæ are also extensively used by the members of certain employers' federations and there is no doubt that they are far in advance of any other method of keeping records, and will probably become universal. The bases used are:—

$$\text{Frequency Rate.} = \frac{\text{Lost-time accidents} \times 100{,}000}{\text{Man-hours worked.}}$$

$$\text{Severity Rate.} = \frac{\text{Hours lost} \times 100{,}000}{\text{Man-hours worked.}}$$

Man-hours = Total hours actually worked, excluding allowances for overtime and nights, etc., and office staff and foremen.

Lost time accidents = All accidents causing loss of time beyond the day or shift on which the accident happened.

Hours lost = All time actually lost due to the above accidents (and any left over from the preceding year), plus weighting for permanent disabilities. Problematical overtime and the actual working hours lost due to permanent disabilities are not included.

Code No.	Product Group and Product.	Total Man-(Thous.)	Frequency Rate.	Severity
	CHEMICALS.			
C 1	Chemical Manufacturers ..	6,278	4.1	1,833
C 2	Do.	683	2.6	365
C 3	Do.	1,440	2.3	437
C 4	Do.	541	2.4	274
C 5	Do.	273	4.0	492
C 6	Do.	341	2.1	359
C 7	Do.	1,131	2.8	566
C 8	Do.	2,050	2.5	2,849
C 9	Do.	262	3.8	1,880
C10	Do.	452	1.8	258
C11	Do.	1,111	2.5	461
C12	Do.	287	2.4	37
C13	Do.	178	2.2	47
C14	Do.	86	4.6	3,532
C15	Do.	2,960	1.5	253
C16	Do.	1,622	2.0	290
C17	Do.	1,564	2.9	3,716
C18	Do.	203	1.0	132
C19	Do.	99	1.0	177
C20	Do.	1,972	2.7	324
C21	Do.	3,210	2.9	3,435
C22	Do.	248	1.6	154
C23	Do.	1,393	3.4	456
C24	Do.	205	1.9	105
C25	Do.	614	2.3	399
C26	Soap Works	399	1.7	185
	PAINT.			
D 1	Paints and Lacquers	243	0.4	25
D 2	Do.	362	1.7	305
D 3	Do.	49	nil	nil
	FERTILISERS, ETC.			
F 1	Fertiliser Manufacturers ..	63	nil	nil
F 2	Do.	31	nil	nil
F 3	Tallow Melters and Bone Products	104	15.3	572
F 4	Fertilisers (Chemical)	12,047	2.5	1,933
F 5	Do.	300	2.0	489
F 6	Fertiliser Manufacturers ..	518	3.5	748
	EXPLOSIVES.			
X 1	Explosive Manufacturers ..	103	nil	nil
X 2	Do.	98	nil	163
X 3	Do.	276	1.4	209
X 4	Do.	205	1.5	79
X 5	Do.	251	0.8	110
X 6	Do.	188	nil	nil
X 7	Do.	174	0.6	46
X 8	Do.	128	nil	nil
X 9	Do.	79	nil	nil
X10	Do.	199	0.5	40
X11	Do.	163	1.2	369
X12	Do.	560	1.4	353
X13	Do.	300	0.3	45
X14	Do.	872	1.0	77
X15	Do.	3,403	1.2	1,588
	MISCELLANEOUS.			
Z 3	Vitreous Enamelling	241	0.4	103
Z 4	Photographic Manufacturers ..	4,259	1.5	103
Z 5	Boot and Floor Polish Mfrs. ..	2,200	1.1	84
Z 6	Tarred Slag, Concrete and Iron	257	4.3	603
Z 7	Petroleum and Asphalte ..	1,449	1.0	1,967
Z 9	Coke Ovens and By-products ..	704	1.0	350
Z10	Seed Crushers and Soap Mfrs.	5,460	3.7	705

Of the 6,913,974 persons employed in industrial establishments during 1931, 379,671 suffered injury, 2,295 of which were fatal. Compensation paid during 1931 totalled £5,450,262. By organised methods, accidents and compensation costs have been reduced by 50 per cent. by many industrial undertakings. It is generally conceded that additional incidental costs as reflected in medical and legal charges, lowered morale, labour turnover, lost time, property damage, increased overhead cost, and decreased production, are at least four times as much as the direct cost of accidents. The total industrial cost—first to employers—and finally to the country as a whole, has been estimated at not less than £20,000,000.

The Human Factor

Authoritative opinion states that 75 per cent. of industrial accidents are attributable to the human factor, the remaining 25 per cent. being due to mechanical causes. The National Safety First Association exists to reduce the 75 per cent. figure. In 1927, the Home Office issued a Draft Order, calling on the chief accident producing industries to provide for the institution of special safety arrangements. That order has never been confirmed, because industry, through its respective federations, responded by giving an undertaking to the Home Office that it would voluntarily promote organised accident prevention. Subsequent reports of H.M. Chief Inspector of Factories prove that this undertaking has been successfully carried out.

Leading employers assert that a substantial reduction of industrial accidents will be more satisfactorily achieved by voluntary co-operation of workers and management than by compulsory regulations. For the prevention of industrial accidents, organised effort is essential to ensure success, and that effort must have a scientific foundation. The poster is the psychological basis of accident prevention work. It prepares the mind of the worker for voluntary co-operative effort, and depicts how accident causes generally can be eliminated.

Another item of service is the monthly Bulletin, a co-operative service for foremen and managers. Produced by the information bureau, it is founded on accumulated factory experience, and deals with safety devices and methods of factory organisation for prevention of accidents; notes on prosecutions and on unwitting breaches of the regulations which may lead to prosecutions, particulars of unusual accidents and expert opinion.

Institute of Fuel Award to Sir John Cadman

The Melchett Medal for 1933

THE Council of the Institute of Fuel has decided that the Melchett Medal for 1933 shall be awarded to Sir John Cadman. The Melchett Medal, founded by the late Lord Melchett, the first president of the Institute, is awarded annually to such person, whether a member of the Institute or otherwise, as in the opinion of the Council has done either original research or professional, administrative or constructive work of an outstanding character, involving the scientific preparation or use of fuel, provided the results of such work have been made available within recent date for the benefit of the community. The award is made without restriction as to the nationality of the recipient.

The first medal was presented to Dr. Kurt Rümmel, of the Wärmestelle, Düsseldorf, for the outstanding work that he had done in connection with the development of fuel economy in the iron and steel industry in Germany. The second was given to Professor W. A. Bone, F.R.S., as a recognition of the fundamental research and investigation he had conducted on fuel technology. The third medal was given last year to Mr. Charles M. Schwab, of the Bethlehem Steel Corporation, for the work carried out by him in past years from which the iron and steel industries of the whole world have materially benefited.

An announcement will be made later as to the time and place of the actual presentation, which will probably be arranged during the autumn session.

Services to the Petroleum Industry

Sir John Cadman is chairman of the Anglo-Persian Oil Co., Ltd., and the Iraq Petroleum Co. He is a member of the Prime Minister's Economic Advisory Council and Research Committee, and recently assisted in the special inquiry into the organisation of the General Post Office.

Sir John was educated at Newcastle-under-Lyme and Durham University, and from an early age held managerial positions in coal mines in England. Subsequently he became one of H.M. Inspectors of Mines, serving in Scotland, during which period the oil shale mines and refineries came under his jurisdiction. Here he made his first entry into the petroleum industry, and in this work he has become one of the leading experts of the world. In 1904 he was seconded from the Home Office for service in Trinidad, where he organised a Mines and Petroleum Department and developed a petroleum industry which owes its inception largely to his activity.

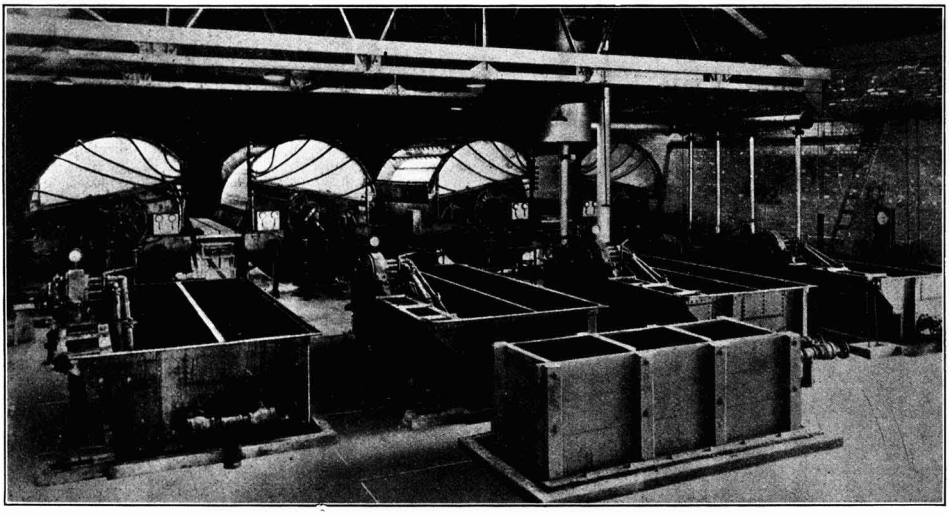
For thirteen years he was professor of mining and petroleum technology at the Birmingham University, and during that period he served on numerous Government Committees. In 1921 he was elected president of the Institution of Mining Engineers, and was re-elected in 1922 and 1923. In 1913 he was a member of a Royal Commission which visited Persia in connection with the Anglo-Persian Oil Co., and it was upon this commission's advice that the British Government became a large shareholder in the company. During the war Sir John Cadman was successively chief executive officer of the Petroleum Department, chief of H.M. Petroleum Executive and chairman of the Inter-Allied Petroleum Council.

Post-War Activities

Subsequent to the signing of the Armistice, Sir John was appointed Chief Petroleum Adviser to the Government, and in that capacity, negotiated and signed the celebrated "San-Remo" Agreement. He joined the Anglo-Persian Oil Co. in 1921 as its technical adviser and shortly afterwards was chosen as one of the directors, subsequently becoming deputy-chairman, and, in 1927, chairman of the board. He has been closely associated for some years past with Middle East developments, particularly in connection with Persia and Iraq. In Iraq are centred the operations of the Iraq Petroleum Co., which owns the oil concessions, so long the subject of international interest and political discussion. The constitution of that company now comprises a combination of American, French, Royal Dutch and Anglo-Persian oil groups, and in response to representations by all these interests Sir John undertook the chairmanship of the company, which, so far as oil is concerned, is the greatest combination of international interests the world has ever known.

Sir John Cadman is a member of the council of the Institution of Civil Engineers, the Institution of Mining Engineers, and the Institution of Mining and Metallurgy.

Filtration in a Beet Sugar Factory



This illustration shows an Oliver Borden Thickener and Oliver Filter Installation operating upon first and second carbonation juices in a Beet Sugar Factory. The object of the installation is the automatic removal and washing of the insoluble solids from the Beet Juice after defecation and carbonation.

Annual Meeting of the British Colour Council

The Value of the Standard Colour Card

THE second annual general meeting of the British Colour Council was held at the May Fair Hotel, London, W.1, on April 4. Mr. John Sharp, chairman of the board of management, presided, and Sir Henry Sutcliffe Smith, president of the British Colour Council, was also present. Since the previous meeting there have been several alterations in the board of management, including the resignations of Mr. Forrest Hewit, of the Calico Printers' Association, and Mr. Herbert Kay, of the London Employers' Association. At the meeting, Mr. E. T. Walker, of Wolsey, Ltd., resigned, but Dr. E. R. Trotman, a director of the company, was elected to fill his place. This was also the case with Mr. W. H. Sutton, of J. and P. Coats, Ltd., and Mr. A. Henderson, merchandise manager, has been elected to fill the vacancy. Mr. F. C. Ellingham, of S. Hubbard, Ltd., has also retired, and the matter of electing a suitable person to represent the interests of the millinery trade will be discussed at the next meeting of the board. Mr. M. Spilman was elected to represent British Celanese, Ltd. Mr. G. W. Clarke, who has been appointed to represent the hosiery dyeing interests, is a director of A. W. Hawley and Co., Ltd., of Hinckley and Basford. During the year Mr. W. L. Jones, of Dickins and Jones, Ltd., was nominated by the Incorporated Association of Retail Distributors to represent their interests on the board.

Sir Henry Sutcliffe Smith, was re-elected president of the Council for the year 1933-1934.

During the year consultative committees have been appointed by the fur trade, the Incorporated Federated Association of Boot and Shoe Manufacturers of Great Britain and Ireland, and by the Federation of Curriers, Light Leather Tanners and Dressers, to work with the council, and others will be announced later.

Order out of Chaos

Mr. Robert F. Wilson, general manager, gave an address on colour, with special reference to the standard card which is in course of preparation by the Council. The standard card was quite different from the seasonal cards, which were issued twice a year. It was necessary to prepare and issue a standard card owing to the chaotic state that existed with regard to colours in constant demand. There are no fixed standard definitions, he said, which can be applied in the same way that definitions can be applied to length or weight. There is a considerable waste through the chaotic state. When he wrote to a number of firms and asked for specimens of "sky blue," for instance, he received a bundle of varying colours. The only conclusion was that to-day there is no definite colour which can be recognised as "sky blue" and a similar condition prevails where other colours are concerned.

The production of the British Standard Colour Card would do much to relieve this situation and be of the greatest value to all sections of those industries in which colours were used. Furthermore, words such as "shade," "tint," "hue," etc., were so misused that they now had no definite meaning and the names must be defined and standardised to mean something understandable and accepted by all.

Colour Training in Schools

Mr. Wilson showed the meeting the standard colour card of America, and also that of Japan, explaining that the standard colours shown applied not only to textiles but also to floor coverings, wall papers, pottery, tinware, etc. He explained the colour systems of Ridgway and Ostwald, showing the similarities and differences. The book of the French Society of Chrysanthemum Growers was also shown, but in this the colours were too near to be of practical use in the case of all the colours. Certain colours had already been standardised by the British Standards Institution and these colours would, if possible, be included in the new card. Mr. Wilson advocated the use of similar colours, colour names and terms for use in schools so that children could commence training on sound lines and not have to learn to speak a new colour language when they entered industry.

Mr. Holbrook Jackson explained that the standard colour card would bear the same relation to colours that the Oxford Dictionary did to words.

