The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Notes and Comments

Spurious Degrees

THE Bill now before Parliament to prohibit the unauthorised use of degrees is long overdue. To many not connected with the learned professions it comes as a surprise to find that people may assume degrees with impunity and without penalty. It may be said that employers and others are lax in not verifying the possession of alleged degrees; it is true that nearly everyone takes degrees on trust. There is something not quite polite in asking a man to prove his qualifications; it is a bad start to the employment of a professional man to ask for proof of his qualifications. Those whose business it is to sift such things, however, relate strange stories, stories that can only be told *in camera* and then without mentioning names. The employer, however, can look after himself. The difficulty arises largely with the public. If men with high-sounding degrees sign the report of the merits of a new process that is the basis of a public issue of shares, the public will be incapable of sifting the wheat from the chaff and may thus be defrauded. There is, moreover, every reason for prohibiting the assumption of degrees that do not legally belong to a person, since there can be little reason for such assumption except as a preliminary to fraud.

To prohibit unwarrantable degrees under penalties is not sufficient unless it is someone's duty to be on the alert to detect such cases. There is, however, a simple solution of this difficulty, namely to insist on the name of the university appearing after the degree in every instance. The principal difficulty is that of tracing the university that has granted the degree. It is a comparatively simple matter to write to all the British universities, even though there is the drawback that the complete list of them is unknown to the general public. Suppose that none of these universities will own the individual about whom inquiry is made. He may refuse to answer questions, or he may say that his degrees were conferred by an American university. Even if he has, in fact, no degrees, it is not easy to trace his absence of record through every university in the American continent; but if the "degree" happens to be granted by a "Quarry" university how many people can discern whether the assumed degree has any value or not? As a safeguard against fraud penalties should be imposed upon all convicted of using recognised degrees to which they are not entitled, and unrecognised degrees of any sort, the institutions entitled to grant such degrees and recognised in this country should be published to every solicitor; and the members of learned societies and similar bodies should not be allowed to use "letters" after their names unless real evidence is produced that those "letters" have a definite professional significance. We recognise the difficulty in relation to this last proviso, especially in regard to certain old-established existing societies. The views of our readers would be of interest.

Leverhulme Research Fellowships

ALMOST by way of a comment upon the suggestion emanating from the "Chemical Practitioner," to which we referred in these notes in our issue of May 27, comes the announcement that the trustees of the will of the first Lord Leverhulme have resolved to devote the income of the fund which he left for the "provision of scholarships for research and education" to the establishment of a scheme of research fellowships intended in the first instance for the assistance of experienced workers. The sum of £12,000 per year will be available and individual grants will normally extend over two years and will not be limited to any definite sum.

The idea underlying this scheme is similar to that suggested by the "Chemical Practitioner" in this respect, that it is intended to make it possible for qualified workers in various fields of knowledge to initiate or complete researches from which they are debarred from lack of time or resources. Men of senior standing are to be found throughout industry as well as in the universities who have some specific and possibly important investigation in mind, or on which they may have been working for years, but upon which they are unable to concentrate sufficient time to reach a definite conclusion. Such men will be released from their duties for a period so that they can pursue their researches undisturbed. The application to industrial workers would be limited to researches of no interest to the firm employing them.

Advantages of the Scheme

THE scheme is one of particular interest because, apart from the Yarrow Professorships, we are not aware of any facilities which exist whereby experienced workers can give the whole of their time to the prosecution of research of an individual character. The individual worker of experience and resource, backed by imagination and able to allow free rein to his imagination following any interesting by-path wherein it leads him, is likely to achieve discoveries of outstanding merit.

The method may not be as immediately useful, but the occasional brilliance of the results far outweighs the failures. Had Faraday not been able to take this course, where would the electrical industries be to-day?

The discoveries of Perkin in their initial stages were another instance. It seems a remarkable fact that research is generally endowed so that it can be conducted by the immature whose discoveries seldom result in anything of greater value than a single stone of a laboriously-erected edifice. The work of real value is generally to be found to emanate from the experienced; it is not even equally valuable if the research is supervised by the experienced. There are so many things, apparently of quite minor importance, that are overlooked by the inexperienced, but which—if followed up—would lead to discovery. The inexperienced is apt to "smooth his curves"; the experienced will see what may lie behind a trifling divergence. Or, on the contrary, the inexperienced may waste much time tracking to its source a divergence which the experienced knows is due to experimental errors.

Fundamentals of Research

IN the fundamentals of scientific research it is the experienced who can best visualise the far-reaching truths that a piece of work may reveal, whether that truth is one of scientific discovery or of an industrially important process. We may expect from a scheme of this sort far better results than from much of the research now conducted individually. Nevertheless, the project is not without its difficulties, particularly as regards the industrial worker. We cannot help feeling that those responsible have little inside knowledge of works routine. A university can appoint a temporary lecturer to carry on for a year or two until the lecturer who has been awarded a research fellowship returns, considerably enhanced in value as the result of a period of quiet thought and study. The industrialist, however, will have more scruples about releasing for an indefinite period—certainly a lengthy period—one of his workers whom he has engaged specifically for the furtherance of his business. His scruples will be all the greater since the worker is to pursue, not a line of inquiry that may interest his employer, but one "of no immediate interest to the employing firm."

We anticipate that most employers will regard a worker who accepts a research Fellowship as having left their staff and will only re-engage him if there happens to be a vacancy. Those "of riper years" will view with some apprehension the prospect of having to look for a post when the research period has elapsed; if the research does not happen to have been productive, it may prove quite difficult to secure a post of as high a standard as that vacated. So far as industrial workers are concerned, the scheme could best be worked in collaboration with the suggestion put forward in the organ of the British Association of Chemists, since it would most benefit industrial workers who are unemployed temporarily.

British Colour Standards

IN conjunction with the National Physical Laboratory at Teddington, the British Standards Institution is engaged in setting up a standard of exactly defined commercial colours. It is reported that one object of the scheme is to rid British manufacturers of losses caused by foreign fashion dictators, and that, so far as manufacturers of coloured fabrics are concerned, a meeting is to be held shortly for the purpose of standardising about a hundred shades. This move is in accordance with a decision of the Imperial Conference at Ottawa last year, and the standards are likely to be adopted throughout the Empire. In meeting competition the manufacturers will not be limited to the hundred standard colours.

It is expected that slightly different shades will be introduced from season to season, but it is intended that these should be obtained merely by modifying one or other of the standard colours. There are some three thousand shades of colour visible to normal eyes, and probably considerably more detectable to the trained observer, so that the standardisation of some hundred colours is not so simple a process as it may appear at first sight. On the whole, the standardisation process will be welcomed by the industries concerned, but the correspondence columns of the "Morning Post" have already borne testimony to the fact that it will not please everybody. We should welcome expressions of opinion from our readers on this latest step towards standardisation.

"An Imbecile Example"

MR. GEORGE SHERINGHAM, in a letter published last Saturday, expressed the view that no other nation would follow "so imbecile an example." This is what he says about the scheme: "Leaving aside the colour blindness bogey, which scientists always drag in whenever colour is discussed, for it bears the same relation to colour as deafness does to music or lameness does to athletics, it appears that in certain scientific and commercial centres it is thought that colour disarmament, so to speak, is the best way of fighting the wicked foreign fashion dictators. These fashion dictators are, as a fact, men with an equipment of real knowledge about colour, not only the knowledge gained by peering through spectroscopes, but, in addition to this, knowledge of the psychological and æsthetic value of colour. They are using the full range of beautiful dyes and pigments which scientists have given them and us too; fully armed for any warfare. Nevertheless, it is seriously proposed that British trade will benefit by restricting its use of colours to one hundred (with occasioned seasonal additions), while its competitors are free to choose from 3,000."

For about ten years Mr. Sheringham has had in his possession a book illustrating 1,431 shades of colour, and he has examined a more recent work illustrating far more. All these colours are named and numbered, and both were issued in the United States for the purposes of American trade, so Teddington cannot claim to be launching "the first system of exactly defined commercial colours in the world." If anyone would like to study examples of restricted and unrestricted colour in actual use, he suggests that they glance at the posters on the nearest hoarding, where they will see examples of the former governed by mechanical limitations. Then let them visit one of the big silk mercers in London, where they can observe the colour activities of the "fashion dictators." Their eyes will not fail to perceive almost infinite variety, much beauty, and thriving trade.

Sugar and Alcohol from Cellulose

A Comparison of the Bergius and Scholler Processes

THE ease with which starchy material is hydrolysed to sugar has led to numerous proposals during the last 20 years for converting the chemically closely allied cellulose, but cheaper, raw material to sugar. During the last few years, however, the causes of the earlier failures to obtain yields of sugar corresponding more or less to those indicated by theory have been ascertained, and there is now at least one process which is operated commercially, whilst others show good promise of becoming commercial. One of these processes which has received considerable attention is that devised by Dr. F. Bergius, but although this process is quite successful in a technical sense, it would seem that the Scholler process is more attractive from the commercial point of view. In the Bergius process the hydrolysis is effected with concentrated hydrochloric acid which involves the necessity of recovering the acid to be economic, but in the Scholler process water, acidulated with 0.2 to 0.6 per cent. sulphuric acid, is used, and the necessity to recover this small amount of acid is avoided, while dilute sugar solution is fermented by yeast to produce ethyl alcohol. The Bergius process, however, yields sugar equal to about 60 per cent. of the dry wood material employed, whereas the Scholler process yields about 40 per cent., although it is said that there is a prospect of making the yield by the latter approximately the same as by the Bergius process.

The Scholler process requires a relatively large heat expenditure owing to low acid concentration of the liquor used and the necessity to heat large volumes of the liquid. It is said to be premature to attempt an economic comparison of the two processes; at present the glut and low prices of cane and beetroot sugar in the markets makes the production of sugar from cellulosic material less attractive commercially, and the obtaining of a fermentable liquor for the production of alcohol, by the Scholler process, as is practised at Tornesch, near Hamburg, seems to offer the best commercial prospect for the time being.

Improvements on Earlier Processes

In using woody material for the conversion, only the cellulose constituent of the wood is convertible into sugar and the lignin remains unchanged in the process. The proportion of cellulose varies somewhat in different woods, but is about 70 per cent. of the constituents of dry pine wood; a yield of 60 per cent. sugar, therefore, is not greatly below that theoretically possible. In many of the earlier processes in which the hydrolysis of the cellulose was carried out by dilute acid, the yields of sugar were much too low to be of commercial importance, and subsequent research has shown that these low yields were due to a great part of the sugar first formed undergoing decomposition. In the Scholler process, which is operated with a very dilute acid solution, the method employed is such that the sugar is removed out of the decomposing influences almost as soon as it is formed and a good yield obtained. The heated acidulated liquor is made to flow continuously under a pressure of about 120 lb. per sq. in. through the mass of woody material, thus carrying away the sugar from the apparatus before it has had time to decompose, and subsequent decomposition is prevented by rapid cooling of the sugar-containing liquor. The success of the process depends upon a strict adherence to the essential conditions, such as right temperature, concentration of acid, time of reaction, and the velocity of the flow of liquor through the woody material. The first commercial factory for operating the Scholler process was erected at Tornesch in 1930, and proved to be highly successful technically, the laboratory results being slightly exceeded in commercial operation.

Plant Operations at Tornesch

At Tornesch a number of vertical cylindrical constructions, 10 metres in height and 1.8 metres in diameter, are used for reaction chambers. One of these is lead-lined and the others are lined with acid-proof brick, the latter having a capacity of 20,000 litres, whilst the lead-lined percolator has a capacity of 25,000 litres. The lower end of these chambers or percolators is cone-shaped and contains an acid-proof filter through which the liquor flows on its way to the outlet pipes and valves below. A small acid-proof pump and a larger water pump are used to handle the percolating liquid, these pumps being operated from the same motor. These pumps are so related that the desired proportions of acid and water are maintained at all speeds of the motor. The acid pump handles 40 per cent. sulphuric acid; the water pump forces water through a counterflow heating system at a pressure of 10 atmospheres and there the water is heated to 150°, being afterwards brought up to a temperature of 190° by fresh steam. In this heat exchanger, the heat is supplied to the water by the hot wort flowing in the opposite direction. The heated water is piped to a mixing apparatus where it is acidulated to 0.2—0.6 per cent. acid. The liquid is then passed through a ring-form distributor into the percolators and then passes downward through the woody material carrying with it the sugar formed to the filter and thence to a neutralisor which contains a bed of granulated raw phosphate and lime, a small amount of phosphate being retained in the wort for encouraging the subsequent fermentation by yeast. The neutralised hot liquor is now passed through the heat exchanger where it gives up much of its heat to pre-heat the incoming water.

The Raw Material

The raw material placed in the percolators consists of wood tops, saw dust, shavings, machine shavings, raspings, and similar low value woody residues. The yield of alcohol averages about 25 litres per 100 kg. of dry raw material, which represents about 35 Imperial gallons to the ton. Wood bark, otherwise useless, yields in this way about 17 litres of alcohol per 100 kg. Careful estimates, based on a factory handling 60 tons of raw material daily, and 6 per cent. interest on the capital invested, show that the alcohol would cost 10d. per imperial gallon, but this estimate includes 40 per cent. for the cost of the raw material. If this material cost nothing, or only a little, the alcohol could be produced considerably more cheaply.

A great advantage claimed for the Scholler process is its technical simplicity. The raw material can be charged into the percolators without previous drying, and even in a wet condition. It is not necessary that the wood be in small pieces; large pieces can be used provided that there is enough fine material in which the large pieces can be imbedded. The lignin by-product obtained is used as boiler fuel and provides the greater part of the heat required in the plant; it is a good boiler fuel and is suitable for gasification. It has been proved that the finely powdered lignin which is practically free of ash, can be used directly as fuel for internal combustion motors. The alcohol product, at the price named, is competitive with other motor fuels.

The possibility of preparing highly albuminous cattle food in the form of yeast on a large scale has been considered. It would then be necessary to supply nitrogen as well as phosphorous to the wort. In districts where maize is easy to cultivate, the Scholler process could be used for its saccharification, in which not only the grain, but the otherwise valueless stalks and leaves, would be raw material. At present, it is required to find a better way of utilising the lignin by-product than as fuel, and such a discovery might greatly improve the economic aspect of the process.

The Greifswald Process

Among other interesting developments in the conversion of cellulose to sugar, it has been proposed to subject cellulosic material to the action of dry hydrochloric acid gas. The raw material used in the experimental work on this process was a cotton waste which was practically pure cellulose. This was acted upon by the gas for 10 hours under a pressure of 45 atm. and the whole converted into products soluble in water. The time required for the conversion can be shortened by increasing the pressure. The process has been developed by Professor Schlubach and his co-workers in the State Chemical University, Hamburg. It is said that the commercial importance of this process rests on a satisfactory

recovery of the acid. Another process which has been experimentally developed at the University of Greifswald is to substitute hydrofluoric acid for hydrochloric acid for acting on the cellulose. As in most reactions, the hydrofluoric acid acts much more vigorously than hydrochloric acid. With anhydrous hydrofluoric acid the cellulose is converted into completely soluble products in a few minutes; if water is present the change proceeds for slowly. Lignin remains insoluble and apparently unchanged. In operating with hydrofluoric acid much lower temperatures can be used for the reaction. The yield in sugar is 80 per cent. or more of the cellulose. It is possible in washing out the soluble products of the reaction to obtain a concentrated sugar solution which can be evaporated to obtain a crude product valuable as a cattle food or for refining to obtain a pure glucose. It is considered that the process has commercial prospects, especially if the product can be used to better advantage than to produce alcohol for motor fuel; its success also must be dependent on the recovery of the greater part of the hydrofluoric acid used for repeated use. This process has been protected and described in German Patent 560,535, and is discussed in "Angewandte Chemie," February 18, 1933.

Plastics in the Paint Industry

Dr. L. A. Jordan Lectures at the Plastics Industry Exhibition

THE procedure of varnish making underwent little change until a few years ago when synthetic resins of the bakelite type began to be talked of seriously, said Dr. L. A. Jordan, Director of the Paint Research Station, Teddington, in the course of his lecture at the Science Museum, South Kensington, on May 17. Bitumens, asphalts and the like were used extensively as paints and varnishes, and in moulding. The same materials were used in both cases but in the latter case it was used in a greater mass, while a solvent or thinner was needed if the material was to be applied as paint. Shellac had also been used extensively for making moulded products as well as for varnish.

Whether the material that was used was bitumen or shellac, when the solvent had dried away the thin film and the moulded article were the same substantially. Whether brushed or moulded these products were susceptible to solvents and more or less to heat, but the production of the bakelite type of moulded article, unaffected by heat and solvents was something new. It was not surprising that considerable effort had been made to apply this new material with such properties to varnish.

Synthetic Shellac

As regards synthetic shellac Dr. Jordan said that inventions for the production of a synthetic material had only been successful to a degree. Synthetic shellac which should really be called shellac substitutes contained as their major component phenolic synthetic resin. Another synthetic resin used for varnish making was the glyptal type—the condensation product of glycerine and phthalic acid. This reaction proceeded up to a point by gentle heating—esterfication, which meant the making of a simple compound between glycerine and phthalic acid by the elimination of water. The material would go solid in a flask at about 300° C. and was then practically a water white glass. The process could be stopped at any intermediate stage of heating and the liquid material applied as varnish in the usual way. Subsequent baking of the metal or whatever it was that had been varnished brought about the insolubilising effect and a glass like finish could be produced like what was usually produced by a plastic moulding process.

The baking temperature employed could be lowered by incorporating oily material in particular castor oil and other non-drying materials. Though this could bring the baking temperature down to 100° C. the film was of a softer character, but still hard enough for practical purposes. If instead of non-drying oils drying oils like linseed and tung were incorporated with glycerine phthalic acid condensation products, the hardening change could be induced by exposure to air. There were on the paint market materials of this class characterised by their capacity to retain very high gloss on exposure.

