

The Chemical Age

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Notes and Comments

Reduce the Income Tax

A USEFUL corrective to the political extravagances indulged in by the delegates at recent party conferences was provided, on Monday, by Mr. Gilbert D. Shepherd in his presidential address to the autumn conference of the National Chamber of Trade. The national make-up is such an odd mixture that far more publicity was given to the utterances of the professional spendthrifts than to the proceedings of the national retailers' organisation, upon whose successful salesmanship the prosperity of Great Britain finally depends. One point which Mr. Shepherd made is so perfectly sound that we should like to hear it repeated every day between now and next April. It was that a further reduction in the standard rate of income tax was essential to assist in the restoration of trade. It is strange that this argument should be still anathema to the most vociferous among the politicians, inasmuch as the events of the last few years seem to stamp it as a self-evident truth. The last Government increased the income tax, and the unemployment figures jumped to hitherto unheard of heights. The present Government reduced the income tax in the last Budget, and 352,000 more persons are in work than in the corresponding period last year. Other causes were no doubt in operation in the one case as in the other, but it remains indisputable that, the less money the State takes from private business, the more is left for its expansion both on the human and the mechanical sides. The income tax is still far too high at 4s. 6d. in the pound, and the business community ought not to be satisfied that the National Government has finally fulfilled its task until it has at least brought the standard rate down to 3s.

Inventions and their Exploitation

THE letter published in our columns from Mr. John Rhodin (page 333) supports much of the plea that we made for the better exploitation of inventions. Mr. Rhodin appears to have misunderstood the nature of the very tentative proposal we made. The suggested committee of experts would not exist for the purpose of deciding actions for the legitimacy of patents, nor of undertaking any of the work done by the Comptroller of Patents nor, in the last resource, of the courts. Perhaps the difficulties of providing a panel of genuinely neutral experts would be analogous to that of the expert witness about which something was recently said in these columns. If, however, a panel of experts could be enrolled competent to decide the

likelihood of value in any invention submitted to it, and unrestricted in their findings by prior interests, inventors could find it of the highest value. The difficulties of personnel are not insuperable; in our judges we have a parallel body of legal experts who can be relied upon to interpret the law without fear or favour.

The many difficulties in patent exploitation which Mr. Rhodin brings forward increase the case for positive action. In too many instances an invention can only be exploited to the real benefit of the inventor by the exercise of an adventurous spirit such as has made the fortunes of many, but has proved the undoing of many more. We are all for the spirit of adventure, but not for foolhardy action. An inventor has too often to spend large sums of money in protecting his invention in many different countries, and he has to abandon his normal activities in order to develop his discovery. We have known more than one inventor who has resigned his position in order to assist a firm willing to give his invention "a run." If the "run" fails he finds himself shown the door and he is left with money expended, without position and in a far worse case than if he had never endeavoured to use his brains. The "run" does not always fail because the invention is worthless; many firms take up invention for which they are not suited simply through an error of judgment.

A Problem for Every Industry

Inventions are sometimes bought in order to prevent them from supplanting an existing process and once bought are never heard of again; many inventions, moreover, are not suitable as patented for immediate commercialisation and require a knowledge and sympathy that too often are lacking in those who are but the step-fathers of the invention. Many valuable discoveries are never commercialised for the reason mentioned by Mr. Rhodin, namely, that the probable profits are below 100 per cent. Admittedly the inventor must be sure of his ground, but in the absence of reliable expert guidance he is apt to be too conservative. All these difficulties would be overcome by either of the schemes referred to in these columns or by Mr. Rhodin. Both are, of course, very tentative, but it is certain that unless some scheme to assist inventors to exploit their discoveries or ideas can be brought into being many new industries will be lost to the nation.

It is not the chemical industry alone to which these remarks are addressed; the problem concerns every industry in the country and, almost more important, it concerns ideas which are not yet the basis of an

industry and which can, therefore only be developed by the aid of the company promoter. Mr. Rhodin's experience of company promotion is not only correct, but is a damning indictment of the system. Too often promoters use a specious but impractical idea to form a company which skilled manipulation then foists on to the public; the public foots the bill—and resolves to have nothing more to do with inventions. There is a clear case here for positive action.

Beginnings of Chemical Industry

THE ascertainment of the chemical composition of water was one of the milestones of chemical discovery. It led to an acrimonious dispute between some of the foremost scientific men of that date. Cavendish proved that water was composed of well-known substances, but left it to the engineer James Watt to state categorically that water was composed of dephlogisticated and inflammable air. That inflammable air was quite well known and almost an article of commerce 150 years ago is shown by the fact that the first ascents in a balloon were made about 1784. For many years there was war between the admirers of Cavendish, Watt and Lavoisier as the discoverer of the composition of water; posterity has given the crown to Cavendish.

Though he undoubtedly discovered the scientific facts, almost coincidentally with his rivals—rivalry among scientific men appears from the earliest days and has not yet ceased!—the industrial development of the production of hydrogen from water appears to be due to the requirements of the balloonists. The balloonists, having to secure sufficient hydrogen on the site to inflate their machines, appear to have set up production plant wherever and whenever the ascent was to commence. Dr. Westwood, Master of the Assay Office at Birmingham, has just made public a letter contained in the library at that office written by Argand to Matthew Boulton, July 4, 1784. Since this letter is of the same date as the earliest balloon attempts, it refers clearly to the first beginnings of the commercial production of hydrogen and is of historical value in relation to the inception of the chemical industry.

“ Cheap Inflammable Air ”

THE letter states that “ Mr. Friend Montgolfier (a pioneer in ballooning) writes to me that he has at last left Paris and retired into his family where he together with his brother shall pursue their experiments in which they desire me very much a third partner. Mr. Montgolfier the eldest and the author of ye discovery is the first entitled to that of ye conversion of water into inflammable air at least in france for I have an idea that Mr. Watt found it a consequence of his system. The process consists of two furnaces in one of which they place a matras containing water, with a glass tube connected to it and bent at right angles that passes through another furnace, the part of that tube that goes into it is somewhat larger and luted to bear a strong heat, the rest of ye tube is bent again and passes into the hydropneumatocal apparatus. The luted part of ye tube is made red-hot first, then the water set aboiling by degrees, the steam passing through that intense heat is rarefied again and converted, I think but partly, into inflammable air which is collected in the apparatus a l'ordinaire. A gentleman lately arrived in Paris where he was present to the experiments told me that

they obtained about 3 gallons of good inflammable air out of 2 oz. of water.”

A little later than this, on October 23 of the same year, Argand again wrote to his friend Matthew Boulton: “ You have heard I suppose of Blanchard's experiment which was committed to my direction. I was very successful in filling the balloon in two hours and with half the expence, but now we may hope to get inflammable air very cheap, by obtaining it from steam passing through red-hot iron, which in that case yields one half more of very pure inflammable air than when dissolved in the vit. acid.” Thus, even 150 years ago, it is found that a highly theoretical experiment was made in the laboratory, an experiment designed for purely scientific purposes.

Rivalries and Jealousies

IF contemporary documents are to be believed M. Montgolfier's was the honour of being the inventor of flying. There is in the Record Office a letter from James Trevenen which refers to him as the inventor of the balloon: “ Another matter now attracts the eyes of all Europe—I mean this art of flying lately invented at Paris—I am not jesting really. A paper manufacturer there (M. Montgolfier) lately found that inflammatory air being lighter than our atmosphere, if enclosed in a very light machine, must rise of itself, and on making the experience of filling a large varnished paper globe with it, and letting it go, was enraptured to see it take its flight into the air—inflammatory air, or as the knowing ones call it gaz, is produced from oil and spirits of vitriol and steel fillings.” Does “ oil ” refer to “ oil of vitriol ” or was there supposed to some virtue in including oil amongst the ingredients for making hydrogen? It can hardly have escaped the scientific minds of the period that hydrogen is much lighter than air, but since none of them were paper manufacturers, it remained to the business man to try the experiment in a paper globe, and so to demonstrate for the first time that man could ascend into the air. At the end of September the International Conference in Physics in London was discussing the lessons learned from the ascents into the stratosphere. It is meet that we should to-day honour the name of M. Montgolfier, whether he was the first to realise that hydrogen would rise in air because it was lighter, or whether he only used the laboratory facts discovered scientifically.

Rivalries and jealousies between scientific men have also been mentioned, and herein lies one of the difficulties of the panel of experts that has been suggested to evaluate inventions and to assist the inventor. Whether from lack of vision or from a vision blinded by rivalry and jealousy, it not infrequently happens that the natural caution of the expert overcomes his optimism and inventions of great potentialities are rejected as worthless by those who should know better. At the end of James Trevenen's letter we read that: “ When the King sent orders to the Royal Society to examine this invention, that envious sulky thing Sir Jos. Banks declared it to be utterly useless, and that he and others had made the discovery long ago, but dropped it for this reason.” It is highly probable that members of the Royal Society of that period knew that a light globe filled with hydrogen would rise, but they were evidently not gifted with the vision that could translate laboratory facts into practical potentialities.

The Association of British Chemical Manufacturers

IT was during the stress of war that the need for the Association of British Chemical Manufacturers was first realised; how much more necessary it has now become under the stress of post-war nationalism! Embargoes, trade treaties, tariffs, free lists, Empire organisation, all these and much more have made the Association an imperative necessity to every British chemical manufacturer. So said Dr. F. H. Carr, chairman of the council, in moving the adoption of the report at the eighteenth annual meeting of the Association, held in London on Thursday. The report stated that the membership had been increased by four, with no resignations, the total at the end of the financial year (May 31) being 109. Since then there had been two further additions. The number of affiliated associations remained unchanged at twelve, the resignation of the Bradford Dyers' Association, which the council accepted with great regret, being counterbalanced by the accession of the Federation of Hide, Gelatine and Glue Manufacturers.

The Association continued to keep a close watch on all new legislation likely to affect its members, but apart from the Budget, the only measures of direct interest were the new Dyestuffs Act, the new Patents Bill, and the British Hydrocarbon Oil Production Act which would foster the production of motor spirit from British raw materials. The council gave consideration to the Merchandise Marks (Trade Descriptions) Bill, which was introduced into Parliament to enable public opinion to be tested, and confirmed the view expressed to the Board of Trade a year ago, namely, that the provisions of the Bill were acceptable, but that it would prefer that applications for the definition of trade terms should be limited to manufacturers.

The Import Duties Act

The Association continued to maintain its cordial relations with the Import Duties Advisory Committee, and was given the opportunity, at an informal conference, of expressing to the members of the committee its views on the operation of the Import Duties Act. The Association made a number of suggestions on points of procedure, which were sympathetically received by the committee. In particular, it drew attention to the largely increased imports which invariably follow the advertisement of a case for an additional duty, in some instances a normal year's consumption had been imported in the course of three months. This stultified for a considerable period the value to British industry of any additional duty which the committee might recommend. The committee promised to give consideration to possible means of dealing with what it admitted to be an unfortunate situation for which at present there was no clear legal remedy.

The Association was successful in securing additional duties on di- and tri-sodium phosphates (specific duties) and lead acetate (15 per cent.). The duty on aluminium oxide, hydrated, was modified to include an *ad valorem* duty as an alternative to the specific duty, in order to give adequate protection against certain high-priced grades. The Association continued to press the case for an additional duty on superphosphates, and in conjunction with the Fertiliser Manufacturers' Association had several conferences with the Import Duties Advisory Committee with a view to meeting the difficulties raised by the agricultural interests. The Association opposed an application for the removal of the additional duty of 10 per cent. on refined borax.

The duty on dried foliage, dried flowers, dried plants and dried roots of all kinds, when used solely for the manufacture of drugs and medicines, was reduced to 10 per cent., as the additional duty on foliage, etc., for decorative purposes was not meant to apply to these medicinal raw materials.

The attention of members was drawn to the possibility of substituting specific duties for *ad valorem* duties, as a means of dealing more effectively with under-declarations of import values. With a specific duty the amount of duty to be paid per ton was constant and was independent of the value declared by the importer; thus it gave a British maker better

Undertakes an Increasing Volume of Work for its Members

protection against low priced imports. In all future cases, careful attention would be given to the possibility of securing specific duties or a combination of both specific and *ad valorem*, so as to provide for high as well as low priced imports.

The following were added to the Free List during the year—raw diatomaceous earth as quarried; rosin (colophony); raw tung oil; persian berries; quercitron bark extract; gum tragacanth; and sumach leaves (but not including ground sumach leaves). The Import Duties Advisory Committee decided to make no recommendation for the free listing of barytes; dry earth colours; pitch coke and petroleum coke, to which certain members of the Association were opposed. The Association opposed the application made by users for the free listing of oxalic acid since there were good prospects of adequate British supplies becoming available in the near future. A similar case in respect of magnesium sulphate was under investigation.

Imperial Relations

The Association dealt with a number of questions arising from the Imperial Economic Conference. With regard to Canada, a question of great importance related to Empire content. The Canadian authorities in this year's Budget completely met the proposals of the Association for the reduction from 50 per cent. to 25 per cent. of the Empire content requirement for a wide range of products made from raw materials not obtainable within the Empire. Two points of importance were raised by the Association with the appropriate authorities. The first related to the whittling away of the preferences granted at Ottawa, for which a *quid pro quo* had to be given, by the Canadian industry embarking on the manufacture of new products under cover of the British preference and then applying the dumping duty against the United Kingdom in respect of these products. This was certainly not in accord with the spirit of the Ottawa Agreement, though it may not infringe the letter.

An endeavour was also being made to get the Canadian authorities to apply their dumping regulations, at present limited to goods competing with those made in Canada, to all classes of foreign goods, so that the British producers may be protected against foreign dumping, and so enjoy the preferences given to them at Ottawa as was obviously the intention of the conference.

Commercial Treaties

The negotiation of new commercial treaties with foreign countries had been continued, and the Association had made a practice, as soon as the negotiations had been announced, of providing all its members with details of the import trade and the tariffs of the country in question in respect of chemical products, and had later submitted to the Board of Trade the views received from members not only as to desirable concessions to be secured from the particular country, but also as to the products supplied by that country on which British duties should not be reduced in the interests of the United Kingdom manufacturer. Points of special interest to the chemical industry in the treaties concluded during the year include:

Argentina: Substantial reductions of duty were secured for a number of chemical products, but their precise value is doubtful since they are on m.f.n. basis.

Finland: The duties on a number of chemical products were conventionalised and arrangements were made between the producers in this country and the Finnish consumers in respect of creosote, salt for curing, and products for the Finnish wood-working industry.

Lithuania: Lithuania agreed to stabilise the duties on salt (vacuum), superphosphates and other phosphatic fertilisers, while arrangements between the trades concerned were made in respect of salt, saltpetre, superphosphates and supplies for the wood-working industry (sulphate of alumina and glue).

Latvia and Esthonia: The treaties just concluded with Latvia and Esthonia contain arrangements in regard to chemical products which should benefit this country.

Russia: The commercial agreement with Russia dealt solely with principles, and contained no specific items. If properly carried out, the agreement should go a long way to meet the points pressed by the Federation of British Industries when the negotiations were begun, and should give greater possibilities for British trade.

France: A new commercial agreement has been concluded under which all the quotas in respect of the United Kingdom were restored to 100 per cent, and the British retaliatory duties were removed. Certain other provisions not of importance to the chemical industry were also included in the new agreement.

Poland: When the decision was taken to open negotiations with the Polish Government, a commercial mission was sent to Poland to collect information so as to facilitate the discussions. The Association was represented by Messrs. L. A. Munro and J. W. Kerr, of Imperial Chemical Industries, Ltd. Discussions are in progress between the Association and the Union of Polish Chemical Industries, which it is hoped will have a successful outcome and be beneficial to the British chemical trade.