In the evening a dinner was held at the May Fair Hotel. Sir Henry Sutcliffe Smith presided, and the principal guest was Dr. Leslie Burgin, Parliamentary Secretary to the Board of Trade. Others present included Mr. Percy Ashley, Mr. Leonard Browett, Mr. Frank J. Farrell, president of the Silk Association of Great Britain, Mr. W. R. M. Lamb, representing the Royal Academy, Mr. C. le Maistre, Director of the British Standards Institution, Dr. James Morton, Mr. John Sharp, chairman of the board of management of the British Colour Council and director of the Bradford Dyers' Association, Sir Henry Wood, Mr. W. J. U. Woolcock and Mr. John de La Valette, honorary organising secretary to the Royal Academy Exhibition of British Art in Industry.

Manufacture of Modern Refractories

Features of a Good Brick

MR. C. R. F. THRELFALL, director of Timmis and Co., Ltd., Stourbridge, and Mr. A. T. Green, assistant director of research to the British Refractories Research Association, were the joint authors of a paper on "Refractories" which was read at a meeting of the Birmingham and Midland Section of the Society of Chemical Industry at Birmingham University on April 6, Mr. H. W. Rowell presiding.

The authors pointed out that the life of a brick depends mainly on its physical properties and these to a considerable extent can be controlled during the course of manufacture. It is the duty of investigators in the field of refractories to search out and indicate the physical properties desired, and to assist the manufacturer to incorporate them in his products. The chief difficulty of brickmaking is the preparation of the body and this is mainly a matter of mixing. The ingredients of a clay body are green clay grog and water, and the object is to get an absolutely uniform dispersal of water throughout the mass, to get every grain of grog coated with green clay so that it will adhere to each of its neighbouring grains on burning. If too much water is used the grading of the green clay grains will be broken down, and if too little is used the mass will be starved and only partly plasticised. The viscous and heavy mass obviously demands a type of mixing which is ingenious, efficient and of long duration, and this is very often precluded by the price at which the article can be sold. Ageing a body does little more than carry on the mixing by the gradual dissemination of the water throughout the mass.

Reference was made to the effect of pressure during mixing, particularly where only slightly plastic materials are being used, some types of which it is absolutely necessary to put under an edge runner mill to obtain a workable body. As regards grain size of the particles the authors pointed out the very striking effects which are obtained when the materials to be mixed are first of all graded and the various grades added one by one, and also the effect of an alteration in the order in which the different grades are added. The different types of common refractory materials were then discussed, with special reference to their physical properties, of which the most important are their resistance under load and porosity. The whole tendency of modern "super" brick manufacture is towards the obtaining of the lowest possible porosity and permeability (which are quite different characteristics) without abnormal vitrification. In the past nearly all work on porosity and its effects was carried out within very narrow limits from about 22 per cent. to 30 per cent.

and a great many of the preconceived ideas (particularly about spalling) are likely to be upset by a complete investigation of porosities from 0 up to 20 per cent. High porosity is generally an indication of structural weakness and of bad brickmaking.

Spalling was discussed at some length and the opinion expressed that low porosity, apart altogether from its help in excluding from the body of brick foreign matter which will act as a spalling agent, is probably a desirable characteristic. As regards permeability, which is the property of the penetration of gases or slags through the body, it was pointed out that the permeability varies very greatly indeed in the various planes of the brick and that a brick which is unsatisfactory when working on the 4½ in. way may be very good indeed if set to work on the 3 in. way. Gas velocity also plays a very important part in the life of a brick. Of the various fuels commonly in use oil is the worst, pulverised coal the next, then coke, then raw coal with gas as the kindest. Carbon monoxide and hydrogen are both bad, especially if the brick has a high iron content. The velocity of the hot gases against the wall was said to be of greater importance than the coefficient of thermal conductivity of the materials of which the wall is built.

In an explanatory lecture Mr. Green illustrated the points raised by a critical survey of the factors influencing the life of the bricks in a blast furnace lining and a vertical retort setting. As far as blast furnaces were concerned, the daily rate of charge and the total throughput required laid a heavy burden on the refractories, which was not always lessened by the design or method of operating the furnace. He mentioned the disintegrating effect of the attack by the alkali (potassium carbonate and potassium cyanide) formed in the bosh, mentioning how it penetrated right into the brick. There was also the question of carbon monoxide, which penetrated the brick and breaking it down at 500° C. deposited carbon in the pores and disrupted the brick. There was also the severe action of high velocity gases containing incandescent dust which was particularly severe in the zone just above the bosh at the base of the stack. The action of zinc vapour was another point which had to be considered; in addition there was the problem of direct slag attack in the hearth, bosh and lower part of the stack. In a vertical retort setting the trouble of flaking was due to a surface weakening of the face of the brick at the zone of greatest temperature of scurfing (periodic removal of deposited carbon). The carbon actually penetrated the brick and caused strains both when being deposited and when being burnt off, though the nature of the scurf itself varied greatly with the coals carbonised. A gas retort differed from a blast furnace in that in the retort the hot face was outside, whereas with the blast furnace it was the interior face. Having the hot face outside tended to make the slag penetration worse as a sucking action was set up which tended to replace with slag the original matrix of the brick.

The Protection of Iron and Steel Structures

Red Lead Paint as a Protective Medium

FOR over a century it has been known that one of the best methods for the protection of iron and steel against rust and corrosion is found in the use of red lead paint. This applies particularly to the severe conditions characteristic of the chemical industry, where there is a moisture saturated atmosphere and often the presence of acid and other corrosive substances. It is for a similar reason that red lead paint is the standard method of protecting ships, lighthouses, docks and harbours, and other equipment exposed to sea water or a salty atmosphere, salt being a highly corrosive agent towards steel.

Of interest in this connection is a valuable report by S. C. Britton and Ulick R. Evans, entitled "The Practical Problems of Corrosion, Part VII, Some Tests on Protective Painting," that appeared some time ago in the "Journal of the Society of Chemical Industry." This followed one published in 1930, which dealt with about 1,000 specimens of iron and steel protected in different ways and exposed to rusting conditions in a corrosive atmosphere. The second report presented a summary of fresh information upon points revealed by inspections carried out up to the spring of 1932. For protection of the steel red lead paints are being used, along with iron oxide (Indian red and Venetian red), lead chromate, and chromic oxide paints, made with varying proportions of raw and boiled linseed oil, turpentine and liquid drier. A vast mass of information on corrosion is contained in this contribution, which gives a pronounced degree of confirmation of the valuable protective properties of red lead paint under severe conditions of exposure.

Red Lead v. Oxide of Iron

A single coat of such paint was sufficient completely to protect steel for a period of about 2½ years, sufficient to cause pitting and corrosion to a depth of 0.32 millimetres in the unprotected steel when exposed to the atmosphere of Cambridge. In studying the effect of varying amounts of linseed oil 15 different experimental red lead paints were used, made in each case from 50 grams of non-setting red lead, and 10, 14, 16, 18, and 20 cc. of raw linseed oil, boiled linseed oil, and mixtures of raw and boiled oils.

Emphasis is laid upon the great difference in protective value between red lead and oxide of iron paints, and it is pointed out red lead inhibits or retards the corrosive reactions upon iron and steel even if water and oxygen penetrate to the metal, whereas iron oxide has no such inhibiting action. In the latter case the protective property of the paint film is physical only, and the protective value rapidly deteriorates as the film wears thinner. Red lead paint, however, has a pronounced beneficial action in two different directions. In the first place it forms an extremely heavy protective film, the paint weighing about 36 lb. to the gallon. Secondly red lead (triplumbic tetroxide Pb_3O_4) is a basic and reactive substance which protects the iron and steel by chemical action, combining with acid constituents present in the atmosphere and dissolved in rain water, such as carbon dioxide, sulphur dioxide, sulphur trioxide, nitric acid, nitrous acid, hydrochloric acid, and salt. There is also formed a strongly resistant "passive" film of oxide of iron and it is because of the "dual" action that red lead is such a valuable means of protection.

Results of Experience

With regard to recent evidence as to the protective value for iron and steel mention may be made of the methods adopted by the Union Pacific Railway in the United States for protecting all their overhead steel water tanks against rust and corrosion. The Union Pacific has about 10,000 miles of track, with 250 steel tanks varying in capacity from about 5,000 to 850,000 gallons. The total capital represented by the tanks, which have a total capacity of over 25,000,000 gallons, is several million dollars. As a result of extensive experience red lead paint is used as the standard method of protecting these tanks throughout the entire system, re-painting being carried out every 4 to 10 years, according to conditions. Before erection the tanks are thoroughly painted with red lead paint; after erection the exteriors have two more coats of the paint applied, suitably tinted, and to the interiors a further three coats of paint are given. The first is a brown colour made by using 10 oz. of lampblack, 6 oz. of Japan drier, and 2 lb. of pulverised litharge (lead monoxide) to each gallon of red lead paint. The second coat is similar except that half of the amount of lampblack is used, but the third coat has no lampblack. As usual non-setting red lead is used containing 94 per cent. actual red lead, but the addition of a further amount of lead monoxide when the paint is actually applied results in the formation of an extraordinarily hard paint film, highly resistant to water. The same methods are used for re-painting.

In applying red lead paint, which, as already indicated, can also be tinted to any desired colour, the surface of the iron and steel must first be scraped absolutely clean and free from all trace of rust, while dryness and freedom from oil and grease is also essential.

British Overseas Chemical Trade in March

Slight Decrease in Imports and Exports

EXPORTS of chemicals, drugs, dyes and colours during March amounted to a total of £1,466,371, being £78,563 lower than the figure for March, 1932. Imports totalling £769,415 were lower by £45,383, and re-exports totalling £81,787 were higher by £33,270, as compared with March, 1932.

	Quantities. Month ended March 31. 1932.	1933.	Value. Month ended March 31. 1932. £	1933. £
Imports				
Acetic Anhydride .. cwt.	763	393	2,271	986
Acid, Acetic .. tons	574	8,632	19,313	15,200
Acid, Tartaric, including Tartrates .. cwt.	733	805	1,504	2,745
Bleaching Materials ,,	5,678	5,681	4,570	7,781
Borax .. .. ,,	16,998	15,720	8,401	8,597
Calcium Carbide .. ,,	24,975	51,023	16,062	31,760
Coal Tar Products, not elsewhere specified value	—	—	1,763	5,161
Glycerine, Crude .. ,,	4,400	3,056	5,940	3,471
Glycerine, Distilled ,,	—	752	—	1,385
Red Lead and Orange Lead cwt.	1,038	1,381	1,453	1,292
Phosphorus .. ,,	3,971	—	15,486	—
Kainite, etc. .. ,,	105,179	192,139	18,594	32,557
Potassium Nitrate (Saltpetre) .. .. cwt.	10,920	5,547	10,325	6,399
Other Potassium Compounds .. .. cwt.	87,818	82,353	54,961	59,190
Sodium Nitrate .. ,,	69,300	—	24,000	—
Other Sodium Compounds cwt.	35,086	27,924	22,042	21,718
Tartar, Cream of .. ,,	342	638	1,873	2,136
Zinc Oxide .. tons	52	72	950	1,065
Other Chemical Manufactures .. .. value	—	—	215,383	193,694
Quinine and Quinine Salts oz.	55,720	78,271	6,320	6,442
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	1,295	569	6,240	3,054
Other Drugs .. value	—	—	87,553	100,750
Intermediate Coal Tar Products .. cwt.	67	14	915	321
Alizarine and Alizarine Red .. .. cwt.	—	—	—	—
Indigo, Synthetic ,,	—	—	—	—
Other Dyestuffs .. ,,	3,700	4,350	89,501	95,738
Cutch .. .. ,,	4,678	1,767	5,430	1,837
Other Extracts for Dyeing cwt.	6,294	1,974	22,749	8,046
Indigo, Natural .. ,,	19	—	303	—
Extracts for Tanning ,,	85,196	90,661	71,462	63,423
Barytes, Ground .. ,,	10,228	25,677	2,328	4,902
White Lead (Dry) ,,	5,686	6,183	7,727	7,420
Other painters' colours and materials .. cwt.	87,756	64,192	89,379	82,345
TOTAL .. value	—	—	814,798	769,415
Exports				
Acid, Sulphuric .. cwt.	8,352	2,364	4,201	1,716
Acid, Tartaric, including Tartrates .. cwt.	469	372	2,497	1,667
Ammonium Chloride (Muriate) .. .. tons	469	422	7,895	6,539
Ammonium Sulphate ,,	37,125	24,738	195,959	143,680
Bleaching Powder (Chloride of Lime) .. cwt.	29,574	35,665	10,481	10,723
COAL TAR PRODUCTS—				
Anthracene .. cwt.	—	—	—	—
Benzol and Toluol gal.	2,654	9,037	269	1,086
Carbolic Acid (crude) ,,	187	4,496	52	564
Carbolic Acid (crystals) cwt.	1,037	322	3,230	1,223
Cresylic Acid .. gal.	122,671	73,952	13,419	9,316
Naphtha .. ,,	1,790	3,630	151	400
Naphthalene (excluding Naphthalene Oil) cwt.	9,158	22,444	3,218	5,575
Tar Oil, Creosote Oil, etc. .. .. gal.	1,409,436	1,099,817	33,225	17,154
Other Sorts .. cwt.	19,850	18,895	9,024	9,414
COAL TAR PRODUCTS value	—	—	62,588	44,732
Copper, Sulphate of tons	8,197	5,474	145,558	80,445
Disinfectants, Insecticides, etc. .. .. cwt.	22,967	24,906	47,206	58,011
Glycerine, Crude .. cwt.	1,976	301	2,471	403
Glycerine, Distilled ,,	16,333	16,102	35,134	31,944
Potassium Chromate and Bichromate .. cwt.	1,268	1,196	3,394	2,998
Potassium Nitrate (Saltpetre) .. .. cwt.	1,651	1,454	2,776	2,606
Other Potassium Compounds .. .. cwt.	4,579	2,578	5,375	7,156
Sodium Carbonate, including Crystals, Ash and Bicarbonate .. cwt.	383,972	369,340	104,331	99,675
Caustic Soda .. ,,	151,425	174,845	100,591	113,431
Sodium Chromate and Bichromate .. cwt.	2,550	2,166	5,250	3,920
Sodium Sulphate, including Salt Cake .. cwt.	12,293	8,072	2,402	1,438
Other Sodium Compounds cwt.	85,232	75,728	75,043	69,520
Zinc Oxide .. tons	923	923	18,897	17,707
Other Chemical Manufactures .. .. value	—	—	217,420	266,382
Quinine and Quinine Salts oz.	48,949	47,416	5,747	6,485
Other Drugs .. value	—	—	192,615	216,706
Dyes and Dyestuffs (Coal Tar) .. .. cwt.	12,119	7,286	103,755	73,922
Other Dyestuffs .. ,,	18,092	16,599	16,641	13,967
Barytes, Ground .. ,,	1,845	2,838	903	937
White Lead (Dry) ,,	1,198	1,668	2,459	3,002
Paints and colours in paste form .. .. cwt.	19,530	20,432	34,178	32,642
Paints and Enamels prepared .. .. ,,	22,385	23,937	67,331	71,978
Other painters' colours and materials .. cwt.	38,920	44,431	71,836	82,039
TOTAL .. value	—	—	1,544,934	1,466,371
Re-Exports				
Acid, Tartaric, including Tartrates .. cwt.	58	61	394	357
Borax .. .. ,,	951	7	779	5
Coal Tar Products, not elsewhere specified value	—	—	9	27
Potassium Nitrate (Saltpetre) .. .. cwt.	738	63	697	76
Sodium Nitrate .. cwt.	8,034	10,003	3,584	4,894
Tartar, Cream of .. ,,	95	148	485	576
Other Chemical Manufactures .. .. value	—	—	8,178	52,532
Quinine and Quinine Salts .. .. oz.	7,126	4,929	865	678
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	427	350	4,477	2,806
Other Drugs .. value	—	—	23,788	16,533
Cutch .. .. cwt.	733	418	1,122	546
Other Extracts for Dyeing cwt.	145	136	728	603
Indigo, Natural .. cwt.	1	—	31	—
Extracts for Tanning ,,	2,074	901	1,784	552
Painters' colours and materials .. .. cwt.	503	271	1,196	495
TOTAL .. value	—	—	48,517	81,787

THE "Unich" Institute of Charkow, Russia, claims to convert naphthalene into tetralin at a temperature of 390° C., using molybdenum trisulphide as the catalyst. The latter is employed in the proportion of 2 per cent. of the naphthalene (by weight) and its activity is increased by the presence of free sulphur. According to the "Chemiker-Zeitung," April 1, 1933 (page 259), crude non-pressed naphthalene also yields a satisfactory hydrogenated product when the above proportion of catalyst is raised to 5 per cent.