Manufacture of Oil Cloths and Linoleum

Dr. Jordan next dealt with oil cloths, which he said, were really mass produced oil paintings on canvas base. He explained how years ago the painter painted his design on the cloth, but later began to use stencil plates and finally printed with blocks. The paint used was much thicker and stiffer than house paints, consistency being rather like that of treacle. It was applied in the manner of plaster. The workmen had a brush and trowel and the material was brushed or scraped well into the fibres of the canvas on the face side of the material. This was continued until the cloth had something of the pliability and durability of leather. Nowadays the process of manufacture was continuous, coat after coat being applied by a spreading machine. After the spreading operation the drying was finished by festooning in a drying room. Instead of oil, compositions could be made in which rubber was incorporated. When a plastic mass of nitrocellulose was used instead of an oil product, its consistency was about half way between that of the celluloid dough and cellulose lacquers. Such products were used in the production of artificial leather of the rexine type. Generally nitrocellulose was softened or plasticised with castor oil and pigmented to the required shade.

Linoleum was substantially thickened linseed oil with a certain amount of resin incorporated in it and filled with cork dust and suitable colouring matter. Resin and kauri gums were combined with oxidised linseed oil to form a firm plastic and elastic mass which was then brought into contact with the cork, wood flour and other filling agents very much in the same way as moulding powders were prepared for use. Finally the linoleum was pressed into contact with the hessian backing by a machine.

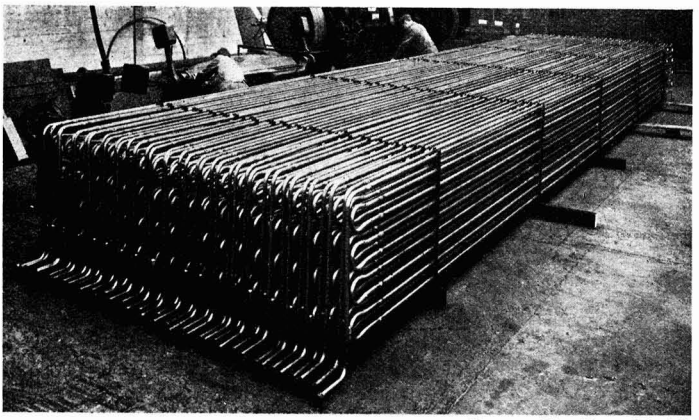
Benzyl Chloride

Precautions Necessary in Manufacture

BENZYL chloride is an intermediate of particular value in the production of benzyl alcohol (for perfumes), benzyl violet in the dyestuffs industry, synthetic resins and tanning agents; the perfume industry, however, is the principal consumer of benzyl chloride.

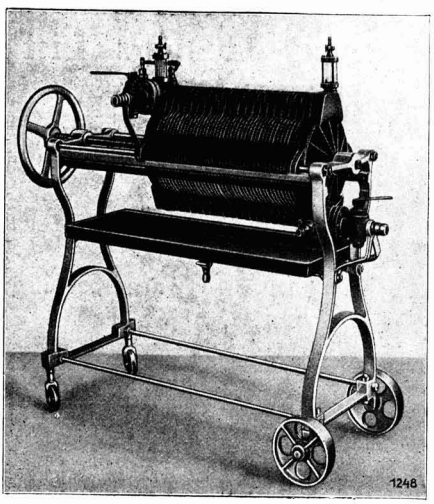
As pointed out by Dr. Paul Sors, in the "Chemiker-Zeitung," April 26, 1933 (pages 321-323), the simple theoretical reaction upon which the manufacture is based—chlorination of toluol—is upset by the whole series of subsidiary reactions which call for exceptional precautions in manufacture. Among the latter may be mentioned: chlorination at the boiling point to suppress as far as possible the entry of chlorine atoms into the greater part of the toluol has reacted to prevent diminution in the yield by further chlorination of the benzyl chloride; and removal of unchanged toluol by vacuum distillation (since under atmospheric pressure benzyl chloride decomposes at its boiling point of 178° C.). The success of the process depends upon the complete absence of water, acids, alkalies, benzyl alcohol and heavy metal salts. All the iron portions of the plant which come into contact with chlorine must be leadlined.

Other suitable constructional materials are glass and stoneware. Although care should be taken to start from toluol containing a minimum of homologues, the higher hydrocarbons are less dangerous since they themselves (or their chlorination products) are continuously removed from the system together with the distillation residue. The chlorine is preferably employed in the liquid form, dilute chlorine by the Deacon process being impracticable. By using liquid chlorine, the required quantity for each batch can be more accurately measured and freedom is ensured from such undesirable impurities as water and hydrochloric acid.



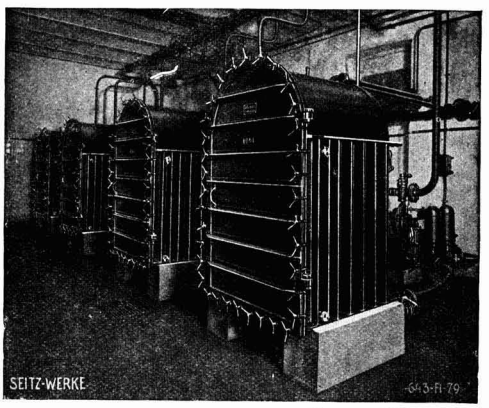
[*By courtesy of Henry Wiggin and Co., Ltd.*

A Battery of Coils for use in a Paraffin Wax Separating Plant, 40 ft. long by 9 ft. wide, comprising 14,000 ft. of Copper-Nickel Tubing, oxy-acetylene welded.



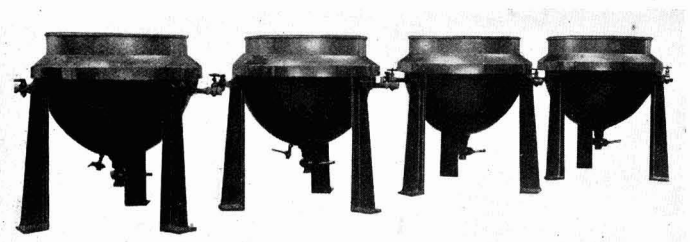
[*By courtesy of John C. Carlson*

Seitz-E.K. Filter as used for Perfumery Solvents.



[*By courtesy of John C. Carlson*

A Battery of Seitz' "Hercules" Giant Filters as used for the Filtration of Miscella.



[*By courtesy of Wm. Brierley, Collier and Hartley, Ltd.*

A Battery of 150-gallon Monel Metal Steam-Jacketed Boiling Pans.

Dyestuffs Output in the United Kingdom

Increase in 1932

FROM returns furnished by the principal British dyestuffs manufacturers, the Board of Trade has compiled a statement showing the quantities of the various main classes of dyestuffs which were produced in the United Kingdom during 1931, together with the total production of dyestuffs for the past eleven years. The figures, which have been published in the "Board of Trade Journal," show a substantial increase over the previous year.

PRODUCTION OF SYNTHETIC ORGANIC DYESTUFFS IN THE UNITED KINGDOM DURING THE YEAR 1932.

Category.	Blacks.	Blues.	Browns.	Greens.	Oranges.	Reds.	Violets.	Yellows.	Total.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Direct cotton colours	2,559,121	1,099,744	824,304	260,145	390,265	1,159,785	147,256	1,140,542	7,581,162
Acid wool colours	2,102,839	1,530,279	225,822	428,962	1,089,607	2,107,327	543,035	1,350,060	9,377,931
Chrome and mordant colours (including alizarine)	1,938,246	407,690	953,382	39,655	421,098	2,466,665	17,895	324,052	6,568,683
Basic colours	—	594,616	230,762	235,876	126,912	677,435	549,308	484,241	2,899,150
Sulphur colours	6,257,700	415,343	810,574	53,200	15,004	5,749	—	44,846	7,602,416
Vat colours (including indigo) ..	223,619	5,252,841	444,260	642,811	277,356	307,283	172,170	161,814	7,482,154
Dyestuffs for lake-making	82,367	8,244	—	117,571	340	1,377,325	3,559	146,495	1,735,901
Cellulose acetate silk colours ..	313,884	458,450	25,672	1,383	129,592	159,368	76,832	100,594	1,265,775
Oil, spirit and wax colours ..	281,552	421,300	12,366	858	20,081	26,081	14,853	34,520	811,611
Unclassified colours	79,897	148,892	51,943	9,415	10,517	35,718	782	951	*4,055,483
Aggregate total	13,839,225	10,337,399	3,579,085	1,789,876	2,480,772	8,322,736	1,525,690	3,788,115	49,380,266

* Including quantities not separately distinguished.

SUMMARY OF PRODUCTION OF SYNTHETIC ORGANIC DYESTUFFS IN THE UNITED KINGDOM, 1922–32.

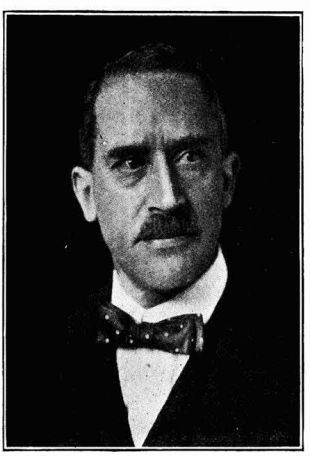
Year.	Total. Lb.	Year.	Total. Lb.	Year.	Total. Lb.	Year.	Total. Lb.
1922	23,832,967	1925	32,693,402	1928	50,960,472	1931	48,621,073
1923	33,100,719	1926	30,297,000	1929	55,785,032	1932	49,380,266
1924	33,242,704	1927	39,551,756	1930	42,590,243		

Well Known Names in the Birthday Honours List

Knighthood for Dr. G. C. Clayton

ACCORDING to the Birthday Honours List published on June 3, a knighthood has been conferred on Dr. George Christopher Clayton, Ph.D., F.I.C., Member of Parliament for Widnes Division, 1922-29, and for the Wirral Division since 1931, a director of Imperial Chemical Industries, Ltd. The Right Hon. Earl of Lytton, chairman of Palestine Potash, Ltd., has been made a K.G.; Percy Walter Llewellyn Ashley, secretary, Import Duties Advisory Committee, has been made a K.B.E. The name of Dr. Martin Onslow Forster, D.Sc., F.I.C., F.R.S., lately director Indian Institute of Science, Bangalore, occurs in the list for knights (India). Mr. Victor Edward Pullin, director of Radiological Research, Research Department, Royal Arsenal, Woolwich, has been made a C.B.E.

Dr. C. Clayton has acted on the Board of Trade Advisory Committee representing the chemical industries, and has also been president of the Institute of Chemistry for Great Britain and Ireland. He is chairman of the Liverpool Gas Co., and a director of the Chester Gas Co. and the Power Gas Co. of Stockton-on-Tees.



SIR GEORGE C. CLAYTON,
whose knighthood was announced in the Birthday Honours List on June 3.

Manufacturers' Mass Meeting

A National Appeal for Unity

MANUFACTURERS from many parts of Grat Britain, representing a wide variety of industries, will attend a national meeting at the Central Hall, Westminster, next Thursday, June 15. The meeting convened by Sir William Alexander, M.P., and Sir Charles Hopwood, on behalf of the National Union of Manufacturers, will be open to all British manufacturers. The principal subjects to be discussed will be questions arising in consequence of the recently concluded foreign trade agreements, the menace of Japanese competition, the fuel oil tax and the policy which should be adopted in future for the adequate protection of industrial interests. Manufacturers are to be urged to organise themselves so that the Government may be kept fully acquainted of the representative view of industry. Sir William Alexander will preside and the chief speakers will represent the staple industries of the country.

Explaining the objects of the meeting in an interview on Tuesday, Sir William Alexander said no manufacturer could regard his position as safe in the light of recent events. Tariffs, for which he fought for years and of which he was just reaping the benefit, had been reduced without notice—reduced by methods which threw the whole question of tariffs back into the arena of party politics. In many cases the estimates upon which his future trading was based had been blown to the winds and he might have undertaken commitments that could not be fulfilled without serious loss. Unless manufacturers were prepared to organise and speak with one united voice, there could never be security for any industry, and unless there could be security and confidence, prosperity could never be restored.

Chemical Plant Repairs by Scientific Welding

By C. W. BRETT, M.I.W.E.*

THE versatility of welding processes deserves to be very much more widely known than it is at the present time, for now a days the expert welder is able to claim that there is practically nothing in metal which cannot be repaired or rebuilt by a welding process. Claims of this kind would have been absurd quite a few years ago because it is only recently that welding has been reduced to a certainty as distinct from a speculation. One of the factors which has eliminated all risk of failure in a welded repair is the adoption by experienced welding engineers of really scientific methods of preheating and cooling the parts concerned. Another reason why welded repairs can now be guaranteed is that "hit or miss" methods are entirely of the past. The exact methods materials and apparatus required for carrying out any kind of repair are thoroughly understood. Further, of course, the stock-in-trade of the specialist welding repairer includes many men whose long experience in using the implements of their craft eliminates any chance of a mistake.

One of a pair of Aluminium Pans, 4ft. diam. × 6ft. deep, which failed around the centre seams and on the outlet pipes.

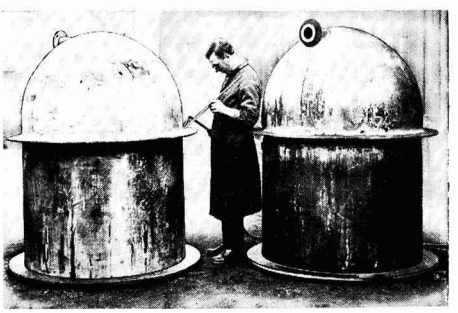
In no branch of engineering is the skill of the worker of greater importance than in effecting welded repairs to valuable pieces of machinery. While the repair is proceeding not only the general, but the local temperature of the part must be maintained within close limits of accuracy. Sometimes in the case of an extensive fracture elaborate precautions must be taken to ensure that none of the broken parts can move while the repair is proceeding and always delicacy of touch is of vital importance. The skilled welder, however, still needs the accuracy and patience of a watch repairer, in spite of the parts which come to him for attention often weighing as much as three or four tons. As much care is needed in repairing a giant casting as in uniting the small motor car parts which are damaged so easily, and the repair of which took welding out of the hands of blacksmiths and led to it becoming an exact science. It was extremely heavy cost and long delays involved in obtaining car replacements which first focussed attention on the important possibilities which welding extended. Before cars and lorries were mass produced, parts were often very difficult to obtain, and welded repairs were capable of being effected at a fifth the cost of a replacement.

Repairing Cracked Vessels

In the chemical industry the possibilities of scientific welding have, perhaps, been more widely exploited than in most other trades which employ expensive machinery. In particular, it is now coming into wide use for repairing cracks and the effects of corrosion in cast iron, steel and aluminium vessels of considerable size and weight. Mixing chambers seem particularly susceptible to damage, which may consist of cracks in the casing or damage to or around the bearings. Cracks are repaired by the familiar fusing methods and troubles with bearing housings present no difficulties which cannot be successfully overcome generally in a way which will not only ensure a sound repair, but, in addition, will make the casting definitely stronger than a replacement. Sometimes, where there is extensive damage in or around a bearing housing, the old metal is cut away and a new portion is cast and welded into place. If they are required, webs can then be welded into place, giving greatly increased strength and the certainty of no further trouble. Cutting away old metal and replacing it with fresh material is a branch of welding that is making rapid headway. It is specially valuable in the case of large vessels which are suffering from local corrosion, and many massive tanks and vats used for storing chemicals have been repaired in this way. As a rule the corrosion is seriously in evidence only in the region of the outlet pipe, and quite a small and inexpensive welded repair enables a costly container to be retained in use.

Aluminium Vessels

Often such repairs can be carried out actually in the works where they are in service, and with only a very short interference with the smooth running of the plant of which they form a part. Aluminium is widely employed for vessels in chemical works, and for a long time it evaded satisfactory repair on account of its considerable expansion when heated. Now a days, however, these difficulties have been overcome and even the large aluminium pans, weighing 10 cwt. each, shown in the accompanying illustration, presented no difficulties when they came under the attention of a scientific welding concern for extensive damage to be repaired. Often large aluminium tanks and vats have to withstand the effects of considerable heat and high pressure, but there need be no anxiety concerning the ability of a welded repair to "stand up." By the use of materials possessing similar characteristics to those of the main body of the casting, the welder ensures that there will be no local overloading and no risk of cracks due to rapid expansion or contraction. This point is well illustrated by the methods employed for welding the stainless steel shafts, rotors and vessels which are coming into wide use in the chemical trades by reason of the ability of this material to resist corrosion. When repairs are needed welding rods of stainless steel are employed, so that the crack is filled or the score built up by fusing into the damaged portion a material which, whilst being non-corroding, is also similar to the main body of the part in its behaviour under the various stresses to which it is subjected.



The same Pans successfully repaired by Scientific Welding, the centre flanges being cut away and new ones welded on.

Compensating the Effects of Wear

Welded repairs are just as successful for building up to compensate for the effects of wear, as they are for remedying the results of an accident or of weakness, which has resulted in a fracture. There are now electric welding processes, which enable the diameter of a shaft to be increased to an unlimited extent. They are very valuable in compensation for bearing wear and are widely employed for filling scores,

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Very high temperatures are employed in work of this kind, and careful subsequent heat treatment of the part is nearly always necessary. The saving in cost, compared with obtaining a replacement, varies, of course, according to the complexity of the part concerned. In the case of a simple shaft it would not be very great, but if the shaft had a rotor or some other intricate part formed integral with it, the repair might cost no more than a fifth of the bill which would have to be paid if a new part were obtained. Pumps of all kinds come under the attention of the scientific welder, and many which are employed in the chemical trades are dealt with. In the case of plunger pumps a not infrequent mishap consists of extensive damage to the barrel, due to frost. Pump shafts which are scored at the point where they pass through a gland, are built up by welding, and a similar process is also employed in cases where a shaft is broken.