Holland and Italy: Negotiations are in progress between the British Government and the Governments of Holland and Italy, and the Association has been consulted in regard to a number of points that may affect the industry.

To sum up, it would appear that the new commercial treaties which include buying or analogous arrangements between the trades concerned are likely to prove more beneficial, so far as the chemical industry is concerned, than treaties which deal solely with tariffs on m.f.n. basis.

Safety Measures

The Works Technical Committee received a considerable number of requests for the Association's model safety rules and other safety publications from foreign firms, chiefly American and German, intending to erect chemical works in this country. Five new safety circulars were issued during the year. One of these dealt with dioxan (diethylene dioxide), the unsuspected toxic properties of which resulted in five fatalities in experimental work before the real cause was appreciated. As a result of these deaths, poisoning by dioxan and its sequelæ have been added to the Schedule of Industrial Diseases under the Workmen's Compensation Act.

The Association has accepted an invitation to a conference to be held in the near future at the Home Office to discuss the general problem of solvents and their physiological effects, and will do what it can to help the Home Office to prevent the recurrence of troubles arising, as in the dioxan case, from lack of knowledge of the dangerous properties of new products.

The problem of spontaneous ignition in light oil and tar stills, arising from what has now been shown to be finely divided iron sulphide in a pyrophoric condition, was further examined in conjunction with the Association of Tar Distillers, and it appears that the ignition troubles have now largely disappeared since the adoption of the recommendation to damp the contents of the stills before opening them to the air. Suggestions were made as to the treatment of the internal surface of stills to prevent the formation of the sulphide, and the problem will be watched in connection with the investigation of the corrosion of tar stills.

The problem of devising tests for the detection of low concentrations of toxic gases that may be encountered in industry and which is being investigated by the Chemical Defence Research Department—the Association and the Government each bearing half the cost—has made good progress. Tests have been developed in respect of sulphuretted hydrogen, hydrocyanic acid, arsine, sulphur dioxide and organic halogen compounds, and work is proceeding on other gases.

The investigations which followed the Mitcham explosion revealed the value of close co-operation with the Factories Department of the Home Office and demonstrated the services

which a strong Works Technical Committee can render to the industry. The Home Office report of the occurrence, which had to be issued quickly in view of political pressure, contained a series of recommendations on the testing of stills and allied matters, designed to prevent similar accidents in future. The Works Technical Committee endorsed the objects of the proposals, but felt that their value and practicability would be enhanced if certain modifications were made. A deputation, on which the Institution of Petroleum Technologists was represented, waited on the Chief Inspector of Factories and, as a result, the recommendations in the report are being redrafted in the sense of the Association's proposals.

Government Patents

The Association gave consideration to the position of the chemical and closely allied industries in relation to Government-owned patents, in particular those taken out by the Department of Scientific and Industrial Research, the number of which has shown a marked increase in recent years. Two main problems arose in connection with the practice of taking out patents by the Department as a result of the research carried on in its various laboratories, namely, (a) the overlapping of Government research with research carried on by industry, and (b) the limitations and handicaps imposed on industry as a result of patents taken out by the Department. Ultimately it was found possible to evolve a scheme of co-operation between the Department and the chemical interests as represented by the Association and the British Chemical Plant Manufacturers' Association which, so far as could be seen, achieved the objects in view. The Department's programme of work will be submitted annually to the chemical interests so that action can be taken to eliminate overlapping. The chemical interests will also be approached as and when new members are appointed to the Chemistry Research Board of the Department with an invitation to suggest nominations; in this way industry will be better represented in the supervision of the chemical and allied investigations. A Chemical Patents Committee has been appointed to consider all provisional specifications on which it has been tentatively decided that patents should be taken out by the Department and to recommend whether or not a patent shall actually be taken out in connection with any particular provisional specification and, if so, in which countries. Where it is agreed that a patent shall be taken out, the Chemical Patents Committee will recommend the conditions under which the patent should be exploited, the object in view being to operate the invention in the best interests of the country as a whole.

Miscellaneous

The Association has kept a close watch on the activities of the Food Law Committee in its possible bearing on food colours and preservatives. It has studied the extent of Japanese competition in various markets and has collected data regarding the effect of the various systems of marks used by Germany to foster her export trade. It has watched the progress of the American National Recovery movement, but has found it impossible to issue regular periodic reports, as was originally hoped, in view of the conflicting information as to its result on American industry. It has nominated a representative to the Grand Council for the proposed International Congress of Chemical Engineering of the World Power Conference, of which the general manager is hon. treasurer.

The Association has dealt with innumerable inquiries of every conceivable description, and it regards the growing volume of these inquiries as an index of a greater appreciation on the part of members of the diverse ways in which the Association can help them.

Dr. F. H. CARR, in moving the adoption of the report, said that since it was printed two more firms had come into the fold, while two more applications were pending. They had to record the loss by death of an unusually long list of leaders in their industry, including Mr. J. B. Orr, Mr. F. G. Williams, Mr. E. T. Brewis, Mr. A. C. Wilson, Mr. George Whiffen, Mr. W. Ackroyd Bower, Sir Max Muspratt, and, since the report was issued, Mr. Howard Spence.

Referring to the British Industries Fair, Dr. Carr mentioned that the key industry duties on fine chemicals would, unless renewed, expire in 1936, and it was in the interests of

the fine chemical manufacturers that they should exhibit at the coming Fair in order to show how great and wise a use had already been made of this Act. A continuation of the duties was needed because it was an essential characteristic of the fine chemical industry to be the nursery of larger developments and the progress of the whole chemical industry was in a measure dependent on the protection of this branch.

The Ottawa Agreements

The trade statistics of recent months had indicated a decided increase in the imports of chemical products made in this country, as compared with last year, in spite of the fact that these products were the subject of additional duties. There were good explanations in some cases, but the matter warranted the closest attention. During the same period, our chemical exports had also increased, but to a less extent than the imports, so there was ground for careful investigation as to whether the best use was being made of the tariff system and whether the manufacturers and buyers affected were making every effort to exclude foreign importations.

In many directions the Ottawa Agreements had benefited the chemical industry, but in certain quarters difficulties of an unexpected nature had arisen. However, until official trade statistics for all the Dominions are available it was not possible to compare post-Ottawa with pre-Ottawa conditions; in the meantime it would be unwise to express any opinion on the merits or demerits of the agreements. The report just issued by India on the working of the Ottawa Agreement showed that in the case of drugs and medicines, the United Kingdom share of the trade rose from 40 per cent. in 1932-33 to 53 per cent. in 1933-34, but no allowance had been made for the effect of the boycott in the earlier year, the cessation of which had probably had more effect than the preferences granted at Ottawa. In the case of other chemicals and chemical preparations, excluding manures, the percentage increased from 52 to 55 for the years in question, but the latter percentage was lower than the average of the three years ended 1929-30.

On the subject of the fine chemical industry, Dr. Carr said he wished to make a few remarks on the insulin situation because there had been much misunderstanding in regard

thereto. By the Safeguarding of Industries Act a duty was chargeable on all fine chemicals, and in order to establish a general principle, namely, whether the active constituents of glandular secretions brought to a state of comparative purity by chemical means were fine chemicals, the Association brought the case of insulin before the Board of Trade tribunal. The decision being given in their favour, they claimed to have definitely established that point of principle. Misleading statements to the detriment of British insulin makers were freely circulated in certain sections of the Press before and after the hearing of this case. Then suddenly, while the Finance Bill was going through Parliament, and without seeking the opinions of the manufacturers, the Cabinet decided to remove the duty from insulin. The Association at once sought an explanation of this drastic action and was given an assurance by the Board of Trade that the Government decision did not prejudice or weaken in any way the Key Industry Duty as a whole. In the debate during the committee stage of the Finance Bill, the Chancellor answering criticisms of this action made it clear that the manufacturers were free to make application for the imposition of a new duty, and that in appropriate circumstances the Treasury would not hesitate to impose a new duty on insulin. The position was being closely watched in the light of this statement.

Increased Work of the Association

At the present juncture in world affairs, the Association was able to protect the interests of British chemical manufacturers to a degree undreamed of when it was first formed. The demands made on it in so many directions on account of international trade agreements and tariffs, and the active part which all Governments must take to help their own industries and protect the livelihood of their people, had added enormously to the work of the Association's office, and it was greatly to the credit of the general manager that all this increased work was being performed without additional cost to the Association and without the necessity of an increase in subscription. Therefore he asked the members to accord to Mr. Davidson Pratt and his staff their earnest thanks for their loyalty and devotion, and for the willingness and enthusiasm with which they turned to every task that arose.

Flame-Resisting Electric Cable

New Application of a Non-inflammable Wax

RUBBER is steadily finding increased uses in industry, not the least of which is its use as a structural material, more especially in the form of flooring tiles. It is also well known that no other material has such a wide use for insulating purposes in electrical equipment in the working of which fire hazards are invariably present. It possesses, however, one characteristic which is undesirable—it is definitely inflammable. In view of the growing attention which is being paid to the elimination of fire risks, any treatment which reduces the inflammability of rubber must therefore be regarded as of the highest importance. Imperial Chemical Industries, Ltd., suggest that, by the production of their non-inflammable "Seekay" wax in some new high-melting non-brittle grades which can be successfully used with rubber, it is now possible to obtain a satisfactory rubber-like material suitable for applications in which it is desired to reduce fire hazard to a minimum. Rubber treated with Seekay wax, while not being rendered actually non-inflammable, becomes flame-resisting to a very marked degree.

Seekay wax is a synthetic product, manufactured by the controlled chlorination of naphthalene, and in a number of grades covering a wide range of melting-points. In appearance, and also in so far as water-resisting and insulating properties are concerned, these synthetic waxes resemble natural waxes, but with the fundamental difference that they are non-inflammable, and can be obtained with melting-point as high as 125° C.

Flame resistance, *i.e.*, the property of not spreading fire, has for many years been realised to be a desirable property

to be aimed at in cable manufacture, but methods of rendering a rubber cable flame-resisting have not been easy to find. Braided cables using wool instead of cotton have been employed, non-inflammable paints have been used to saturate the braid, and asbestos has in some cases been incorporated in the cable covering, but the use of Seekay wax as an impregnant instead of paraffin waxes for saturating the braid of fabric-covered cables has been shown to be the only really satisfactory flame-resisting treatment yet established. It results in the depression of the inflammability to such an extent that the resulting cable can be regarded as truly flame-resisting, whilst remaining serviceable in all other respects.

The fact that Seekay wax can be incorporated in rubber to give a flame-resisting mixture enables it to be used for the outer covering of rubber-sheathed cable, and it can be used equally well in place of bitumen for the fabric cover of the outside of lead-sheathed cable. There are innumerable different types and styles of cables, ranging from very fine wire for coil-winding, up to heavy subaqueous cables. Those of the vulcanised india-rubber braided type and rubber-sheath type contain appreciable amounts of rubber and, in consequence, if a fault in the cable starts an electric arc, or if the cable is involved in a fire from any other cause, either type will ignite and burn readily. They will act as paths along which fires will spread from the affected localities to other regions which might otherwise not be involved.

Seekay wax as a flame-proofing agent is not expensive to use and its incorporation in the cable does not result in an increase in cost at all in proportion to the benefits derived.

Automatic Electric Control in the Chemical Industry

By H. SEYMOUR

IN general, the requirements of chemical works as regards automatic control gear do not differ materially from those of other works, though very often special precautions must be taken to protect the control gear from fumes or corrosive liquids. On the other hand, several devices have been introduced during recent years which make a special appeal to users of chemical plants. One of these is the motor-operated valve.

Motor-operated Valves

Large valves worked by electric motors under centralised control have been used for some years in power stations on steam mains, and also on water works and gas works. More recently, the same principle has been applied to small valves of from 1 in. to 6 in. on chemical works, the valves being built in capacities of 15 lb. ft. and for working pressures of 25 to 900 lb. per sq. in. The smallest sizes require 12 to 18 seconds to close, and the largest 72 seconds. The principle is no different from that used on large motor-driven valves, and the motors which, through suitable gearing, open or close the valves, may be placed under push-button or automatic control. Where push-button control is used and the valves are scattered throughout the building, the push-button station for each valve can be placed on a centralised control board, and each station equipped with two lamps, red and green, to indicate whether the valve is open or closed.

The motor-operated valve is likely to find its chief application where automatic control is required, as in cases where liquids are constantly being transferred, either by gravity or pump, from one vessel to another. In the case of regulation by quantity, a float-switch can be used to close the circuit of the valve-operating unit. In other cases where the desired temperature of a process has been reached, the valve can be made to open or close by thermostat. The valve can also be used in conjunction with a calorimeter for automatically controlling the mixture of gases of different heating values to maintain a constant heating value of the mixture. In this case contacts are arranged on the calorimeter to open or close the valve in the rich or poor gas supply according to whether the calorific value of the mixture rises or falls.

The Photo-Electric Cell

Another device which holds the greatest possibilities in the chemical industries is the photo-electric cell. In general, the photo-electric cell can be utilised for the control of mechanisms according to the colour, shape, transparency or reflecting power of an actuating object. For example, in the process of recovery of the sand used in a coal-washing process it is essential to maintain the proportion of solid matter in the waste water between certain limits for maximum recovery to take place, and the opacity of a thin stream of the effluent can be employed as a guide of the solid matter contained. In paper mills the acidity of the paper stock solution and the concentration of the black liquor must be controlled. The acidity of the paper stock solution can be readily determined by the addition of an indicator to a sample, while the concentration of the black liquor can be determined from its opacity. In cases where water chlorination is practised, the addition of an indicator can be used to give a colour corresponding to the excess chlorine present.

Electrical methods can be used to indicate the purity or otherwise of water, the principle being based on the fact that the resistance to the flow of an electrical current between metal electrodes immersed in water varies with the concentration of salts or impurities in the water. Various methods are employed, including the ammeter, ohmmeter, and the balanced Wheatstone Bridge circuit. Reliable instruments have been devised consisting of an automatic recording potentiometer which, when employed with hydrogen electrodes or special electrodes, give a continuous record of the acidity or alkalinity of solutions. Such instruments are extremely robust, and in some of them the power for actuating the recording pen is supplied by a motor of comparatively high power. Such an arrangement makes available an excess of power for operating contacts which can be connected to signals to give warning whenever the acidity or alkalinity

goes beyond established high or low limits. Modifications of the instruments are also in use for operating valves or similar devices to provide automatic control of the acidity or alkalinity of solutions.

The light diagram is recognised as a valuable aid in the supervision of power plant operation and distributing networks, though it has, so far, not found much use in ordinary industrial operations. A recent installation in Switzerland points to the great possibilities of the light diagram, particularly in the handling of material in bulk. In this case the light diagram is used on a new cement storage and sack-filling plant. The cement is stored in 12 silos, each with a capacity of 680 tons, from which it is drawn off as required and carried by means of a series of screw conveyors and elevators to two automatic sack-fillers. The sacks, when filled, are then loaded on to vehicles for transport, and any sacks which become damaged during the process automatically return their contents to the conveyor.

Supervision by Aid of Light Diagram

The conveyors leading from the silos to the sack-fillers run in two parallel lines, and gates are placed on these lines so that the cement from either silo may be directed to either of the two conveyor lines, or from one line to the other, and yet again from either line to one or other of the two sack-fillers. Two grades of cement are handled, standard and special, and no mixing of the two is allowed. The problem was an exceedingly complex one owing to the size of the plant and the fact that some of the gates are almost inaccessible. A light diagram was installed, on which one sack-filler is shown in red and the other in green. When the cement, having passed through a machine, is on its way to the red sack-filler, the symbol of the machine it has passed through lights up in red on the light diagram. For the other line of travel the symbol lights up in green. Commutating switches on the gates, operated by cams, cause all changes in the position of the gates to be indicated on the light diagram by a change in colour of the corresponding line symbols, *i.e.*, by a change in colour of all apparatus placed before the gate.