The Manufacture of Cellulose Acetate Foils

Commercial Possibilities for Small Output

WHEREAS the manufacture of cellulose acetate rayon only offers any prospect of commercial success when carried out on a vast scale, the related industry of cellulose acetate transparent paper offers commercial possibilities even when operating on the basis of a comparatively small output. According to Johann Eggert, writing in "Kunststoffe," April, 1933 (pp. 78-80), 500 kg. lots of cellulose acetate can be conveniently turned out in five batches on the basis of the method detailed in G. Bonwitt's "Das Zelluloid und seine Ersatzstoffe." For batches of this size, the requisite raw material and their quantities are 320 kg. of air-dry cotton, 2,483 kg. of glacial acetic acid (100 per cent.), and 1,120 kg. of acetic anhydride, together with a catalyst in the shape of 9.6 kg. sulphuric acid (66° Bé). For costing purposes, other major items are: 420 kilowatt hours of electrical energy, 118 cubic metres of water and 5,500 kg. steam.

In a suitable kneading apparatus constructed of bronze or nickel chrome steel, 512 kg. glacial acetic acid and 1.72 kg. of sulphuric acid catalyst are well stirred and rapidly raised to 30° C., when 64 kg. of air-dry cotton are added. After the cellulose has been hydrolysed at the stated temperature for 1 hour, it is cooled to 16° C. and then incorporated with 224 kg. acetic anhydride which are run into the vessel in a thin stream, the temperature being maintained at a minimum of 25° C.; this operation occupies a period of three hours. In the course of the succeeding three hours a spontaneous rise in temperature is suppressed by cooling so as to maintain the mass at 25° C. After a further 3 hours, the acetylation has so far proceeded that a sample of the clear, viscous mass may be tested for ready solubility in choloroform. At this point, which is reached after a total working period of approximately 10 hours, the primary cellulose acetate is precipitated by gradual addition of 800 kg. of ether over a period of one hour. The mixture of concentrated acetic acid, ether and sulphuric acid is run out through a tap in the base of the apparatus and the acetylated mass is thoroughly freed from acids by washing with ether, the last traces of the latter being removed by heating to 30 to 40° C. with the aid of a stream of air or inert gas.

Conversion of Primary Acetate

To convert the primary acetate into the secondary product, preference is given by the author to the process outlined by Miles in U.S. Patents 733,729 and 838,350. After confirming the solubility of the primary acetate in chloroform and its insolubility in 99.5 per cent. acetone, there is slowly added with stirring a mixture of 41.6 kg. water, 38.4 kg. glacial acetic acid and 6.4 to 8 kg. sulphuric acid, care being taken to avoid any precipitation of the acetate. The actual hydrolysis of the primary acetate is effected by allowing the mass to stand for 12 to 16 hours at a temperature of 40 to 50° C. Complete hydrolysis is indicated by solubility of a washed sample in pure acetone. At this stage the reaction mass is indicated by solubility of a washed sample in pure acetone, gradually stirred into cold water when the acetate is at once washed until the reaction is neutral and dried at 35 to 40° C.

An alternative method, which possesses the advantage of yielding a solution of the secondary (acetone-soluble) acetate in acetic acid which can be kept unchanged for a long period, involves the use of sulphuryl chloride or chlorsulphonic acid as the catalyst. For working on a small factory scale, 300 kg. glacial acetic acid, 550 g. sulphuryl chloride and a proportion of acetic anhydride depending upon the water content of the cotton (6 kg. of 100 per cent. acetic anhydride per kg. of water) are thoroughly stirred together in a horizontal, double-walled cylindrical vessel constructed of copper or a suitable bronze alloy. After raising the temperature to 20° C., 80 kg. of air-dry cotton are gradually added. Gradual increase in temperature takes place, reaching 28° C. after 7 hours reaction, and should under no circumstances be permitted to rise higher than 30° C. After intensive cooling to 19° C. the mass is allowed to stand over night.

Continuing early on the following morning, 245 kg. of 100 per cent. acetic acid are added to the mass which has been cooled to 18° C., the temperature rising to 54° C. after the reaction has progressed for 4½ hours, at which temperature the mass assumes a transparent, glassy appearance. The maximum permissible temperature for this stage of the reaction is 60° C. A temperature of 56° C. is attained at the end of a further 30 minutes, when precautions are taken to avoid any further development of heat. Samples of the reaction mixture are examined every 30 minutes on a glass plate. No fibrous structure should be visible and films obtained by precipitation in water should possess a good tensile strength and ready solubility in chloroform.

Transformation of this primary acetate into the secondary product is achieved by gradually stirring into the mass a hydrolysing acid mixture consisting of 28.8 litres water, 31,2 litres 100 per cent. glacial acetic acid and 10 kg. sulphuric acid of 60° Bé. Completion of the hydrolysis is effected after 3 hours warming at 58° C. but low viscosity solutions call for brief increase in temperature to 63 to 65° C. The quality of the product is nevertheless improved by carrying out the hydrolysis at a maximum temperature of 40° C. for a period of 24 hours. To judge the progress of the reaction, samples are covered with hot water in a mortar and tested for solubility in acetone. Rapid solution indicates completion of hydrolysis. Neither should it be forgotten that sulphuryl chloride is a highly toxic substance so that the acetylation should be carried out in well sealed apparatus and a well-ventilated factory. This catalyst may be replaced by chlor sulphonic acid in the proportion of 2 per cent. of the dry cotton.

For transparent foil manufacture, the solution should be stabilised (with a view to storage over an indefinite period) by the addition of sodium acetate. A 10 per cent. acetic acid solution of the latter should be added to the reaction mixture in the theoretical proportion for exact combination with the sulphuric acid. After the addition of suitable plasticisers to the cellulose acetate solution in acetic acid, followed by filtration, the latter is in a condition for conversion into transparent foil by the wet process. By the process outlined 80 kg. air-dry cotton provides the possibility of turning out 3 to 3,500 square metres of acetate foil (weighing 30 grams per square metre) in 24 hours.

Panama Coconut Exports

Effect of Fall in Prices

THE Department of Overseas Trade has issued a report on the Economic Conditions in the Republic of Panama and the Panama Canal Zone, by G. L. Rogers, M.C., British Consul at Colon. (H.M. Stationery Office, 1s.). The balance of trade is discussed in relation to the imposition of new and heavy customs tariffs on foods, etc., and the effect of the consequent increased price of goods. Coconuts used to form a valuable source of revenue for the country, but owing to the fall in prices, export is now on a reduced scale. In 1918 nearly 20 million nuts were exported but for the year ending June 30, 1931, less than half of this quantity was shipped and the total value of exports was only £25,200. Production is mainly carried on by the Indians of the San Blas region on the Atlantic seaboard, where it is estimated there are three hundred thousand palms growing. A Decree of 1932 closed the San Blas region to international shipping.

There are three breweries established in Panama City and Colon, and the average daily amount of beer brewed since January 1, 1931, has been about 20,000 litres. The industry has become so successful that the import of bottled beer has practically ceased. Materials such as malt and hops are imported.

PROFESSOR A. SZENTGYORGYI claims to have isolated the pure anti-scorbutic vitamin from paprika, according to a report which appears in the "Chemiker-Zeitung," April 5, 1933. The work involved the extraction of more than two tons of paprika which is credited with a much higher vitamin content than either oranges or lemons. A relatively simple structure is attributed to the vitamin, since it is regarded as being identical with galacturonic acid.

New Technical Books

THE CHEMISTRY OF DRUGS. By Norman Evers. Second Edition, entirely revised and enlarged. Pp. 256. Ernest Benn, Ltd. 55s. net.

THE rapid advances which have been achieved in the chemistry of drugs and the discoveries which have been made in certain fields since the first edition was published, in 1926, have necessitated a complete revision of this book. Although few drugs have been found to which some addition has not been necessary, developments which have taken place in the chemistry of the hormones and vitamines combined with the extension of their therapeutic applications in the last few years have also made it necessary to include two new chapters on these subjects. The author is chief chemist to Allen and Hanburys, Ltd., and in preparing this book he has endeavoured to give a description of substances used in medicine from the standpoint of pure chemistry—that is to say, the book is chiefly concerned with their chemical constitution and reactions, as well as the chemistry of the methods of manufacture of drugs obtained from natural sources or prepared by chemical synthesis. Useful classified lists of drugs, giving data as to chemical constitution, action or use, botanical or other sources, constituents, etc., are included as appendices.

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ANNUAL REPORTS OF THE SOCIETY OF CHEMICAL INDUSTRY ON THE PROGRESS OF APPLIED CHEMISTRY. 1932. Vol. XVII. REVIEW BY PROTEUS.

JUDGED from the number of pages in the latest of these annual reports, the world-wide depression has not adversely affected the progress of applied chemistry. Naturally, the effect of the fall in value of most of the basic materials has been felt in nearly all branches of industry, but, far from discouraging research, the necessity of lowering the costs of production has acted as a stimulus. Other economic factors have profoundly influenced many branches of the chemical industry in Great Britain, in particular the suspension of the principle of free imports and the depreciation in the value of sterling, which have led to an expansion of some manufactures, noticeably in dyestuffs and textiles. A striking feature of the present abnormal conditions of world trade is the extent of overproduction which characterises many of the basic industries. The available supply exceeds the world's capacity for absorption in the case of coal, mineral oils, paper, rubber, artificial fertilisers and sugars, to mention only those dealt with in this report. It is also well known that the crops of cotton, coffee and wheat are likewise far in excess of the probable demand. It would be interesting to speculate on the degree of responsibility of the application of science to methods of production for the present situation. There is no doubt that it is largely due to the fact that, during the war period, research was mainly concentrated on the production side. To restore the balance, therefore, it will be necessary to direct as much attention to the problems of distribution and utilisation of products, and such a tendency is already discernible in many branches of chemical industry. It would appear that the purely chemical industry is on a firmer footing than most, for some of the large groups which have a wide variety of interests, such as I.C.I. and Lever Bros., are beginning to make headway once more.

This report resembles its predecessors in thoroughness of treatment, and fully maintains the high standard set by them. The whole field of chemical industry is covered in the 26 sections into which the volume is divided, and it is difficult to detect any important omissions. In each section, the recent progress realised is summarised and the corresponding research reviewed by a competent authority in that particular branch. Compared with last year's report, there are many changes in the list of authors, and two more sections, one on Explosives and one on Pulp and Paper, have been included. The full list is as follows:—General Plant and Machinery by Godfrey W. Himus; Fuel by Arthur Brounds; Gas, Carbonisation, Tar and Tar Products by J. MacLeod and T. A. Wilson; Mineral Oils by Alfred W. Nash and A. R. Bowen; Intermediates and Colouring Matters by F. M. Rowe; Textiles, Fibres and Cellulose by V. E. Yarsley; Pulp and Paper by H. Ainsworth Harrison; Bleaching, Dyeing, Printing and Finishing by W. Harrison; Acids, Alkalies and Salts by A. Proven; Glass by J. D. Canwood; Refractories, Ceramics and Cement by A. H. B. Cross and W. J. Rees; Iron and Steel by A. L. Norbury and E. Morgan; Non-ferrous Metals by Alan R. Powell; Electro-chemical and Electrometallurgical Industries by J. H. West; Oils, Fats and Waxes by H. M. Langton; Paints, Pigments, Varnishes and Resins by members of the Oil and Colour Chemists' Association; India Rubber by D. F. Twiss, F. A. Jones, A. E. T. Neale and W. McCowan; Leather and Glue by W. R. Atkin; Soils and Fertilisers by E. M. Crowther; Sugars, Starches and Gums by Lewis Eynon and J. Hy. Lane; Fermentation Industries by R. H. Hopkins and F. W. Norris; Foods by G. D. Elsdon; Fine Chemicals, Medicinal Substances and Essential Oils by Edgar Stedman; Photographic Materials and Processes by H. V. Horton; Explosives by John Weir; Sanitation and Water Purification by A. Parker. References to the literature and patent specifications are copious and accurate, while the index, compiled by F. G. Crosse, is remarkably complete, though marred by an unfortunate fault in the type at the bottom of p. 692. In all other respects, the presentation of the volume reaches the level to which we have now become accustomed, and both industry and research will have no hesitation in once more acknowledging their indebtedness to the Society of Chemical Industry.

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CATALYSIS AND ITS INDUSTRIAL APPLICATIONS. By Edward B. Maxted. Pp. 529. J. and A. Churchill. 36s. net.