Engine Repairs

Chemical plants drawing power from steam engines are still common, and there is practically no steam engine repair which cannot be accomplished by welding. Boilers are capable of being restored very readily, particularly when the trouble is with a defective seam or leaking rivets. Corrosion in the fire-box of a boiler is rectified by cutting away the damaged material and welding new metal into place. Extensive work of this kind can be very speedily completed, and this naturally is of great importance in cases where the repair involves a shut down of the plant. Electric power station mishaps generally come in this category, although it is customary now-a-days for arrangements to be made for an emergency service to be obtainable from the local town supply. As in the case of steam engines, gas and heavy oil power units of all kinds present no new problems to the welder.

A not-infrequent trouble with all internal combustion engines is the scoring of the cylinders, due to inadequate location of the gudgeon pins. Broken piston rings are another frequent cause of scored cylinders in the case of engines with a bore of considerable diameter. For repairs of this kind there is now a process which fills the damaged portions of the cylinder bores without the use of high temperatures, and does not necessitate machining the bore. This process eliminates the need which would otherwise arise for new pistons, and has proved its suitability in thousands of cylinder bores where temperatures are high and the loading is heavy. It is probably well-known that internal combustion engine crankshafts can be welded electrically, even if the fracture is through one of the journals. The process employed is speedy considering the intricacy of the work, and the repaired shaft is a strong as a replacement would be. The building up of internal combustion engine valve seatings, when they have become sunken, due to grinding in, is another familiar welding repair. Experience gained in work of this kind has pointed the way to effecting completely satisfactory repairs to the valve seatings of ammonia compressors, air compressors, and so forth. This building-up process prevents the valves from being partially masked and adds greatly to the efficiency of the unit.

The greatest value of the latest welding processes to the engineer in the chemical industry is in their ability to effect repairs in the shortest possible time, and always at a cost below that of replacements. Those who have gone deeply into the question are making ever-increasing use of the latest facilities and are finding that scientific welding can solve all of their most serious difficulties. Its scope is almost unlimited, both for repairing and reconditioning, whilst for constructional work its claims are gaining ever-increasing recognition. Welding to-day is being employed in place of riveting even in such large undertakings as bridge building, and it is generally recognised that for permanent pipe work of all kinds it will soon completely displace flanged and bolted, or screwed, junctions, with the inevitable risk of failure which their use essentially involves

Examination of Explosion Flames

Analysis by Photographic Methods

THE photographic analysis of explosion flames was the subject of a lecture given by Professor W. A. Bone, D.Sc., F.R.S., at the 70th annual general meeting of the Institution of Gas Engineers at Liverpool on May 31.

In recent years in order to develop the experimental method with a view to increasing its analysing power more particularly for the exploration of "detonation," some new high-speed cameras have been designed by Mr. R. P. Fraser, their accuracy and analysing powers far surpassing anything yet achieved. In 1928 a 9-in. duralumin drum was rotated within the camera at speeds up to 16,000 r.p.m., or equivalent to any constant film speed up to 200 metres per second, when it became possible for the first time to photograph and measure periodic movements in explosion flames with frequencies up to 250,000 per second. In 1931 the latest camera was designed in which an 8 lb. stainless-steel mirror revolved in vacuo at any desired speed up to 30,000 r.p.m. and projected the image of the explosion flame on to a stationary film; the analysing power of this new camera being four or five times greater than that of its predecessor. With the assistance of these new cameras much new light has been thrown both upon the development and characteristics of "detonation" in gaseous explosions.

Pre-Detonation Phases

Among the most potent disturbers of flames are compression-waves, which may either accelerate or decelerate (or even temporarily arrest) them, according as either they overtake a flame front moving in the same direction or impinge upon it in an opposite direction. These "compression waves" may originate either (*a*) from a source external to the flame, or (*b*) autogeneously either in, or just behind, the flame front whenever anything occurs to enhance the chemical activity of the burning medium. When an advancing flame is being accelerated under the influence of successive compression ("shock" waves moving in the same direction there is a practical difference according as the flame is either being overtaken by, or is overtaking, the compression wave; for, although in the former case a marked increase in flame velocity occurs, it is in the latter circumstance that detonation may be set up, and such condition has been termed the "pre-detonation" stage of an explosion. At this stage auto-ignition may occur ahead of the advancing flame front when the latter is on the point of overtaking a compression wave moving ahead of it; although one such auto-ignition does not necessarily set up detonation, in some cases it may do so although frequently more than one is required.

Since 1927 the new cameras have been employed for the exploration of the phenomenon of "spin." Among the many features of outstanding interest, however, may be mentioned (*a*) the spiralling is usually clock-wise, though not invariably so, (*b*) whereas the photographs of detonations in many explosive media give evidence of "spin," there are some which as yet have not done so, (*c*) in certain cases two or more rotating "heads" of detonation may be observed, and (*d*) the "spin" does not primarily depend upon such factors as either the density or chemical composition of the medium or its rate of detonation. It also seems probable that the "head" of detonation is a locus of intensive ionisation of the medium, for the "spin" can be destroyed by sufficiently powerful electric fields suitably applied.

Aluminium Sulphate in Finland

THE Finnish paper industry and water supply systems are dependent for aluminium sulphate on imports, since there is no known local production. The bulk of the imports during recent years came from Sweden, Belgium, and the Netherlands whereas prior to 1930 France was the source of from 500 to 900 tons yearly. Total imports exceeded 5,900 metric tons in 1932, compared with 5,300 and 5,800 tons respectively in 1931 and 1930, or an upward tendency from 4,600 tons in 1927.

United States Exports of Chemical Products

The World's Largest Producers

THE impossibility of the complete commercial segregation of the United States and its dependence on foreign markets for a profitable outlet for its export surplus, both agricultural and industrial, are emphasised in a report on economic conditions in the United States, recently published by the Department of Overseas Trade (H.M. Stationery Office, 4s.). It draws attention to the fact that, however serious has been the decline in the total trade, the value of exports has been consistently greater than that of imports, in spite of the comparatively high place occupied by the United States in the list of the purchasing markets of the world.

Exports of chemicals and related products appear in the aggregate to have shown a less severe proportionate decline that other main groups of exported merchandise, and they also show greater divergence and variety of commodities with less importance placed on former essential items. In 1931, for example, the 15 leading export items accounted for 65 per cent. of the export trade, while these same commodities represented 88 per cent. in 1927. Some items which were prominent in 1927, such as coal tar and pitch, zinc oxide, dynamite, superphosphates, and dextrine, have declined so decidedly as to make them of only minor importance. Their places have been taken by chemical specialities and synthetic organic chemicals. Chemicals manufactured for the first time during the past decade are now exported. Rubber compounding agents, such as accelerators and retarders, have become prominent during recent years, an indication of what may happen if "duprene," the new synthetic rubber, is exported.

Rayon Developments

Development of rayon and its widespread manufacture in many foreign countries has resulted in a demand from these countries for many chemicals exported by the United States. An example is carbon bisulphide. Some of the other industrial chemicals exported in growing amounts are likewise closely related to the textile industry. Over 5,500,000 lb. of textile speciality compounds, which include finishes and bleaches, and 1,500,000 lb. of industrial speciality cleaning and washing compounds were shipped abroad in 1932. Exports of chemical fertilisers, nitrogen compounds, exclusive of ammonium sulphate, increased to 167,000 long tons in 1932, a gain of 250 per cent. over 1931, valued at £871,400, compared with £495,856 in 1931. The exports were mostly nitrate of soda, and it was the first year more nitrates were exported than imported.

The United States ranks as the world's largest consumer and producer of chemicals and related products. Owing to the wide diversity of products, the variety of uses which each product is adapted, and an inherent flexibility in make-up, the industry as a whole has been less affected by prevailing economic conditions than most other industries in the United States. Sulphuric acid consumption which in 1931 stood at 5,904,000 short tons dropped in 1932 to the estimated figure of 4,330,000 short tons, the most pronounced declines in consumption being the fertiliser and iron and steel industries, 46 per cent. in each case.

Domestic sulphur resources centred in Texas have recently been increased by the discovery of sulphur deposits of fairly substantial proportions in the neighbouring State of Louisiana where, it is understood, one entirely new unit is about to commence operations with a contemplated capacity of 250,000 tons annually. Production of sulphur in 1931 amounted to about 2,128,900 long tons.

Nitrogen Production

Recent developments in the nitrogen field have been particularly striking. The domestic air reduction industry is now capable of producing sufficient nitrate of soda to cover practically all United States requirements with the result that, not only have imports of the natural product from Chile been largely displaced (imports dropped from 616,000 tons in 1931 to about 50,000 tons in 1932), but in 1932 exports of nitrate of soda exceeded imports for the first time on record. Synthetic ammonia production in 1932 was well in excess of that of the previous year, probably by 35 per cent. By-product ammonia productions showed a severe decline. Output of ethyl alcohol for the year ended June, 1932, amounted to 147 million proof gallons, a decrease of 19 millions from the total produced in the previous fiscal year. Methanol, produced entirely by the wood distillation industry, was formerly one of the most important chemicals made in the United States. Production of synthetic methanol has, however, made its appearance in the past four or five years, and in 1931 the total so produced amounted to 7 million gallons, and the average monthly production in 1932 was higher; in the same period the wood distillation production has dropped 65 per cent. Butyl alcohol output has increased in the past few years.

Rubber Manufacture

Owing to the heavy fall in the price of crude rubber, exports of rubber manufacturers show a greater percentage decline in value than in quantity, and the establishment of branch factories of American tyre manufacturers abroad naturally displaces exports from the United States. Throughout the history of the rubber trade the trend of prices has been downward, and the decreased value of exports in recent years represents a much higher volume of trade than the value figures would seem to indicate. Exporters of rubber footwear are facing more serious problems than any other branch of this export industry owing to the increasing competition from manufacturers in Japan and Czechoslovakia and other European countries. This price competition is found to be increasingly severe in British India, Netherland East Indies, the Philippines, the United Kingdom, Argentina and Cuba, and even more than generally poor economic conditions is a cause of the heavy decline in export shipments of American rubber footwear. In 1932 the latter declined 77.3 per cent. in volume compared with 1931, whereas the exports of semi-manufactured rubber goods, including scrap and reclaimed rubber and rubber thread, were only 2.3 per cent. less in volume.

No Improvement in Copper

Conditions in the copper industry, which have been extremely unsettled since the end of 1929, failed to show any improvement in 1932. At the beginning of that year, stocks of smelter and refined copper in the United States stood at a record high mark while prices had reached a low record The year closed with still greater stocks on hand (notwithstanding a programme of curtailed production which has been in operation), prices at a new low record, and the domestic consumption total registering only just over one-half of the 1931 figure which itself had been the lowest since 1922. Control of production has proved one of the major problems of the copper industry during the past two or three years, and in 1932 it was decided to hold actual production down to 20 per cent. of capacity, but this arrangement lapsed at the end of that year when an international copper conference, which had under consideration the question of extending the period of curtailed production, ended in failure.

The United States Revenue Act, of 1932, embodied an import duty of 4 cents a pound on all copper-bearing ores entering the country. This tariff became effective on the 21st June, 1932, and will continue in force until the 30th June, 1934. While the imposition of the tax has failed, so far, to have any beneficial effect on domestic prices, it has resulted in a considerable reduction of copper imports in recent months, practically the only consignments entering the country having come in under bond for refining and re-exportation. Imports of unmanufactured copper for the first eleven months of 1932 amounted to 371,089,038 pounds as compared with 585,892,998 pounds for the entire year 1931. It is estimated that the total imports for 1932 will be about 35 per cent. below the 1931 figure.

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Exports of Metallic Copper

Exports of metallic copper during the first eleven months of 1932 totalled 305,177,405 pounds and the estimated total for the whole year is placed at about 320 to 330 million pounds. Exports in 1931 amounted to 557,574,235 pounds. An early return to profitable operations in the United States copper in-

dustry is improbable. It is true that the industry is now temporarily sheltered by a tariff, and it is likely that domestic producers will continue to hold down production in spite of the failure of the recent conference; but it finds itself burdened with stocks equivalent to about two years' supply at the present rate of consumption and, until this accumulation is at least partially absorbed, material price advances can hardly be expected.

According to a recent poll conducted by the Massachusetts Institute of Technology, the engineers of the world are almost unanimous in placing the extended use of the factory-built house in the forefront of impending developments, with steel as the material most often suggested. Experimental work has been carried out in Milwaukee and Cleveland, and the experience gained by English and German attempts in this connection has been duly noted. Apart from the factory-built house of steel or other material, there are many changes in contemplation in the building industry as a whole, most of them based on the idea of maximum pre-fabrication. In addition to steel frame-work for houses there have been recently announced new processes for sound and fire-proofing buildings and individual rooms, a new cement mixture, aluminium covered shingles, asphalt shingles, steel tiles, gypsum wall-boards to bend or fold in conformity with structural requirements, and many other minor methods of improving and accelerating construction.

New light-weight alloys have been brought into use, and may eventually be of considerable importance in the railway equipment industry. Freight cars built of "dow metal," a magnesium alloy one-third lighter than aluminium, and with half the tensile strength of steel, are already in use. Roller bearings are being used to an increasing extent on rolling stock, and the use of automatic train control and automatic signal systems has also been extended on the railways. Magnesium and aluminium alloys which can be moulded under pressure by the extrusion process are also of increasing importance in the automobile trade, and metallurgists who have been working with the new alloys say they can be used economically for the manufacture of automobile frames, motor blocks, transmission and axle housings, etc., without sacrifice of stability in the vehicle. The greatly extended use of aluminium both in alloys and in its pure form (many-coloured kitchen utensils) is confidently looked to by authoritive reporters on research activities. In the textile field mention must be made of attempts to increase the consumption of cotton by using canvas coated with asphaltic oils on graded earth highways for subsequent surfacing with sand or gravel. Experiments with a view to replacing jute by cotton in bag manufacture continue. Ramie is also a fibre of great interest to seekers after new products and processes, but a satisfactory de-gumming process has not yet been devised. There is, despite the incentive offered by certain qualities of this fibre, no immediate prospect of the development of the use of ramie to an extent which would revolutionise the textile world. Rayon continued to offer a satisfactory field for improvement and research, and the success of the laboratories in producing the dull appearance of taffeta, crepe de Chine, etc., has met with its due reward. Cellophane and bakelite have also had a very wide and successful vogue, especially the former.

Chemical Invention in 1932

Production of Solvents and Synthetic Resins

ACCORDING to the fiftieth report of the Comptroller-General of Patents, Designs and Trade Marks, 37,052 applications for patents were filed in Great Britain in 1932, against 36,117 in the previous year, the number of patents sealed being 21,150 against 21,949. Applications for trade marks during the year totalled 10,035 in Part A of the register and 287 in Part B, registrations totalling 5,808 and 252 respectively.

Reviewing the trend of invention during the year, the Comptroller-General states that invention has been directed to the development and application of existing knowledge in the arts, and no outstanding originative inventions are recognisable. In connection with the chemical industry, attention has been particularly directed to the production of solvents, synthetic resins and wetting agents. In the dry cleaning of fabrics, endeavour is being made to obtain solvents which will remove uniformly all kinds of dirt or stain and to construct apparatus, safe in use, for carrying out the cleaning process. The problem of freeing motor fuels from gum-forming constituents which retaining "anti-knocking" constituents is receiving attention.

In the electrical field, attention is being devoted to the development of grid control systems for mercury arc and similar gaseous discharge apparatus, whereby such apparatus is afforded better regulation and protection when used for rectifying alternating currents, and is rendered applicable for transmitting power from a direct current to an alternating current network or between alternating current networks operating at different frequencies.

Electrical Measurement

There is still much activity in connection with hot-cathode neon and other discharge lamps for general lighting and for advertisement purposes, and also in cathode-ray tubes for television and electrical measurement purposes. The photo-electric and like cell is finding applications in widely diverse fields, thus these cells are being used for automatically determining printing exposures in photographic printing, for controlling tools in engraving and other machines, and for maintaining registry of webs fed to printing-machines.

There has been a notable decrease in inventions connected with talking-picture films and apparatus, but on the other hand, there has been a marked advance in photography generally. The sensitivity of photographic plates and films has been greatly improved, both as to the response to particular spectral ranges and to general increase in speed, which has now reached about 2,500 H and D to daylight and 8,000 H and D to artificial light. The improvements in the production of layers highly sensitive to infra-red radiation permits the production of clear photographs under misty atmospheric conditions. Colouring matter, or substances yielding colouring matter under treatment, are being incorporated in sensitive emulsions for the production of coloured prints.

Within the home, the applications of more scientific and technical appliances are showing a steady increase. For example, attention is being directed to small emulsifying machines for making artificial cream and to the use of "dry ice" (*i.e.* solid carbon dioxide) in domestic refrigerators.

Applications and Specifications

Applications for patents received during the year included 7,606 claiming priority of date under international and imperial arrangements, this number being 763 less than in 1931. Under Section 91 (2), 102 complete specifications were filed in respect of 247 applications. Applications in respect of inventions communicated from abroad to persons resident in this country numbered 1,469 as compared with 1,670 in 1931, and the number of applications made by women was 520 as compared with 376 in the previous year. The number of applications for patents of addition was 996, and the number of applications post-dated in consequence of disconformity between the complete and provisional specifications was 228, the corresponding numbers for 1931 being 1,154 and 249 respectively.

Typical specimens were furnished in connection with applications in respect of chemical inventions in 49 cases, 160 sample bottles and 86 dyed or printed specimens being filed. The number of complete specifications filed was 19,834 as against 22,838 in 1931.