If a motor driving a screw conveyor stops for any reason, the symbol corresponding to that conveyor stops. The light diagram, though it gives a complete picture of what is happening, does not, of course, prevent mistakes. For this reason interlocking circuits have been added which are in parallel with the signalling circuits. This permits the motors to be switched in in logical sequence, and it also ensures that the cutting out of one motor causes the stoppage of all motors preceding it in the system so as to prevent choking the system. The switches of the 34 motors in the plant are all grouped in batteries, which are placed, with the light diagram, in the room where sack-filling is carried out. Such an installation should suggest infinite possibilities in the supervision of loading plants, particularly where a product of different grades is led from hoppers to bagging machines.

Key Industry Duty

New List of Exemptions

THE Treasury has made an Order under Section 10(5) of the Finance Act, 1926, exempting the following articles from Key Industry Duty from October 15, 1934, to December 31, 1935: Acidol (betain hydrochlorate); Acyl derivatives of urea, the following:—N-methyl-C-C-cyclohexenyl methyl malonyl urea; N-methyl-C-C-cyclohexenyl methyl malonyl urea-sodium; N-methyl ethyl phenyl malonyl urea; Cyclohexenyl ethyl malonyl urea; Coryfin; Holocaine; Melubrin; Mercury compounds, the following:—Mercury sodium salicyl allyl amino o-acetate; Methyl anthranilate; B-Naphthol ethyl ether (nerolin); B-Naphthol methyl ether (nerolin); Organo-arsenic compounds, the following:—4-oxo-3-ethyl amino phenyl arsinic acid—n-methyl tetrahydro pyridine B-carboxylic acid methyl ester; Orthoform; Orthoform (new); Sajodin; Salophen; Theocine (theophylline); Valyl.

Crushing and Grinding

Can the Existing Machinery be Considerably Improved ?

THE very low energy efficiency of existing machines for crushing and grinding points to scope for improvement, said Mr. W. F. Carey, M.Eng., in his paper on crushing and grinding, read at a meeting of the Institution of Chemical Engineers, on October 5. Mr. W. Macnab was in the chair.

If a single particle were crushed in the jaws of a vice, it would shatter after a small reduction in the dimension of the particle along the line of action of the crushing stress. The largest particles could then be crushed again and added to the fragments from the original, which were below the required dimensions, and this could be repeated until the particle was broken into a number of smaller particles each under a predetermined size. In such a process material breaks down with a constant fracture pattern which is independent of size, but this is an average law in which wide individual variations will be encountered. The theoretical work necessary to crush a powder from one mean radius to another is equal to the product of (a) a constant for the material, (b) the weight of the material crushed, and (c) the logarithm of the total mean reduction, which equals

$$\frac{\text{Mean original size}}{\text{Mean final size}}$$

To crush coal and anhydrite (CaSO₄) through a 10:1 reduction ratio involves an energy consumption of 0.05 and 0.15 kWh per tonne respectively. With a ½-in. feed crushed to 200 mesh the mean reduction ratios amount to about 100:1, and the work necessary is thus 0.1 kWh per tonne for coal and 0.3 kWh per tonne for anhydrite. Different methods of applying the load, for example, impact and shear, etc., make little difference to these results. Values shown in Table I indicate that industrial crushing requires about 100 times as much energy as that which is theoretically necessary. To crush only the largest particles is the method which will lead to the minimum expenditure of power, since in other methods of crushing there is over-grinding and greater consumption of power.

Over-Grinding

It has been claimed that over-grinding accounts for the enormous difference between the 30 kWh per tonne required in practice, and the 0.3 kWh per tonne required by a theoretically perfect pulveriser. That the majority of the responsibility does not rest upon over-grinding can be demonstrated by calculating the work necessary to reduce 1 tonne of material from a mean size of ¼ in. to molecular size.

TABLE I.
Crushing Constants for various Materials.

Material.	K.W.H./T. for RR=10.
Felspar	0.354
Black Oxide	0.0185
Flint	0.138
Limespar	0.144
Calcined bones	0.0076
Cement clinker	0.108
Carbide	0.280
Coal	0.05
Anhydrite	0.15

The constant averages about 0.25 and never rises above 0.7, so that the work required to grind all the material to molecular size, under free crushing conditions, becomes 1.75 kWh per tonne on the average, rising to 4.0 kWh per tonne as a maximum, whereas that actually used amounts to 15 kWh per tonne.

There is no very satisfactory method of obtaining analyses of size of the particles below 50 μ , but from microscopic examination it can be stated definitely that the amount of superfine under 10 μ rarely exceeds 20 per cent. of the total, and the amount less than 1 μ is probably very small indeed. Consequently, under free crushing conditions over-grinding is not likely to account for more than 0.4—1.0 kWh per tonne. Over-grinding will, of course, always increase power consumption, and considerable improvements will result from

its elimination. On the other hand, the losses incurred in the transmission of energy are far greater than those to be ascribed to over-grinding.

In considering the fundamental conditions to be complied with in free crushing, the large area to be covered by the crushing surfaces is very striking. Thus a ton of material of unity density when divided into slices 200 mesh thick (63.5 μ) will have an area of 170,000 sq. ft. In other words, to ensure free crushing the area of the crushing surface presented for every 1 ton per hour of material must exceed 4,000 sq. ft. per min. Either a high speed machine or a very large one is necessary to fulfil the condition of free crushing, so that many machines are designed to crush deep beds of material.

Existing Crushing Machines

When a bed of particles is crushed in a vice, the energy actually expended in crushing will be the same as under free crushing conditions, but it will have to be transmitted from particle to particle through the bed. The resulting internal frictional forces in the bed will demand a much higher energy expenditure by the jaw than that actually transmitted to the particle. Experiments carried out with coal have shown that the work performed in crushing varies with the crushing ratio. With larger reduction ratios the whole mass becomes compressed into a hard aggregated flake which will indent the toughest steel: the formation of such aggregates leads to very inefficient crushing and power consumptions per tonne of material as great as those observed in actual mills. The work done is independent of the thickness of the bed, but varies with the reduction ratio to which the powder is subjected. The formation of an aggregate occurs in a somewhat irregular fashion, but invariably results in a high consumption of energy for any given amount of crushing.

The designer of a pulveriser therefore has either to provide very large crushing surfaces or to crush deep beds of powder. The former process leads to engineering difficulties, and the latter to high power consumption unless special precautions are adopted.

Most ball mills are designed so as to lift the balls bodily and to allow them to fall on a bed as in (1) where the balls are lifted bodily about 6 ft., carrying material in the interstitial voids, and the whole fall together so that the material is crushed in beds whose depth averages about half the radius of the ball; (2) when the mill is run slower or with a larger ball charge, the balls and material tumble together. With the dropping balls analysis of the working results from various mills shows fairly clearly that about 50 per cent. or more of the energy supplied to the mill shaft must be expended in lifting the balls, so that the main wastage of power appears to lie in forming small aggregates by dropping balls from a considerable height on to loose beds of material. Thus, it is not surprising that the power consumption of these mills should be as high as 15 kWh per tonne crushed through a reduction ratio of 10:1, when it is considered that the conditions of crushing the powder in this case are almost precisely similar to those of the experiments upon crushing aggregates.

Ring Roll Crushers

In ring roll machines such as the Raymond, Sturtevant or Lopulco, where the material is crushed between small rollers, which run round a bull ring, it is difficult to arrange for much more than 500 sq. ft. per min. of swept crushing area per tonne per material fed. For this reason, and on account of the difficulty in designing crushing surfaces which will register accurately with each other, it appears inevitable that the crushing conditions are such that deep beds of material lie between the crushing surfaces. Power consumptions as low as 3 kWh per tonne for a reduction ratio of 10 have been obtained on such machines, but two or three times this power

consumption is certainly a more usual figure for this type of mill.

With high speed impact mills such as the Atritor, Clark Chapman, Resolutor, Miracle mill, etc., the material is in general pulverised by being struck in mid-air by beater arms moving at 100 to 200 ft. per sec. Free crushing conditions certainly obtain in these mills, and the power consumptions appear to be about 8 kWh per tonne for a reduction ratio of 10:1. About half this power is expended in air friction, leaving 4 kWh per tonne as work done on the coal. The probable explanation of this high consumption is that a very large proportion of the collisions between the beater arms and the suspended particles fail to shatter the particle. It is certainly an experimental fact that very little crushing results from an airborne stream of particles which impinges at 100 ft. per sec. upon an obstacle. This process is, of course, essentially the same as the high-speed mill, in which the particle is stationary and the obstacle moves; in fact, the obstacle becomes the beater arms.

The principle of free crushing without over-grinding is most closely imitated in the multi-stage roll crusher, in which each pair of rolls is set closer and runs faster than its predecessor, so that each particle can be crushed individually without interference from its neighbours. Calculation shows that the conditions of crushing in such high speed rolls can be imitated closely in a testing machine by crushing slowly between horizontal plates.

Clean Breaking Materials

This method of study has shown experimentally that if a particle of coal is crushed in a single operation to much less than one-third of its original dimension, the fragments become pressed together into a hard aggregated flake, which requires enormous stresses for further reductions in size. The production of such a flake in the earlier stages of a roll crusher will thus cause very high local stresses in the later stages. This is particularly important in the last stage, in which flattening the whole of the coal fed into a thin strip would give an area sufficient to cover the bottom rolls 50,000 times per hour. Therefore, to protect the last stage against wear, which results from flat particles causing flaking in the earlier stages, low reduction ratios are employed at each stage, and the flakes are sieved out from the product at entry to the mill and after the first two stages.

It will be found that such a system of crushing will be applicable to brittle clean breaking materials such as coal. Anhydrite (CaSO_4), for instance, forms aggregates with as small a reduction ratio as 2:1, so that the number of stages necessary to avoid aggregation would be very great. Although there are no roll crushers which are used for fine grinding and which avoid wear, it appears that the mill briefly described might be developed for brittle materials to reduce power consumption, whilst avoiding wear on the rolls.

At the moment, concluded Mr. Carey, it is difficult to see how the existing mill type can be considerably improved,

because (a) ball mills and ring rolls will always tend to form aggregates; and (b) impact machines will either suffer excessive windage losses, due to air friction and movement, or else fail to fracture a large proportion of the particles which are hit. On the other hand, the way of development of a high speed roll crusher seems moderately clear, although it is by no means certain that this is the best or the only means of securing the very considerable reduction in energy usage consumption which might be anticipated.

Points from the Discussion

Professor B. W. HOLMAN remarked that the author had certainly attacked this problem from first principles and had shown up some of the special difficulties which had to be faced. With a hardened steel surface and a specially prepared hammer he had tapped a number of pebbles. The hammer was a carefully heat treated one and weighed about 4 lbs., and he had found that with a sharp tap the pebbles broke into a comparatively large number of small pieces. That happened with a light sharp blow, but with a somewhat heavier blow the silica pebbles would split into something between four pieces and a dozen pieces. That was an interesting point illustrating the fact that the more rapid the blow the more efficient would be the crushing.

Mr. C. J. SEAMAN said it was a pity that nothing had been said about the difference of rolls for crushing. Personally, he believed there was a great deal to be said for roll crushing, but it was important that there should be a considerable difference in ratio of speed, *i.e.*, the surface speed. It was also advisable when making two rolls to work together to have one of a larger size than the other for the reason that when a crystal had to be fractured it was easier to fracture it if there were two different surface angles. The important point he wished to bring out was the need, with roll crushing, to have a considerable difference in the speed at which the surfaces pass one another, because this was very helpful in breaking up the particles.

Mr. CAREY, replying to the discussion, said so far as high speed rolls were concerned, it seemed to him that the main point of a high speed roll was that it enabled one to crush at energy consumptions which approached fairly closely to the theoretical. Work had been done with working the rolls at different speeds, as suggested, but it had been found that this encouraged rather than diminished aggregation; that was with coal. In the ordinary roll crusher, provided the machine worked in the manner anticipated, it did not matter whether the material was crushed in sheer or at different speeds, but there was less aggregation and therefore it had been thought best to stick to the same speed for the two rolls. There was also a good theoretical reason for doing so because with two rolls running at different speeds there was a tendency to scrape the particles into each other. He had not made any investigation as to whether an electric charge occurred when aggregates were formed; personally, however, he had always regarded this as a physical phenomenon.

Crushing and Grinding Appliances

The Connection between Type and Purpose

ANY complete classification of the bewildering variety of crushing appliances used in ore dressing, quarrying and manufacturing processes is not an easy matter, said Professor B. W. Holman, A.R.S.M., in the course of a paper also read before the Institution of Chemical Engineers on October 5. Many practical men consider that the arranging of machines such as crushers, screens or concentrators into classes is merely an academic exercise, of no real value to industry. Such classifications, however, are of practical utility if they are based on first principles in such a way as to assist the practical man in selecting the best type of machine for a particular purpose, such as the production of a maximum proportion of very fine particles, as in the preparation of pigments or emery, or a uniform product of less extreme fineness as in the preparation of some complex ores for separa-

tion by flotation, or of gypsum for compressed products. On the other hand, it may be desirable to avoid the production of fine particles to save power and prevent the production of an unmarketable or untreatable product, as in the preparation of special materials for filter beds, or of ores for separation by water concentration.

The question of the choice of the best type of machine for a particular class of work, said Professor Holman, is of the greatest practical interest. In this choice the circulars issued by manufacturers to solicit the public favour are not always a sure guide.

In the selection of crushing plant, the advantage of simplicity of operation, low maintenance, cost and freedom from breakdown may often outweigh considerations of low first cost and power consumption, but due consideration for first

principles must never be neglected. The ultimate purpose of the size reduction, the characteristics of the material, and the range of sizes of the different constituents, before and after each stage of crushing, must decide the different ways in which the individual particles are to be acted upon in each stage of size reduction. With non-metallic minerals the ultimate purpose is often either the reduction of the material to a limited number of sized products or the reduction of the material to a fine impalpable powder, often by dry crushing. With ores containing metallic minerals the ultimate purpose is, as a rule, either the separation of a valuable constituent which occurs in coarse particles or the separation of a finely disseminated valuable constituent. In the former case, both size reduction and separation are conducted in stages; in the latter case, only the size reduction is conducted in stages.

If the valuable constituent occurs in coarse particles, care must be taken not to comminute this constituent unduly. In the earlier stages of size reduction, arrested crushing and low ratios of reduction in each stage produce a minimum of fines, particularly if the oversize obtained be removed at each stage. The guiding principle in this case is the avoidance of choke crushing, the crushing of material on material, which produces fines and causes waste of power. Overgrinding also should be avoided because of the high consumption power in the production of very fine particles, and because such particles involve losses in water concentration and in flotation.

Wear on the Crushing Surface

When the whole of the material has to be reduced to a definite size, considerations of layout are more dominant, particularly where the scale of operations is large. In such cases the employment of a high ratio of reduction is desirable because it involves fewer stages in the size reduction and therefore fewer and larger crushing machines.

Rapid motion is not desirable for rough coarse work because of the increased wear on the crushing surfaces from abrasion and because of the increased liability to breakage, the direct application of the crushing force, either by impact or pressure, favours low power consumption. For fine work the liability to breakage is not increased unduly by rapid motion, and wear on the crushing surfaces may be rendered beneficial by employing the crushing of ore on ore, as in tube milling, or reduced by employing the attrition of particle by particle, as in grinding pans. In the Krupp ball mill, when used dry, the rapid automatic screening of under-size, combined with cyclone exhaust, reduces wear on the crushing surfaces by allowing a considerable element of impact to be employed; in dry pulverisers with metallic pegs or hammers the heavy wear is compensated for by the special nature of the product obtained.