THIS book is based partly on material collected over a period of twelve years and partly on lectures given during the past three years at the University of Bristol. Part I deals with the general principles and kinetics of catalytic processes; the variation of catalytic activity with external factors; inhibition of activity; adsorption and its relation to heterogeneous catalysis; methods of preparation and principal uses; catalytic hydrogenation, reduction and and oxidation. Here an attempt is made to group under specific headings the various phenomena connected with catalysis generally. "The theory of catalysis is," in the words of the author, "intimately connected with the theory of chemical affinity itself; for catalytic reactions are only a special type of ordinary reactions in which one participant emerges finally in its original chemical state." Part II is devoted to industrial applications, including the synthesis of ammonia, the hydrogenation of oils, the oxidation of ammonia, catalytic manufacture of sulphuric acid, and processes connected with fuel such as the hydrogenation of coal.

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PROTECTIVE FILMS ON METALS. By Ernest S. Hedges. Pp. 276. Chapman and Hall, Ltd. 15s. net.

THE book is volume five of the series of monographs on applied chemistry published under the editorship of Dr. E. Howard Tripp. In his preface the author points out that scientific research aiming at the preservation of metal structures is now of more than usual interest and importance, for economy has become almost a world-wide religion whilst the annual loss to the world through the corrosion of metals is estimated to be something approaching £500,000,000. With the increase in the use of different metals in both the structural parts and ornamentation of buildings and in other situations involving exposure to atmospheric corrosion, as well as in chemical and other industrial plant, the need for a proper understanding of the principles of the protection of metals against corrosion of all types has become greater in proportion. During recent years much research has been conducted on the properties and isolation of thin films which form spontaneously on metals under certain conditions and which protect them from further chemical attack. Work on the examination of both natural and artificial protective films is described in this book, which also discusses problems of passivity and anodic films at their practical application. The early chapters deal with the mechanism of corrosion, the protective effect of oxygen, and protective films formed in air and in liquid media; then follows anodic oxidation, coating by hot-dipping, electro-plating, spraying and cementation. The growth of the food canning industry in this country has made desirable the inclusion of a brief account of the protective properties of the tin-plate container.

The Hungarian Chemical Industry

Heavy Decline in all Branches

THE chemical industry in Hungary is passing through difficult times, and the unfavourable situation shows no sign of improvement. In different branches of the industry the decline varies from 25 per cent. to 70 per cent. The world crisis has brought a considerable fall in the prices of agricultural produce, with inevitable consequences. Farmers find themselves unable to buy chemical fertilisers, and the consumption has fallen to a level which is lower than it has been for many years. Consequently the work in chemical factories which produce fertilisers is at a standstill. For example, there are stocks of superphosphates in warehouses to the extent of about 30,000 tons, and yet no factory has produced any of this type of fertiliser for over eighteen months. The same restriction of consumption can be observed in the sulphuric acid industry; while for ammonium sulphate, a by-product of the Budapest gas industry, there is no sale at all, except for a little for export, which is sold at very low prices.

Production of Pharmaceuticals

There are about fifteen factories in Hungary engaged in the manufacture of pharmaceuticals. These are operating at 50 per cent. capacity, and have an estimated value of about £2,800,000. This branch of the industry, besides finding times bad because of the crisis, is faced with intense competition from German manufacturers. Forty per cent. of the output is in biologicals. About 80 per cent. of the entire production of pharmaceuticals is used in the domestic market—the balance finding a sale in adjacent countries, chiefly the Balkans. Domestic consumption has increased in recent years through improved methods of vaccination and inoculation. Despite the development of the domestic production of other pharmaceutical and medicinal preparations, Hungary imports more than it exports. Both imports and exports have shown an increase in the past few years, amounting to £147,200 and £114,400, respectively, in 1931. Serum and vaccine imports were £6,200, against £16,400 in exports. Fully 85 per cent. of the imports of finished products come from Germany, with England, Czechoslovakia, and France supplying the remainder. Hungary exports substantial quantities of pharmaceutical products to the Balkan countries and the Near East. Figures for 1932 are not yet available, but they will naturally show a contraction since imports have been placed under a permit system and pengo in payment must be left except in rare cases in Hungary.

Though the present state of the industry is bad, the future is not without hope. A number of factories in Hungary have been founded on foreign capital recently. Among these is a factory set up by the Shell Oil Co., for the production of asphalt. This firm also manufactures a product known as "Shelbit." Another factory has been set up for the manufacture of zinc white and lithopone, and the firm of Schwarzlose, of Berlin, has built another for the manufacture of perfumes. Borax Consolidated, Ltd., of London, has recently undertaken the construction of a new borax factory. Finally the fixation of atmospheric nitrogen for the manufacture of synthetic fertilisers is to be carried out on an industrial scale in a new and up-to-date factory at Pest.

Concentrated Acetic Acid

It is probable that the imports of concentrated acetic acid will cease completely, owing to a new method of distillation applied in Hungary. The method is much like that used in the preparation of anhydrous alcohol. The use of the new fractional distillation towers allows the producers of fermentation acids to concentrate that acid which before had an initial concentration of not more than 10 per cent.

An interesting invention for the organic industry was recently announced. It was found that the derivatives of cresol lose their disagreeable smell when dissolved in alcohol, and that by gelatinising the solution obtained, by means of sodium stearate, the double treatment scarcely alters the internal structure of the product at all.

In the metallurgical industry, a new process has been discovered for the direct production of ferrosilicium, of iron, of steel and similarly of pure iron from bauxite containing iron. This process avoids the use of coke and is unlike either the Bessemer or Martin processes.

Paper Manufacture in Sweden

Co-operation with other Industries

OF the total wood taken from from the Swedish forests and of the total power generated in the Swedish power stations, more than a third is consumed in the production of wood pulp, paper and cardboard. A characteristic feature of the Swedish paper industry is its co-operation with other industries, and just as the paper industry has been stimulated by cheap and abundant raw materials and power and a highly developed engineering industry, so also it has afforded to the major Swedish exporting industries the support of a steady home market. This is especially the case as regards forestry, the manufacture of paper-making machinery and to a considerable extent also the manufacture of water turbines and a number of other mechanical auxiliaries in the paper-making industry. At present, probably about 80 per cent. of its costs for raw materials goes to other Swedish industries. The remaining 20 per cent. is disbursed in the main for imported chemicals, such as china clay, bleaching powder, soda ash and dyestuffs, and for felt and wire, principally from England.

Specialised Productions

A review of the Swedish paper industry in the "Anglo-Swedish Trade Journal" for April states that the manufacture of paper in Sweden is specialised in a remarkably high degree in coarser kinds of paper, such as wrapping paper, newsprint, tissue paper and the large range of fancy papers which enjoy an excellent reputation for high and uniform quality throughout the world. The production of finer paper of best and medium quality amounts, however, to about 50,000 tons and comprises principally writing paper, drawing paper and packing paper, both of the best and medium qualities.

Swedish wrapping paper is manufactured in three different grades, namely, kraft paper, M.G. sulphite and greaseproof. The export of these kinds of paper have constantly risen since the foundation of the industry, and in recent years the increased use of kraft paper for sacks of different kinds and also for the manufacture of corrugated board has opened up a new market of growing importance.

In the Indian market, M.G. kraft (which found no buyers there before the war) and M.G. sulphite of lower substance than is usually sold in England have been sold in increasing quantities. The M.G. sulphite, and also poster paper and other printing paper is in demand. Kraft paper, which is nowaday the most important kind of paper, is often preferred dyed in deep strong colours in India. Other exports are M.G. cap consisting of 70 per cent. mechanical and 30 per cent. sulphite pulp as well as coloured tissue paper. There is also a considerable market for Swedish newsprint of lower substances.

South African Trade

In the South African market Sweden still maintains its position as supplier of various kinds of wrapping paper. M.G. kraft in rolls as well as unglazed kraft constitute the largest quantities, but M.G. fruit paper also finds a good market in South Africa. Competition is strong in newsprint and the preferential duty in favour of British and Canadian paper makes the position difficult for Swedish mills, despite the high qualities that they are able to offer to their customers. The consumption of greaseproof is increasing and the same is true of wood-pulp board for packing eggs. Swedish qualities of these commodities are highly esteemed.

The relatively good market previously enjoyed by Swedish paper in Australia has been affected by the tariff policy and exchange restrictions, which opened the way in this market, especially for Canadian and English newsprint. The Swedish specialities in wrapping paper are, however, still attractive to Australian buyers, especially M.G. fruit paper of lower substances. In recent years Swedish wood-pulp board for egg packing has also found considerable sales, not least because of the care with which the Swedish mills have observed the regulations regarding minimum substances for paper used for this purpose.

New Zealand is primarily interested in M.G. sulphite and M.G. cap, but various kinds of kraft paper and greaseproof enjoy a ready market.

The Rotary Kiln

Its Use as a Roasting Furnace

THE subject of using a rotary kiln as a roasting furnace was first discussed in 1927. Since then further research has been carried out, the results of which appear in an article by C. P. Debuch in the " Periodic Review " of the Metallgesellschaft, Frankfort-on-Main. Experiences show that the rotary kiln has fulfilled all the expectations that could fairly be set upon it. It must at the same time, however, be added that this type of furnace is still in course of development, so that the present article is only to be looked upon as an interim report. The most important features of the rotary kiln as applied to roasting are the air and gastight joints at both ends; the system of adjustable nozzles, uniformly distributed over the length and circumference of the kiln; and the inner construction with baffle rings, deflectors and firebrick-lining of varying thickness.

As far as the roasting process proper is concerned, leakages are of no importance, because they merely represent a constant, on the strength of which the total amount of air admitted through the other inlets can be regulated. However, the use of an absolutely gas-tight joint at the ends renders it possible to avoid the undesired leakage of even the smallest quantities of gas. Consequently, with a kiln so constructed, furnace gases are drawn off at both ends, so that several reactions which do not coincide in time or place can be carried out separately and simultaneously, as, for instance, when arsenical pyrites, or mixtures of arsenic and pyrites, or arseniferous magnetic pyrites have to be roasted. Practice with the rotary kiln has shown that in such cases the process comprises two stages, a de-arsenising and a de-sulphurising period.

Removal of Gases

A furnace of the type under discussion allows removal of the arsenical gases at the upper end and the sulphuriferous gases at the lower. The form and the material of the nozzles presented difficult problems. The old clumsy construction has been replaced by a simple and practical one. Its chief advantage is that when opening the slide valve the largest clear opening in the centre is forthwith secured, thus enabling a constant observation of the kiln and a control of temperature by means of optical pyrometers while the furnace is in operation. The inner construction of the furnace satisfies all demands that can be made upon it for roasting. The temperature inside the furnace can be adjusted by simple means to the varying requirements for the treatment of different products or grades of pyrites. The interior equipment with deflectors transfers the roasting reaction to the free space of the furnace, while in other types of furnace it depends chiefly on surface areas. The latter, where roasting is concerned, are to be considered in two different directions; first, in regard to the size of the roasting surface available, whereby is meant the surface of the hearths covered with ore, in the second place, in regard to the surface areas of the ore particles that come into contact with the gases. In connection with the construction of other furnace types, the best roasting effects take place during the free fall of the ore from a higher to a lower hearth. It therefore specially deserves notice here that the rotary kiln roasts exclusively during the period of free fall of the ore. This is so with granular as well as with powdered material, known commercially as " fines " and " flotation ore."

Experimental evidence shows that furnaces fitted with deflectors are far superior to those without. An arrangement of baffle rings provides a means of increasing the intensity of a reaction between gaseous and solid material. A furnace constructed on these lines can therefore not only be used for roasting, but is equally well adapted, or can easily be made so, for any other reaction, however slow its process may be.

AN expanding sugar production in India indicates the possibility of the establishment of a domestic industrial alcohol industry. The total imports of industrial alcohol largely from Java, was 1,137,331 gallons in 1930-31. Assuming that each ton of cane molasses could be made to yield 69 gallons of alcohol, it is thought that India could meet its demands for industrial alcohol and have an excess for export.

Wool Industries Research

A Visit to the Laboratories at Torridon

A NEW process to vest wool fabrics with unshrinkable properties, efforts to perfect the jute woolpack, and the production of a wool process oil removable without the use of alkalies, are but a few directions in which scientific progress is being made at the headquarters of the Wool Industries Research Association, at Torridon, Leeds. On the occasion of the recent annual meeting over which Lord Barnby presided, visitors were conducted over the laboratories of the association, and saw something of the work being carried out for the benefit of the industry.

Much has recently been heard of the paper-canvas woolpack, the raw material for which comes from Continental pine forests, and which is represented in some quarters as a coming competitor of the jute pack now in universal use. The view held at Torridon is that cost is likely to be an obstacle in the way of the paper pack, and the Association is directing its efforts to perfection of the jute pack.

Extensive claims are made for two new oils evolved in the laboratories at Torridon. One of them, intended for oiling wool before carding and spinning, has been subjected to a process as a result of which it mixes with water, and, if need be, can be removed without alkali. Visitors, invited to put their fingers into such oil, could remove all traces of it by the use of water, without soap. Another oil, intended for lubrication of machinery, is declared to be incapable of permanently staining material which may be passing through the machine. This, though not yet commercially available, is undergoing bulk tests in a Yorkshire factory.

Unshrinkable Woollen Goods

The Association attaches no small importance to the discovery of a new process for rendering wool fabrics unshrinkable—a matter of special importance to the hosiery and knitted goods trades. The method is not disclosed, though one understands that whilst most processes with this end in view are applied to the finished fabric, this one is a new method of treating the wool at an early stage of processing. The method imparts additional lustre and an improved "handle" to the final product, combining softness with a silken sheen. "There are some who would like to produce artificial wool," says Dr. Barker, " and others who would like to see a silk finish on wool which is unshrinkable. We are among the latter, and this process, which is to that end, is no more costly than its counterpart now in use."

Passing reference must suffice for a large number of other scientific investigations calculated to aid the industry at many stages of manufacture. The successful production of sheep marking and dipping fluids which leave no permanent stain on the wool is well known, and, at the other end of production, progress is reported for dyestuffs. Photography is being employed to reveal whether certain dyed fabrics will absorb or reflect infra-red rays—in other words whether a fabric will be warm or cold in wear. Special apparatus is also in use to test the air-permeability of fabrics—the extent to which they are wind-proof—and the heat retaining powers of various types of cloth.