Trade marks registered during 1932 included the following: Chemical substances used in manufacture, etc., 227 (against 260 in 1931); chemical substances used in agriculture, etc., 145 (against 125); chemical substances used in medicine, etc., 370 (against 331); explosive substances, 8 (against 8); candles, detergents, oils, matches, starch, etc., 269 (against 185); perfumery, etc., 237 (against 190).

Benzyl Cellulose Moulding Compositions

The Technique of the Moulding Operation

BENZYL cellulose, a product of Imperial Chemical Industries, Ltd., is a cellulose derivative with uses that have developed rapidly and its valuable characteristics are now finding for it an increasing number of outlets. The properties which characterise and commend benzyl cellulose are its chemical stability, its low hygroscopicity, its excellent electrical properties and its relative non-inflammability. It can be used as the base from which to prepare moulding materials, celluloid, films, various coating dopes, insulating compositions, lacquers and enamels, weatherproof linoleum, plastics, etc.

The stability of benzyl cellulose permits of the manufacture of coatings, moulding compositions, etc., which have good resistance to acids and alkalies, and which do not discolour on exposure to ultra-violet light. A range of different grades of benzyl cellulose is available, to meet the many applications which this material now has in the technical field.

Various types of moulding compositions can be made from benzyl cellulose. These compositions may be varied in rigidity and flexibility, in specific gravity and to some extent in properties—such as resistance to corrosion under special conditions. The specific gravity of benzyl cellulose itself is 1.2. The specific gravity of moulding compositions varies from 1.2 to 2.0, according to the composition and according to the purpose for which it has been prepared. One of the characteristic properties of benzyl cellulose is its low hygroscopicity and the moulding compositions made from it also have low hygroscopicities. Moulding powders, which were dried in vacuo, and then exposed to an atmosphere of 72 per cent. saturation at 20° C., showed a gain in weight of 0.4 to 1 per cent. after 48 hours.

Resistance to Acid and Alkali

When mouldings made from benzyl cellulose compositions are exposed in a moist atmosphere of 100 per cent. saturation a slight gain in weight takes place. One of the characteristic features of benzyl cellulose and its compositions, however, is their resistance to acids. Transparent mouldings made from benzyl cellulose have remained visibly unattacked after 15 months' immersion in various strengths—10 per cent. by volume (sp. gr. 1.098) 20 per cent., 30 per cent., 40 per cent. and 60 per cent. (sp. gr. 1.588) of sulphuric acid at room temperature. Strips made from the various benzyl cellulose moulding compositions have remained visibly unattacked after 8 weeks' immersion in sulphuric acid, up to a specific gravity of 1.4. These mouldings are similarly unattacked by 5 per cent. hydrochloric acid and 5 per cent. acetic acid. Benzyl cellulose moulding compositions also resist caustic soda solutions of 1 to 40 per cent. strength at room temperature.

The moulding of thermoplastic materials like benzyl cellulose and its compositions can be carried out in two main ways. In injection moulding the material is heated to a suitably plastic state and is squirted under very high pressure into a cold mould; here one of the essential features of injection moulding is that the mould is dealing with applied pressures exerting their force from the inside, tending to open the mould. In compression moulding, the material is heated in a mould and pressed to shape when sufficiently plastic; here the pressure is exerted from the outside and tends to close the mould. Both methods are described in detail in booklets which have been issued by Imperial Chemical Industries, Ltd.

Injection Moulding

As already indicated above, one of the essential features of injection moulding is that the mould is dealing with applied pressures exerting their force from the inside and tending to open the mould. Furthermore, the pressures dealt with in injection moulding are of a much higher order and necessitate special provision for keeping the mould closed in all cases in which the superficial area of the top surface of the moulding exceeds the area of the ram applying the pressure to the material. The difficulties involved in securing the mould against a tendency to open have been such that hitherto the tendency has been to confine injection mouldings to the production of small or intricate shapes. Another factor influencing this has been contraction of the material, brought about in injecting it into a cold or relatively cold mould, making for difficulties in the case of any relatively thick section in the mouldings. On the other hand, if full recognition of the factors is taken into consideration it has been found possible by suitable design of both plant and moulds to mould by this method relatively large articles.

Injection moulding lends itself to very high speed production and has this advantage over compression moulding that the material comes into contact with inserts when it is still in the plastic state. This feature enables one to deal with inserts which would be too delicate to withstand compression moulding, where the pressure is applied before a suitably plastic state has been reached. For small articles, multiple impression moulds, containing a number of cavities, can be filled in one operation lasting 15 to 20 seconds. The essential part of injection moulding, as practised with thermoplastics of the type of benzyl cellulose, is injection into cold moulds. When the material is inside the mould under a pressure on the ram of some 8 to 10 tons per square inch, and the pressure released, the article can be removed instantly. Three, four and five or even more injections per minute are thus possible.

Compression Moulding

Compression moulding may be carried out in certain cases in the type of moulds which are used for ebonite and synthetic resin materials. Moulds may be of the "flash" or overflow type, or of the positive plunger type. In the flash type more material than is required for the article is placed in the mould, softened by heating and when pressure is applied, the material fills the mould and the excess overflows into channels which run round the cavity. The closed mould cuts off this flash at the edge of the cavity. In the positive type mould, the article is added. Both types may have provision for ejection of the article which may be operated by hand or by power.

Heating of the moulds is carried out in two ways. In the commoner the mould is placed between two platens of a press, which are cored for the circulation of steam and water. With benzyl cellulose compositions, a maximum steam pressure of 70 lb. per sq. in. suffices to heat ordinary thicknesses of metal. When the working temperature is attained in the interior of the mould, the lag in cooling the mass of metal permits the stream to be turned off and cold water to be circulated through the platens, when pressure is lightly applied, and increased as cooling proceeds. The second method, and that which is recommended for benzyl cellulose, is one in which a cored mould is employed and steam and water are actually passed through the body of the mould itself. The proximity of the source of heating and cooling to the material in these so-called "auto-cellulose" moulds results in a very rapid rate of work, but the time required for moulding varies with the thickness of the article.

The pressure required to make benzyl cellulose compositions flow at their working temperature is ½ to 1 ton per sq. in. The mould is heated first to about 110°C., and is then filled with the requisite quantity of moulding powder. Cooling can then usually be started though the right moment to apply it is a matter of experience with the particular mould, and the pressure is gradually applied until the maximum of about 1 ton per sq. in. is reached. The mould may be opened when the temperature has fallen to a temperature at which the mould can be handled. Temperature varies somewhat, depending on the type of mould and the ease of flow which curved and inclined surfaces make possible, but the usual limits are between 100-120°C.

Benzyl Cellulose Solvents

The common aromatic solvents such as benzene, toluene, and xylene are not by themselves solvents for benzyl cellulose, but have a swelling or gelatinising effect. When, however, 10-20 per cent. (by volume) of industrial spirits is added to benzene, toluene, or xylene, the solvent mixture is an excellent solvent for benzyl cellulose. The best method of making a benzyl cellulose solution is to wet the granular benzyl cellulose with industrial spirit and then to add the aromatic solvent. The solution may be made up in any of the usual types of stirring, shaking or tumbling apparatus commonly

used in paint manufacture. For the preparation of very viscous solutions or dopes, say, 30-40 per cent. solutions of benzyl cellulose, an apparatus of the Werner Pfleiderer mixer type is most suitable. In such cases the solvent should be added gradually, a portion being added first and thorough mixing being continued until a dough is formed. The remainder should be added gradually to prevent the formation of lumps.

Aliphatic hydrocarbons are non-solvents for benzyl cellulose and even when mixed with alcohol have no solvent action. Some solutions, however, may tolerate the addition of quantities up to 50 per cent. of aliphatic hydrocarbons. The lower aromatic hydrocarbons such as benzol, toluol and xylol, have a gelatinising effect and form excellent solvents with the addition of 20 per cent. industrial spirits.

Aliphatic alcohols are non-solvents, but the lower numbers of the series have the property of conferring solvent power on some of the hydrocarbons and chloro-compounds. Aromatic alcohols such as benzyl alcohol are solvents for benzyl cellulose. Aromatic ethers, and mixed ethers containing an aromatic group, are solvents. Methyl cellosolve (the methyl ether or ethylene glycol), and 1:4 dioxane are solvents. The ethers of glycerol are solvents for benzyl cellulose. Ketones are non-solvents, but the addition of 20 per cent.-50 per cent. of benzene sometimes confers solubility, *e.g.* acetone-benzene (50:50 by volume) is a good solvent mixture. The esters of the lower fatty acids up to the amyl ester possess a certain solvent action which is improved by the addition of 20 per cent. of benzene or toluene: *e.g.* tehyl acetate-benzene (80:20 by volume) is a good solvent mixture.

British Association of Chemists

Annual Meeting of the Birmingham Section

THE annual meeting of the Birmingham section of the British Association of Chemists was held at the Birmingham Chamber of Commerce on May 30. Mr. J. R. Johnson, chairman, presided. Professor E. C. C. Baly, president of the Association addressed the meeting, and there was a good attendance of members.

The CHAIRMAN reviewed the events of the year, and pointed out that every phase of the Association work was progressing. The number of appointments dealt with by the appointments bureau had increased by over 50 per cent. The unemployment benefit fund had now paid out £8,500 in benefit. The right of the chemist to a minimum of three months' notice had been established by unassailable precedents and judicial decisions.

The annual report of the committee stated that the section continued to progress quietly in point of members, in spite of several losses by transference to other sections, some resignations and the regretted death of Mr. A. Gray, a probationer member of the Section. As in previous years co-operation between the section and the local sections of the Institute of Chemistry and the Society of Chemical Industry had been demonstrated in the Midland chemists' dinner and the joint concert, both of which were well attended and very successful. The past year was also distinguished by the incidence of the Association annual general meeting and dinner-dance in Birmingham. Members of the Association continued to play vital roles in local affairs. Mention was made of Mr. H. W. Rowell, chairman of the local section of the Society of Chemical Industry, Mr. A. W. Knapp, chairman of the local section of the Institute of Chemistry, and Dr. E. D. Mason, chairman of the Midland Chemists' Joint Committee. These had filled their offices with distinction and were playing important part in the negotiations now taking place in chemical circles.

Mr. W. SALMON, hon treasurer, in presenting the financial statement, pointed out that much of the satisfactory balance on the year's working was due to the generous act of the council in allowing a special allocation to wipe off the accumulated deficit, and a special grant in recognition of the fact that a certain proportion of the section expenses were really general purposes committee expenses.

Election of Officers

The following officers were elected for the ensuing year:—Chairman, Mr. J. R. Johnson; vice-chairman, Mr. A. W. Knapp; hon treasurer, Mr. W. Salmon; section recorder, Mr. H. W. Rowell; hon. secretary, Mr. R. A. V. Tayar; hon. membership secretary, Mr. A. Churchman; committee, Drs. Hampton and Mason, Messrs. Baker, Hall, Phillips, Wilson, Hill, and Bain.

Professor BALY said the Birmingham section was the fourth he had visited during his presidency, and the fact that had most forcibly been drawn to his attention was that there was a remarkable divergence in the predominant note in the activities of each section. Each had a "pulse" of its own. The Association had to evolve a forward policy, which had for its ingredients the sum total of the harmonious elements in sectional outlook. At present the Association was not progressing fast enough. A protective Association required to number among its members the really influential people, and a large majority of members who would not be likely to be a charge on its funds. The splendid record of the unemployment benefit fund should be a good reason for the support of the leaders of industry. They should encourage their young employees to safeguard their interests by joining the Association. Reverting to the question of sectional policy, the president urged sections not to be sectionally minded. If recommendations by sections failed to obtain the general support of the council there was really no need to be discouraged or to harbour resentment. In his own work some of the most valuable advances that had been made proceeded on a foundation of unexpected criticism of seemingly incontrovertible hypothesis. The Association was the one body which was 100 per cent. chemistry, and which all chemists should join.

Referring to the present negotiations with a view to a merging of publishing societies, the president gave it as his considered view that only a properly conceived scheme which embraced in its purview the inclusion of the Institute of Chemistry and the British Association of Chemists had any hope of success. He outlined an idea which he had conceived of the holding of conferences by the British Association of Chemists, say, every two or three years, on topics of general interest. Chemists of international fame could be invited to take part and much good should accrue to the Association thereby. Professor Baly closed by appealing to all sections to pull together for the common good, as sections and individuals were the stepping stones on which the Association could proceed to higher and better things.

Mr. A. W. KNAPP, in proposing a vote of thanks to the president, said all members were proud of the Association.

Hydrocyanic Acid

A Method for Colorimetric Determination

A NEW method for the colorimetric determination of small amounts of hydrocynanic acid is described by N. Gales and A. J. Pensa ("Ind. Eng. Chem.," Analytical Edition, 1933, 5, 80). The solution is acidified with tartaric acid, and the hydrocyanic acid is removed by distillation. The distillate is collected in decinormal sodium hydroxide solution. The resulting solution is treated with hydrochloric acid in a suitable glass container which is then sealed, and heated in an oil bath at a temperature of 140° to 150° C. for 30 minutes. The hydrocyanic acid is thereby saponified or hydrolyzed, and converted into formic acid and ammonium chloride. The contents of the sealed vessel are allowed to cool, then transferred to a beaker. The excess acid is removed by evaporation almost to dryness. The residue is diluted with distilled water, and its ammonia content is determined colorimetrically after addition of Nessler solution to develop the characteristic yellow colour. Since the molecule of hydrocyanic acid and that of ammonia each contains one atom of nitrogen, the hydrocyanic acid content of the sample may then be readily calculated.

Economic Conditions in Belgium

A Review of the Chemical and Allied Industries

BELGIUM has resisted the general depression as well as, if not better than, many other countries, and towards the end of 1932 more hopeful signs were apparent. That is the chief conclusion drawn from a persual of "Economic Conditions in Belgium, 1932," recently published by the Department of Overseas Trade (H.M. Stationery Office, price 4s. net.). A separate chapter of this report deals with Anglo-Belgian trade and discusses the Belgian market, the prospects of increasing imports from the United Kingdom, and the methods of British firms in general. Many trades are also reviewed in detail.

Pharmaceutical Products

In proportion to its population, the trade in pharmaceutical products is as large in Belgium as in any other European country. As local manufacture is not important, an exceptionally large proportion of this business is done with France, Germany and the United Kingdom, in that order of importance. Although a large number of United Kingdom branded products are on sale here, the United Kingdom share in the trade is still far behind that of France and Germany. The United States also supply this market. The trend of the trade during the first nine or ten months of 1932 shows a general increase in United Kingdom imports. This is due largely to the depreciation of sterling. With the exchange at about 125 frs. to the £ values of United Kingdom goods approach the average interior values of similar products. It must be admitted, however, that the fall in the £ does not appear to have resulted in a proportionate fall in retail prices of United Kingdom specialities.

Prospects for the immediate future of pharmaceutical products are very good, so long as the exchange remains fairly stable round about its present level. Prospects of increasing the share of United Kingdom firms in this trade were never so good as at present, because prices, which were far too high when the exchange was at 175 frs. to the £, are more in accordance with interior values. This particular trade has shown a surprising resistance to the crisis. The United Kingdom article, however, can only be popularised by issuing the product with French and Flemish labels and literature, while maintaining the distinction of the article being of United Kingdom origin. A British pharmaceutical product is preferred even to a Belgian one, but it is important that the national languages should occupy a prominent position. The agent appointed for this line should be well introduced to the medical profession and should be in a position to distribute free samples to its members. Customs duties and other taxes do not damage sales at the present rate of exchange; and in any case it is easy to avoid a great part of these duties by exporting in bulk and having the product packed by the local agent.

Paints, Colours and Varnishes

Imports of United Kingdom paints, enamels and varnishes have been more difficult, chiefly owing to the depressed state of the rolling stock and automobile industries. Few new railway carriages or tramcars have been built in Belgium in 1932, except for the national railway company and the municipal tramway companies, for which Belgian materials were specified wherever possible. Consequently, purchases of United Kingdom painting materials have been largely restricted to maintenance work. Prices have fallen approximately 10 per cent., in terms of sterling and considerably more in terms of Belgian francs, by reason of the exchange position. There has been little sign of any improvement in the quality of Belgian-made varnishes which would tend to reduce imports from the United Kingdom, though it is understood that certain British makers are seriously considering the manufacture of some of their paints and enamels in Belgium. It is said that provisional arrangements have already been made with Belgian paint factories for this purpose.

Trade in sulphuric acid and other chemical products has been far from satisfactory both as regards quantity and price. In so far as chemical fertilisers are concerned, the quantities supplied both on the home and export markets were normal, but sales prices were unfavourable. There have been no extraordinary price fluctuations, but the level has been low. The use of chemical fertilisers has diminished as a result of the lower purchasing power of the agricultural industry, and the resulting reduction in the output of sulphate of ammonia and super-phosphate of lime has, in turn, reduced the consumption of sulphuric acid. The sales price of certain basic products has in the last two years fallen by over 40 per cent.

The principal Belgian firms interested in the nitrogen industry have formed a co-operative society to be known as the Belgian Federation of Nitrogen Producers, with the object of obtaining more technical unity in the manufacture of nitrogenous products in Belgium. The capital, amounting to 100,000 francs, and which may be increased indefinitely, was subscribed in equal shares by all the participating firms.

Dyes and Colours

So far as the home trade in dyes and colours is concerned the demand for domestic lines has been well maintained, but there has naturally been some falling off in the demand for ultramarine colours for industrial use. Many of the large buyers have suffered severely from the trade depression and orders for such colours have fallen off owing to the fact that the industrial firms which make use of them have reduced their output. With regard to export business, the dye and colour trade has been handicapped—apart from the continued lack of demand—by the stringent import control and exchange restrictions which are in force in many of its export markets. Activities are therefore restricted to the very few markets where commercial operations are still more or less normal. Although there has not been a great reduction in the cost of ultramarine colours the price level has fallen considerably since 1931, owing to severe competition from other manufacturers who have been forced to liquidate stocks.