If one of the constituents in an ore is considerably softer than the others, crushing by separate appliances, or with a specially arranged water service, is often particularly desirable. For example, with the use of stamps on an ore consisting of quartz leaders in a soft slate, or of quartz with micaceous schist, washing preliminary to stamping, and in the stamps the introduction of the water on a level with the dies may improve both capacity and subsequent recovery. The guiding principle here is to avoid the crushing of hard particles on soft particles, and thus the production of finely slimed tailings.

Points from the Discussion

Mr. W. H. STITSON, looking at this question from the paint aspect, asked which type of paint mill the author would recommend to give the maximum efficiency in the grinding or wetting of carbon black. This was a case in which nearly all the energy was used merely in wetting the particle and not actually in breaking it down. He believed that a certain amount of energy was used up in overcoming the hydrocarbon layer, but the carbon black particle was so small that no actual breaking down of the particle size took place, and he believed he was correct in saying that no method had yet been devised of wetting the carbon black particle and absolutely breaking down the loose aggregates without some rubbing action and the using up of some energy in that way. If the particle size was so small it was surprising that such a large amount of energy was necessary to bring about wet-

ting and he therefore asked if the author could suggest the type of paint mill which had the maximum efficiency in that respect.

Mr. A. VIVIAN HUSSEY, speaking chiefly in connection with ball mills, said that his experience had been contrary to theory in some respects. It was always said that it was desirable to remove the under-size and, generally speaking, the removal of the under-size appeared to improve the grinding conditions, but under certain conditions he had found that when there was difficulty in grinding the material, the return to the ball mill, as a finishing mill, of some of the finished product, increased the output of that mill in a far greater proportion than the amount of material that was returned to it. Finally, there was a problem in connection with ball mills which was very rarely referred to, *viz.*, the constitution of the ball charge put into the ball or finishing mill. Ball mills were usually referred to without reference to the size or grading of the ball used, but the efficiency of the mill and the power consumption in grinding any particular material depended very largely on the correct proportioning of the ball charge and also the percentage of the total volume of the mill which was filled with balls. There were on the market innumerable forms of grinding media, many of which seemed to have no specific advantages. Some of them were cubes, some were spheres with flats on four sides, some were springs or coils and others were little cylinders of hard metal. The manufacturers of these made various claims as regards improved efficiency in grinding and some of them had shown certain advantages, but he would like to hear Professor Holman's views on them, because for the most part they were fanciful rather than practical.

Ball and Tube Mill Linings

As regards the lining of ball and tube mills, Mr. Hussey said the question was whether or not we should confine wear to the grinding media or to the lining of the mills. His own experience showed that it was better to limit the wear as far as possible to the grinding media rather than to allow the wear to take place in the lining plates. For a long time chrome and nickel-chrome steel had been accepted as the best type of plate for lining that type of mill, but in his own case they had gone away from the nickel-chrome and had gone back to manganese in spite of the objections to this, and had found that in practically every case manganese had given far better results than nickel-chrome.

Professor HOLMAN, in his reply to the discussion, said the question put to him concerning carbon black was easily answered on paper although that could not be regarded as a wholly satisfactory answer. The answer on paper would be to say that one should use a type of mill which gave maximum rubbing with maximum pressure. Also, one should naturally work with a fairly thick mixture of whatever it was it was desired to wet the carbon black with, and the carbon black itself. Although he was not acquainted with the carbon black industry, the thing which suggested itself was some form of light burrstone, but there was one point which might have escaped the speaker who mentioned this point, and that was how much the surface energy of the carbon decreased in a period of three or four days. Coal was very much easier to wet three or four days after it had been broken than it was immediately after it had been broken. If coal was placed on a vibrating table at an angle of 45 deg. it would adhere, whereas three days later it would slide down perfectly easily at only 30 deg. In suggesting the burrstone type of machine for carbon black, however, he was quite unacquainted with the detailed requirements of the problem.

Grinding Media

With regard to different shapes of grinding media mentioned by Mr. Hussey, he (Professor Holman) had carried out a test with short hollow cylinders, but in that particular case the results were not definitely in favour of the fancy shape. In some cases the fancy shape designs did no harm, but how much good they did he did not know. In the case of one of the largest smelting plants in the world in Western Canada, a pulverised coal plant was put in which was not found to work satisfactorily. After a while scrap iron was used, but eventually it was found that 1½-in. iron balls did not give rise to the snow-ball effect that had been mentioned.

The New Unemployment Insurance Scheme

Points for Employers and Employees

THE 1934 Unemployment Insurance Act introduces many new provisions, and makes many important alterations. The insurance sections came into force July 26, and the "under 16" sections operate from September 3, but the commencing date for unemployment assistance is yet problematical and not likely to be for some time.

To secure insurance benefit a person must prove 30 contributions paid in the two years prior to the date of claim to benefit (disability pensioned service men qualify with ten); he must also prove being continuously employed and capable of and available for work. Added to the two years mentioned may be any sickness or work in uninsurable occupations periods, but the covering period will not in any case exceed four years. A person is considered as continuously unemployed if he proves three unemployed in any period of six days, reckoned backwards and forwards. For example, assuming U represents "unemployed" and E represents "employed" days, in UUUUUUUUUUUU the first two U-days are not effective for benefit, but the second two U-days are, linking up with the first of the set of three U-days to make three days in six signings, whilst three days together always carry benefit. Six waiting days without benefit are required to be given on first registering as unemployed. If a short period of work follows, and then unemployment again occurs, a further six waiting days is not given providing that the intervening work period did not exceed ten weeks (*i.e.*, 60 days).

Duration of Benefit

Conditions proved, insurance benefit may be drawn by all persons for 156 days in any benefit year. Further, if a person at the beginning of the benefit year has then been insured for at least five insurance years, he is qualified for extra benefit, called "additional days." An insurance year runs July to July, and the necessary five years' insurance would commence to count from the beginning of the insurance year in which the first contribution was made. The extent of "additional days" benefit depends upon the contributions paid in the five complete insurance years which precede the beginning of the benefit year in question. Three additional days' benefit is given for every five contributions so paid, but a deduction of one is made for every five days' benefit which has been received in any benefit year ending in the five insurance years of test. Thus, suppose a person has registered 260 contributions, that is, 52 "five day" periods, this, multiplied by three, gives 156 "additional days" benefit, and therefore with the ordinary 156 days, that person would receive insurance benefit for twelve months. If in the five years 200 contributions had been registered, that is, 40 "five day" periods in this case, multiplied by three, 120 "additional days" benefit would be available. But if that person had received 60 days' benefit in the testing period, a deduction of 12 would be made from the 120 total, leaving 108 additional days (*e.g.*, 60 days gives 12 "five day" periods, and one day deduction for each "five days" makes a deduction of 12), which with the ordinary 156 days gives 264 days insurance benefit for that person.

Exhausting Insurance Benefit

When a person has had all the insurance benefit to which he is entitled, he exhausts his right to insurance benefit and this right can only be revived when ten further contributions have been registered and then not until the commencement of the next benefit year, when right to a further 156 days and any "additional days" is again present and so on for any subsequent benefit year, provided always however that the "30 in two years" rule is met at the relevant date. A benefit year is particular to each person; there are no common commencing and finishing dates for all persons. It runs from the first time a person proves the "30 in two years" rule; if unemployed at the year's end, the next year would commence on the anniversary date. If a benefit year has run its course before unemployment again occurs, that benefit year would date from when the person concerned again proves the "30 in two years" rule. As regards a person who has

exhausted his benefit rights in any year, if the ten contributions requalification rule has been met before the close of the year, and the person is then unemployed, the next benefit year would similarly as above start on the anniversary date.

A person under 18 years of age who fails to attend a course of instruction or a person 18 years of age and over who fails to attend a training course when required to do so, will be deemed to have not fulfilled the fifth statutory condition and unless good cause for non-attendance is shown, benefit may be disallowed. Formerly, benefit being dependent upon attendance at a course was only applicable to persons under 18. New regulations provide that employers must notify Exchange authorities when any boys or girls between 14 and 18, uninsured or insured, leave their employment. Proceedings can be taken in the case of boys and girls under 18, similarly as in the Education Act, 1921, respecting non-attendance at courses, the provisions of that Act being made to apply for this purpose to the Unemployment Insurance Act, 1934.

Boys and girls under 16 are now brought into the unemployment insurance scheme, contributions being employer 2d. and employee 2d. Benefit, however, will not be payable until the age of 16, notwithstanding that a person may qualify before that age. The children's allowance of 2s. weekly however will be payable to a claimant for benefit who supports a child of this class while unemployed (*e.g.*, parent, brother, etc.), just the same as if the child were at school or invalid.

A person who exhausts his insurance benefit rights in a benefit year and requires further payments in that year, or a person who cannot prove the "30 in two years" rule, but can qualify by proof of 30 in two years or 8 at any time for transitional payments, must, until the new unemployment assistance scheme comes into force, continue to apply for transitional payments, as now, when a "needs" test must be passed in addition to all other insurance benefit conditions.

Industrial Alcohol in Ireland

Difficulties Now Being Encountered

THE Irish Free State Government is likely to encounter a number of difficulties in the operation of its plan for the production of industrial alcohol from potatoes. Farmers have already expressed their dissatisfaction at the statement that they will be paid 35 shillings per ton for potatoes supplied to the distilleries. It would be impossible to produce alcohol for 2 shillings per gallon, which is the maximum permissible cost of production according to the statements of the Minister for Industry and Commerce, if more than this price is paid. In support of their contention that 35 shillings per ton for potatoes is uneconomic, the farmers point out that potatoes have been making £4 and £5 per ton in the markets during the past two years; and there is really no big surplus of potatoes available in the country.

The first two distilleries are to be built at Cooley, County Louth, where there is a large potato-growing district in which the prevalence of "black scab" in the crop prevents it being sold outside the area, and Carrickmacross, County Monaghan. No announcement has yet been made regarding the location of the other three distilleries.

Last week the visit of Mr. J. H. West, M.I.Chem.E., to investigate the position on behalf of an English firm of chemical engineers, aroused considerable interest. Irish newspapers commented on his visit and on the race for the contracts for building the factories. A German company, which has been engaged in the erection of three beet sugar factories, is to compete for the work. A Dutch firm is also in the running and it is reported on good authority that in order to obtain the work for French chemical plant manufacturers the government of that country is prepared to make tariff concessions in favour of Irish Free State goods if the business goes to France. Negotiations on this matter are said to be in progress through the French Chamber of Commerce.

Safety in the Chemical Industry

MR. J. DAVIDSON PRATT, secretary and general manager of the Association of British Chemical Manufacturers, addressed the Andersonian Chemical Society, at the Royal Technical College, Glasgow, on October 5, on "Safety in the Chemical Industry." The technical hazards of the chemical industry, he said, might be divided broadly into three sections, (1) fire and explosion, (2) gassing, and (3) corrosion.

Fire and explosion risks may occur with solids, liquids, gases or vapours, liquified or compressed gases, and dusts. Apart from substances with recognised explosive properties, many substances are inflammable or combustible and can be ignited by a flame or spark or by being heated to a sufficiently high temperature. Some of them may generate sufficient heat under certain conditions, or when in contact with certain other bodies, to cause ignition. Some solids may on combustion develop explosive properties, whilst others may be ignited by shock or friction, in the same way as scheduled explosives. There are also some which are liable to explode in contact with other materials, for example, chlorates in contact with organic matter or sulphur can be readily ignited by friction.

Dangerous Liquids

The same remarks apply to liquids as to solids. The flash point may be regarded as a fair indication of the fire risk with liquids, though obviously the temperature at which the liquid is being handled will play an important part. The lower the flash point the greater the danger of ignition. Liquids, have, however, an additional source of danger in that the vapours, which they emit may be inflammable or explosive.

Gases or vapours may be ignited or exploded by heat as well as by a flame or spark, in the same way as solids or liquids, but the temperature must, as a general rule, be comparatively high to produce ignition or explosion by heat alone. In general, however, combustible gases or vapours are not actually explosive except when mixed with air or oxygen, and then only when the mixture is within certain definite proportions. The limits differ for each gas or vapour. Regarded from this point of view, the explosive gases and vapours lose a good deal of their dangerous repute, since often in practice the ratio and concentration of gas and oxygen in the mixture will not fall within the explosive limits. Owing to these circumstances, the industrial world is spared countless explosions. The possibility of explosion with gas mixtures not containing oxygen must not, however, be overlooked.

Liquefied and Compressed Gases

A primary danger arises from the fact that liquified or compressed gases are under pressure and that explosions may occur if they are handled or stored in vessels of inadequate strength. There is a further danger with gases of an inflammable nature in that escaping gas may be ignited by a flame, a spark, or any incandescent material. An important cause of ignition, particularly with hydrogen, is a static discharge of frictional electricity generated by the flow of the gas through the nozzle of the container. There is a specific danger with liquid oxygen in that it may form explosive mixtures with organic substances.

The possibility of a severe explosion through the ignition of a dust cloud by a naked light or spark is always present in a factory or warehouse where carbonaceous dust is produced. The same risk may arise in the case of the dust from many other substances, including metals, for example, aluminium, which in the compact state will only burn with difficulty, if at all. In fact, it is asserted by some authorities that nearly all finely-divided organic or metallic substances are liable to explode when mixed with air and ignited, and it would certainly be sound policy to treat the risk as existent. As a general rule, the finer the dust and the more complete its mixture with air or oxygen, the greater is the danger of explosion.

Mr. J. Davidson Pratt Emphasises the Need for Safety Measures

The extent of the danger from dust explosions is not generally recognised, although several explosions occur every year. During the six years 1921-26, thirty-seven such explosions came to the notice of the Factory Department of the Home Office, causing five deaths and in some cases, much damage to property. Of these, malt dust caused seven; sulphur, five; coal and seed, four each; grain, flour and dyestuffs, three each; cork, two; and ebonite, rubber, aluminium, pitch, sugar and oatmeal, one each. Other substances of interest to the chemical industry which produce dusts capable of igniting and readily propagating flame are cellulose acetate, celluloid, naphthalene and a number of dye-stuffs, for example, those containing undecomposed diazo groups, such as some of the chrome blacks and browns.

Importance of Cleanliness

"Cleanliness is next to godliness" is a sound motto for any industries using dangerous materials. Cleanliness should be construed in the widest possible sense and as meaning that everything should be in its right place and nowhere else. If this is carefully observed, the first essential to safety will have been assured. Solids, liquids and gases should not be allowed to escape from the plant, and if they do, immediate steps should be taken to deal with such an escape.

No electric arc lamp or naked light, fixed or portable, should be used in, on, or about any part of the works where such danger exists. All incandescent electric lights should be in flame-proof enclosures and be properly protected by substantial guards if there is any danger of breakage. All switches and fuse boxes for electric light must be outside the building or danger zone, and where the risk is serious it will be well to have the electric lamps outside, the light being admitted through suitably located windows which cannot be opened.

Portable electric hand-lamps connected by flexible wires should never be used where there may be inflammable vapours. These have been the cause of numerous accidents, especially in inspecting tanks or vessels which have contained inflammable liquids. Any of the approved patterns of miners' safety lamps may be used instead. Gas jets are permissible for lighting purposes, but should be used only where safer means are not available; they must obviously be outside the building, behind strong closed windows and with a gas-tight setting to prevent vapour from inside the building reaching the gas jets. The flame must be protected against accidental extinction by the wind, while there should be means for the early detection of any gas leaks.

In rooms where there are volatile and inflammable liquids, or where there is a risk of dust explosion, no internal combustion engine, or electric motor, unless of totally-enclosed pipe-ventilated or flame-proof type, should be installed and no electrical equipment capable of generating sparks, such as motor starter or electric bells, should be fitted.