Canadian Fertiliser Industry

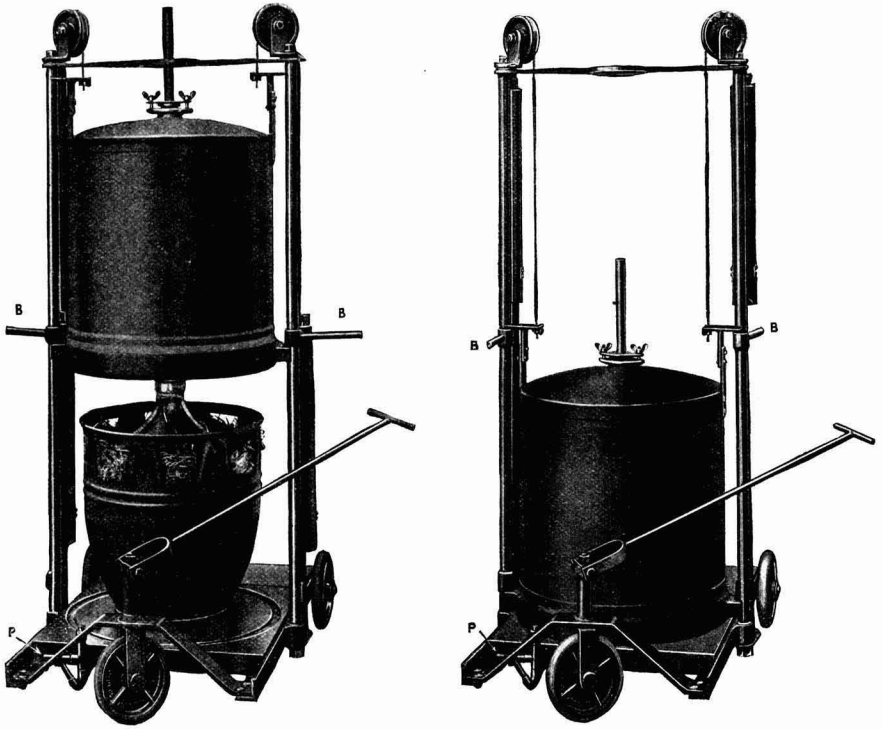
Statistics for 1931

THE Dominion Bureau of Statistics at Ottawa reports that production from Canadian plants engaged primarily in the manufacture of fertilisers reached a total value of $4,251,840 in 1931, whilst certain other industries produced materials such as calcium cyanamide, ammonium sulphate, animal tankage, ground bone and fish fertilisers. The total value of these other commodities reached $1,732,611, in 1931. The total production of mixed fertilisers was 113,632 tons, including the amounts made in fertiliser plants, at abattoirs and by glue manufacturers; this output represented a reduction of 45 per cent. during the year. Superphosphate was manufactured by two different companies in four separate plants. Canadian imports of fertilisers and related materials in 1931 were valued at $476,786. Exports included manufactured fertilisers valued at $610,755; cyanamide, $1,507,879; fish meal, $661,468, and ammonium sulphate, $167,477.

The Handling of Corrosive Liquids

A Portable Carboy Discharger

To overcome difficulties associated with the removal of corrosive liquids from carboys and bottles, Albright and Wilson, Ltd., have recently introduced the portable carboy and bottle discharger here illustrated. This device may be regarded as a convenient modification of the " acid egg " or montejus. The carboy or other container which it is desired to empty is placed on the base of the machine. The bell (balanced by counterweights) is brought down over it and clamped firmly by the handles B, thereby making an airtight joint with the base. Compressed air is then admitted through the inlet P. An adjustable discharge tube passes to the bottom of the carboy, and the air pressure elevates the liquid through this tube, and so to any desired point. It should be noted that the air pressure is applied equally to the inside and outside of the carboy, so that no strain is imposed on it, and there is therefore no risk of breakage however large may be the required pressure. The apparatus is constructed of acid-proof materials wherever necessary, and the neck at the top of the bell is fitted with a simple device for the manipulation of the outlet pipe.



The " Oldbury " Portable Carboy and Bottle Discharger. *Left* : Bell raised to allow carboy to be placed in position. *Right* : As sealed ready for discharge of liquid by admitting compressed air.

Chemists' Professional Interests

Continued Encroachment

THE Journal of the Institute of Chemistry reports that the Institute continues to receive complaints of attempts made by certain rate-aided institutions as well as by members of other professions, to undertake professional chemical consulting and analytical practice. The prevailing economic condition is pleaded in justification of this procedure, which is almost invariably accompanied by advertising, by soliciting for practice by means of circulars and lists of fees, and by other practices which are not countenanced among members of the Institute. While the Council cannot deal with the persons whose practices are the subject of these complaints, it impresses upon Fellows and Associates that they should refrain from giving any kind of assistance to persons who, not being qualified chemists, seek to exploit the services of those who are so qualified, by the adoption of procedure which is contrary to the accepted traditions of professional life.

A New Oil Bath Liquid

Many Advantages

AN improved liquid for oil baths presenting many advantages over the oils hitherto in use, as well as glycerine and sulphuric acid is described in the " Chemische Fabrik," April 5, 1933 (page 158). Apart from complete immiscibility with water, which ensures almost immediate evaporation of any drops of water which may happen to alight on the surface, the new liquid is non-inflammable, the vapour in fact functioning as a flame extinguisher. The unpleasant and dangerous frothing of ordinary oils on contact with traces of water, and all risk of fire, are thus avoided. The oil can be kept for an indefinite period at a temperature of approximately 220° C. without undergoing any change whatsoever in the shape of resinification or thickening. When taken up to 250° C., slight evaporation takes place, but the vapours are entirely non-toxic. The liquid does not actually begin to boil until the relatively high temperature of 420° C. is reached.

Metals for Electrical Distribution

Features Peculiar to Copper, Aluminium and Lead

AT a joint meeting of the Institution of Chemical Engineers, the Chemical Engineering Group and the Liverpool Section of the Society of Chemical Industry, held at Liverpool University, on April 7, Dr. F. J. Brislee, F.I.C., read a paper on "The Corner Metals of Electrical Distribution—Copper, Aluminium and Lead." Introducing the lecturer, Viscount Leverhulme, president of the Institution, said this was the first time the Institution of Chemical Engineers had held a meeting in Liverpool to his knowledge, and he was very glad it had fallen to his lot to preside over that gathering, not only as president of the Institution, but also in his capacity as Pro-Chancellor of Liverpool University.

In the course of his paper, Dr. Brislee said that copper for electrical purposes had to have a high degree of purity, since the electrical conductivity was extremely sensitive to the influence of impurities. H.C. copper of good average quality would contain 99.92 per cent. to 99.96 per cent. of copper, 0.03 to 0.05 per cent. of oxygen and less than 0.02 per cent. total of other impurities. The properties of outstanding importance to the distribution of electrical energy were conductivity, sufficient mechanical strength and resistance to atmospheric and other corrosion. While aluminium was considerably poorer than copper as a conductor, it had the advantage of being less dense, so that its uses led to gains in several economic aspects. Lead owed its association with the other two to its peculiar properties of flexibility and ductibility which enabled it to be extruded as a pipe, and to its power to withstand corrosive agents to a remarkable degree.

Dealing with the question of fatigue failure, Dr. Brislee pointed out that one of the most difficult problems which confront the metallurgist to-day was to produce a given metal in the best physical condition for the purpose of its use. There were two distinct sections to this problem, the working of the pure metal, and the use of alloys containing the metal in question as a major constituent. So long as the highest possible conductivity was required, alloys were excluded, and then the problem narrowed down to the production of the best physical condition by judicious mechanical treatment, including, of course, heat treatment. It was by no means easy to devise a series of tests which would show that the metal was worked so as to give the best results. The tensile strength or ultimate stress might be high and the metal fatigued to such an extent that a break occurred under a very moderate load. Turning to the effect of impurities on the properties of copper and aluminium, there emerged the fact of the very high purity of these two metals as met with commercially. The effects of a large number of impurities on the properties of copper were now known and understood. The effect of each impurity had been investigated individually, and also in association with the other constituents. When this work was complete, it would be a classic in the history of copper. So far as electrical uses were concerned, the conductivity formed a safeguard of purity. It was a remarkable fact that although silver had a higher conductivity than copper, the addition of silver to copper rapidly lowered the conductivity to a very low value. The only serious competitor to copper as a conductor was aluminium, which had a conductivity value of 60, if copper was taken as 100. The density of copper was 8.9 and that of aluminium 2.7, so that weight for weight aluminium was a very good proposition for use as conductors.

Chemical Industry Lawn Tennis Tournament

Entries Close Next Week-End

ONLY another week remains before the closing date for entries for the third annual Chemical Industry Lawn Tennis Tournament. All entries must reach us by Monday week, May 1, and for the benefit of those lawn tennis players in the chemical industry who have not yet obtained their entry forms we would repeat that forms may be obtained on application, either personally, by post, or by telephone, to the Editor of THE CHEMICAL AGE, Bouverie House, Fleet Street, London, E.C.4. (Telephone: City 0244.) The tournament, which is extended this year to include men's singles as well as men's doubles, is open to all members of the industry, whether principals or members of staffs. The rules of the tournament are reprinted below. There are silver challenge cups to be held by the winners for one year, and miniature cups to be presented outright to the winners and runners-up.

The draw for the first round will be made as soon as possible after the closing date for entries, and it is hoped that full particulars of the draw will be published on May 6. As in previous years there will be a new draw for each round. In the early stages of the tournament the county will be divided into areas, the geographical limits of which will depend upon the number of entries from each locality, in order that the difficulties of travelling may be minimised.

Rules

1. Every competitor must be a member of the chemical industry, either as a principal or a member of a staff. There is no entrance fee of any kind.
2. Each pair in the Doubles Tournament must be members of the same, or an associated, firm.
3. The Challenge Cups shall be competed for annually on courts of any surface in accordance with the Rules of Lawn Tennis and the Regulations of the Lawn Tennis Association. The winners of the Cups shall make arrangements for their safe custody and insurance.
4. The competition shall be conducted on the knock-out principle, and the best of three advantage sets shall be played in all matches, except in the Final of the Singles, when the best of five sets shall be played.
5. **Entries shall be made not later than May 1, 1933, and addressed:**

"Lawn Tennis Tournament,"
"The Chemical Age,"
Bouverie House,
Fleet Street, London, E.C.4.

6. The draw shall be made on the first convenient day following the close of entries. The dates on or within which the several rounds must be played will be published in THE CHEMICAL AGE.
7. The Editor of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations governing this competition.
8. Except in the case of the special period set apart for the final stages of the competition, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement, the first name drawn shall have the right to choose the ground.
9. In the general interests of competitors throughout the country it has been decided to divide into areas as far as possible all matches up to, and including, the Semi-Finals, the rule as stated under Clause 8, however, still standing.
10. The result of each match must be sent by the winners to the Editor of THE CHEMICAL AGE, signed by all players (winners and losers) immediately after the match, and must reach the office of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round.
11. If any player be not present at the agreed place or time of the match, opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the others' appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which both sides agree, within the stipulated period.
12. Any dispute arising between players, or otherwise, shall be referred to the arbitration of the Editor of THE CHEMICAL AGE, whose decision shall be final.
13. While competitors will make their own arrangements as to hard or grass courts for the preliminary rounds, it must be understood that the Finals will be played on hard courts.

Ottawa Agreement Changes

New Canadian Tariffs

REPLYING to a question by Mr. Lansbury in the House of Commons, on April 12, Mr. J. H. Thomas, Secretary for the Dominions, stated that consultations had taken place in regard to the variation of certain provisions of the United Kingdom-Canada trade agreement. As a result, alterations had been agreed to in the Customs tariffs on British goods. Particulars of the variations in the duties were issued later. They are as follows:—Modifications of present items in Schedule E. Chemical compounds composed of two or more acids or salts soluble in water, adapted for dyeing or tanning Aniline and coal tar dyes, soluble in water, in bulk or packages of not less than 1 pound weight. New import duties:—British preference tariff, free; intermediate tariff, 10 per cent. *ad valorem*; general tariff, 10 per cent. *ad valorem*.

Items added to Schedule E:—Potash, chlorate of, not further prepared than ground (on and after July 31, 1933). New import duties:—British preference tariff, free; intermediate tariff, 15 per cent. *ad valorem*; general tariff, 20 per cent. *ad valorem*. Solution of hydrogen peroxide of strengths of 30 per cent. and over. New import duties:—British preference tariff, free; intermediate tariff 22½ per cent. *ad valorem*; general tariff, 25 per cent. *ad valorem*. In addition the following articles have been added to the free list:—Amyl alcohol or refined fusel oil, when imported by the Department of National Revenue or by a person licensed by the Minister, to be denatured for use in manufacture of metal varnishes or lacquers, to be entered at ports prescribed by regulations of Minister, subject to Excise Act and to regulations of the Department of National Revenue; xanthates for use in the process of concentrating ores, metals or minerals; nitrate of soda or cubic nitre when imported for use in curing or pickling of meats; olive oil for manufacturing soap, aluminium scrap (provided that nothing shall be deemed to be aluminium scrap except waste or refuse aluminium, fit only to be remelted).; chlorate of potash not further prepared than ground (until July 31).

Mind and the Machine

Utilising Scientific Knowledge

LECTURING on "Mind and the Machine" at the League of Industry Easter Study School at Oxford on April 15, Dr. Leonard P. Lockhart, Medical Officer of Boots Pure Drug Co., said the strain of mental adaptation to modern conditions was enormous, but it was not always by any means manifest on the surface. Planning on a scientific basis involved planning every aspect of life. We must not only plan and organise our material life, but apply scientific investigation to the vital question of human adaptation. It was far from general acceptance that there was such a thing as a science of human nature, and further still from acceptance that such a science was of practical importance to every one, and that some knowledge of it should be an indispensable qualification for all in positions involving control over other people.

When a response to a situation learned in childhood had to be changed in later life to meet new demands, that was a true example of suppression. In place of a primitive reaction was substituted something more complicated. The word repression was often confused with the word suppression. Suppression was actually the putting aside the old man and putting on the new. Repression was nothing more nor less than intellectual dishonesty. Life was becoming more and more standardised, and we were trying to force the essentially individualist man into essentially similar modes of thought and conduct. It could not be done without danger and something must eventually give way. If we utilised our scientific knowledge of materials in conjunction with the scientific knowledge of mind there seemed to be no limit to progress.

New Zinc Oxide Plant in Canada

AN organisation known as the Zinc Oxide Co. of Canada, reported jointly controlled by French and German interests, will soon establish a factory at Montreal to manufacture zinc oxide. The plant expects to start operations shortly and 25 employees have already been engaged.