The market for cement has been calm and competition keen, some firms lowering prices below costs in order to effect sales. Demand for export has been weak and prices low. The tariff in the United Kingdom and the abandonment of the gold standard by that country affected Belgian exports. There was keen competition on the Dutch market as a result of United Kingdom competition and the denunciation of the agreement with Germany regarding imports into Holland; the agreement with French manufacturers was also denounced on June 30. Many works have been at a standstill and the others have been working much below capacity. Unemployment has increased and hours of work reduced. Exports to Holland during the first nine months of 1932 fell from 302,000 tons to 179,000 tons, and the United Kingdom share was more than halved, dropping from 155,000 tons to 69,000 tons.

Paper Industry

On the whole, the position in the paper industry is worse than during 1931. Except in regard to writing paper, the Belgian factories worked without profit, in order to keep their customers and occupy their workers. The decrease in sales has been progressive since the beginning of the year, and is now estimated at 25 per cent. Prices have shown an equal downward tendency, and manufacturers consider that they have now reached their lowest possible level, as a further drop would strike a death-blow to the Belgian paper industry. Foreign competition is hampering the trade at home; thanks to the drop of their exchange and the lack of protective measures in Belgium, the Scandinavian countries have been able to supply certain qualities of paper—especially newsprint—at prices much below those of the local production. Unemployment in this industry has therefore increased and the output has been reduced by 30 per cent. as compared with the year 1929. In June, 1932, the total production of paper and cardboard fell to 11,375 tons, after having varied between 12,000—13,000 tons monthly, since the beginning of the year, and as against a monthly average of 14,500 tons in 1931.

During the first nine months of 1932, Belgian production of matches amounted to 676,789,000 boxes, a diminution of 215,201,000 boxes on the production in the corresponding period of 1931. Consumption in Belgium rose by 2,147,000 boxes to 315,545,000 boxes; exports, however, fell by

191,642,000 boxes to 388,980,000 boxes. Total sales exceeded production therefore by 27,736,000 boxes. Imports were practically nil. Here it will be observed that production continues to decrease and it is now only about 50 per cent. of what it was several years ago. Internal consumption continues to increase, in spite of trade conditions; and the decrease in sales is entirely due to lower exports.

Sugar Production

The sugar industry has been greatly influenced by the reduction in the demand for all comestible luxuries containing sugar, and the tendency of consumers to cover their immediate requirements only from day to day caused a lack of firmness in the sugar market. The output of the sugar refineries, however, increased to 113,786 tons during the nine months under review, as compared with 105,864 tons for the corresponding period of 1931, and though the export trade was difficult, exports of crystallised and moist sugar were larger. Temporary exemption from excise duties was again granted to sugar manufactured from home-grown beet, and the various measurers already taken for the protection of the sugar beet industry were reinforced by the imposition, by law of July 23, of a customs duty of 130 frs. per 1,000 kilos on imports of foreign sugar beet.

Accidents in the Chemical Industry

American Safety Council's Activities in 1932

THE American National Safety Council has issued an informative report on accidental injury rates in the chemical industry in 1932. Statistics given in the report show that chemical plants made a further reduction during the year in the frequency of disabling injuries, but had the worst experience of recent years in severity. The 1932 frequency rate is 14 per cent. below that of 1931, but the 1932 severity rate is 16 per cent. above that of 1931. A pronounced increase in the number of fatalities accounts for the unfavourable 1932 severity rate. The fatality index of the chemical industry in the United States has risen in each of the past four years and is now higher than in 1926. Permanent partial disabilities and temporary injuries, however, dropped both in frequency and severity.

The 1932 experience of chemical plants is similar to the records in several other industries whose figures have been compiled. Severity rates increased from 1931 to 1932 in electric railway organisations, automobile plants, and paper and pulp mills, whereas frequency rates in these important industries declined. The records of the construction, rubber, clay products, and printing and publishing industries, however, show improvement in both injury rates.

Records of 266 Establishments

All reporting chemical plants averaged 10.53 in frequency and 1.92 in severity for 1932. These rates are based on the records of 266 establishments, whose employees worked almost 175,000,000 man-hours during the year. While the number of reported units is the largest in the history of the chemical industry, the exposure is somewhat below 1931. The change in the accident experience of the industry from 1931 to 1932 is more reliable than in earlier years because it is based on the records of more companies than reported for any previous two-year period.

Considering the records in various branches of the industry, manufacturers of carbon products had the lowest frequency rate, 2.68; and coal tar distillation plants had the lowest severity rate, 0.26. The average frequency rate was highest among manufacturers of fertilisers, 38.75; and the higher average severity, 6.04, occurred among explosives manufacturers. The figures given in the report also show considerable room for improvement in frequency among coal tar distillers, manufacturers of salt, and plants producing vegetable oils. Severity rates were particularly high in dye plants, chlorine and alkali manufacturing establishments and among makers of industrial gases, pharmaceuticals and fine chemicals, and vegetable oils. These high severity rates raise the average severity rate for the industry considerably above the rates for rubber, meat packing, glass and automobile plants. The frequency rate for all chemical plants, however, compares favourably with rates in these industries.

Causes of Accidents

If a company's rates show a tendency to increase, or indicate no progress during this period, a new investigation of plant hazards should certainly be made. Likewise, if an organisation has made substantial reductions in frequency but severity continued high, a logical conclusion is that minor hazards have been eliminated but some serious ones remain to be determined and corrected. Special attention to the accident situation in each plant is important at this time because, in the event of an improvement in business, it will probably become more difficult to maintain a good record or to improve a poor one.

According to statistics prepared by the National Safety Council the greatest number of minor casualties were caused by the handling of objects, and the greatest number of fatal injuries, by electricity and explosives. Falls of workers from a height, and harmful substances, formed a surprising total for temporary injuries, and machinery claimed a large total for permanent minor injuries. The smallest total was caused by stepping on and striking objects. Of the different branches of the industry, soap manufacturing reached the highest total of disabling injuries, and industrial gas manufacture the least.

A Roll of Honour

There is a roll of honour in the report, comprising a number of chemical and allied undertakings with exceptional records of accident prevention. In the acid manufacturing group, the Greenwich, Philadelphia, plant of the Pennsylvania Salt Manufacturing Co. made the largest improvement in frequency from 1930 to 1932 among small plants—79 per cent.; also in severity—60 per cent. The Fremont, Ohio, plant of the National Carbon Co., a subsidiary of the Union Carbide Co., worked more hours without a disabling injury than any other large unit in the carbon products manufacturing group. The Cleveland, Ohio, plant of the same company also worked 260,000 man-hours without a disabling injury.

The New Westminster plant of Canadian Industries, Ltd., had the best 1932 record among fertiliser manufacturers by working 63,000 man-hours without a disabling injury. This plant was the only one in the group to reduce frequency and severity consistently from 1930 and to attain a perfect record in 1932.

The Diamond, West Virginia, plant of the Union Carbide Co. headed the list of large establishments producing industrial gases by working 94,000 man-hours without a disabling injury. In the soap manufacturing industry the Cambridge, Massachusetts, plant of Lever Bros. had the lowest frequency rate among large plants (3.9), and the Springfield, Massachusetts, plant of the Perkins Soap Co., had the best record among small plant—21,000 man-hours without a disabling injury.

The Molybdenum Industry in 1932

THE production of molybdenum ore in 1932, according to the United States Bureau of Mines, amounted to 363,400 short tons, which yielded 2,616 short tons of concentrates carrying an average of 85.21 per cent. or 4,458,000 lb. of molybdenum sulphide (MoS_2) equivalent to 2,675,000 lb. of metallic molybdenum. In 1931 the production was 434,400 tons of ore which yielded 3,038 tons of concentrates carrying an average of 85.93 per cent. or 5,221,000 lb. of molybdenum sulphide, equivalent to 3,132,700 lb. of metallic molybdenum. The shipments of concentrates from mines in 1932 contained an equivalent of 2,616,700 lb. of metallic molybdenum having an estimated value of 1,308,000 dollars, compared with shipments in 1931 of 3,157,000 lb. of molybdenum, valued at 1,577,000 dollars.

Chemical Notes from Overseas

Hydrogen Peroxide in Belgium

GERMANY and Switzerland supply all of the hydrogen peroxide imported into Belgium which averaged nearly 400 metric tons annually during the past three years. By comparison in 1929 only 250 tons were imported. Exports of this product by Belgium totalled 92 tons in 1931 and 117 tons in 1932.

South African Paint Industry

A DECIDED attempt is being made to build up a South African paint-manufacturing industry, but as yet it has made little headway. The quality of the product has improved slightly, but the demand even for the cheapest types of South African paint has shown no sign of improving, probably because the local product cannot compete on equal terms with the imported. The bulk of South Africa's requirements in paints and varnishes are served by Great Britain. At the present time the United Kingdom is selling about £700,000 of oilmen's stores a year in the Union. The existing consumption of paints and painters' goods is worth about £430,000 a year.

Copper Sulphate in Argentina

IT is reported that La. Sulfurica, S.A. of Buenos Aires, has installed a copper sulphate plant of 2,400 metric tons annual capacity at their Avellaneda sulphuric acid plant. La Sulfurica is now jointly owned by Bunge and Born, Ltd., and the Imperial Chemical Industries, the latter serving as exclusive representative in Argentina of the British Copper Sulphate Export Association. The chief use of copper sulphate in Argentina is in the vineyards. Official statistics disclose that in 1930-31 there were slightly over 350,000 acres devoted to the production of grapes. The peak imports of copper sulphate in recent years occurred in 1928 when 3,378 tons were imported. Receipts during 1931 totalled 2,616 tons and for the first half of 1932, 653 tons. In 1931 the United States supplied 1,225 tons, United Kingdom 798, and Russia 337 tons. Russia is no longer directly represented in the market but solicits orders through its Montevideo trading organisation.

A Substitute for Carbon Black

GERMANY consumes annually large quantities of carbon black for use in the manufacture of rubber products, and this demand stimulated German interests to develop a process for manufacture of a black pigment of equal value from the materials available in the country. The domestic lampblack industry is an important one but the product has only a limited range of uses and recent research work was directed toward gas as a starting point instead of liquid fuels used in the manufacture of lampblacks. As far as scientific and technical possibilities are concerned, carbon black was produced satisfactorily on a small scale and its quality was reported favourably by many industries. From the commercial standpoint, the methods were too costly and further attempts were discontinued. The decline in prices of American carbon black in recent months was a decisive factor in discouraging this intended competition.

New Linseed Oil Plant Operating in Norway

A NORWEGIAN firm, A. S. Vera Fabrikker, organised during the summer of 1932, recently started the production of linseed oil in an old factory located at Sandefjord. This concern is also interested in the paint plant of Jotun Kemiske Fabrik, A.S., which will purchase its supplies of linseed oil from the new company. The new plant is equipped with modern machinery, the oil pressing and refining apparatus being entirely automatic. It is stated that this is the first plant of its type in the world. The capacity of the plant is approximately 30 tons of linseed per day, with an annual production of about 12,000 barrels of linseed oil. Consumption of linseed oil in Norway is estimated to be approximately 45,000 barrels per year. This plant with three other oil mills in the country is expected to take care of the entire demand for linseed oil. In 1932 total imports of linseed oil into Norway were 554 metric tons. Linseed comes principally from Argentina and Great Britain, while the oil is imported from Germany, the Netherlands, and Sweden.

French Nitrogen Commission

AN inter-ministerial commission has been created in France for studying problems relating to the production, distribution, and consumption of nitrogenous fertilisers. The commission will be under the chairmanship of the Under Secretary of State of the presidency of the council charged with national economy. The commission will have power to convoke to its meetings in a consulting capacity, the representatives of the chambers of agriculture, of the professional agricultural groups, and of the general groups of industrialists, business men, and specialists interested in the production, importation, and distribution of nitrogenous fertilisers.

Manchurian Nitrogen Plant

THE new ammonium sulphate plant of the South Manchuria Railway which will be constructed in Dairen will employ the Uhde process. The capacity, when fully completed, will be 180,000 metric tons of sulphate. Raw material requirements for capacity production will include 220,000 tons of coal and 108,000 tons of pyrites. The estimated cost of production for one ton of sulphate, according to an engineer of the company, will include: coal £96, electric current £156, sulphuric acid, £288, and other direct charges £240. Miscellaneous other charges, and the transportation of the fertiliser from the plant to Dairen City bring the cost to slightly over £1,152 a metric ton, according to other estimates.

Molasses as a Fertiliser in Australia

THE extensive use of molasses on cane fields in the northern areas of Queensland is becoming increasingly prevalent. The 1931 statistics indicate that 1,753,086 gallons were so used and that the quantity of molasses discarded has been reduced to the lowest proportions on record. The "Annual Report of the Bureau of Sugar Experimental Stations" refers to a 10-ton application of cane molasses per acre as having been responsible for an increase of sugar cane yield of almost 13 tons per acre over parts receiving no treatment. It further stated that the molasses gave a yield of almost 4 tons more than was obtained from plots which received commercial fertiliser equivalent to the plant food content of the molasses.

Manufacture of Pure Hydrobromic Acid

A CHEAP and convenient process for the manufacture of pure, dry hydrobromic acid is described by Jung and Ziegler in "Angewandte Chemie," May 20, 1933 (page 279). It involves passing a mixture of hydrogen and bromine over heated active carbon located in an S-shaped glass tube which is heated in an electric oven of suitable size. A water-filled wash bottle serves to adjust the speed of the hydrogen current over the active carbon surface and the latter is first treated with a strong stream of air which sweeps out all traces of dust. The bromine is introduced through a funnel into one of the limbs of the tube, the temperature being maintained below 25° C. to prevent premature volatilisation. The method is claimed to be superior to previous methods such as hydrolysis of phosphorus bromide, reaction of potassium bromide with acids, or catalytic combination of the two elements in presence of platinum.

Caustic Soda and Bleaching Powder in Japan

PRODUCTION of caustic soda in Japan in January amounted to 4,213 metric tons, a gain of 224 tons over December, and 1,048 tons over January, 1932. Total 1932 output was 71,327 metric tons. The Japan Bleaching Powder Producers' Association agreed to continue through the month of March the production curtailment rate of 30 per cent. Production during January of bleaching powder amounted to 5,545 metric tons, and increase of 395 tons over December, and 2,557 tons over January, 1932. Total 1932 output was 42,685 metric tons. The Nihon Chisso K. K. of Osaka has taken over from the Osaka Soda Co. its patent rights for manufacturing caustic soda and proposes to produce approximately 500 tons per month. The fact that some 1,000 tons of bleaching powder will be obtained as a by-product from the manufacture of caustic soda is causing bleaching powder manufacturers considerable concern and they are endeavouring to persuade the Nihon Chisso K. K. to join their association.

New Books

THE SELLING GAME. By John Notley. (Ernest Benn, Ltd., 7s. 6d. net).

"YOU'RE getting more and more into the way of the experienced traveller, and that means that you are becoming more and more useless." Dicky Singer's sales manager was seldom, if ever, encouraging, but there was really nothing encouraging in Dicky's life. It was his misfortune to be a representative of the firm of Watts, Paynter and Co., wholesale and export dealers in fancy good, goods which were practically unmarketable except as job lines. His life was one long pilgrimage from store to store and from buyer to buyer who seldom placed orders and never welcomed his appearance. Dicky was bored, but he told himself that so long as he possessed sanity and strength he would never become ambitious. Fate, however, ordained otherwise. He met Marjorie, and Marjorie had certain views about "men with the go in them to do anything hard." Almost as soon as he had made the momentous decision to model himself on those lines for the future, a skid in a borrowed car threw him in the path of Sam Goldman. Then Dicky's life became a whirl of energy, he worked day and night, he encountered difficulties with which any young man in his position might be faced; he had his triumphs and his share of disappointments, but he had something to work for and he enjoyed it. Working for two different employers broadened his outlook and he found that Sam's forceful business methods were worth emulating in his own transactions with buyers. Even the irritable and pompous Mr. Stamford, the sales manager, seemed less awe-inspiring than before. The Singer parents and their son did not understand each other too well, and Dicky's late hours led to friction which culminated in his departure from home, not without some trepidation and subsequent regret. He was to discover later that his parents had good points which he had not suspected. He was, in fact, to discover a great many things about which he had not previously worried himself. "The Selling Game" should appeal to all engaged in business, especially in business of the type which forms the background for the book. The author knows the world in which his characters move, and he has succeeded in building a good plot without having to invoke the aid of unlikely coincidence or rare good luck. Many hard working "reps" would perhaps question the possibility of writing a story round their lives, but Mr. Notley has attempted the task and has produced a readable and entertaining book.

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AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, TRANSACTIONS. Vol. XXVII, 1931. Pp. 425. D. Van Nostrand Co., Inc., New York City. $6.00.