Static Electricity

Precautions should also be taken against the dangers of static electricity which may arise from a variety of causes, such as in pumping and discharging liquids or gases, grinding of chemicals, and the movement of belts and machinery. Flameless methods of heating products or reaction mixtures should be employed where there are serious fire risks, but in practice it is not always convenient to do this. When open-flame burners are used, the danger may be much reduced by enclosing the burners in an entirely separate chamber so arranged in relation to the plant that escaping vapour or liquid will not come into contact with the flame. Similarly, the artificial heating of such places should be done by steam, hot water or other flameless methods.

A danger that is sometimes overlooked is the risk of ignition from sparks produced from the use of iron or steel tools, especially when doing repairs, or from the heat generated by the friction of belts or machine parts, or by the over-heating of bearings. As an example of how danger may arise in unexpected ways, it has been found that the delivery pipes of an air compressor have become red hot. This temperature is sufficient to ignite many vapours. Carbon bisulphide is particularly susceptible, and even a warm lamp, though fully enclosed, has been known to cause ignition.

While the need for precautions to prevent the presence of any possible source of ignition will be obvious with liquids of low flash point, there will often be difficulty in practice in deciding whether such precautions are really necessary or not. The Factory Department of the Home Office, with which the problem has been discussed, has suggested that in all case of doubt, the firm concerned should consult the local inspector and endeavour, in conjunction with him, to arrive at a decision as to the extent of the special precautions necessary in the particular case.

Risks of Gassing

Gassing risks arise from the action of gases, vapours and dusts on the human organism, more particularly when taken into the system through the mouth and nose. Under this definition is included the action of gases, vapours and dusts on the eyes. The effects of solids and liquids on the skin or when absorbed through it on the system are regarded as falling within the heading of corrosive risks. In other words, "gassing risks" refers to air-borne dangers, whilst "corrosive risks" deals with all direct contact hazards.

Gassing risks are often associated with fire and explosive risks; for example, the vapour of benzol is not only poisonous but can form an explosive mixture with air, so that in planning the necessary safety measures both hazards have to be taken into account. In the same way corrosive and gassing risks may be associated in cases where the liquid, for example, hydrofluoric acid, exerts a deleterious action on the skin, in addition to producing a poisonous or irritating vapour.

Methods to protect workers must include the following measures: (a) the avoidance of dust or fumes by using wet processes or by installing automatic or enclosed machinery, (b) the removal of the dust or vapour by natural or mechanical ventilation, (c) the isolation in a separate room or building of the process or machine by which the gas, vapour or dust is generated, and (d) the use of protective devices, such as respirators, helmets, etc., by the workers.

The primary consideration for protecting the worker against gassing risks is to take every precaution against the escape of the dangerous material into the atmosphere and especially into that of the workroom. The use of automatic or totally enclosed plant and machinery will in many cases achieve the desired object, and too much attention cannot be given to the design of the plant to ensure that there will be no escape of dangerous gas. This should be regarded as the basic method of ensuring safety. Where conditions of working make it impossible to achieve this ideal, then adequate ventilation should be provided.

Dangers from Corrosive Liquids

Corrosive risks arise from the direct action on the skin of substances such as strong acids and alkalis, or from the absorption of poisonous materials through the skin as with gassing risks, the effects may be more or less immediate, as with strong acids, or they may take some considerable time to become apparent, as in the case of pitch warts, which occur among men who have been handling tar products for a long period of years. Dermatitis, or skin trouble, of a persistent nature, may also occur from the chronic handling of products which have no apparent effect at the time. The basic precaution is obviously to prevent contact of the skin with the dangerous material. As in the other cases, proper attention to the design of the plant and to ventilation will do much to eliminate the danger. Where the manipulation of corrosive substances such as acid cannot be carried on without risk of personal injury from splashing or otherwise, the workers should be protected by means of gloves and goggles, and, if necessary, protective clothing. Personal

cleanliness on the part of the workers and immediate and thorough washing of any part that may come into contact with the material will go a long way towards safeguarding the workers from the results of working with corrosive products over a period of years.

As a general rule, in planning new works, the more dangerous the process the further it should be from other danger points and from areas of high labour density. Reasonable distances should be maintained between dangerous and other operations, and if site or control requirements make this difficult, the construction of buildings should be such as to make up for the lack of distance. Advantage can often be taken of natural features of the ground, which will assist in isolating some particularly dangerous operation, while mounding or wall surrounds may at times be necessary.

Grouping in Fire Areas

Operations involving fires, furnaces, etc., should be grouped as far as possible into one or more fire areas, which should be kept as far as practicable from fire and explosive hazards.

If on sloping ground, liquid discharges must be allowed for, and these should be capable of control so as to exclude the possibility, even in case of accident, of inflammable material reaching a fire area. Buildings with inflammable liquids should be specially designed to prevent the spread of liquid that may result from an accident.

It is important that due regard should be taken of the nature of the operations in the neighbourhood when placing a plant. This is well exemplified by an accident which occurred near Grenoble in 1917 in a factory for the industrial manufacture of oxygen from liquid air. Some 300 yards from the oxygen works was a factory making chlorine derivatives of acetylene, and an appreciable quantity of the acetylene was liberated into the atmosphere in the initial stages. A week after the manufacture of the acetylene derivatives commenced, the distillation column of the liquid air apparatus exploded, due to the gradual concentration of the acetylene with the formation of an explosive mixture in contact with the liquid oxygen.

Similarly, works manufacturing chlorates may be greatly endangered by the proximity of plant from which sulphurated hydrogen may be liberated. Should this gas find its way into the chlorate works, it will act on the metal machinery and apparatus, thereby producing metallic sulphides, which will cause explosions on the slightest provocation if they come in contact with the chlorate. Hence, it is desirable to avoid placing works disengaging sulphurated hydrogen or treating metallic sulphides in the vicinity of a chlorate factory, or *vice versa*.

Attention to Design of Plant

Careful attention to the design of plant will go a long way towards making a process safe, and this again involves a full knowledge of the process and products to be handled. The design should be such as to ensure the minimum risk of escape for dangerous materials, and an easy means of dealing with any escape which may occur, whether of gas, liquid or solid. Easy cleaning and easy inspection are also essential, for on these factors much depends.

Mr. Pratt dealt briefly with the safety activities of the Association of British Chemical Manufacturers and emphasised the importance of safety to all students during their training. It was desirable, he said, that the safety aspect should be brought to their attention at an early stage of their training, so that they might have these considerations in view in all their researches. In practice this would mean that when they made a new product they would observe carefully its physiological characteristics, and make a detailed study of the reactions involved in any new process to see whether danger would arise if the conditions were varied within the wide limits that might be possible in practice. To show the importance of this, Mr. Pratt instanced the case of how a serious accident occurred owing to an explosion which was brought about by a change in the order in which the reacting materials were introduced.

Later the same day, Mr. Pratt addressed the Glasgow Section of the Society of Chemical Industry on "The Chemist and National Defence."

Letters to the Editor

Training the Chemist

SIR,—Like your correspondent who signs himself "External Graduate," I, too, have just completed ten years in a large factory. While admitting the truth of his five points, and sympathising with him, I suggest that he considers the following:

(1) The man he refers to as "a good chemist" stagnates because, although he knows "everything about something," he does not also know "something about everything." Both the qualities are necessary for "success."

(2) He must realise that industry is business, not science. Success in business only comes to the man who takes risks—it is the reward, not for work, but for "enterprise." The man who has risked unemployment by following a full-time course at a university is living in the business tradition. He has taken a risk. The "good chemist" must take the risk of moving to a new job, where his chances may be better.

(3) As long as he is satisfied to remain "a good chemist," he will, of course, remain one. The will to progress comes from within oneself; that is, one must make one's own opportunities. In industry, chemistry is its own reward. If he wishes for other rewards—money, power, privileges—he must make for himself an opportunity to get outside the laboratory, and eventually he must stop outside it.

(4) Jealousy of other employees, however much it is "justified," will not help him.—Yours faithfully,
INTERNAL GRADUATE.

Inventions and their Exploitation

SIR,—I noticed the leading article under the above heading in your issue of September 29, and although I agree with many of your arguments, I doubt whether the suggested remedy for the inventor's troubles—committees of experts to settle the right of the inventor to official financial support—would meet the case. We live in a time of authority worship, and one authority is more likely to support another authority than the unknown inventor, or even the well-known man who belongs to that unfortunate category. Taking, for instance, the once famous cordite case, Nobel v. Anderson and others, there is no doubt whatever that Nobel first patented the idea of retarding the action of nitro-cellulose by gelatinisation for rendering it suitable as a propellant in firearms. The arguments about the degree of nitration, nature of the gelatinising agent, and the admixture of camphor and mineral oil, etc., which gave the verdict against Nobel have not prevented Ballistite in one form or another from killing and wounding as many human beings as cordite. Do you suppose for one moment that a committee, such as mentioned, would have supported a minor inventor against Nobel, or if the case had been reversed, and Nobel had been the late-comer, supported Nobel against the others? What became of Sprengel, famous in connection with the fall-tube-mercury pump, when he pursued his (in his opinion) just claim to the idea of exploding wet gun-cotton? He simply disappeared! Nobel could stand on his own legs, and Sprengel could not, that is all. No committee of mere humans would have helped Sprengel, who was unpopular, and the angels who helped Nobel to a fortune over dynamite were otherwise engaged. The individual inventor, unless he has means and commercial knowledge, meets with difficulties at every step. To begin with patents cost money, and to bring an invention to the point, where the cost of a world's patent is warranted, in the course of the year allowed by the convention, is almost impossible to a man who has to work for his living. And then he is met with the question, whether he has got German and American patents—if he has not, then he is pushed off till it is too late! Later on comes the question of expert opinion, models or in the case of chemicals, samples of increasing magnitude and so on. Finally, if the probable profits are less than cent per cent the whole thing is dropped.

In times gone by the company promoter was of some use to the inventor, and taken on the whole industrial progress benefited by his activities; this in spite of his misdeeds. He

was not afraid of paying the inventor a reasonable part of the purchase money on the signing of the contract, if his experts reported favourably. Had the promoter sold to the public at a proper price, and limited his own profits to a reasonable figure, no fault could have been found with the procedure. What is wanted is something of the same nature, *viz.*, a kind of banking undertaking, the actual head of which would deal with inventors direct and adjudicate as to the fairness of the findings of the experts, whether they be individuals or committees, to whom he has to submit the cases for information only. The profits of the undertaking should, after paying a fixed dividend to the shareholders, be put to reserve available for supporting industry in general. That a suitable man of sufficiently high integrity and judgment for the post of head or president can be found allows of no doubt, and if mistakes should occasionally be made, there is quite sufficient inventive activity in the country to make the good more than balance the bad.—Yours faithfully,
JOHN RHODIN, F.I.C.

Swedish Paper Pulp Industry Increased Shipments

As about 80 per cent. of the estimated output of chemical pulp for 1934 had already been sold in April, sales during the summer for delivery during the current year have not been very considerable, though a further 5 to 7 per cent. found a market. A number of sales for next year have also been closed, although the political and economic uncertainty contribute to restraining buying. The position for mechanical pulp is unchanged. The shortage of water still gives rise to difficulties for this industry, and sales for delivery next year have only recently been of any volume. During the second quarter, as during the first quarter of the year, shipments were considerably larger than during the corresponding period of 1933. This applies in the first place to chemical pulp, as shown in the following table (in thousands of tons dry weight):

	April—June 1933.	April—June 1934.	Jan.—June 1933.	Jan.—June 1934.
Sulphite pulp ..	195.5	254.2	323.4	399.6
Sulphate pulp ..	158.3	185.3	211.0	288.4
Mechanical pulp ..	92.2	100.0	136.0	140.9
TOTAL ..	446.0	539.5	670.4	828.9

During the past few months, the level of prices, which was firm during the spring, has remained fairly unchanged, with possibly a downward tendency for mechanical pulp.

A Nation of Nosey Parkers

Sir Ernest Benn on the Passing of Liberty

SIR ERNEST BENN was one of the principal guests at the annual dinner at the Garden Club, Mayfair, of St. Hugh's Club, on October 5. Responding to the toast of his health, Sir Ernest said we had lost the spirit of liberty which we had in the old Victorian days. Instead of being now what we used to be called, a nation of shopkeepers, serving one another, we had become a nation of Nosey Parkers engaged in putting everybody right and only succeeding in putting everybody wrong. Instead of individuals robbing individuals in the good nineteenth-century manner, whole classes now robber other classes.

Modern politics assumed that man was a helpless, inefficient fool with a pauper mentality. Liberty was a personal possession which brought out the best in the individual, but the modern substitute—control—was an external arrangement which brought out the worst and created a nation of dole wangers and tax dodgers. While liberty generated and developed a personal pride, control developed an inferiority complex. Liberty was a lasting quality on which credit, confidence, stability, and a plan of life could be founded. Control was an illusory, passing, changing affair. The system of slavery known as Socialism arose out of a misconceived demand for liberty.

Continental Chemical Notes

Luxembourg

ARTIFICIAL FERTILISER MANUFACTURE has been commenced at a cement works in Esch, Luxembourg.

Czecho-Slovakia

THE CZECHO-SLOVAKIAN RADIUM INDUSTRY is suffering from Belgian competition which has brought about a price reduction to 200,000 Kronen per milligram.

Latvia

THE PRICE OF ABSOLUTE ALCOHOL for use in the manufacture of ethylene oxide has been fixed by the Latvian Government at 0.65 lat per litre.

Switzerland

THE MANUFACTURE OF KOLA PREPARATIONS is to be undertaken by a new Swiss firm (Kola Basel A.-G.) with a share capital of 160,000 Swiss francs. Other products which it is intended to manufacture are dietetic and cosmetic preparations.

Hungary

THE HUNGARIAN SOAP CONCERN, Albus, is now operating a hardening plant for fish oils, with an annual capacity of 2,000 tons.

THE PRODUCTION OF PHOTOGRAPHIC FILM BASE is contemplating in Hungary by the Belgian firm of Gevaert S.A.

THE MORPHINE FACTORY at Budszentmihaly (in which the Hungarian Government is financially interested) is now being enlarged. A new process now in operation utilises the waste straw left after threshing the poppy seed and gives direct yields of 0.8 per cent. morphine and 0.08 per cent. codeine. The straw is treated with dilute mineral acid, reduced to 1/5th of its volume in a vacuum, freed from impurities with lime or alcohol, filtered and further concentrated. Finally, treatment with alcohol and caustic soda precipitates all the alkaloids with the exception of morphine ("Chemiker-Zeitung").

Germany

ELIMINATION OF CARBON MONOXIDE from illuminating gas with a view to reducing toxic action is most effectively and economically reduced by removal of carbon monoxide by low temperature cooling in the opinion of K. Winzer ("Chemiker-Zeitung," October 3). For various reasons he rejects other proposed methods such as absorption by cuprous chloride, combination with caustic potash with formation of sodium formate and catalytic reduction to methane. The biological method of carbon monoxide elimination is impracticable at present owing to the slowness of the reaction.

THE FLUORINATION OF ORGANIC SUBSTANCES with free fluorine while avoiding pyrogenic reactions has been successfully carried out by Fredenhagen and Cadenbach ("Berichte," 1934, p. 928). They used a well-roughened copper nozzle provided with numerous fine slits and with a wrapping of thin copper wire. Issuing from this nozzle the fluorine (diluted with nitrogen in some cases) enters a rotating externally cooled glass tube containing the reacting substance. If a liquid, the latter is diluted with acetic acid or carbon tetrachloride. Substances which can be fluorinated by this method include aromatic hydrocarbons, cresol, paraffin oil and palmitic acid.