Standard Samples

New List Issued by Bureau of Standards

A NEW list of standard samples for use in chemical analyses has just been published by the United States Bureau of Standards as supplement to Circular No. 398. The samples are listed by groups, such as irons and steels, ferro alloys, sheet brass, bronzes, bearing metals, die-casting alloys, limestone, clays, glass sand, various kinds of glasses and ores; sugar, naphthalene and benzoic acid for determining heats of combustion; cement for testing the fineness of sieves; and pure chemicals, such as sodium oxalate, arsenic trioxide, and acid potassium phthalate. Directions are given for ordering and the methods of shipment to addresses in the United States and foreign countries are described. Copies of this pamphlet are obtainable without charge from the Bureau of Standards, Washington, D. C.

Moisture Determination

A Speedy Method Involving Use of Carbide

THERE are several stages in the manufacture of ceramics where a rapid check of the moisture content would be an aid to uniform production and would reduce the percentage of faulty ware produced, said Mr. S. Stanworth in the course of a paper read before the Ceramic Society at the North Staffordshire Technical College, Stoke-on-Trent, on April 10. Since tests can be taken in a few minutes by the "Speedy" moisture tester, very little, if any, delay is occasioned, whilst the cost of testing is extremely low, being about one-third of a penny per test for the absorbent material used in the test.

When testing with the "Speedy" moisture tester, the moist material is weighed accurately on the sensitive balance provided. This material is then placed in the cap of the instrument. The absorbent material is then measured out with the measure provided and placed in the body; the instrument, which is held in a horizontal position, whilst the cap is placed in position and the stirrup is brought round and screwed up tight. The instrument is then shaken vigorously for about two or three seconds and held steadily whilst the pressure rises. By these means the powdered carbide is mixed with the damp material, and the slight amount of heat which is generated raises the temperature of the remaining material. It is desirable that this heat should remain in the mixture, since it raises the vapour pressure of the remaining water and enables the absorbent to remove it more quickly. Quicker readings are obtained when the materials are not disturbed after their first shaking. The final reading on the gauge gives the percentage weight of water which was present in the moist material, since gas is given off in proportion to the amount of water which was in the substance.

The author compared his "Speedy" method with the electrical devices that have been introduced for moisture determinations. These instruments measure the resistance offered to an electric current by the moisture in the material to be tested. This resistance varies with the percentage of water present in the material, the purity or otherwise of the water, the density of the material and the percentage of the material present which will act as a conductor. In this connection it was pointed out that the sample, if plastic or granular, requires ramming to a constant density for each test, and since a damper material rams more easily than a dryer one, it may be difficult to ensure that the sample has been rammed correctly. Since there are so many variables in this method it is only reliable when used on some material which does not vary much in quality, otherwise errors may be introduced.

Fauser Synthetic Ammonia Process

THE total capacity of world plants for the production of synthetic ammonia by the Fauser process is now about 1,000 tons of ammonia daily, while the daily capacity of the nitric acid plants using the Fauser processes is over 800 tons. The Fauser process for direct production of dry ammonia salts, particularly ammonium sulphate and ammonium nitrate without the use of centrifugal apparatus and driers, is being exploited industrially in Italy, the Netherlands, Belgium, and Poland.

Chemical Trade Marks Committee

Appointment of Representatives

IN connection with the appointment by the President of the Board of Trade of a committee to examine the question of alterations in the trade mark legislation in this country, the Association of British Chemical Manufacturers has appointed a trade marks committee to examine the question from the point of view of the chemical industry. In order to make the inquiry as comprehensive as possible the various bodies comprising the Federal Council for Chemistry have been approached and invited to nominate representatives to form a Joint Chemical Trade Marks Committee, on the same lines as the Joint Chemical Patents Committee, which was so successful in connection with the recent alterations in the Patents and Designs Act.

The following organisations have accepted this invitation and appointed representatives.—The Institution of Chemical Engineers, International Society of Leather Trades Chemists, Institute of Chemistry, Society of Glass Technology, Society of Public Analysts and the Oil and Colour Chemists Association. Other bodies are awaiting the next meeting of their councils in order to consider the invitation. In this way it is hoped that the comments to be submitted by the committee will cover the interests of chemistry as a whole.

Magadi Soda Co. Ltd.

Annual General Meeting

THE annual general meeting of the Magadi Soda Co., Ltd., was held in London on April 13. In the absence of the chairman, Mr. J. G. Nicholson, Mr. Hugh F. Marriott presided and read the speech prepared by Mr. Nicholson, which stated that the production of soda ash over the three years 1930, 1931, and 1932 had continued at a fairly constant level, and that it had thus been possible to fulfil the company's modified obligations to the Kenya Government in respect of 1932. Deliveries to customers had been maintained, and costs further reduced, resulting in a slight improvement in trading results in spite of low prices. The agreement of the debentureholders, at a meeting in July, 1932, to accept a reduction in interest from 6 per cent. to 4 per cent. (subject to the repayment of the 2 per cent. remitted, and to the appropriation of sinking fund payments in arrears, prior to the distribution of any dividends) had also considerably improved the profit and loss position.

Attention was also drawn to two other agreements which had been concluded in 1932; the first with Imperial Chemical Industries, Ltd., which secured to the company a reasonable share of the available trade in existing markets; the second with the Kenya Government, whereby the company's obligation had been further reduced to a figure more commensurate with present conditions.

Salt Prospects

Turning to prospects, Mr. Nicholson explained that, as regards soda exports, the position remained very unpromising. National production in Japan presaged the disappearance of that market in a comparatively short time, while there was little prospect of expansion in other directions without a great improvement in world conditions. In these circumstances, the company was attempting to develop local markets more intensively, primarily by the production of salt for consumption in Kenya Colony, as the directors believed that the recovery of salt from the lake liquors had now been demonstrated to be economically feasible. The local market for salt amounted potentially to 10,000 tons per annum, but spectacular results were not to be expected, as the new enterprise could at best hardly do more than recompense the company for some of its lost export business. Industrial development in Kenya might later on also lead to a larger local consumption of soda, but it was as yet too early to anticipate any definite results in this direction.

Oxygen Industry in Lithuania

OXYGEN production in Lithuania was begun prior to the war by the firm of R. M. Sommeris ir ko., Kaunas. The total output is now placed at £8,300 annually, all of which is consumed locally, primarily in the welding industry.

Sulphuric Acid Plant Wrecked

Fire at a Durham Colliery

A SERIOUS fire occurred at Dorman, Long and Co.'s Dean and Chapter Colliery, Ferryhill, near Spennymoor, Durham, on April 14, when a sulphuric acid plant, covering an area of two acres and valued at over £20,000, was destroyed. The tanks contained 600,000 gal. of acid, which poured away from the bursting tanks in streams and flowed in all directions over the colliery premises.

The fire, which is believed to have been caused by a fused electric wire, was detected by a workman, who heard an explosion and saw flames coming from a cistern at the top of a tower about 100 ft. from the ground. An alarm was raised, but within a few minutes the building, which was composed entirely of wood, was burning fiercely. By the time the fire brigade arrived the interior of the works was a mass of flames, and it was impossible to do anything but prevent the fire from spreading to adjoining laboratories and other buildings. The wooded framework of the burning building collapsed and three towers, each over 100 ft. high, were destroyed. The lead cisterns containing the acid crashed to the ground, causing danger to firemen and workmen who were engaged outside the building.

There was danger of the flames involving a store of iron pyrites in the base of the building and causing a heavy release of poisonous gas. This was prevented after many hours' work.

British Drug Houses, Ltd.

Improved Export Trade

PRESIDING at the annual general meeting of the British Drug Houses, Ltd., held in London, April 12, Mr. Charles A. Hill (chairman and managing director) said that the trading profit amounted to £60,302. The net profit has been diminished by at least one non-current item. In the profit and loss account the depreciation on plant was heavier than in the previous year. After payment of the preference dividend there remained a balance of £41,157, which the directors recommended should be dealt with according to the report.

The balance sheet presented its usual healthy appearance. Fixed assets were slightly lower than in 1931, due to the amounts written off exceeding the additions. Liquid assets—stock-in-trade, debtors, and cash—total £473,709, against which sundry trade creditors amount to a mere £80,000

The company now owns 360 separate trade-mark registrations. Export trade has shown a substantial move forward during the past year. This improvement has taken place notwithstanding the disabilities imposed by the Import Duties Act, 1932, which is a factor operating mainly to the company's disadvantage. During 1932 the chairman visited Canada to investigate the affairs of the subsidiary British Drug Houses (Canada), Ltd., and was later joined by Mr. F. C. O. Shaw, who spent a considerable time with the company in Toronto. As a result a reorganisation of the management was effected which is already reflected in the signs of better progress which the company is showing. Patience, however, is still needed in connection with the development of the Canadian market, and the changes which have been made in the organisation of the subsidiary company will have the effect of shortening the initial stage of outlay against the time when the new company shall be on a paying basis. A further new development in connection with export trade has been the formation of the British Drug Houses (Australia), Ltd., registered in 1932. This subsidiary company was formed for the purpose of facilitating a freer distribution of products in the Australian market. The Australian company differs from the Canadian subsidiary inasmuch as the latter is a new business, whereas the Australia "B.D.H." business was already substantial and well established.

The report was unanimously adopted and a dividend of 5 per cent. on the ordinary shares was declared.

Proposed Dye Plant in Japan

THE Japanese Press has recently announced the proposed construction of a dye plant at Yamato to be operated in connection with the Government steel works. No definite details are available regarding the project.

News from the Allied Industries

Matches

BRYANT AND MAY, LTD., have declared final dividends for the year ended March 31 on the ordinary shares of 4 per cent., free of tax (unchanged), and on the partnership shares of 5 per cent., free of tax (unchanged). It is also proposed to pay to holders of ordinary shares a bonus dividend of £150,000, being profit realised on the sale of investments.

Tanning

THE USE OF NITRO-CELLULOSE finishes on leather is increasing rapidly. The latest type of leather on which it is being used is the bright coloured sandal leather in white and bright colours. Some firms are refusing orders owing to the great demand. The finish is applied without dyeing the leather and it is quite flexible.

Iron and Steel

THERE WERE SEVENTY FURNACES IN BLAST in the United Kingdom at the end of March, being an increase of seven since the beginning of the month. The production of pig-iron in March amounted to 332,200 tons, compared with 270,800 tons in February and 335,600 tons in March, 1932. The daily rate in March was, therefore, about 10 per cent. higher than in February. The production included 91,600 tons of hematite, 149,000 tons of basic, 78,100 tons of foundry, and 7,800 tons of forge pig-iron. The output of steel ingots and castings in March amounted to 577,700 tons, compared with 482,700 tons in February and 462,800 tons in March, 1932.

NO TIME IS EXPECTED TO BE WASTED by the National Committee of the Iron and Steel Industry in giving effect to its own recommendations. The committee will get to work on the details of the formation of the proposed National Iron and Steel Corporation. It is hoped that opposition within the industry will not be such as to render statutory powers necessary. The possibility, and even the probability, that modifications will have to be made in the scheme has not been overlooked, and, whether or not legislation becomes necessary, the Government will be informed of developments. An early task facing the National Committee must be the constitution of the Council of the National Corporation, the Executive Committee, and the four regional committees.

Rubber

A WELL-KNOWN ITALIAN rubber manufacturing company has now linked up with International Latex Processes, Ltd. The latter, it will be recalled, was formed at the end of last year for the purpose of consolidating, outside the United States, the whole of the wide range of patents and technical knowledge held by the Anode Rubber Co. and the United States Rubber Co. within the field relating to the direct use of rubber latex for manufacturing purposes. The Anode Rubber Co. itself represents a pooling of the latex patent interests of such important corporations as the Dunlop Rubber Co., the Hungarian Rubber Goods Factory and the Compagnie Générale d'Eléctricité, and the formation of the new company brought together two groups which have done a great deal of work in the sphere of latex development. With these groups the Sociéta Italiana Pirelli, of Milan, is now co-operating. That company also has played a leading part in the development of rubber latex.

Paint and Varnish

THE PAINT AND VARNISH INDUSTRY of Sweden is made up of about forty-five manufacturers, producing paints, varnishes, and lacquers of all types. The two most important producers are Aktb. Vilhelm Becker, Stockholm, and Dorsch, Backsin, at Gothenburg, whose brands have the greatest demand. In 1930 the total production of enamels and lacquers by all domestic manufacturers reached 885,962 kilos. The preference for colours of spray lacquers is divided equally between dark and light shades, black predominating. Imports into Sweden during 1931 totalled 42,869 kilos of spirit lacquers, 262,996 of nitro-cellulose lacquers, and 793,384 of all other lacquers. Germany supplied over 50 per cent. of the spirit lacquers imported, with small quantities from Great Britain and the United States. Nitro-cellulose lacquers also came mostly from Germany, whose share was approximately 60 per cent. The United States was represented by about 36 per cent. Great Britain, although, a small participant in the market for nitro-cellulose lacquers, was the leading source of supply for other grades, shipping approximately 40 per cent. of the imports. Germany and the United States were the other chief countries.

Chemical Notes from Overseas

Sicilian Sulphur Trade

SICILIAN sulphur production during the fiscal year 1931-32 totalled 261,641 metric tons, an increase of 12,341 tons over 1930-31. Production of the different grades was as follows (in metric tons): Superior Yellow, 39,039; Inferior Yellow, 112,401; Third Good, 82,698; Third Common, 26,082; Third Common Dark, 1,421. It is reported that the prevalence among certain sulphur producers of an optimistic outlook based upon expectation of regaining part of the Italian Continental sulphur market of some 50,000 tons, the expected re-establishment of the Consortium and retaining the active Mediterranean and Netherland Indies sulphur trade.

New Lithuanian Industries Using Chemicals

DUE to the establishment of several new enterprises in Lithuania an increase should occur in the imports of certain industrial chemicals. The Swedish Match Co. constructed a paper factory in Lithuania, near Kaunas, and expects to begin operations in the near future. The maximum capacity is 4,000 metric tons per annum. This factory will manufacture its own wood pulp. The construction of a rubber factory was begun in 1932 and operations are expected to begin in the latter part of 1933. A new glue factory at Kaisedorys, Lithuania, with a potential capacity of 1,500 metric tons per annum of bone and refuse from slaughter houses has been established. It is hoped to enlarge the factory in the near future to include the manufacture of bone oil, and bone char required in the sugar industry. A sugar beet factory began operations in the fall of 1931. The capacity of this factory is claimed to be 600 metric tons of sugar beets per hour.