THE occupations and earnings of chemical engineering graduates, the relative merits of platinum versus vanadium pentoxide as a catalyst for sulphuric acid manufacture and the broad subject of stream pollution, its causes and prevention, comprise the greater part of this volume. Other papers comprise a symposium on the theoretical considerations governing heat technology and the corrosion resisting properties of zirconium alloys. A survey of the occupations and earnings of 1,000 recent chemical engineering graduates from five recognised institutions of learning reveals the existence of a potential demand from industry for about 2,000 of these men per year. To-day, it is shown, about one-eighth of all engineering graduates took chemical engineering and that the saturation point is far from being reached. Five industries—chemicals, petroleum, rubber, iron and steel, and pulp and paper—seem to absorb more than half of these graduates, while the food, textile and leather industries, strangely, absorb only 2 per cent. The highly controversial question of the relative merits of platinum and vanadium catalysts for sulphuric acid manufacture is set forth in detail and is enriched by a large amount of discussion submitted by engineers having actual experience with both types. Both sides of the question are presented, accompanied by a great deal of performance data, such as SO_2 concentration in burner gas, consumption of catalyst per cent. conversion, and rate of arsenic poisoning. One-third of the volume is devoted to the subject of stream pollution and the treatment of industrial wastes. The contributors include, in addition to chemical, civil and sanitary engineers, a number of governmental officials, with the result that the problem is attacked from the legal, economic and social viewpoints as well as the technical. The source of the problem is traced to the congested industrial centres, the natural self purification of streams explained, and the experiences of three states in regulating waste disposal outlined. Reference is made to the broad federal and specific state powers bearing on the situation and the effective methods of treatment actually worked out in a dozen different industries. A symposium of heat technology, comprising four papers, covers such theoretical questions as the effect of tube length on the transfer of heat to oil flowing in pipes, the application of theoretical equations to the drying of solids and the rate of heat transfer in stream-line flow. Another paper, the seventh of a series, reports on studies made to determine the resistance to corrosion of zirconium alloys and on comparative tests with other types of alloys.

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PATENTS EXPLAINED. Herbert J. W. Wildbore. B. J. Wildbore and Son, 5s. net.

The importance of new inventions in industry cannot be too highly stressed, for they virtually constitute the new blood so essential to proper well being and progress in any manufacturing organisation; but, strange to say, comparatively few seem to appreciate or to be aware of the peculiar advantages the patent system offers to those who evolve or make use of inventions. The subject of patents is essentially technical in nature and this, maybe, accounts for the scarcity of handbooks adapted for the enlightenment of the ordinary reader. Considering the compact form of Mr. Wildbore's book it is remarkable how comprehensive a survey it gives of the patent system prevailing in this country and a further advantage is the fact that it takes notice of recent changes of the patent law effected by the Act of 1932. This book is well arranged and deals with all aspects of the subject in a manner making the whole easy to follow. After perusing its pages one is not only made conversant with the general working of the patent system but realises also that distinct benefits are available for those who seek and secure protection by patent.

Disinfection in Norway

Demand for British Cresol

DISINFECTION, as practised in some countries, is almost unknown in Norway. The climate is healthy, towns are small and situated mainly on the seaboard, the population is scattered, especially in the interior of the country, and there are no crowded industrial districts with slum quarters. There is, therefore, not the need for disinfection which exists in other places and there is no tradition in this respect in the housekeeping of the general public. Disinfection after dangerous infectious diseases is always undertaken by the public authorities.

Possibly for these reasons the market in Norway has never been interested in the sale of patent disinfectants. In a report issued by the Department of Overseas Trade, Norwegian markets for disinfectants are discussed. Patent disinfectants which contain poison can only be sold by authorised pharmacists. Other disinfectants can be sold by general dealers.

In all cases formal approval must be obtained before the article is placed on the market, and for this purpose a qualitative description must be submitted to the competent department of the Directorate of Medicine. A list of appropriate dealers and agents in patent disinfectants can be obtained by interested United Kingdom firms upon application to the Department of Overseas Trade. There is a fair demand for cresol (cresylic acid) which is imported mainly from the United Kingdom in iron barrels of 40 gal. At one time there was a large demand for "Lysol" but the trade in this commodity, which is sold by chemists in gallon containers and also in small bottles, has declined considerably in recent years. "Formaline" is imported from Sweden, Germany, England and Belgium in glass demijohns of 60 kilogrammes.

Letters to the Editor

Fertilisers and Crops

SIR,—I have read with interest the comments in your issue of May 13 (pages 423-424) on the work that is being done here in tracing relationships between plant growth and weather conditions which will, we hope, ultimately find practical application in the form of tables of expectancy of crop yield under different conditions. These tables would be similar in general character to the tables of expectancy of life which form the basis of life insurance. So useful are the life tables that life insurance companies, at a very low rate, insure human beings against accident of sickness, travel and other risks to which we are all exposed.

Judging by the records of yields on our own farm which now extend back for 90 years we have no reason to suppose that the risk borne by the company would be high. In consequence the premium could be low. Various difficulties have been suggested and particularly in the direction of finding out whether the farmer had really played the game or used the fertiliser properly. Most of these difficulties are more apparent than real. The farmer would have to declare his yield before he could make any claim and if his yield fell below what could reasonably be expected from the known weather conditions during the growing season, he would have to prove that he had not been guilty of negligence. Information of the kind now accumulating would enable the insurance company to form a good estimate of the yield that should be obtained under normal good husbandry in given weather conditions and this would form the check on the claim put forward by the individual farmer.

The weather is by far the most potent agent in causing variation in yield from year to year. Soil is a permanent factor in farm economy and its influence can be evaluated from a knowledge of the average yields obtained.

I do not want to give the impression that the tables are yet ready or that insurance of the kind I personally envisage could be started just yet. Our present business is to obtain information about the influence of weather on crop yields and on fertiliser efficiency which will form the basis of the further work necessary. Happily, a good deal of material already exists and awaits only detailed statistical examination, and we are hoping that the opportunities may rise for this to be put in hand as early as possible.—Yours faithfully,

E. J. RUSSELL.

Rothamsted Experimental Station,
Harpenden, Herts.

Questions and Answers

Technical, Industrial and General

WITH a view to promoting closer co-operation between members of the chemical industry who are in search of information on technical, industrial and general points and those who are in a position to supply their requirements, a selection from the large number of questions received is given under this heading. It is important that the full data in regard to each question that is asked should be put before us, or the answers given will have less value than they might otherwise possess. In cases where the answers are of general interest, the answers are published; in others, the answers are simply passed on to the inquirers. Readers are invited to co-operate in supplying information on the subjects of the queries and in augmenting replies already given.

194.—WATER SOFTENING MEDIUM.—In THE CHEMICAL AGE of May 27 (p. 488) information was sought as to where a water softening medium could be purchased for use in portable water softening plants.

In addition to the information already given, we are informed that the base exchange principle is employed in Electrolux water softeners. This is the process, employing zeolitic softening compounds, which has been found to give the most satisfaction and best results under most circumstances. The base-exchange process of water softening is suitable for the treatment of water required for almost all purposes. Zeolites are of two main types, natural and synthetic. Each type has its particular application. Natural zeolites are extremely durable but, as a rule, will deal with a smaller amount of water, between regenerations, than a given amount of synthetic softening material under similar conditions. The material used by Electrolux, Ltd., is a natural substance known as "Natrolith." Although natural and possessing the advantages possessed by most natural softening materials, it has an efficiency much higher than the normal. Like other natural softening materials it is only slightly soluble in water and is extremely resistant to the attack of waters having a low *pH* value. When employing Natrolith the amount of common salt required to remove a given quantity of hardness is extremely low and the rate of flow through the plant may be high without fear of incompletion of the softening reaction. The containers for the softening material are designed to emphasise its best qualities and are equipped with a system of valves for regeneration purposes. The grouping of the valves is so arranged that the operation is straightforward. In all but the larger types, the brine tank is integral with the softening cylinder and, in all cases, is of such proportions that the brine is correctly diluted before entering the plant. It is noteworthy that, with this softening material, it is not necessary to allow the brine to stand inside the softener for a considerable time—washing out may commence immediately after the introduction of the brine and time is thus saved. There are standard plants designed to suit the most usual requirements, but special apparatus to suit any special set of conditions can be designed and supplied at the lowest prices consistent with high quality.

Queries Awaiting Replies

199.—VARNISH FOR SMOKED SAUSAGE.—Information is required with regard to a suitable antiseptic varnish for painting on smoked sausage for the prevention of mould and slime. It is understood that there is a product on the Continent known as Polselak, but the name and address of a manufacturer or supplier in Great Britain is required.

Chemi-Luminescence

Attempt to Manufacture Cold Light

THE Massachusetts Institute of Technology is experimenting with a project to extend the practical application of the cold light phenomena beyond the present use of it on watch dials. At a recent meeting of the American Chemical Society, Professor E. H. Huntress demonstrated this phenomenon by oxidising the organic compound luminol at so low a temperature that a piece of ice placed in the same vessel was removed later unmelted. The firefly and the luminescent fish have been serving as bases for these researches, the results of which have shown that compounds of sulphur with calcium, barium and strontium will produce phosphorescence.

The object of further researches is to create visible light by the reaction of chemicals at low temperatures. The process now being evolved is founded on the principle of chemical oxidation as in burning wood or stored light energy as in fluorescence. Classification of light has placed phosphorescence in the class originating from chemical activity, mainly in that class of oxidation following the exposure of the substance to visible or invisible light. It has been found that in living things some chemical, while being slowly oxidised, produces the compound known as luciferin. Efforts are, therefore, directed to produce this chemical by artificial means and subject it to the same oxidation process as in the so-called bioluminescence. There still remains to be investigated whether or not the light emitted by various organisms is part of the natural respiration of these organisms. It appears that the lucifrase generally present serves as a chemical catalyst for oxidation of the luciferin and emits it as light. Here it is thought is the secret of steady luminescence without stimulation.

Anglo-Palestine Exhibition

Display by Imperial Chemical Industries

THE strikingly rapid development of agricultural and industrial Palestine could not be better demonstrated than it is by the exhibit organised by Imperial Chemical Industries at the Anglo-Palestine Exhibition which opened at the Agricultural Hall on June 7. The scheme of this exhibit is to show, on the one hand, I.C.I. products exported to Palestine—chemicals, fertilisers, explosives, paints and varnishes, non-ferrous metals, ammunition, dyestuffs, Lightning fasteners and Rexine; and on the other, the results, shown by samples and photographs, of their practical application by Palestinian importers.

Palestine is seen to be interested in the latest methods of agriculture. Pamphlets on the use of fertilisers are prepared and printed there in Hebrew, Arabic and German, and the size and quality of the fruit—grapefruit, washington oranges, shamouty oranges, lemons and mandarins, from Jaffa—testify as much to the beneficial use of fertilisers as do the photographs of oats, vetches and grapes. Photographs illustrate the way in which modern methods of fumigation are used in the orange groves. Another interesting exhibit demonstrates the advance of soap manufacture, from the most primitive product to one which can easily compete with any made in Europe. There is the native soap made in Arab homes in Acre, and native soap made with I.C.I. chemicals in Nablus—the kind used by Moslems all over the Near East. The third stage is demonstrated by samples of Marseilles soap, Nablus soap, laundry powder and utensil cleaning powder made in Jaffa, together with Marseilles soap, toilet soap and laundry powder made in Tel-Aviv. Finally there are the products of the Shemen Works soap factory of Haifa, an up-to-date factory turning out a whole range of soaps of renown which are even being sold to quite a large extent in England.

Contrast is again evident in the use made of non-ferrous metals sent out from the Kynoch Works, Birmingham. There are hand-made hammered native copper utensils alongside a white bath geyser made by the biggest copper works in Palestine, and incidentally painted and finished with products from Slough. The Palestine manufacturer of materials for sunblinds and deck chairs makes use of British dyes, and I.C.I. dyes are also used in the manufacture of jumpers, bathing suits and summer shirts.

Depression in Central America

Imports and Exports of Chemicals

THE Department of Overseas Trade has lately issued a report on economic conditions in the republics of Guatemala, Honduras and Nicaragua (H.M. Stationery Office, 3s. net). The British Vice-Consul at Guatemala City remarks that the depression consequent upon the difficult situation of world markets is still felt both in the external and internal trade of the country. The purchasing power of the general community is depressed, and there is a lack of confidence in banking institutions which arises from the banking disasters of 1931. A definite trend for the better can arrive only as a result of an improvement of conditions outside the republic. It is shown that although attention has been given to fostering industrial expansion, Guatemala is principally an agricultural country, and must continue to rely chiefly upon revenue derived from taxation of imports as well as from that imposed upon exports of agricultural products. The participation of the United States, Germany and the United Kingdom in the trade with Guatemala is discussed, together with the future prospects of trade with the United Kingdom.

The British Consul at Tegucigalpa reports in regard to the Republic of Honduras that the depressed financial conditions which prevailed throughout 1931 have in no way improved. The suppression of the revolution involved the Government in heavy expenditure, while revenue has fallen, largely on account of shrinkage of customs receipts. The conversion of the national currency to a gold basis failed to help external trade. Trade with the United Kingdom is considered in detail, and in its relation to trade with Germany and the United States.

In reporting upon economic conditions in Nicaragua, the British Consul at Managua remarks that the Managua earthquake has had a disastrous effect on the commercial fabric of the country. Merchants have lost so heavily that they have been driven into bankruptcy, and few importers can find ready money to pay for purchases abroad. Imports have fallen off during the last two years by about 50 per cent. and foreign exchange operations have been controlled. Nicaragua is passing through a period of the greatest difficulty, although internal and external Government debts are low, and the most that can be hoped for, is a gradual return to the normal.

Chemical Trade Figures

Statistics given in the report show that the total imports of chemicals and simple drugs in Nicaragua decreased from 957,700 kilos to 842,600 kilos in the space of a year. The imports under this heading from the United Kingdom, however, rose in the same period from 298,540 kilos to 310,221 kilos. Imports of paints, pigments, colours and varnishes shrunk from 229,124 kilos to 158,876 kilos, the imports from the United Kingdom falling from 11,513 to 3,531 kilos. Imports of distilled spirits decreased from 42,840 to 19,421 kilos, the United Kingdom proportion falling from 27,454 to 12,083 kilos. Imports of medicines, however, showed an increase from 129,972 to 146,815 kilos, the United Kingdom sending 22,106 kilos in 1931, against 15,183 in 1930, and cement imports increased from 3,424,207 to 4,769,437 litres.

Several soap and candle factories have been established in Honduras, the most important of which produces some 500,000 lb. of candles and 150,000 lb. of soap annually, all of which is consumed locally.

There is one cement factory on the outskirts of Guatemala, which is a source of supply for the majority of the native builders. Washing and toilet soaps are manufactured at local factories which, although much inferior to foreign articles, are sold profitably owing to the low retail prices at which they can be offered. Candles produced in Guatemala and Quezaltenango supply practically the whole demand of the country.

Chemical Industry in Hungary

Reduced Trade with the United Kingdom

ACCORDING to a report by Dr. H. C. A. Carpenter, late of the British Legation at Budapest, on "Economic Conditions in Hungary," issued by the Department of Overseas Trade (H. M. Stationery Office, 2s.), trade conditions are still undergoing the depression first felt in 1929. The report states that the position of Hungary is a difficult one, and the future is still uncertain. The Hungarian agricultural crisis has seriously interferred with the chemical industry. The consumption of artificial manure alone has decreased by about 90 per cent. during 1931 and 1932. At the end of 1931 the factories had several thousands of truckloads of quite unsaleable artificial manure left on their hands. The consumption of sulphuric acid was also heavily reduced and factories made strenuous efforts to sell abroad their stocks at reduced prices. Whereas formerly 7,000 truckloads were produced, the output has now declined to about 10 per cent. of this quantity. Heavy decreases have also occurred in the consumption of tar, asphalt, cement, dyes and varnish.

The branch of the industry supplying chemicals for the textile, leather, paper and furrier industries was self-supporting. Satisfactory results were also achieved by the branch supplying the coal briquette industry and explosive, medical and serum factories. The decline in sugar consumption which has been experienced since 1930 was considered to be singularly unfortunate, as only an increase in home consumption could relieve the crisis felt in the sugar industry, due to foreign competition. The petroleum industry has not escaped the general economic depression. The Hungarian petroleum industry is able to handle 400,000 tons of crude oil per annum, whilst at present the total inland requirements do not exceed 150,000 tons.

Both the export and the import trade with the United Kingdom have suffered losses. Between 1931 and 1932 the total decrease of exports to the United Kingdom was £73,013. With regard to imports asbestos showed a decrease of £2,089, raw rubber a decrease of £34, and other products, including sugar, chemicals and mineral oil, a decrease of £531. Crude metal was among the few commodities which rose, showing an increase of £717.

News from the Allied Industries

Margarine

A GERMAN GOVERNMENT DECREE of April 13, 1933, which became effective on May 15, requires that containers and other outer packing in which margarine, edible substitute fats, hardened edible oils, vegetable fats (cocoanut oil, etc.), or hardened fish oils are offered for sale, must be marked in German, to indicate the percentage of the ingredient oils and fats used as raw materials.

Dyeing and Cleaning

CHANGES IN THE COMPOSITION of the board were announced at a meeting of the Associated Dyers and Cleaners, Ltd., on June 7. Mr. J. W. Murray, chairman, intimated his resignation, and Mr. G. E. Leavey and Mr. A. W. Fisher did not offer themselves for re-election. Mr. Leonard Rigg was re-elected, and Mr. Frank Eastman and Mr. William Gillespie were elected to the board. At the request of the whole of the new board, Mr. H. D. Drysdale and Mr. Cyril Eastman will remain joint managing directors. Both these gentlemen emphasised that all differences had been put aside, and the board would concentrate as a united body upon the tasks before them.

Artificial Silk

THE FORMAL AMALGAMATION of three Japanese rayon firms—Asahi Kenshoku Kaisha, Nippon Bemberg Kenshi Kaisha, and Nobeoka Ammonia Kenshi Kaisha—has been recently achieved at Osaka, although the three companies will not begin to operate as one unit until July 15. The new company will be called the Nobeoka Ammonia, and will be the largest rayon-yarn producing company in Japan, with a paid up capital of 32,500,000 yen (£3,250,000). Its capacity will be 35 tons of yarn a day. It is estimated that the cost of production will be about £4 10s. per 100 lb. All three companies are closely associated with the Japan Nitrogen Fertiliser Co. The Asahi firm and the Japan Bemberg are affiliated with the Algemeen Kunstzijde Unie (A.K.U.).