THE TECHNICAL PRODUCTION OF ACETALDEHYDE by the process of the Consortium für elektrochemische industrie (oxidation of acetylene in presence of mercuric oxide catalyst) is described by Dr. H. Thommen in the "Chemiker-Zeitung," October 3. A compressor sucks the acetylene (freed from phosphine and sulphuretted hydrogen) from a gasholder into the reaction chamber filled with 30 per cent. sulphuric acid and fitted with a stirrer. Simultaneously a suspension of mercuric oxide in water continuously streams into the chamber. The temperature of the acid rises to 60 to 70° C. in the course of stirring and at this temperature a good yield of acetylene is formed and carried away with water vapour in the gaseous stream. Part of the acetaldehyde is condensed in a cooler and a part is absorbed in a washing tower. From the aqueous solution pure acetaldehyde is isolated by distillation. The remaining gaseous mixture is returned to the reaction chamber where more acetaldehyde is absorbed and the cycle is repeated.

News from the Allied Industries

Non-Ferrous Metals

THE INTERNATIONAL ALUMINIUM CONFERENCE, which opened in Paris on September 25, has just been concluded. The conference met to consider recent developments of the aluminium market position in general, and in particular with regard to Germany's greatly increased output. It is understood that no change in the organisation of the cartel has been decided upon.

THE INTERNATIONAL TIN COMMITTEE has decided that it is desirable that an advisory panel representing the chief consuming countries should be invited to attend its meetings, at which subjects directly concerning the interests of consumers are under discussion. The participating Governments have now been consulted, and they have agreed with the committee's view. An advisory panel, representative of consuming interests, will shortly be constituted.

Artificial Silk

ON THE PETITION OF A JUDGMENT CREDITOR an order was made by Mr. Justice Eve, on October 8, for the compulsory winding-up of Alliance Artificial Silk, Ltd.

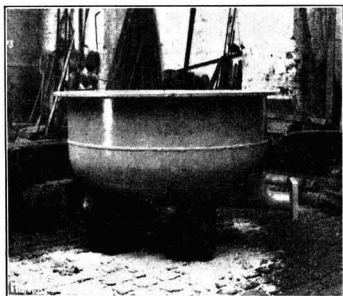
THE DIRECTORS OF BRITISH CELANESE, LTD., have decided to pay on October 31, to holders registered as at the close of business on October 19, a half-year's dividend on the 7 per cent. cumulative first preference shares. This is the first preference dividend since 1931, when six months' payment was made on the 7 per cent. first preference to October 31,

1930. The issued total is £2,000,000, and there is also in issue £4,350,000 in 7½ per cent. second cumulative preference shares, on which no distribution has been forthcoming since 1930. In that year eighteen months' dividend to April, 1930, was paid. No dividend has been paid on the ordinary capital, which now amounts to £2,211,333. For the year to July 1, 1933, trading profit rose to £1,685,550 from the 1931-32 level of £1,471,892, and the net balance after debenture service from £126,428 to £237,872.

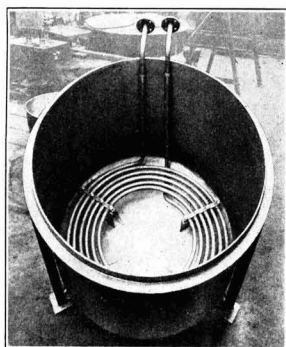
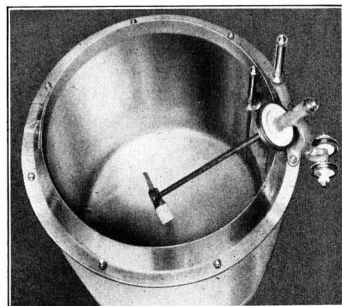
Beilby Memorial Awards

FROM the interest derived from the invested capital of the Sir George Beilby Memorial Fund, at intervals to be determined by the administrators representing the Institute of Chemistry, the Society of Chemical Industry, and the Institute of Metals, awards are made to British investigators in science to mark appreciation of records of distinguished original work, preference being given to investigations relating to the special interests of Sir George Beilby, including problems connected with fuel economy, chemical engineering, and metallurgy. The administrators of the fund will meet towards the end of this month, and will be glad to have their attention directed, not later than October 27, to outstanding work of the nature indicated. Correspondence should be addressed to the Convener, Sir George Beilby Memorial Fund, Institute of Chemistry, 30 Russell Square, London, W.C.1.

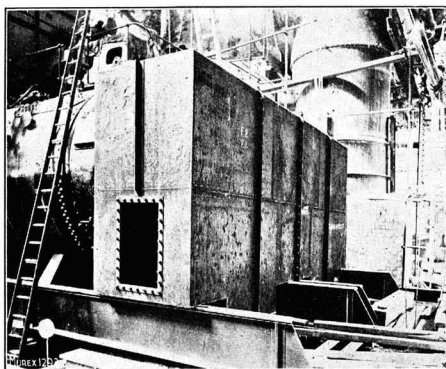
Right: This hemispherical lead kettle was built up from $1\frac{1}{2}$ in. pressed steel plates, welded with Cresta electrodes. It is 14 ft. 4 in. diameter and weighs approximately 9 tons. (Joseph Adamson & Co.)



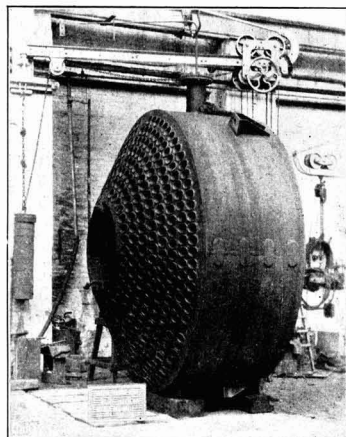
Below: This batch pasteuriser, 100 gallons capacity, is constructed with an outer jacket of mild steel and an inner vessel welded with Staybrite F.S.T. It is provided with an agitator made of Staybrite. (Aluminium Plant & Vessel Co., Ltd.)



Above: Boiling pan, 200 gallons capacity, constructed by welding sheets of Staybrite F.S.T., together with heating coil of solid drawn Staybrite tube wound in flat turns. (Aluminium Plant & Vessel Co., Ltd.)

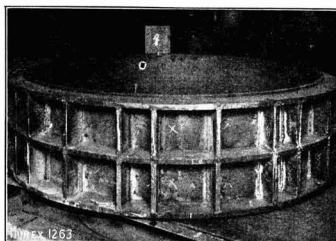


Left: Dust boxes for flues, made of $\frac{1}{2}$ in. steel plate. The sections are fastened together by bolted flanges which consist of flats welded to each half, and were welded entirely with Murex electrodes. (I.C.I., Alkali, Ltd.)



Above: Prior to the use of electric welding it was a difficult matter to ensure a steamtight joint on a tubular heater of this type, due to the tube plate not being square with the tubes. (Joseph Adamson & Co.)

Right: This milk heating vessel, 400 gallons capacity, is constructed by welding sheets of Staybrite F.S.T. It is complete with a $1\frac{1}{2}$ in. tinned copper oscillating coil, and is mounted on cast iron supports. (Aluminium Plant & Vessel Co., Ltd.)



Left: Very high contraction stresses were set up by the rigid construction of this mild steel ring, 8 ft. 5 in. diameter x 2 ft. 5 in. deep, which is reinforced by wide flanges and ribs. (I.C.I., Fertiliser and Synthetic Products, Ltd.)

Water Sterilisation Problems

A Practical Handbook

It is natural in a year of drought that the experience of Imperial Chemical Industries, Ltd., in the treatment of water should have been put to the test. One development which was particularly noteworthy was the rapid organisation by the company of an emergency water sterilisation service, by which experts in water treatment were placed at the disposal of rural district councils and other bodies throughout the country who might be experiencing difficulties in their supplies of drinking water. It is therefore appropriate that the General Chemical Group of I.C.I. should have chosen this moment to publish a 50 page booklet ("Water Sterilisation," 1934) summarising existing knowledge of water sterilisation by chlorination methods, and containing much practical information concerning their application. This follows closely upon the issue last May of a similar booklet by the Alkali Group of I.C.I., dealing with the removal of inorganic impurities from water.

It is nearly thirty years since Sir Alexander Houston stamped out an epidemic of typhoid at Lincoln in a most spectacular way by the use of sodium hypochlorite solutions, and more than twenty years since the efficiency of free chlorine gas as a sterilising agent was first demonstrated in America. Chlorination has since then become world-wide in its application, and to-day it is estimated that over 90 million people in 6,000 communities are drinking water sterilised with chlorine. In this booklet no attempt is made to assess the relative merits of these methods, nor is there any detailed digression on the exact *modus operandi* of the bactericidal action of chlorine. The line of approach is essentially practical and chemical, mechanical details of dosage plants and the like being outside the scope of the booklet.

Separate sections are devoted to detailed discussions of the three main lines of treatment along which sterilisation by gaseous chlorine has developed to suit individual conditions—namely, simple chlorination, superchlorination, and the ammonia-chlorine process. In all three cases the aim of the authors has been to survey the subject as completely as possible in its historical and general aspects, and at the same time to lay down as far as possible such practical guiding lines in respect of dosage and time of contact as will indicate how almost any water likely to be met with can be economically sterilised. This has been achieved by the provision of valuable tabulated data on the effect of chlorine at various concentrations on various test organisms. Factors influencing the sterilising action of chlorine, such as pH and temperature, and methods of application and control, are also fully discussed in their theoretical and practical aspects. The general summary of the relative merits of the three processes should be of definite assistance in deciding which to adopt for the treatment of any particular water.

There is a useful section giving details of various industrial applications of chlorine methods of sterilisation, such as swimming baths, water mains, condenser cooling water, paper mills, beet sugar factories, and sewage disposal, and also a note on the analytical procedure for the determination of free chlorine in water.

National Physical Laboratory

Published Researches

PAPERS read or published by the staff of the National Physical Laboratory during September, 1934, include:—

"The work of Walter Rosenhain." By J. L. Haughton, D.Sc., F.Inst.P., Read before the Institute of Metals in Manchester, September 3, 1934.

"The thermal and electrical conductivity of metals and alloys, Part I—Iron, from 0° to 800° C." By R. W. Powell, B.Sc. "Proceedings of the Physical Society," 46, 659.

"Latent energy due to lattice distortion of cold worked copper." By W. A. Wood, M.Sc. "Philosophical Magazine," 18, 495.

"Fluid flow in rough pipes." By A. Fage, A.R.C.S. Aeronautical Research Committee Reports and Memoranda No. 1,585. H.M. Stationery Office, price 1s. net.

"AnalaR" Laboratory Chemicals

An Authoritative Standard of Purity

READERS OF THE CHEMICAL AGE will hardly need to be reminded of the importance of purity and correct composition in chemicals employed for scientific work, whether this be chemical analysis, research into physical or physiological properties, or indeed any other branch of critical laboratory investigation. The only satisfactory means by which purity in laboratory chemicals can be assured is to be found in the existence of an authoritative set of specifications or standards, to which the chemicals are guaranteed to conform. Hitherto there have been current in this country a number of different specifications governing the purity of chemical reagents—an unsatisfactory state of affairs which has led to a certain amount of misunderstanding—but a single authoritative standard of purity has now become available.

The two British firms who have chiefly been concerned in the production of chemicals for scientific work, The British Drug Houses, Ltd., and Hopkin and Williams, Ltd., have hitherto possessed their own series of specifications, which, although on similar lines, were not identical. Accordingly, during the past year these firms have undertaken the unification of their specifications, and as an outcome of this collaboration have just published a new volume under the title of "AnalaR Standards for Laboratory Chemicals." This project has been carried out by co-operation between the chemical staffs of the two firms, in the course of which there has been conducted an extensive investigation into the technique of detecting minimal quantities of impurities. The new book contains specifications for 220 substances and has been written in the light of recent advances in analytical technique. Many new and delicate tests have been devised, and older tests have been made more stringent. At the head of each monograph is to be found a numerical statement of the maximum limits of impurities which might be contained in a chemical passing the tests. In many cases, of course, the actual impurities in the chemicals are considerably below these maxima.

A New Registered Trade Mark

Some explanation may be offered of the new designation, "AnalaR." Hitherto, the letters "A.R." (an abbreviation for analytical reagent) have been applied in this country to chemicals intended for scientific work. During the last decade, however, the description "A.R." has ceased to possess any certain or definite meaning, partly on account of the multiplicity of specifications for reagents which were extant, but more particularly since the letters "A.R." have been applied both to substances which did not, in fact, conform to any of the published specifications, and also to substances in respect of which no specification existed. These occurrences have combined to bring the term "A.R." into disrepute and accordingly the publishers of the present volume have abandoned its use. In its stead they have substituted the term "AnalaR," which is a registered trade-mark, the joint property of the two firms concerned, and constitutes the user's guarantee that the chemical bearing it conforms to the high standard of purity laid down in this book.

This new volume of standards contains 295 pages, and is bound in a durable red cloth and sold at 3s. 6d. It should find a place in every laboratory, whether academic or industrial, since it deals with a very wide range of chemical substances, including the customary inorganic reagents, chemicals for the accurate standardisation of volumetric solutions and for the preparation of buffer solutions, organic reagents and indicators. The compilers are to be congratulated on the publication of a book of great importance to workers in many branches of both pure and applied science, and one which cannot fail to enhance the prestige of the British fine chemical industry.

DOMESTIC production of bone black is almost negligible and demand is supplied by imports. Imports of bone black and animal charcoal are classified together in the import schedule, and total imports of this group in 1932 reached 302,660 kilos, valued at 117,051,000 crowns.

Notes and Reports from the Societies

Society of Chemical Industry

Manchester Section : Textile Research

THE Manchester Section of the Society of Chemical Industry held the opening meeting of the session on October 5, under the chairmanship of Dr. A. Schedler, when Dr. R. H. Pickard, F.R.S., delivered an address entitled "Research on Textiles: Some General Considerations."

In his opening remarks Dr. Pickard compared the amount of publicity given to the progress of textile knowledge some 17 or 18 years ago with the amount which is provided to-day, and in doing so pointed out that the first volume of the Society's "Annual Reports on the Progress of Applied Chemistry" did not contain a section on this branch of chemical technology, the omission being due either to lack of interest on the part of those engaged in that industry or to restrictions placed on publication of results by managements. Textiles, however, had been a valuable feature of the later volumes of the Annual Reports. When the British Cotton Industry Research Association was founded at the Shirley Institute in 1919, with a membership of 1,800 firms, each firm was invited to submit problems; and it was noteworthy, remarked Dr. Pickard, that only one was submitted. The situation at the present time was very different, for the question was: "Can a firm afford to stay out of the Association?"

In discussing the connection between the Shirley Institute and the factories Dr. Pickard pointed out that the practical man was often inarticulate when he wished to explain the problems with which he was confronted, thus emphasising the real necessity for a close liaison between the scientific workers and the factory managements, this liaison being a feature of the policy of the Association. In point of fact, it was beneficial to both parties, for the scientist must learn from the practical man. In addition to workers in the central research institution, where fundamental research was the dominant feature, there must be research workers in the factories, where the fundamental knowledge could be applied. A further necessity was closer co-operation among the various units of the industry.

Liverpool Section : Award of Prizes

THE Liverpool Section of the Society of Chemical Industry will hold the opening meeting of the session in the Muspratt Lecture Theatre, the University, on Friday, October 26, at 6 p.m., when the Leverhulme prize and the Society of Chemical Industry prizes will be presented. An address will be delivered by Professor C. O. Bannister, F.I.C., A.R.S.M., on "The Blast-Furnace as a Chemical Plant."