Compressed Gases in Uruguay

AMMONIA is not produced in Uruguay but is imported for use by meat packers, breweries, and ice plants. Some ammonia water is imported for further dilution and sale. Carbon dioxide is produced by one plant at present while two firms make solid carbon dioxide. Additional output of these products is in prospect if proposed new government subsidised alcohol plants materialise. Oxygen is produced by two firms while 60 tons annually are also imported.

Water Treatment Chemicals

UNTIL about three years ago, the water supply in the city of Athens and surrounding territory was markedly inadequate. In 1925, however, an American engineering firm was awarded a contract for the construction of a modern water supply system to take care of the requirements of the cities of Athens and Piraeus and their immediate suburbs. The work was completed in 1930 and has solved the water supply problem for this district. The water passes through a modern filtration plant and is distributed to 63,000 customers. The latest analysis (November 22, 1932) shows a hardness of 203 parts per million, of which 182 parts are carbonate constituents. This water supply is so much softer and superior to that formerly available, that the need for softening is not evident to the local public. It appears that Athens and Piraeus, containing about one-half of the total urban population of Greece, offer at present little opportunity for such products and that the cities of Salonika (240,000 population) and Patras (60,000) offer the only markets for water purifying and softening products.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

OWING to the Easter holidays, the coal tar products market has been unattractive, and prices have remained practically unchanged. Business on the Manchester chemical market this week has opened quietly after the holidays, and on the Royal Exchange on Tuesday actual trading conditions were dull, many members obviously having extended their break. In a few instances, also, consuming works have been closed for slightly longer periods than usual, and this, of course, has interfered with deliveries. New business has been on a restricted scale and mainly for early consumption, contract bookings still being few and far between. Generally, however, the market maintains a steady appearance so far as prices are concerned. The Easter holidays have had a marked effect on the Scottish heavy chemical trade, business being almost at a standstill.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9¼d. per lb.; less 5%. MANCHESTER: 9¼d. to 9⅝d.

ACID, CRESYLIC.—97/99% 1s. 3d. to 1s. 7d. per gal.; 99/100%, 1s. 7d. to 2s.

ACID, FORMIC.—LONDON: £50 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £45; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 7s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48 to £50 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—11d. per lb. SCOTLAND: B.P. crystals, 10¼d., carriage paid. MANCHESTER: 10½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £24 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £22 14s. c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r. mines. SCOTLAND: White powdered, £25 ex wharf. MANCHESTER: White powdered Cornish, £23 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 1d. to 3s. 5d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¾d. to 5¼d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¾d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 5s. per cwt.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£46 to £50 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36; brown, £1 per ton less. MANCHESTER: White, £32; brown, £30.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton, carriage paid.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£52 per ton d/d.

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PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¼d. B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76 77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23 to £24.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.
SODIUM CHROMATE.—3¾d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—Spot, £19 to £22 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£12 10s. per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £15 per ton f.o.b.
SULPHUR.—£11 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 5d. to 4s. 9d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.
ZINC SULPHIDE.—1s. to 1s. 1d. per lb.

Pharmaceutical and Fine Chemicals

ACID, TARTARIC.—11¼d. per lb.
MENTHOL.—A.B.R. recryst. B.P., 15s. per lb.; synthetic detached crystals, 8s. 6d. to 10s. 6d. per lb.
SAFROL.—1s. 6d. per lb.

Essential Oils

BERGAMOT.—6s. 6d. per lb.
CITRONELLA, JAVA.—2s. 9d. per lb.
LAVENDER, MONT BLANC, 38/40%.—10s. per lb.
LEMONGRASS.—3s. per lb.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated:—
ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
p-CRESOL 34.5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
DICHLORANILINE.—2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C. 8¾d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb.., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 4d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 11d. per lb.; crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 3s. 0¾d. MANCHESTER: Crystals, 9½d. per lb.; crude, 2s. 6d. per gal. SCOTLAND: 60's, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100%, 11d. to 1s. 8d. per gal.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 7d. to 1s. 8d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 10d. to 11d. per gal.; standard motor, 1s. 6½d. to 1s. 7d.; 90%, 1s. 7d. to 1s. 8d.; pure, 1s. 10d. to 1s. 11d. LONDON: Motor, 1s. 7¼d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7¼d.; 90%, 2s. 0¼d. to 2s. 1¾d.
CREOSOTE.—Standard for export, 4¾d. to 5d. net per gal. f.o.r. for Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 2½d. to 3½d. SCOTLAND: Specification oils, 3¾d. to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4¾d. to 5d.
NAPHTHA.—Solvent 90/160%, 9d. to 1s. 2d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 90/160%, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaker, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PITCH.—Medium soft, £4 10s. per ton. MANCHESTER: £4 to £4 5s. f.o.b. LONDON: £4 5s. to £4 10s. f.o.b. East Coast port.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £8 15s. per ton. Grey £13 to £14. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £9 10s.; grey, £13.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.
REFINED COAL TAR.—SCOTLAND: 4¾d. to 5d. per gal.
XYLOL.—Common, 1s. 11d. to 2s. per gal.; pure, 2s. to 2s. 2d.
TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 3d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Export, £6 per ton f.o.b. U.K. ports in single bags; home, £6 10s. per ton, delivered in 6-ton lots to consumer's nearest station.
NITRATE OF SODA.—£8 16s. per ton, delivered in 6-ton lots to consumer's nearest station.
CYANAMIDE.—£7 per ton, delivered in 6-ton lots to consumer's nearest station.
NITRO-CHALK.—£7 5s. per ton, delivered in 6-ton lots to consumer's nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£10 9s. 6d. to £11 per ton according to percentage of constituents as follows:—

PERCENTAGE OF CONSTITUENTS.

	Nitrogen.	Phosphoric Acid. Water Soluble.	Insol.	Potash.	Price per Ton.
No. 1	12.5	12.5	—	15.0	10 14 0
No. 2	10.4	10.4	—	20.8	10 16 0
No. 4	10.4	20.8	—	10.4	10 12 6
No. 5	8.0	16.0	5.5	16.0	10 9 6
No. 6	7.5	26.0	6.0	7.5	11 0 0
No. 7	6.5	22.5	3.0	13.0	10 12 6

The above prices are for delivery to farmer's nearest station in 6-ton lots packed in 1 cwt. bags supplied free by the sellers.

Latest Oil Prices

LONDON, April 19.—LINSEED OIL was steady. Spot, small quantities, £17 5s.; April, £14 5s.; May-Aug., £15 5s.; and Sept.-Dec., £16 per ton, naked. RAPE OIL was slow. Crude extracted, £29; and technical refined, £30 10s. per ton net, naked, ex wharf. COTTON OIL was quiet. Egyptian, crude, £19; refined common edible, £21 10s.; and deodorised, £23 10s. per ton, naked, ex mill. TURPENTINE was dull. American, spot, 61s. 6d. per cwt.
HULL.—LINSEED OIL spot, quoted £15 10s. per ton; April, £15; May-Aug., £15 10s.; Sept.-Dec., £16 7s. 6d. COTTON OIL, Egyptian, crude, spot, £18; edible, refined, spot, £20 10s.; technical, spot, £20 10s.; deodorised, £22 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £17 10s., naked. GROUNDNUT OIL, extracted, spot, £22 10s.; deodorised, £26 10s. RAPE OIL, extracted, spot, £27; refined, £28 10s. SOYA OIL, extracted, spot, £19; deodorised, £22 per ton. COD OIL, May 17s. per cwt. CASTOR OIL, pharmaceutical, spot, 38s.; first, 33s.; second, 30s. per cwt. TURPENTINE, American, spot, 63s. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

METHOD OF SOLUBILISING FATTY SUBSTANCES.—R. Vidal. June 20, 1931. 390,148.

PROCESSES OF POLYMERISING ACETYLENE.—W. W. Triggs (E. I. Du Pont de Nemours and Co.). June 22, 1931. 390,179.

MANUFACTURE AND USE OF COLOURING MATTERS.—J. F. Thorpe, R. P. Linstead, and Imperial Chemical Industries, Ltd. June 22, 1931. 390,149.

PROCESS OF PRODUCING CARBON HALIDES.—E. I. Du Pont de Nemours and Co. July 23, 1930. 390,191.

METHOD OF, AND APPARATUS FOR, SEPARATING WAX FROM OIL.—Standard Oil Co. Aug. 7, 1930. 390,222.

MANUFACTURE AND USE OF AMINOACID DERIVATIVES HAVING WETTING, CLEANSING, EMULSIFYING, AND DISPERSING PROPERTIES.—H. Dreyfus. Sept. 18, 1931. 390,166.

PROCESSES FOR PERFORMING CHEMICAL REACTIONS.—British Celanese, Ltd., H. F. Oxley and W. H. Groombridge. Sept. 24, 1931. 390,186.

PRODUCTION OF MONO- AND/OR DI-AMMONIUM PHOSPHATE, OR OF MIXED FERTILISERS CONTAINING SAME IN GRANULAR FORM.—Kali-Forschungs-Anstalt Ges., and Dr. O. Kaselitz. Sept. 25, 1931. 390,187.

METHODS OF RENDERING LIQUID HYDROCARBONS FLUORESCENT.—A. L. Mond (I. G. Farbenindustrie). Sept. 25, 1931. 390,188.

CERAMIC CONTAINERS FOR FLUID RESISTANCES AND METHODS FOR THE PRODUCTION THEREOF.—Hermsdorf-Schomburg-Isolatoren Ges. Sept. 29, 1930. 390,199.

FUNGICIDES, INSECTICIDES, AND THE LIKE.—Grasselli Chemical Co. Oct. 1, 1930. 390,205.

MANUFACTURE OF ALKYL HALIDES.—E. I. Du Pont de Nemours and Co. Oct. 2, 1930. 390,209.

PRODUCTION OF ACETALDEHYDE.—H. Dreyfus. Oct. 2, 1931. 390,211.

FILTERS FOR AIR OR OTHER GASES.—C. G. Vokes and H. D. Fry. Nov. 10, 1931. 390,243.

RINSING, CLEANSING, AND FAT REMOVING AGENTS.—Chemische Fabrik Budenheim A.-G. Dec. 1, 1930. 390,249.

PREPARATION OF CLEANSING AGENTS.—Chemische Fabrik Budenheim A.-G.. Dec. 11, 1930. 390,250.

PROCESS OF ADDING ARSENIC TO LEAD OR AN ALLOY THEREOF TO INCORPORATE SAID ARSENIC IN SAID LEAD OR ALLOY THEREOF.—A. H. Stevens (American Smelting and Refining Co.). April 22, 1932. 390,330.

PRODUCTION OF WATER SOLUBLE VITAMIN CONCENTRATES.—S. J. Dannenberg. May 7, 1932. 390,378.

CLEANING AND POLISHING AGENTS FOR METALLIC SURFACES.—A. Carpmael (I. G. Farbenindustrie). Aug. 23, 1932. 390,402.

RINSING, CLEANSING, AND FAT REMOVING AGENTS.—Chemische Fabrik Budenheim A.-G. Dec. 1, 1930. 390,435.

EXTRACTION OF ORGANIC ACIDS FROM THEIR AQUEOUS SOLUTIONS. C. E. Every-Clayton (Produits Chimiques Purs). June 23, 1931. 390,185.

Applications for Patents

PRODUCTION OF THIOCYANATES OF AROMATIC QUARTERNARY AMMONIUM BASES.—Kali-Chemie Akt.-Ges. March 31. (Germany, April 12, '32.) 9752.

PURIFYING ZINC.—New Jersey Zinc Co. March 27. (United States, Dec. 20, '32.) 9205.

PREPARATION OF LACTONES.—Röhm and Haas Co. March 30. (United States, April 13, '32.) 9574.

MANUFACTURE OF 1-METHYLAMINO-4-AMINO-ANTHRAQUINONE.—Soc. of Chemical Industry in Basle. March 29. (Switzerland, April 2, '32.) 9492.

PURIFYING THE HORMONE OF THE CORPUS LUTEUM.—Soc. of Chemical Industry in Basle. March 30. (Switzerland, April 27, '32.) 9620.

CONVERSION OF FERRO-PHOSPHORUS INTO USEFUL PRODUCTS.—W. J. Tennant (Victor Chemical Works). March 28. 9330, 9331.

STABILISING DELIQUESCENT CALCIUM BROMIDE PREPARATIONS.—L. G. Stone (Hermann). March 30. 9567.

TREATMENT OF SOLID MATERIALS WITH GASEOUS FLUIDS.—J. C. Allan and R. H. Bingham. April 7. 10397.

BURNING OXYGEN WITH HYDROCARBON IN GASEOUS, ETC., FORM.—A. E. Batchelor and B. Lang. April 7. 10383.

PRODUCTION OF CELLULOSE ACETATE.—E. Berl. April 5. 10212.

SYNTHETIC RESINS.—British Celanese, Ltd. April 4. (United States, April 4, '32.) 10116.

MAGNESIUM BASE ALLOYS.—Dow Chemical Co. April 8. (United States, April 25, '32.) 10567.

MANUFACTURE OF PAINTS, ETC.—E. I. Du Pont de Nemours and Co. April 7. (United States, April 8, '32.) 10442.

MANUFACTURE OF MIXED ESTERS OF POLYHYDRIC ALCOHOLS, ETC.—E. I. Du Pont de Nemours and Co. April 8. (United States, April 8, '32.) 10581.

SUBSTANCES FOR USE AS PIGMENTS FOR PAINTS, ETC. R. J. Hibbert. April 5. 10233.

MANUFACTURE OF ALKALI DICHROMATES. I. G. Farbenindustrie. April 3. (Germany, April 4, '32.) 9997.

APPARATUS FOR AUTOMATICALLY MEASURING DENSITIES.—I. G. Farbenindustrie. April 4. (Germany, April 4, '32.) 10091.

PRODUCTION OF CAUSTIC ALKALIES FOR PACKING AND TRANSPORT.—I. G. Farbenindustrie. April 5. (Germany, April 5, '32.) 10217.

STRIPPING AGENTS.—Imperial Chemical Industries, Ltd. April 7. 10486, 10487, 10488.

DYEING PROCESS.—Imperial Chemical Industries, Ltd. April 7. 10489.

MONOAZO DYES.—Imperial Chemical Industries, Ltd., and A. H. Knight. April 7. 10490.

NAPHTHALENE DERIVATIVES.—Imperial Chemical Industries, Ltd., and R. W. Kersey. April 7. 10491.