Whale Oil

IN THE KING'S BENCH DIVISION on June 1, Mr. Justice Branson had before him an *ex parte* application in the case of Hvalfangerselskapet Polaris, A/S and Hvalfangerselskapet Globus A/S v. Unilever, Lever Bros., and de Nordiske Fabrieker de no fa A/S. The dispute concerned a whale oil contract. Mr. Valentine Holmes asked that the order of the House of Lords reversing an order of the Court of Appeal should be made an order of the High Court. He also asked for an order that the plaintiffs have the costs of agreeing the amount of damages and the costs of assessment of the damages, and, further, that the two sums of £75 paid into Court as security should be paid out to the plaintiffs. He also asked for the costs of that motion. His lordship agreed to these requests and granted the application.

Iron and Steel

AS A RESULT of the recent imposition of tariffs imports of foreign iron and steel have almost reached vanishing point, according to a report of the Tees Commissioners at their meeting at Middlesborough on June 7. Only 1,719 tons were imported during May, compared with 7,740 tons during the same month of 1932.

IT IS OFFICIALLY STATED that an application is now before the Court for calling the necessary meetings of the debenture stockholders and shareholders of Dorman, Long and Co., Ltd., for the purpose of considering in detail the scheme for the proposed amalgamation of Dorman, Long and Co., Ltd., and the South Durham Steel and Iron Co., Ltd.

ELLESMERE PORT IRON WORKERS knocked off work owing to the intense heat on June 6. Burnells started with a morning shift, but in the afternoon the workers informed the management through a deputation that they were not turning in. Mersey ironworkers should have started afternoon work, but the men refused to turn in because of the excessive heat. Before the war, when work was regular and wages good, knocking off for heat was a common occurrence, but during the depression and the economic situation the men have worked during the heat wave.

Cement

THREE HUNDRED MEN employed at the brick making plant of the Associated Portland Cement Manufacturers at Murston, Sittingbourne, who came out on strike on Tuesday, returned to work on Wednesday.

IT IS UNDERSTOOD that the issue at par of £1,500,000 new 4½ per cent. debenture stock of the Associated Portland Cement Manufacturers, Ltd., has been oversubscribed by conversion application by the holders of the existing 5 per cent. second debenture stock. There will, therefore, be no allotments made in respect of the cash applications which have been received.

Matches

A NET LOSS of Kr. 522,800,000 (approximately £27,000,000 at the current rate of exchange) is shown in the accounts of the Swedish Match Co. for 1932. Actually the income, including interest, dividends and trading profit, exceeded expenditure by Kr. 19,700,000, but no less than Kr. 542,500,000 is written off various assets. After deducting Kr. 10,785,740 brought in, there is a deficit of Kr. 512,005,619. This is covered by a transfer from reserve, which is thus reduced to Kr. 2,994,380. The profit and loss account is made up on broad lines. With the book-keeping system previously in force, the board say that it is impossible to render a detailed profit and loss account. A new system was put into effect on January 1 last, which will enable detailed accounts to be submitted in future. Sales of matches made in Sweden fell heavily, the 1932 total being 327,038 cases, against 474,904 in 1931. With regard to the huge claims made by Kreuger and Toll and International Match Corporation, it is stated that these have been repudiated by the company, which has put forward considerable claims against these concerns. The board is unable to make any statements as to the legal question or as to how the company's position will be affected.

British Standards Institution

Specification for Turbine Oils

THE long awaited British Standard Specification for Turbine Oils has been published by the British Standards Institution as No. 489-1933. Whilst a standard specification (No. 210) for pure mineral lubricating oils has been available since 1924, it has been evident for some time that an agreed specification for turbine lubricating oils was desirable and since the service conditions for these oils are of a somewhat special nature, it was not considered that a general widening of the scope of the 1924 specification to include these oils, would satisfactorily meet the situation.

While it is realised that in its present form the specification may exclude occasional oils which would yet give satisfactory service, but with which no actual experience has been recorded, the limits set are such that the specification will not admit any oils other than those which experience to date has shown to be suitable for turbine lubrication. The specification is open to revision at any reasonable time after publication.

The limits set for certain characteristics, as well as the methods specified for their determination, in connection with which some controversy exists, are being considered by a small but representative investigating committee and the findings of this committee will determine the justification or otherwise for any modification in these limits in subsequent revised editions of the specification. In the past, turbine manufacturers and many of the turbine users have each set their own standards as to the requirements of the lubricant for their machines. The correlation of one set of such standards with another had often to be made, or attempted, and the difficulties attendant on this and the lack of confidence often associated with any recommendations or decisions made from such correlations will be clearly apparent and therefore, the provision of one standard, approved alike by turbine builders and users, as representative of good turbine lubrication practice, will be welcomed. Copies of this specification may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

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.

THE holiday influence has naturally been felt in the London chemical market during the past week, and there is little alteration to report. Prices of coal tar products remain unchanged from last week and there has been little interest in any products. In spite of the efforts of the Chamber of Commerce to prevent the usual interference with business, Manchester trade has succumbed almost to its normal extent to the influence of the Whitsuntide holidays and the chemical market has been correspondingly affected. New business has been extremely quiet and not until early next week will conditions be normal. Prices, however, show little change on balance. Business in the Scottish heavy chemical market has been very quiet on account of the Whitsun holidays.

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: 9½d. per lb.; less 5%. MANCHESTER: 9¾d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%, 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. 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, £48; 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 £52 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, 10¾d., carriage paid. MANCHESTER: 11¼d.

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: £19 c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r mines. SCOTLAND: White powdered, £24 ex wharf. MANCHESTER: White powdered Cornish, £23 10s. at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. 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. to 3s. 4d. 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.—3⅞d. 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, 3½d. 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 per cwt.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

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

LAMPBLACK.—£45 to £48 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, £31 10s.; brown, £30.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £27 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 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.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40 to £42.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5⅜d. 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.—LONDON: £37 to £40 per ton. SCOTLAND: 99⅜/100% powder, £37. MANCHESTER: £37 to £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.

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 : £16 10s. 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. 1d. to 4s. 6d. 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.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

ACID, TARTARIC—11¾d. per lb., less 5 per cent.
CADMIUM IODIDE.—14s. 6d. per lb.
IRON QUININE CITRATE.—9¾d. to 1s. 0½d. per oz.
LINALOL (ex Shui oil).—5s. 9d. per lb.
SOD. BARBITONUM.—13s. to 15s. per lb.

Essential Oils

ALMOND, FOREIGN S.P.A.—9s. per lb.
BOURBON GERANIUM.—25s. 3d. per lb.
CINNAMON.—3s. 6d. per lb.
CLOVE, 90/92% English.—4s. 9d. 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.
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.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 2s. 5d. to 2s. 6d. per gal.; 2% water 3s. 0¾d. MANCHESTER : Crystals, 9½d. per lb.; crude, 2s. 7d. 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, 9d. to 9½d. per gal.; standard motor 1s. 4d. to 1s. 4½d.; 90%, 1s. 5d. to 1s. 6d.; pure, 1s. 7½d. to 1s. 8d. LONDON : Motor, 1s. 7½d. SCOTLAND : Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—B.S.I. Specification standard, 3d. per gal. f.o.r. 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, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 7d.; 90/190%, 9d. to 1s. 1d. 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. Flaked, £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 5s. per ton. MANCHESTER : £3 15s. f.o.b. LONDON : £4 to £4 2s. 6d. f.o.b. East Coast part.
PYRIDINE.—90/140, 3s. 9d. to 4s. 6d. per gal.; 90/180, 2s. to 2s. 6d. SCOTLAND : 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND : 4¾d. to 5d. per gal.
XYLOL.—Common, 1s. 10d. to 1s. 11d. per gal.; pure, 2s. 1d. to 2s. 2d.
TOLUOL.—90%, 2s. to 2s. 1d. per gal.; pure, 2s. 4d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9 per ton. Grey £14 to £15. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER : Brown, £9 10s.; grey, £15 10s.
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.

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.

Latest Oil Prices

LONDON, June 7.—LINSEED OIL was easy. Spot, small quantities, £21; June, £19 10s.; July-Aug. £19 12s. 6d.; Sept.-Dec., £20, naked. RAPE OIL was quiet. Crude extracted, £29; technical refined, £30 10s., naked, ex wharf. COTTON OIL was firm. Egyptian, crude, £20 10s.; refined common edible, £23 10s.; and deodorised, £25 10s., naked, ex mill. TURPENTNE was quiet. American, spot, 60s. 6d. per cwt.
HULL.—LINSEED OIL, spot, quoted £20 2s. 6d. per ton; June, £19 12s. 6d.; July-Aug., £19 17s. 6d.; Sept.-Dec., £20 2s. 6d. COTTON OIL, Egyptian, crude, spot, £20 5s.; edible, refined, spot, £22 10s.; technical, spot, £22 10s.; deodorised, £24 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £21, naked. GROUNDNUT OIL, extracted, spot, £24 10s.; deodorised, £28 10s. RAPE OIL, extracted, spot, £27 10s.; refined, £29. SOYA OIL, extracted, spot, £21 10s.; deodorised, £24 10s. per ton. COD OIL, June, 17s. per cwt. CASTOR OIL, pharmaceutical, spot, 39s.; first, 34s.; second, 31s. per cwt. TURPENTINE, American, spot, 62s. 6d. per cwt.

Pumps for Heating Systems

A BOOKLET, describing their patent "Fullway" Mopump (super type) has been received from Rhodes, Brydon and Youatt, Ltd. In heating systems, forced circulation is usually associated with the condition that when the pump is stopped the flow under the action of gravity should be as large as possible. To gain this end, pumps have been arranged on by-passes and many free acting non-return valves have been devised with the object of keeping the resistance to flow in the main circuit down to a minimum. The "Fullway" Mopump has obviated the necessity for both by-passes and all valves, since, owing to its special design, the resistance to flow across the pump when stopped is actually less than that in any known non-return valve. Standing on its own base, the unit needs only to be brought into line with, and coupled up to, the heating pipes. No further securing is necessary and holding down bolts are not required. The unit is practically noiseless, and in order to prevent the transmission of any vibration to the fabric of a building a special adjustable anti-vibration base has been devised.

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.

Emulsions for Artificial Silk

AN emulsion suitable for sizing artificial silk is made by adding molten resin to an aqueous emulsion of wax and dextrin, according to Specification No. 388,994 of P. Jean-Prêtre. Emulsifying agents such as gums, for example gum arabic and gum from the carob tree, fecula and glucose and also albumen or gelatine may be added. An aqueous solution of gum from the carob tree is mixed with a solution of Marseilles soap in water and glucose and gum arabic are added. The solution is heated and molten bees wax is poured in while stirring. Fecula, a solution of dextrin neutralised with sodium carbonate and albumen are then added. Molten pine resin is then poured, while stirring, into the warmed liquid to form an emulsion.

Manufacture of Higher Alcohols

HIGHER alcohols can be prepared by passing a mixture of hydrogen with the vapour of both methyl and ethyl alcohols over catalysts comprising an alkaline-earth metal oxide, particularly magnesia, activated by the presence of less than 10 per cent. of one or more of the oxides of the metals lead, thorium, silver, uranium, tungsten, cadmium, tin, chromium, manganese, zinc, iron, nickel, cobalt, and copper. The reaction is effected below 400° C., preferably between 200 and 350° C., at ordinary or increased pressure, and using one-half to three molecular proportions of hydrogen (a molecule being regarded as H_2) per molecular proportion of alcohol mixture. The catalyst may be stabilised by the addition of aluminium oxide or hydroxide, titanium oxide or hydroxide, stannic acid gel, silica gel or wood charcoal; the influence of the latter is stated to persist even after the usual regenerative treatment with oxidising gases or steam at temperatures of 300-500° C. Examples are given of the preparation of (1) a product comprising *n*-propyl alcohol, isobutyl alcohol, *n*-butyl alcohol, methylethylcarbin carbinol, hexyl, heptyl, octyl and nonyl alcohols by use of a catalytic mixture of magnesium, aluminium and copper oxides, the pressure conditions being atmospheric; (2) a mixture of *n*-propyl, isobutyl, *n*-butyl and higher alcohols with methyl-ethylcarbin carbinol, using the same catalyst but at a higher temperature and the gases under a pressure of 30 atmospheres. (See Specification No. 381,185 of British Industrial Solvents, Ltd.)

Specifications Accepted with Dates of Application

PRODUCTION OF ALKALINE PHOSPHATES.—Bozel-Malétra Soc. Industrielle de Produits Chimiques. May 22. (Germany, June 17, '32.) 15308.

PRODUCTION OF HYDRAZINE.—G. B. Ellis (E. Merck). Dec. 3, 1932. 392,845.

PRODUCTION OF IONISED AIR.—British Thomson-Houston Co., Ltd. (Allgemeine Elektricitats Ges.). Jan. 31, 1933. 392,873.

PROCESS FOR DEHYDRATING PHENOLS AND MIXTURES CONTAINING PHENOLS.—Chemische Fabrik Von Heyden Akt.-Ges. Feb. 20, 1932. 392,878.

Specifications Open to Public Inspection

METALLIC POWDER AND ITS PROCESS OF MANUFACTURE.—Soc. Anon. Le Carbone. Nov. 16, 1931. 30183/32.

MANUFACTURE OF INTERMEDIATE PRODUCTS AND DYESTUFFS.—Soc. of Chemical Industry in Basle. Nov. 21, 1931. 31935-6/32.

MANUFACTURE OF ANTHRAQUINONE-ACRIDONES.—E. I. Du Pont de Nemours and Co. Nov. 16, 1931. 32286/32.

COMPOSITE TITANIUM PIGMENTS.—Titanium Pigment Co., Inc. Nov. 19, 1931. 32711/32.

PROCESS FOR PRODUCING SPIRITS BY FERMENTATION OF MATERIALS CONTAINING CARBOHYDRATES.—Aktieselskabet Dansk Gaerings-Industri. Nov. 19, 1931. 32767/32.

METHOD FOR PRODUCING FROM CYMOL OR ITS DERIVATIVES A HYDROCARBON WITH A LARGER MOLECULE OR DERIVATIVES OF THIS HYDROCARBON.—N. Puranen and E. Erhnrooth. Nov. 20, 1931. 32900/32.

Applications for Patents

PRODUCTION OF BENZOIC ACID AND BENZOATES.—Bozel-Malétra Soc. Industrielle de Produits Chimiques. May 26. (France, May 26, '32.) 15318 and 15319.

CONCENTRATION OF RUBBER LATEX.—J. Brandwood. May 25. 15078.

PRODUCTION OF VITREOUS SILICA WARE.—F. L. Clark and Imperial Chemical Industries, Ltd. May 25. (June 16, '32.) 15128, 15129.

PREPARING OXALIC ACID.—Consortium für Elektrochemische Industrie. May 23. (Germany, May 30, '32.) 14842.

PRODUCTION OF COMPOSITIONS COMPRISING CHLORINATED RUBBER AND SYNTHETIC PLASTICS.—Dunlop Rubber Co., Ltd., D. F. Twiss and J. A. Wilson. May 26. 15232.

MERCERISATION OF TEXTILE MATERIALS, ETC.—E. I. Du Pont de Nemours and Co. May 24. (United States, May 24, '32.) 14987.

MANUFACTURE OF CELLULOSE ESTERS.—E. I. Du Pont de Nemours and Co. May 25. (United States, May 25, '32.) 15147.

MANUFACTURE OF AZO DYES.—E. I. Du Pont de Nemours and Co. May 27. (United States, May 27, '32.) 15379.

MANUFACTURE OF SULPHUR.—J. P. Fraser. May 24. 15046.

RECOVERY OF SULPHUR.—J. P. Fraser. May 24. 15047.

TREATMENT OF NATURAL RESINS, ETC.—H. L. Frenkel. May 22. 14710.

MANUFACTURE OF GELATINOUS SUBSTANCES.—E. W. Geere. May 22. 14774.

VULCANISATION OF RUBBER.—Goodyear Tire and Rubber Co. Rubber Co. May 26. (United States, July 13, '32.) 15247.

STERILISERS FOR LIQUIDS.—E. G. Greville. May 26. 15281.

MAKING POTASSIUM OXALATE FROM POTASSIUM FORMATE.—E. Hene. May 26. (Germany, May 30, '32.) 15289.

MANUFACTURE OF SPONGY RUBBER, ETC.—J. A. Howard. May 26. 15310.

MANUFACTURE OF 1.4-DIAMINO-ANTHRAQUINONE-2.3x-TRISULPHONIC ACIDS.—I. G. Farbenindustrie. May 22. (Germany, May 23, '32.) 14751.

MANUFACTURE OF SOLID DIAZO SALTS.—I. G. Farbenindustrie. Bay 22. (Germany, May 21, '32.) 14808.

MANUFACTURE OF WATER SOLUBLE DIAZOAMINO COMPOUNDS.—I. G. Farbenindustrie. May 23. (Germany, May 23, '32.) 14900, 14901.

MANUFACTURE OF NAPHTHALENE-1 :4 :5 :8-TETRACARBOXYLIC ACID, ETC.—I. G. Farbenindustrie. May 25. (Germany, May 25, '32.) 15148.

MANUFACTURE OF DYESTUFF PREPARATIONS FOR TEXTILE PRINTING.—I. G. Farbenindustrie. May 25. (Germany, May 26, '32.) 15189.

STRIPPING AGENTS.—Imperial Chemical Industries, Ltd., and L. G. Lawrie. May 23. 14915.

MANUFACTURE OF TITANIUM OXIDES.—Intermetal Corporation. May 26. (United States, June 17, '32.) 15315.