The committee has made the following awards:—Leverhulme Chemistry Prize, Mr. W. N. Howell, Shirley, Hale; Society of Chemical Industry Senior Prize, Mr. Maurice L. Scott, Pook's Hill, Spital Road, Bromborough; Junior Prize of the Society, Mr. Charles A. B. Woodhead, 148 West Derby Road. The Leverhulme Chemistry Prize is awarded to a student at the University of Liverpool, and the Society of Chemical Industry Prizes are awarded to students at the Central Technical School. The prizes are to be presented at the first meeting of the Liverpool Section on October 26.

Institution of the Rubber Industry

Chemistry in the Development of Rubber

CONTRIBUTIONS which chemistry and engineering have made in the development of rubber were commented upon by Mr. S. A. Brazier in a paper read before the Preston and District Section of the Institution of the Rubber Industry on October 1.

At the beginning of the present century, said Mr. Brazier, circumstances arose which caused increased attention to be given to the technical aspects of rubber manufacture. The discovery of the alkali reclaiming process by A. H. Marks was a development of the greatest importance for the more satisfactory utilisation of waste rubber, whilst the extended use of substitutes for rubber or the satisfactory utilisation of

lower grades of rubber became attractive because of the price advantages obtained. The increasing difficulty in obtaining sufficient supplies of high-grade rubbers, and the price advantage to be obtained by a satisfactory utilisation of the lower grades, led A. H. Marks to establish a research laboratory for the Diamond Rubber Co., in America, in 1905. After extensive investigation it was found that the addition of mercuric iodide to the rubber improved the speed of vulcanisation to approximately that of the first grade rubbers and gave roughly equivalent physical characteristics, but a small scale output test in pneumatic tyres proved a failure.

The partial success obtained with mercuric iodide led Oenslager to the investigation of organic materials, particularly because of their analogy to mineral bases such as lime, litharge, and magnesia, which were those basic in character. Aniline was found to give promising results and was cheap, but unfortunately also decidedly toxic. In view of this, efforts were made to develop a solid derivative, low in toxicity, and this led to the alternative use of thiocarbanilide. Further experience with such bodies also showed that these new "vitalisers" (or accelerators of vulcanisation as they are now called), in addition to shortening the cure, also gave considerably improved physical properties. When the Diamond Rubber Co. merged with the B.F. Goodrich Co., in 1912, the use of aniline and thiocarbanilide was extended to their factory.

Synthetic Rubbers

The success achieved by Oenslager's research led to the establishment of research laboratories by several other companies for the purpose of studying problems relating to rubber. The increase in price of raw rubber also stimulated interest in the commercial production of synthetic rubber. As a result of this work a chemical substance, isoprene, 2 methyl, 1, 3, butadiene (C₅H₈), was identified and which Tilden showed in 1884 could also be obtained from turpentine, and as this product (by treating with strong hydrochloric acid) yielded a tough substance resembling caoutchouc, the possibility of making synthetic rubber commercially from turpentine was indicated by him. Similar work had also been carried out by other chemists on the polymerisation of isoprene and its homologues, and there had been a good deal of controversy as to how far or how near the resulting products of condensation approached the natural product.

A Frenchman, Bouchardet, in 1879, first showed that isoprene could be converted into a rubber-like solid, whilst in 1900 a Russian, Kondakoff, found that 2-3 dimethylbutadiene gave a "leather like elastic mass" amongst other things when it was heated with alcoholic potash. He later reported that the same product, on keeping for one year in sealed tubes exposed to light, had undergone complete polymerisation to a rubber-like material. It was this material which formed one of the synthetic rubbers produced on a large scale in Germany by the firm of Bayer and Co. during the war. In England, work on synthetic rubber was carried out by Matthews, Strange, and Perkin, which, although it never reached the stage of producing synthetic rubber commercially, had important results in that the processes developed necessitated a source of supply of amyl alcohol other than fusel oil.

Polymerised Chloroprene

During the war large-scale manufacture of synthetic rubber was undertaken in Germany. Two types were made—one called methyl-rubber as it was made from 2, 3-dimethylbutadiene or methyl isoprene which was made by Bayer and Co., at Leverkusen, calcium carbide being used as the raw material for the production of acetone as all supplies of potatoes were required for food purposes. After the war, work on synthetic rubber lapsed for a time, partly due to the fall in price of the natural product; later the patent literature showed a renewal of interest, particularly in Germany, America, and Russia. In America, work done by the Du Pont Co. led to the discovery that, when acetylene was treated with cuprous and ammonium chlorides under suitable conditions and in the presence of hydrochloric acid, a synthetic rubber was produced having remarkable properties. The

first stage may be considered to be formation of vinyl acetylene which, by addition of hydrogen chloride, gives 2 chloro, 1, 3 butadiene, and this, owing to its analogy to isoprene has been called chloroprene. The fully polymerised chloroprene is very familiar under the trade name of "Duprene," and more closely resembles vulcanised natural rubber in its properties than any synthetic rubber previously produced.

Society of Public Analysts

Election of New Members

AN ordinary meeting of the Society of Public Analysts was held at the Chemical Society's Rooms, on October 3, with the president, Mr. John Evans, in the Chair.

Certificates were read in favour of:—Victor C. Branson, Roydon G. Cowdell, Joseph Davies, Frank A. Hatch, Herbert L. Hind, Alexander Marr, Daniel D. Moir, Teunis Potjewijd, Magnus A. Pike, Walter J. Rees, James Sandilands, William W. Taylor, William P. Thistlethwaite, Frederick Thomas, and Dennis G. Tompkins.

The following were elected members of the Society:—John F. Brown, Carl E. Resch, Wilfred Smith, Sidney G. E. Stevens.

Pharmaceutical Society

Award of Hanbury Memorial Medal

THE Hanbury Memorial gold medal of the Pharmaceutical Society of Great Britain has been awarded to Professor George Barger, professor of chemistry in relation to medicine at the University of Edinburgh. The Hanbury Medal is awarded periodically for "high excellence in the prosecution or promotion of original research in the chemistry and natural history of drugs." Professor Barger is the twenty-fourth recipient of the award. Jointly with Dr. F. H. Carr, Professor Barger was the discoverer of ergotoxine as one of the specific alkaloids of ergot.

Institute of Fuel

Opening of Meeting of the Session

THE opening meeting of the session for the Institute of Fuel will be held on Wednesday, October 17, in the lecture theatre of the Geological Society of London, Burlington House, Piccadilly, London, W.1, at 6 p.m., when Mr. A. A. Hurst will present a paper entitled "Coal Cleaning by Gravity Methods," which will be followed by a discussion.

The Technology of Latex Supplies

Preservatives and Their Application

RUBBER, as obtained from the *Hevea Braziliensis*, is in the form of a white liquid, which varies in consistency, though analogous to milk. This liquid, known as "latex," contains on the average about 35 per cent. of rubber by weight in suspension, though the percentage may fall below 30 per cent. and in exceptional cases may be as high as 50 per cent. Up to the end of last year the United States absorbed at least two-thirds of the world's supplies of latex, but the figures for the current year to date indicate a far more rapid expansion of its use in Europe, said Mr. F. D. Ascole in his paper on "Latex Supplies," read before the Institution of the Rubber Industry on October 11.

Though in origin largely used in substitution of dry rubber, e.g., the impregnation of tyre fabrics, the extended use of latex has been largely due to its application for uses outside the dry rubber field—notably in the paper, artificial leather, boot and shoe industries, and latterly in such speciality articles as Dunlopillo and Lactron. Excess packing and freight charges, however, must always weigh the scales against latex, even if bulking installations are substituted for tins or drums and even though a large proportion of the water element is evacuated by some method of concentration.

Premature Flocculation

While it is important, even for the preparation of sheet, that latex should arrive at the estate factory entirely fresh, premature flocculation will not materially affect the quality of the sheet, while changes occurring in the serum solids which would normally affect the stability of latex are of no importance as there is no stability problem to be faced in the marketed product. In the case of latex, both flocculation and decomposition of non-rubber substances must be prevented. The simplest preventative is sodium sulphite, but its use with latex is inadvisable as it causes discolouration.

Latex from a young tree is liable to coagulate rapidly without the early application of an anti-coagulant. The latex is carried by the tapper to the estate factory, if within walking distance—otherwise to a collecting station. If latex has to be assembled at a collecting station, the possibility of coagulation is increased and it is accordingly necessary to add an anti-coagulant. The latex is poured into a steel or iron collecting tank and ammonia gas is bubbled into the latex until 0.25 per cent. of ammonia by weight is present in the latex. The latex is then transferred to a tank lorry or similar conveyance for transport to the factory.

When the latex has been received, early steps are taken

to ensure its preservation by the addition of an alkali. The usual preservative used is ammonia gas, which is either bubbled into the latex direct from the cylinder or added in the form of a solution, until the ammonia content is from 0.7 to 1.0 per cent. by weight. Where ammonia gas is used, the gas cylinder is placed on scales and the quantity of ammonia added is checked by weight; where a solution is used the quantity to be added is measured out. In both cases the alkalinity is then checked by the titration method. Other preservatives that can be used are formaldehyde, which is effective but more expensive than ammonia, and caustic soda or potash, which have the disadvantage of being expensive and non-volatile and accordingly remain a permanent addition to the latex. Normal latex is usually sold at concentrations of 35 per cent. or 38-40 per cent.

Centrifuged Latex

For centrifuged latex, adopted at Dunlop plantations, the ammonia content of the latex is raised in the reception tank to 0.25 per cent., and after settling overnight it is passed through a float valve, 1 inch below the surface of the latex, to pipes which feed the centrifuge machines by gravity at a pre-determined rate. The machines are of a special design operating at a speed of 8,000 revolutions and divide the latex into approximately two equal portions, the one containing about 80 per cent. of the rubber at an almost definitely fixed concentration of 60 per cent.; this concentrate flows from the machines through a stainless steel flume to an ammoniating tank, while the skim flows through another channel to coagulating tanks. Ammonia gas is bubbled into the ammoniating tank at a predetermined rate which ensures that as the latex flows through the tank the ammonia content is raised to 0.5 per cent. From this tank the concentrated latex flows by gravity into 25,000-gallon bulking tanks, fitted with efficient stirrers.

There is only one evaporating process in operation, viz., Revertex, which gives a concentration of 68 per cent. dry rubber or 75 per cent. total solids. Under this process latex is exposed to heat in a steam-jacketted revolving cylinder or oscillating bowl, excess concentration which would result in drying being prevented by devices which keep any part of the latex during the process from continuous contact with the heated shell of the receptacle. The application of heat makes it necessary to add a protective colloid to prevent coagulation and a non-volatile preservative in place of ammonia.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

A FAIR volume of business is reported in the home market and prices generally have been maintained. Among industrial chemicals formaldehyde, acetone, formic acid and anhydrous ammonia have been in good demand, while a satisfactory amount of business has been transacted in hydrochloric acid, saltcake, sodium sulphate and acetate of lime. There have been no changes in prices of wood distillation products, pharmaceutical and photographic chemicals, perfumery chemicals, essential oils or intermediates. The only items that have shown any variation during the week have been lithopone, which has gone down by an average of 10s. per ton; phenol, showing a fall of a farthing per pound; and pitch, which is 2s. 6d. per ton cheaper. Good business is being done in all grades of creosote oil, and there is a steady inquiry for cresylic acid and naphthalene. Business in pharmaceutical chemicals has been on a moderate scale and the essential oils market is fairly active.

LONDON.—The London chemical market continues to receive quite a satisfactory volume of inquiry and the amount of business booked is up to the usual average. There is little change to report in prices, figures continuing exceptionally steady.

MANCHESTER.—Without providing cause for any particular enthusiasm, trading conditions on the Manchester chemical market are improving gradually. Traders during the past week have booked a moderate amount of new business though there is no general disposition among consumers to buy far forward, and, as before, the majority of the transactions are restricted both as to quantity and delivery positions. There is, however, in a number of directions a speeding up of specifications and aggregate deliveries during the past week or ten days have represented an improvement compared with the early part of September. The alkali products and some of the potash compounds and the heavy acids have been taken up in somewhat bigger quantities, though the position in respect of the cotton textile and its allied establishments still leaves much room for improvement. So far as prices are concerned, there has been little change in the general position, with, however, an easy tendency still in evidence in one or two of the by-products.

SCOTLAND.—Business continues to improve in the Scottish heavy chemical market.

Price Changes

General.—LITHOPONE, £17 to £17 10s. per ton; PHENOL, 8½d. to 8½d. per lb.; CAUSTIC POTASH (Manchester), £38 10s. per ton; SULPHATE OF COPPER (Manchester), £14 to £14 10s. per ton.

Tar Products.—CARBOLIC ACID, crude (Manchester), 1s. 10d. to 1s. 11d. per gal.; FITCH, medium soft, 55s. per ton.

All other prices remain unchanged.

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.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £28 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—9d. per lb. less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £43 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. 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, SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £48 10s. to £53 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 1s. per lb. SCOTLAND: B.P. crystals, 1½d., carriage paid. MANCHESTER: 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 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, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (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, £26 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: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22, ex store.

ARSENIO SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton. SCOTLAND: £10 10s.

BARYTES.—£6 10s. to £8 per ton.

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

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—2s. 5d. to 2s. 9d.

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.—¾d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—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 2s. 6d. per cwt. SCOTLAND: £4 2s. less 2½ per cent.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £26 per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £33.

LEAD, NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

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

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

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 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.—8½d. to 8½d. per lb. without engagement.
 POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38 10s.
 POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. 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: £27 to £40 per ton. SCOTLAND: 99/100%, powder, £37. MANCHESTER: £38.
 POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.
 POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.
 POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.
 POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 9½d.
 POTASSIUM PRUSSIAN.—LONDON: 8½d. to 8½d. per lb. SCOTLAND: Yellow spot, 8½d. ex store. MANCHESTER: Yellow, 8½d.
 SALAMONAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.
 SODA ASH.—56% spot, £5 15s. per ton f.o.r. in bags.
 SODA, CAUSTIC.—Solid 76/77% spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. 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 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 15s. 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. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.
 SODIUM BISULPHITE POWDER.—60/62%, £18 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.—4d. 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, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £15.
 SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.
 SODIUM IODIDE.—B.P., 6s. per lb.
 SODIUM NITRATE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.
 SODIUM PERBORATE.—LONDON: 10d. per lb.
 SODIUM PHOSPHATE.—£13 per ton.
 SODIUM PRUSSIAN.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5s. to 5½d. ex store. MANCHESTER: 4½d. to 5½d.
 SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.
 SODIUM SILICATE.—140° T. Spot £8 per ton. SCOTLAND: £8 10s.
 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 5s.
 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 2s. 6d.
 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: £14 to £14 5s. per ton f.o.b.
 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, 3s. 11d. to 4s. 1d. per lb.
 ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
 ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.
 ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 8½d. per lb.; crude, 60s, to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. per lb.; crude, 1s. 10d. to 1s. 11d. per gal. SCOTLAND: 60s, 2s. 6d. to 2s. 7d.
 ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 6d.; dark, 95/97%, 1s. 3d. SCOTLAND: Pale,

99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.
 BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d.
 CREOSOTE.—B.S.1. Specification standard, 4d. to 4½d. per gal. f.o.r. Home, 3½d. d/d. LONDON: 3½d. f.o.r. North; 4d. LONDON. MANCHESTER: 3d. to 4d. SCOTLAND: Specification oils, 4d.; washed oil, 4½d. to 4½d.; light, 4½d.; heavy, 4½d. to 4½d.
 NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d.; 99%, 11d. 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.—Purified crystals, £10 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, 70s. to 75s.
 PITCH.—Medium soft, 55s. per ton, in milk, at makers' works. LONDON: £3 per ton f.o.b. East Coast part for next season's delivery.
 PYRIDINE.—90/140, 7s. 6d. to 9s. per gal.; 90/180, 2s. 3d.
 TOLUOL.—90%, 1s. 10d. to 1s. 11d. per gal.; pure, 2s. 1d. to 2s. 2d.
 XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

Intermediates and Dyes

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 NAPHTHIONIC.—1s. 8d. per lb.
 ACID, NEVILLE and WINTER.—Spot, 3s. per lb. 100%.
 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.
 BENZIDINE HCL.—2s. 5d. per lb.
 p-CRESOL 34.5° C.—2s. per lb. in ton lots.
 m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
 DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
 DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
 DINITROBENZENE.—8d. per lb.
 DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 0½d.
 DINITROCHLOROBENZENE, SOLID.—£72 per ton.
 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.
 α-NAPHTHYLAMINE.—Spot, 1½d. per lb., d/d buyer's works.
 β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.
 o-NITRANILINE.—3ss. 11d. per lb.
 m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.
 p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.
 NITROBENZENE.—Spot, 4s. 5d. per lb.; 5-cwt. lots, drums extra.
 NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.
 SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
 o-TOLUIDINE.—9½d. to 11d. per lb.
 p-TOLUIDINE.—1s. 11d. per lb.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Oct., £6 17s. 6d.; Nov., £6 19s.; Dec., £7; Jan., 1935, £7 2s.; Feb., £7 3s. 6d.; Mar./June, £7 5s.
 CYANAMIDE.—Oct., £6 17s. 6d.; Nov., £6 18s. 9d.; Dec., £7; Jan., 1935, £7 1s. 3d.; Feb., £7 2s. 6d.; Mar., £7 3s. 9d.; Apr./June, £7 5s.
 NITRATE OF SODA.—£7 12s. 6d. per ton for delivery to June, 1935.
 NITRO-CHALK.—£7 5s. per ton to June, 1935.
 CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents.
 NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton.