RUBBER COMPOSITIONS.—Imperial Chemical Industries, Ltd. April 7. 10492.

PRODUCTION OF WHITE OPAQUE ENAMELS.—I. Kreidl. April 7. (Austria, April 20, '32.) 10498. (Austria, Nov. 28, '32.) 10499.

MAKING COMPOUNDS CONTAINING HEAVY METALS AND SULPHHYDRYL GROUPS FROM KERATINATES.—E. Möller. Firm of J. A. Wülfind, and R. von Wüfing. April 5. (Germany, April 5, '32.) 10260. (Germany, Sept. 24, '32.) 10261 (cognate with 10260).

Trade News

Standard Catalogue of Scientific Apparatus

THE new standard catalogue of scientific apparatus and chemicals of Baird and Tatlock (London), Ltd., is now published in sectional form, and bound in an attractive slip binder, which enables sections to be removed when any part is brought up to date. Many of the sections in the catalogue are of interest to chemists. Sections I, II and III deal with laboratory fittings, equipment and general chemical apparatus, section IX with organic chemistry, cotton dyeing, and brewing sugar, sections XII and XIII cover oil and tar, and coal testing, and section XXXI gives a selection of the company's wide stock of chemicals.

Scientific Instruments and Apparatus

IN their latest catalogue, A. Gallenkamp and Co., Ltd., show examples of laboratory fitting work executed by them. The firm supplies all fittings necessary for laboratories, as well as a wide selection of organic and inorganic chemicals and indicators. The catalogue, which comprises over 550 pages, also includes physical and electrical apparatus, the reduction in prices of which, it is claimed, has been made possible only through simplification of designs, and not by reduction of quality.

Steel Stairs for Factories

A BROCHURE giving illustrations of their "Eclipse" steel stairs, has been issued by Frederick Braby and Co., Ltd. These stairs are being constantly erected throughout the United Kingdom, one of the largest contracts having been with Unilever House, London. The stairs, although constructed of light material, are capable of carrying very heavy loads. The landings are formed from dovetailed steel sheets which provide a rigid platform and perfect key for any composition filling.

Precious Metals for Industry

GOLD, silver, platinum and metals of the platinum group play an important part in the industries of to-day, and Johnson, Matthey and Co., Ltd. supply them in the various commercial forms required. Their activities comprise the refining and working of these metals, recovering them from ores, concentrates and jewellers' sweepings. Every type of alloy in which the precious metals are a constituent, is prepared in ingot, sheet, wire or any other form for use in the jewellery, electrical, chemical, and other industries. A research staff is maintained which is engaged in devising new processes and new uses for the precious metals. Platinum is supplied in suitable forms for lead-in wires, magnetos contact screws and standard fuse wires, together with its various alloyed forms in conjunction with iridium and rhodium. All products are of standard quality.

From Week to Week

MAJOR-GENERAL A. C. JOLY DE LOTBINIERE, a director of the British Thomson-Houston Co., Ltd., has accepted the chairmanship of the Nor-Rust Liquid Lead Co., Ltd.

HUNDREDS OF TONS OF NITRATE OF SODA, belonging to Chilian and Colonial Agencies, were destroyed by fire at Leith Docks last week.

PROFESSOR H. E. ARMSTRONG, F.R.S., will deliver the sixth Hugo Muller lecture of the Chemical Society, entitled "Chemistry at the Cross Roads," in the meeting hall of the Institution of Mechanical Engineers, on Thursday, May 25.

MR. R. BRYDIE, secretary of the Caldwell Paper Mill Co., Ltd., was presented with gifts by the staff and management at the Inverkeithing mills last week, in recognition of his approaching marriage.

MR. H. STANDISH BALL, a Master of Science of South Africa and of McGill University, has been appointed principal of the Camborne School of Mines, in succession to Mr. R. Arthur Thomas, who is retiring at the end of this session, after having occupied the post for ten years.

A MEETING of the 7 per cent. first mortgage debenture stockholders of the Compania Salitera Anglo-Chilena is to be held on April 26 to consider a resolution that a committee, consisting of Messrs. G. A. Whiteley (chairman), J. S. Cannington, Charles Hendry, Hon. J. Mulholland and T. Smith, with power to add to their number, be appointed to represent such stockholders.

APPLICATION HAS BEEN MADE to the Import Duties Advisory Committee for the addition of gum arabic to the free list. Any representations which interested parties may desire to make regarding the application should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, London, S.W.1, not later than May 8.

IMPERIAL CHEMICAL INDUSTRIES, LTD., have offered the use of their recreation club and sports ground between the hours of 10 a.m. and 5 p.m. on Monday, Wednesday and Thursday to the unemployed of Widnes. Association and Rugby football is to be permitted during the winter months, whilst other facilities include the use of the club-room, dominoes, cards, billiards, bowls and cricket.

THE COMMISSION FOR THE LIQUIDATION OF COSACH is understood to be considering reorganising nitrate exploitation. The plan envisages the division of the nitrate region into two zones, with centres at Tarapaca and Antofagasta. A consortium would be constituted for the distribution and sale of nitrate which would be bought direct. The difference between the purchase and sale price would be earmarked for the payment of the debt service. Fifty per cent. of the profit would go to the Treasury.

SIR WILLIAM MORRIS, addressing a League of Industry Conference at Oxford on April 16, said he had done his best to mitigate the present state of unemployment in this country. He had done his best for the coal industry. At his works at Birmingham in the last 12 months they had given a contract for 100,000,000 cu. ft. of gas to be used in place of oil. That was going on through all his organisations, and it was being done so that they might use the products of this country instead of the products of the foreigner. He was doing his best to persuade others to do the same.

A REPRESENTATIVE GATHERING OF AGRICULTURAL INTERESTS in the Midlands recently attended a demonstration, arranged by the agricultural department, Imperial Chemical Industries, Ltd., Oldbury, Birmingham, of a new machine, produced by W. Weeks and Son, Ltd., Maidstone, for use in the eradication of charlock and possibly other weeds with dilute sulphuric acid. Mr. W. A. S. Calder presided at luncheon, at the conclusion of which Mr. N. E. Dewdney outlined the results of research work and experiments obtained in recent years in connection with the eradication of weeds with dilute sulphuric acid. Later a practical demonstration was given.

MR. HAROLD COX was the speaker at the 61st Individualist Luncheon held at the Hotel Victoria, London, on April 12. Mr. Gordon Robbins presided in the unavoidable absence of Sir Ernest Benn. Speaking on "Politics and Public Finance," Mr. Cox said the Government should make every effort to cut down the expenditure of public money and thus reduce the burden of taxation. Whereas 20 years ago income tax was at the rate of £3 11s. per head, during 1932/3 it was £16 8s. per head. He criticised the suggested expedients of endeavouring to reduce unemployment by state relief works and inflating the currency in order to raise prices. Experience had shown that to sell largely one must sell cheaply. The root of the trouble was that out of 28,000,000 voters, only 2,500,000 paid income tax, the majority of electors voting away money which they themselves had not contributed. Every elector should be a taxpayer and the voting age should be raised to 25 years.

MR. ANTON JURGENS has resigned his seat on the board of Lever Brothers. Mr. Jurgens and Mr. Jacob Hartog have resigned their seats on the board of Unilever.

THE BRITISH ALUMINIUM CO., LTD., Adelaide House, King William Street, London, E.C.4, has removed from its Birmingham office and warehouse at 21 Barwick Street, to Lawley and Landor Streets. The new telephone number is Aston Cross 5865-6.

A PROMINENT GERMAN INDUSTRIALIST, Herr Ernst Albert Ludwig Plagemann, who was chairman of the board of the German Iron Corporation and a partner in the Danzig Iron Company, has died. It is reported that Herr Plagemann had had economic difficulties.

THREE MEN WERE INJURED on Wednesday at the works of Messrs. James Robinson and Co., chemical manufacturers, of Hillhouse Lane, Huddersfield, when the lid of a vat blew off and demolished part of the wooden roof of a shed and the end of a wall.

A GERMAN FIRM is to open a factory for the production of malleable cast iron goods at Bedford. This branch works will be called Britannia Iron and Steel Works, Ltd., and will be a branch works of the Schaffhausen firm of Eisen- und Stahlwerke, formerly the firm of Georg Fischer. The reason for this step is stated to be the fall in sterling and the British tariff.

THE FOLLOWING MEMBERS of the chemical industry have been elected to the executive committee of the Scottish National Developments' Council: Mr. J. S. MacArthur (Blacklock and MacArthur, Ltd., Glasgow), Mr. G. P. Laidlaw (Scottish Oils and Shell-Mex, Ltd., Glasgow), Colonel A. Stein (Glenboig Fireclay Works, Bonnybridge), Professor F. J. Wilson, vice-chairman of the Chemical Committee, and Lord Amulree.

MR. RICHARD N. STRATHAM, son of Mr. Noel Stratham, president of the Industrial Chemical Sales Co., Incorporated, New York, and a graduate of Dartmouth College, has joined the staff of the Chicago office of the company. He was previously employed at the company's laboratory at Covington, Va. Mr. Noel Stratham took out the patents covering the manufacture of the company's product, Nuchar, an activated carbon, and also covering Snow Top precipitated chalk.

THE DEATH OCCURRED last week, at the age of 53, of Mr. James Wood, the joint head of the research department of the Co-operative Wholesale Society. Mr. Wood was a graduate and research student of Aberdeen University, and afterwards an assistant to the Lancashire County Analyst at Liverpool. He entered the service of the Co-operative Wholesale Society on the formation of the department in 1917, and was in charge of all the important work connected with foodstuffs.

THE CALCIUM CHLORIDE ASSOCIATION has been organised with offices at 4200 Penobscat Building, Detroit, Michigan, U.S.A. Members of the association include the Solvay Sales Corporation, the Dow Chemical Company, the Michigan Alkali Co., and the Columbia Alkali Corporation. Mr. Ray A. Giddings, Barberton, Ohio, formerly manager of special product sales for the Columbia Alkali Corporation, has been appointed secretary. The association succeeds the Calcium Chloride Publicity Committee, formed by the same interests in 1928 to promote the calcium chloride industry.

THE ANNUAL MEETING of the Ceramic Society was held last week at the North Staffordshire Technical College, Stoke-on-Trent, when there was a large attendance of members from all parts of Great Britain. Mr. E. Gwynne Vevers, of Bristol, nominated by the Building Material Section, was elected president to succeed Colonel Alan Stein, of Bonnybridge, Scotland, and Dr. J. W. Mellor, F.R.S., was re-elected hon. secretary. The Pottery Section again elected Mr. Dunbar Bishop as chairman, and Mr. B. J. Moore, Mr. Cuthbert Bailey (nominated by the British Pottery Manufacturers' Federation), Mr. J. Meredith, and Mr. A. E. Hewitt were elected as vice-presidents of the society. Following the routine business, Mr. Stephen Stanworth gave a paper dealing with moisture contents in pottery and other materials.

AS THE OUTCOME of a meeting held at Lancaster three months ago (referred to in THE CHEMICAL AGE of January 28) to consider the formation of a society to perpetuate the memory of Sir Edward Frankland, the Lancastrian Frankland Society has been established under the presidency of Professor H. E. Armstrong. The Society has for its objects the advancement of natural science, the promotion of the use of scientific methods in the community, and the affording of opportunities for scientific and social intercourse between scientfic workers in the Lancaster district. Sir Edward Frankland had associations with Lancaster in his early life, receiving part of his education at the Royal Grammar School, and serving his apprenticeship to the profession which he was later to adorn.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—A Sydney firm of importers and agents desires to represent United Kingdom manufacturers of bichromate of soda and potash; calcined anhydrous glauber salts; titanium potassium oxalate; titanium oxide and hydro-sulphite of soda for the whole of Australia. (Ref. No. 556.)

Belgium.—A firm of manufacturers and merchants established at Brussels wishes to obtain the exclusive representation of United Kingdom manufacturers of fish oils (cod and others). Correspondence may be in English. (Ref. No. 531.)

Brazil.—A firm established in Sao Paulo wishes to obtain the representation of United Kingdom manufacturers of galvanised sheets and tinplates, brass and copper, and linseed oil. (Ref. No. 553.)

France.—A civil engineer established at Paris wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of industrial heating apparatus, apparatus for heating industrial ovens of all industries, fireproof material, electrical ovens for manufacture of iron and steel, electrical ovens for the thermic treatment of iron and steel. Correspondence may be in English. (Ref. No. 534.)

Holland.—An agent established at The Hague wishes to obtain the representation of United Kingdom manufacturers of chemicals, chemical products and mineral oil products. (Ref. No. 576.)

Holland.—A merchant established at The Hague wishes to obtain the representation of United Kingdom manufacturers of druggists' sundries and perfumery. (Ref. No. 577.)

Italy.—An agent established at Genoa wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of chemical and pharmaceutical products. (Ref. No. 540.)

Company News

Shawinigan Water and Power Co.—A dividend for the quarter ended March 31 of 12 cents per share is announced, payable on May 15.

Babcock and Wilcox, Ltd.—The directors announce a final ordinary dividend of 3 per cent., less tax, and a distribution of 1½ per cent. actual, out of profit realised on sale of investments, making with the interim a total distribution of 9 per cent. for the year 1932.

Thos. Firth and John Brown, Ltd.—After charging debenture and other interest, but before providing for depreciation, the loss for 1932 was £75,950. There was a loss in the previous year of £44,669. A credit balance of £31,314 was brought in, and £30,000 is transferred from general reserve. A credit of £5,364 is carried forward.

Tomaszow Artificial Silk Works, Ltd.—The net profits in 1932 were Z1.2,695,093. At the meeting held in Warsaw last month, it was decided to utilise this in writing down plant and machinery. In 1931, the profit was Z1.2,899,500, after transferring Z1.319,296 to statutory reserve and providing Z1.2,959,114 for depreciation.

Joseph Crosfield & Sons, Ltd.—An increase in net profits from £680,072 in 1931 to £696,351 in 1932 is reported. The dividend on the ordinary shares is to be unchanged at 30 per cent., the sum carried forward being increased from £54,365 to £73,216. The balance sheet shows interests in subsidiaries at £819,815 and interests in allied companies at £2,893,924. Floating assets total £831,527, against current liabilities of £563,756.

Reckitt & Sons, Ltd.—Trading profits in 1932 were £1,175,626 against £1,223,939 in 1931. The total distribution on the ordinary shares is 22½ per cent. The transfer to reserve is increased by £50,000 to £150,000, and £127,325, representing the appreciation in the company's investments, has been placed to the investment reserve.