MAKING RUBBER THREAD.—International Latex Processes, Ltd. May 26. (United States, May 28, '32.) 15233.

ADHESIVES FOR JOINING SURFACES OF OILED PAPER, OILED SILK, ETC.—R. G. Israel. May 27. 15328.

MANUFACTURE OF AZO DYESTUFFS.—J. Y. Johnson (I. G. Farbenindustrie). May 22. 14769.

MANUFACTURE OF RESINOUS CONDENSATION PRODUCTS.—J. Y. Johnson (I. G. Farbenindustrie). May 25. 15149.

DYEING SKINS.—J. Y. Johnson (I. G. Farbenindustrie). May 25. 15149.

MANUFACTURE OF DIAZO COMPOUNDS.—Kalle and Co., Akt.-Ges. May 22. (Germany, May 23, '32.) 14796.

PLANT FOR CRACKING HYDROCARBONS, ETC.—E. Livraghi. May 25. (Italy, Sept. 16, '32.) 15201.

PRODUCTION OF CONCENTRATED NITRIC ACID.—Lonza Elektrizitätswerke und Chemische Fabriken. May 26. (Germany, June 4, '32.) 15301.

PYROGENATIC PRODUCTION OF HYDROCARBONS.—O. D. Lucas and E. J. Lush. May 24. 15030.

METHODS OF PRODUCING RUBBER ARTICLES, ETC.—R. F. McKay (International Latex Processes, Ltd.). May 24. 14929.

PRODUCTION OF CEMENTS.—Metallges. May 26. (Germany, April 4.) 15299.

PRODUCTION OF HYDROGEN.—Oxhydrique Française. May 22. (France, May 25, '32.) 14731.

RECOVERY OF SULPHUR.—J. Parrish. May 25. 15135.

PRODUCTION OF BENZOL FROM FUEL-DISTILLATION GAS.—J. E. Pollak. May 22. (Aug. 15, '32.) 14799.

CONTINUOUS TREATMENT OF VEGETABLES FOR TPRODUCTION OF LELLULOSE.—U. Pomilio. May 22. (Italy, June 10, '32.) 14800.

RUBBER DERIVATIVES.—C. A. Redfarn, P. Schidrowitz and F. G. Smith. May 24. 15037.

COLORIMETERS.—A. G. Sheftel. May 22. 14777.

MANUFACTURE OF DYESTUFFS CONTAINING CHROMIUM.—Soc. of Chemical Industry in Basle. May 22. (Switzerland, June 9, '32.) 14809.

DYEING BONES OR OBJECTS MADE THEREFROM.—Soc. of Chemical Industry in Basle. May 23. (Switzerland, June 3, '32). 14891.

METHOD OF OBTAINING COMPOSITE COATINGS OF METALS.—W. S. Thorpe. May 23. 14826.

PRODUCTION OF AROMATIC ALCOHOLS.—I. Valik and L. Valik. May 23. (United States, June 1, '32.) 14893.

From Week to Week

NEXT MONDAY, June 12, is the closing date for the first round of the Chemical Industry Lawn Tennis Tournament. Results of all first round matches must reach the Editor of THE CHEMICAL AGE by 9.30 a.m. on Tuesday.

MEMBERS of the Institution of Mechanical Engineers, numbering 280, last week visited the bitumen refinery at Dundee of Wm. Briggs and Co., Ltd.

MR. H. MCCULLOCH, late manager of the Carevale Chemical Co., Paisley, and Mrs. McCulloch have celebrated their golden wedding. He retired two years ago.

FOR THE OCCASION of the Chicago Exposition, 1933, the Wellcome Research Institution has published a booklet giving a résumé of its many activities which commenced with the founding of chemical and physical research laboratories in 1894. More than 275 scientific publications and reports have now been published by this institution.

MR. H. R. GREENHALGH, joint vice-chairman of Lever Brothers, Ltd., has had the honour of Commander of the Order of Leopold II conferred upon him by the King of the Belgians "in recognition of his long association with and service to Belgium and the Belgian Congo." On April 30 Mr. Greenhalgh completed forty years' service with Lever Bros., Ltd.

TWO COMPANIES under the control of Imperial Chemical Industries, Ltd., propose to redeem debentures. Welsbach Light Co., Ltd., is redeeming on November 30 next the outstanding 4½ per cent. debenture stock at 103 per cent. There is £35,353 of this stock outstanding. I.C.I. (Lime), Ltd., is redeeming on the same day the balance of the 5 per cent. debentures at par.

AT AN EXTRAORDINARY GENERAL MEETING of the Brittany China Clay Co., Ltd., on May 23, it was resolved that the company be wound up voluntarily, and that Mr. B. E. T. Boswell, chartered accountant, of 9 Basinghall Street, E.C.2, be appointed liquidator to conduct the winding-up. This is a members' voluntary liquidation, and all creditors have been, or will be, paid in full.

ABOUT 400 EMPLOYEES of the New Northfleet Paper Mills, Northfleet, Kent, went on strike on June 1 in consequence of a reduction of 1d. an hour in wages. Only about 80 employees remained in the mills, and four of the five machines were stopped. The general manager issued a statement warning the employees that those on strike automatically dismissed themselves, and that no wages would be paid them the next day. Production was also stopped at the Sun and at the Star Paper Mills at Feniscowles, near Blackburn, as the result of a similar wage reduction.

MR. H. MASSIE-BLOMFIELD, officer-in-charge of the British Trade Commissioner's office at Kingston, Jamaica, is now in this country on an official visit. Mr. Massie-Blomfield will be available at the offices of the Department of Overseas Trade during the periods June 12 and 13 and July 10-14 for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to Jamaica, the Bahamas and British Honduras. Mr. Massie-Blomfield will also visit a number of industrial centres in the provinces. Firms desiring interviews with Mr. Massie-Blomfield in London or information regarding his arrangements to visit provincial centres should apply to the Comptroller-General, Department of Overseas Trade, 35 Old Queen Street, London, S.W.1 (quoting reference number 2379/33).

FOUR PEOPLE WERE SERIOUSLY INJURED in a series of explosions, followed by a quickly spreading fire, which occurred on June 1 at the factory of Standard Fireworks, Ltd., Crosland Moor. The works are at a height of nearly 1,000 feet, and there was a strong south-easterly wind blowing. As the hut where the first accident occurred was on the windward side, the flames and embers were swept over the other huts, and in a very short time nearly a score of the sheds were blazing. The Standard Fireworks, Ltd., export their fireworks to all parts of the world. They were working last week on a number of big shipping orders, some of which would normally have been completed by June 1, and the stock of wrappers and explosives in the sheds was bigger than usual. During the war, the factory was used for making munitions.

CONSIDERABLE CHEMICAL RESEARCH into the derivatives of peat, in the bogs of Ireland, is to be carried out in the laboratories of University College, Cork. In an interview Professor Joseph Reilly, who is in charge of the work, admitted the discovery of a process for obtaining wax from peat. Previously, remarked Professor Reilly, peat in Ireland had only been examined from the point of view of its calorific value. Now it was intended to thoroughly investigate it from the chemical viewpoint. The difficulty with regard to such research in the Irish Free State is the lack of a central body under which the work can be carried on, such as the Department of Industrial and Scientific Research. It is likely that the present government of the Free State will be strongly pressed to establish a central research board for the conducting of investigations for industrial and scientific purposes.

MR. L. JACOBS has been elected to a research scholarship in physical chemistry at Trinity College, Cambridge.

MR. GILES NEWTON, formerly general manager, has been appointed managing director of the Cape Asbestos Co., Ltd.

DR. A. J. V. UNDERWOOD'S office address is now 38 Victoria Street, London, S.W.1. His telephone number is unchanged.

THE EMPLOYEES of the Imperial Chemical Industries, Ltd., at Regent Factory, Linlithgow, held a successful gymkhana on Saturday.

PLANS HAVE BEEN PASSED for the erection of an addition to the works of Scottish Tar Distillers, Ltd., Limewharf Chemical Works, Camelon.

THE DEATH OCCURRED on June 3, suddenly, at Downside, Edensor Road, Eastbourne, of Louis J. Nathan, late chairman of directors of Joseph Nathan and Co., Ltd.

SIR HARRY MCGOWAN, chairman of Imperial Chemical Industries, who was accompanied by Lady McGowan, opened a gala for the children of employees at Ardeer explosives factory at Stevenston on Saturday.

RECENT WILLS INCLUDE:—Mr. Frederick Johnson Twelves, of Woodcliffe, Alexandra Road, Colwyn Bay, secretary and director of the British Cotton and Wool Dyers' Association, Ltd., Manchester, £8,601 (net personalty £7,803). Dr. Alfred Ree, of Manchester, formerly a chemical manufacturer and one of the founders of the Association of British Chemical Manufacturers, and a former Inspector of Research for the Board of Trade, £33,941 (net personalty £33,002.)

THE AMERICAN SOCIETY FOR TESTING MATERIALS has issued in pamphlet form tentative methods of chemical analysis of metallic materials for electrical heating. The changes proposed consist principally of a different method of solution which in general provides at least as good accuracy as was previously obtained and the tests are more readily made and in a shorter time. Copies of the methods are available at 25 cents per copy, and orders should be sent to the society at 1315 Spruce Street, Philadelphia, Pa.

MR. R. J. DAVIES, M.Sc., has been appointed technologist to the English China Clays, Lovering, Pochin and Co., Ltd., of St. Austell. This is the first appointment of a research scientist in the English clay industry. Mr. Davies, a student from St. Austell, entered the University College of the South West, Exeter, in 1926, and after obtaining his B.Sc. degree, with special honours in physics, did two years' research work at the Washington Singer Laboratories under Professor Newman, making a special study of electrolytes. At the end of that period he was awarded the M.Sc. in physics by London University. His duties in his new post include the setting up and equipping of a research laboratory, routine tests and original investigations.

Trade News

Use of Monel Metal and Nickel

THE use of Monel metal and nickel in the chemical and allied industries is dealt with in a brochure which has been issued by Henry Wiggin and Co., Ltd. This brochure gives tables showing the material handled, the industry or process in which Monel metal or nickel is used, and the articles which are made (of either) of these two metals.

Strength in Steel Forgings

THE importance of forgings and of testing the strength of steel used for forging is explained in a brochure received from the Albion Drop Forgings Co., Ltd. A table is given containing a specification of various steels with comments on their particular uses. Illustrations are also given showing four successive stages in drop forging. The firm possesses physical and chemical laboratories where steels are analysed, processes are checked and various safeguards are provided.

Factory Cooling and Heating

A NEW general catalogue has been issued by the Sturtevant Engineering Co., Ltd., containing photographs of heating and ventilation equipment for industrial and public buildings, air washers and filters and cooling plants. According to this catalogue, the Sturtevant ventilation system has been used with good effect in all types of factories and laboratories. Sturtevant air conditioning plants supply the desirable temperature and humidity conditions required in confectionery and patent food factories. Illustrations are given of the Sturtevant viscous filters of the oil-film type, as used in ventilating installations. Other illustrations show the Sturtevant method of dealing with the gas fumes from the fume cupboard of a chemical laboratory in a foodstuffs factory, rotary blowers and exhausters, and cyclone separators.

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).

British India.—The Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, invites tenders for 10,553 dozen bottles, green, amber and blue, of various sizes; 9,340 lbs. chloroformum B.P.; 42 lbs. cocaine hydrochlor, etc.; 21,700 gallons cresol saponified; Tablets: Hypodermic, medicinal and disinfectant; Iodum and Iodoformum B.P., and 17,110 lb. lint, plain. Tenders due June 20, 1933. Forms of tender obtainable from the above at a fee (which will not be returned) of 5s.

Poland.—A commission agent in Warsaw is desirous of representing United Kingdom exporters of fats and oils for soapmaking, resin, shellac, industrial chemicals. (Ref. No. 879.)

Poland.—A firm in Lwow desires to represent United Kingdom exporters of pharmaceutical and technical chemicals; essential oils; chemicals and materials, including colours, for the tanning and textile industries; wood oil, lamp black, copal, shellac, etc., for paint and lacquer manufacturers, on a commission basis. (Ref. No. 821.)

Morocco (French Zone).—A firm of commission agents established at Fez is desirous of obtaining the agencies of United Kingdom manufacturers of linseed oil, soya bean oil. (Ref. No. 825.)

Brazil.—A firm established in Rio de Janeiro wishes to obtain the representation of United Kingdom manufacturers of raw materials for the paper and textile industries. (Ref. No. 826.)

New Companies Registered

Correction.—Under the heading of New Companies Registered appearing in THE CHEMICAL AGE, June 3, page 518, lines 2 to 7 inclusive, appearing in the second column became transposed from their correct position in the item relating to Refrigeration Patents, Ltd., and have no connection whatever with the item relating to White Knight Oils, Ltd.

Welbeck Laboratories, Ltd., 49-51 Blandford Street, W.1. Registered May 31. Nominal capital £200 in £1 shares. Manufacturers of and dealers in powders, dyes, soaps, salves, compounds. A subscriber: Victor Maynard, 65 Chancery Lane, W.C.2.

Sulphur Extraction Co., Ltd., 9a Creswell Park, Blackheath, S.E.3. Registered May 31. Nominal capital £100 in £1 shares. Dealers in ores, crude substances, chemicals, and chemical compounds; chemical engineers, etc. Directors: Mrs. G. E. Parrish, 57 Westcombe Park Road, Blackheath, S.E.3.; J. Parrish.

Pearce Duff & Co., Ltd., 126 Spa Road, S.E.16. Registered June 1. Nominal capital £150,000 in £1 shares (30,000 6 per cent. cumulative preference). The objects are to acquire the business of drysalters, etc., carried on by Daniel Duff, Elizabeth J. Duff and Leslie G. Cockhead at Spa Road and Ronel Road, Bermondsey, as "Pearce Duff & Co.," and to carry on the business of manufacturers, packers and importers of gums, dyestuffs, drugs, chemicals, paper bag makers, cardboard and wooden box makers, etc. Directors: D. Duff, Coombe Lea, Grand Avenue, Hove, E. J. Duff, and L. G. Cockhead.

Forthcoming Events

June 14.—Electroplaters' and Depositors' Technical Society. Annual Election. "Question" Night. 8.15 p.m. Northampton Polytechnic Institute, St. John Street, Clerkenwell, London.

June 15.—National Union of Manufacturers. Mass meeting of manufacturers. Central Hall, Westminster.

June 16.—The Physical Society. 5 p.m. Imperial College of Science, South Kensington, London.

Company News

Zinc Corporation.—A dividend of 5 per cent. is to be paid for the year 1932 on the ordinary shares, and a participating dividend of 6d. per share on the preference.

Bradford Dyers' Asscciation, Ltd.—The directors, it is announced, have decided to defer the dividend on the 5 per cent. cumulative preference shares due to be paid on July 1.

A. Boake Roberts & Co.—The profit for the year to March 31 last was £70,542 and £37,440 was brought in. To reserve is placed £8,474, leaving to be carried forward £53,156.

Veno Drug Co., Ltd.—A dividend on the deferred shares of 60 per cent., against 40 per cent. a year ago, is announced. The net profit in the year to March 31, 1933, was £116,718, an increase of £5,409 as compared with the previous year.

J. C. and J. Field, Ltd.—The profit for the year to March 31 last amounted to £18,835 and £9,935 was brought in. After payment of the dividend of 10 per cent. and a bonus of 2½ per cent., £6,500 is placed to reserve and £9,751 carried forward.

W. J. Bush & Co.—The accounts for the year 1932 show a net profit of £58,388 against £27,985 for 1931. A final dividend of 6 per cent. is to be paid on the ordinary shares, making 9 per cent. for the year, and £111,512 is to be carried forward.

Boots Pure Drug Co., Ltd.—The accounts for the year to March 31, 1933, show a net profit of £701,453, against £731,891 in the previous year. The payment on the ordinary shares is maintained at 20 per cent.; the general reserve is increased by £100,000 to £1,500,000, and £190,187 is carried forward.

Benzol and By-Products Co.—For the year to September 30, 1932, the report shows a loss of £4,269. After deducting £1,013 from tax reserve, the net loss is £3,256, making a total debit of £126,831. The annual meeting will be held at 18 Grosvenor Gardens, London, on June 15, at 12 noon.

Bleachers' Association, Ltd.—After charging £175,647 for maintenance and repairs, the trading profit for the year to March 31, 1933, amounted to £360,772. This compares with £391,233 in the previous year, when £172,820 was charged for repairs, etc. After debenture interest, and allowing for £175,000 for depreciation, and crediting £25,000 from tax reserve, there was a net profit of £107,173, against £112,634. The preference dividend is being met, but the ordinary dividend is again passed. The annual meeting will be held at Blackfriars House, Manchester, on June 23, at 12 noon.

Cape Asbestos Co.—The accounts for 1932 show a profit, after provision for taxation and bad and doubtful debts, and including income from Capamianto S.A.I., Turin, of £14,388 against £13,141 last year; to this is added balance brought forward £18,056, making £32,444, less dividend of 5 per cent. on preference £4,844, and allocation to employees' fund £2,000, leaving £25,601. The directors recommend a dividend of 4 per cent. per annum on the ordinary £3,875, a final dividend to the preference shareholders of amount equivalent to final dividend on the ordinary shares £3,875, leaving to be carried forward £17,851.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to June 30, 1933.

Bensala. 539,026. Class 1. Chemical substances for use in the treatment of textile fabrics and leather. H. Th. Böhme Aktiengesellschaft, 29 Moritzstrasse, Chemnitz, Saxony, Germany. February 11, 1933.

Asplit. 539,077. Class 1. Surface dressings for waterproofing and hardening cement work. I. G. Farbenindustrie Aktiengesellschaft, Grüneburgplatz, Frankfort-on-Main, Germany. February 14, 1933.