Latest Oil Prices

LONDON, Oct. 10.—LINSEED OIL was firm. Spot, £20 5s. (small quantities 30s. extra); Nov.-Dec., £19; Jan.-April, £19 5s.; May-Aug., £19 2s. 6d., naked. SOYA BEAN OIL was firmer. Oriental (bulk), Oct.-Nov. shipment, £14 10s. per ton. RAPE OIL was quiet. Crude, extracted, £27; technical refined, £28 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian, crude, £14 10s.; refined common edible, £17 10s., and deodorised, £19, naked, ex mill (small lots 30s. extra). TURPENTINE was steady. American, spot, 46s. 3d. per cwt.
 HULL.—LINSEED OIL.—Spot quoted £19 10s. per ton; Oct., £19; Oct.-Dec., £19 2s. 6d.; Jan.-April, £19 5s.; May-Aug., £19 12s. 6d., naked. COTTON OIL.—Egyptian crude, spot, £14 15s.; edible, refined, spot, £16 15s.; technical, spot, £16 15s.; deodorised, £18 15s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £15 10s., naked. GROUNDNUT OIL.—Extracted, spot, £23; deodorised, £27. RAPE OIL.—Extracted, spot, £26; refined, £27 10s. SOYA OIL.—Extracted, spot, £16; deodorised, £19 per ton. COD OIL (industrial), 25s. per cwt. CASTOR OIL.—Pharmaceutical, 36s.; first, 31s.; second, 28s. per cwt. TURPENTINE.—American, spot, 48s. 3d. per cwt.

From Week to Week

IRISH PHARMACEUTICALS, LTD., at their annual general meeting held in Dublin recently, stated that turnover had increased by nearly 100 per cent. over the previous year.

MR. ALEXANDER McMILLAN (or Alexander Fraser), of Hillside, Larcombe Avenue, Upton, Cheshire, formerly with the United Alkali Co., Ltd., left £1,123 (net personality £753).

TWO ABERDEEN GRADUATES, Mr. Ben Collie, B.Sc., and Mr. James Grigor, B.Sc., have recently received appointments as research chemists with Imperial Chemical Industries, Ltd., Mr. Collie going to Manchester and Mr. Grigor to Billingham.

THE SEARCH FOR OIL IN SUSSEX has been abandoned by the present licence holders, the N.M.D. Syndicate of London. Boring operations have been carried on in the Tilgate Forest, at Worth, near Crawley, over a period of about three years, and a well has been sunk to over 1,800 feet.

BORAX PROPERTIES in California, reputed to be worth millions, have been made over by deed to Borax Consolidated, London, for a consideration of approximately \$130,000. This transaction ends prolonged litigation over the properties, which in late years have been operated jointly by the London company and Dr. John K. Suckow, of Los Angeles, and associates.

COURTAULDS, LTD., announce that they have come to an arrangement with La Cellophane of France, manufacturers of "Cellophane" transparent paper, and its allied companies, regarding the erection of a factory in England for the production and marketing of transparent paper under the trade-marks "Cellophane" and "Viscacele."

AT A MEETING of the board of the Institute of Physics held on October 9, the following were elected to membership: Fellows: C. A. Beever, and D. F. Martyn; associates: C. L. S. Gilford, J. S. Hunter, D. S. G. Lewis, W. D. Oliphant, J. E. Smith, Ph.D., H. Walke, and E. L. Yates; students: M. Deane, M. Gibson, H. J. Gummer, J. D. Hufflington, L. E. J. Norman, and R. Smith; ordinary member: C. Morton.

THE 10TH INTERNATIONAL EXHIBITION OF INVENTIONS, organised by the Institute of Patentees (Inc.), closes at the Central Hall, Westminster, to-day. This exhibition brings before manufacturers particulars of inventions, which are awaiting commercial development; it also enables inventors and patentees to meet individuals with whom they can discuss the technical details and commercial development of their inventions, and stimulates public interest in invention.

THE MANVERS MAIN COLLIERIES, LTD., are to extend their coking plant at Wath-on-Dearne. It is barely a year since the new coke-oven plant, upon which the company spent nearly £250,000, was put into operation. They are now erecting an additional battery of fifteen coke ovens, and have placed the contract for them with Simon-Carves, Ltd., of Cheadle Heath, near Manchester, who were responsible for the erection of the battery which was completed last year.

REPRESENTATIONS HAVE BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption from Key Industry Duty under Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act, of apparatus specially adapted for producing and applying electromagnetic waves for electro analysis. The ground of the representations is that the product is not made, and is not likely to be made, in any of the British Dominions in substantial quantities having regard to the requirements of the United Kingdom. Communications on the subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, not later than October 23. Tothill Street, Westminster, London, S.W.1, not later than October 25.

THE IMPORT DUTIES ADVISORY COMMITTEE has received applications for the addition to the free list of the following raw materials for drugs and other uses: Jaborandi leaves (all varieties); henbane (*hyoscyamus muticus*) plants; digitalis purpurea and digitalis lanata (leaves and seeds); calabar beans; hydrastris canadensis rhizomes; ephedra plants (all varieties); ergot of rye; aloes; jalap root; leptandra root; podophyllum and Indian podophyllum rhizomes; quillaja bark; scammony (pomoea or orizaba jalap) root; aniseed; chamomile flowers; balsom of tolu; cassia fistula pods and pulp; cochineal; cummin fruit; damiana leaves; gentian root; liquorice root; witch hazel (*hamamelis*) bark and leaves; orris root; lobelia; sarsaparilla root; squills; semna leaves and pods; stramonium leaves; tonquin beans; uva ursi (bear-berry) leaves; valerian root; henna leaves (but not including groundhenna leaves); slippery elm bark; saffron (*crocus sativus*) stigmas and styles. Application has also been received for drawback under Section 9 of the Finance Act, 1932, in respect of linseed or linseed oil used in the manufacture of printers' inks. Representations, as usual, should be addressed in writing to the Secretary, Import Duties Advisory Committee.

CHEMICALS, DRUGS, AND SIMILAR PRODUCTS (including chemical fertilisers) imported into the Irish Free State during the month of August last totalled £78,122, as compared with £96,034 in the corresponding period of 1933.

AN £80,000 MUNICIPAL SEWAGE SCHEME, reputed to be one of the best equipped in Britain, has been opened at Wishaw, Lanarkshire. The equipment was supplied by the Dorr-Oliver Co., Ltd., London.

THE UNIVERSITY OF MELBOURNE has conferred the honorary degree of doctor of engineering upon Sir John Cadman, chairman of the Anglo-Persian Oil Co. and the Iraq controlling company, a director of the Great Western Railway, and past President of the Institution of Mining Engineers.

SEVENTY-NINE BOILER EXPLOSIONS involving the loss of eleven lives and injuries to fifty people were inquired into during the year ended December 31, states the current report by the Board of Trade upon the working of the Boiler Explosions Acts, 1882 and 1890. The average for the 51½ years since the passing of the Boiler Explosions Act, 1882, is 65.2 explosions, 21.3 lives lost, and 53 people injured. Of the seventy-nine explosions during 1933, 37 resulted in loss of life or in personal injury.

TWO ENGLISHMEN AND A NORWEGIAN have applied to the Irish Free State Minister for Industry and Commerce for a mining right in respect of sulphur, zinc, cobalt and other metals and minerals in certain townlands in County Waterford. They are Mr. A. B. Broughton-Edge, of Lynton Lodge, Rickmansworth, Hertfordshire; Mr. L. A. Impey, of Great Rollright Manor, Chipping Norton, Oxfordshire; and Nils Erik Lenander, of Orkla, Lokken Verk, Norway.

THE LAUTARO NITRATE CO. is to re-open its Guggenheim plant. As the Lautaro Co. accounts for over 30 per cent. of Chilean nitrate exports, this new move is of considerable importance. The re-opening appears to be according to plan, for at the shut-down of the plant in November, 1932, allowance was made for a period of inactivity covering at least two years. If working operations should continue on normal lines, the public will be provided with an opportunity of deciding on the rival claims of the Guggenheim and Shanks processes as cheap producers of nitrate.

THOMAS FIRTH AND JOHN BROWN, LTD., of Sheffield, have changed over from their private electricity supply to that of Sheffield Corporation. The development follows nearly twelve months of negotiation between the directors of the company and the Corporation. With two selected stations under the Central Electricity Board's grid scheme the Corporation have enormous supplies available. The company were faced with the problem of extending their own generating plant or taking a supply from other sources. They decided to close down their two large generating stations and rely on the Corporation.

DR. R. E. SLADE, a director of Imperial Chemical Industries, Ltd., speaking at the North of England Gas Managers' Association meeting at Middlesbrough on Wednesday, said he looked forward to the time when a gas grid should connect towns with each other and with coke ovens. The grid system should grow from working arrangements and combinations between companies and coke ovens, and the municipal gas committees, rather than be started by a grid scheme covering a large area, which was bound to carry with it much larger costs. The electricity grid scheme was going to be a very heavy charge on the industry for a number of years to come. Mr. R. H. Duxbury, engineer, manager and secretary of the South Bank and Normanby Gas Light and Coke Co., who is president of the Association, is the fourth member of the Duxbury family to be president of either the North of England or the Manchester Association.

Books Received

- Dangerous Goods.** Second Supplement. By Jules Aeby. Antwerp: Jules Aeby. Pp. 96. £1.
- Science Progress.** October, 1934. London: Edward Arnold & Co. Pp. 100. 7s. 6d.
- Notes on First Aid in Industrial Injuries.** Section I. London: Imperial Chemical Industries, Ltd. Pp. 50.
- A Text-Book of Quantitative Chemical Analysis.** By Alex. Charles Cumming and Sydney Alexander Kay. London: Gurney and Jackson. Pp. 482. 15s.
- "AnalaR" Standards for Laboratory Chemicals.** London: The British Drug Houses, Ltd., and Hopkin and Williams, Ltd. Pp. 295.
- Dictionary of Organic Compounds.** Vol. 1. By I. M. Heilbron. London: Eyre and Spottiswoode. Pp. 706. £5 5s.
- Lange's Handbook of Chemistry.** By Norbert Adolph Lange. Ohio: Handbook Publishers, Inc. Pp. 1512.

Inventions in the Chemical Industry

Patent Specifications and Applications

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.

Sensitising Dyes

SILVER halide emulsions are sensitised with benz-selenopseudo-cyanine dyes or substitution derivatives thereof, the molecule of the dye containing an anion other than the halide or alkyl sulphate. Suitable anions are nitrate, perchlorate, *p*-toluene sulphate and 2-naphthalene sulphate; these are introduced into the molecule of the dye by the double decomposition of the alkyl halide of the dye with a suitable salt of the anion, e.g. sodium salts where the resulting compound of the dye is less soluble, and silver salts where the resulting compound is more soluble. (See Specification 411,912 of I. G. Farbenindustrie.)

Sulphonic Acids

SULPHONIC acids are prepared by reacting unsaturated aliphatic compounds containing an ethylenic linkage with alkyl di- or trisulphonic acids or derivatives thereof preferably in the presence of substances capable of binding water such as anhydrous acids and of solvents. Suitable sulphonic acids include methane, ethane, propane and methyl methane-disulphonic acids and the halogen and amino derivatives thereof, acetaldehyde disulphonic acid and acetone trisulphonic acid. The products are wetting, purifying, dispersing, foaming, and softening agents for the textile, paper and leather industries and are suitable for addition to soaps and washing agents. (See Specification 411,773 of W. W. Triggs.)

Synthetic Resins

SYNTHETIC resins soluble in fatty oils such as chinawood or tung oil, linseed oil, soya bean oil, corn oil, perilla oil, castor oil, rapeseed oil, fish oil, blown oils or free fatty acids such as oleic acid, linolic acid or linoleic acid are prepared by reacting a cyclohexyl-phenol with a methylene containing agent in the presence or absence of acidic or basic catalysts. In an example *p*-cyclohexyl-phenol is condensed with formaldehyde in the presence of oxalic acid. The product heated with tung oil and dissolved in a suitable solvent such as solvent naphtha mineral spirits xylol, monoethyl ether or glycol with or without a metallic drier such as a cobalt drier yields a coating composition. A lacquer may be prepared by dissolving the resin and nitrocellulose in a mixture of toluol, *n*-butyl acetate, ethyl acetate and *n*-butanol with or without a plasticiser such as triethyl phosphate. (See Specification 411,442 of W. J. Tennant.)

Recovering Acidic Gases

ACIDIC gases, such as carbon dioxide and/or hydrogen sulphide, are recovered from gas mixtures containing them by treating the gas mixture with an aqueous solution of a water soluble poly-amino alcohol containing more than 25 per cent. nitrogen, e.g., 1,3-diamino-2-propanol, and recovering the acidic gases from association with the polyamino alcohol. A 30-35 per cent. by volume aqueous solution of 1,3-diamino-2-propanol may be employed in the absorption stage at temperatures up to 70° C. The solvent is regenerated and the acidic gas liberated by causing the heated liquor to flow down a column in counter current to a hot current of the acidic gas together with steam. Stack gases, natural gas, coal gas, water gas, producer gas, hydrogen, nitrogen and the like may be treated by the process for the removal of their carbon dioxide and hydrogen sulphide content. (See Specification 410,848 of Girdler Corporation.)

Refining Benzene

CRUDE benzene is freed from olefines readily forming gases by treating it at 0-100° C. with an added double compound of aluminium chloride with a gaseous or other olefine, and removing the polymerised olefines. Double compounds specified are those of ethylene, propylene, and cracking gases. The process is especially applicable to cracked benzines and to benzines obtained by polymerising olefines or gases containing olefines. In an example, a mixture of 3,000 lb. of cracked benzene, with the double compound contained by the action of ethylene on 60 lb. of aluminium chloride, is stirred at 50-60° C. for 1-2 hr.; it is then cooled, freed from aluminium chloride by adding aqueous hydrochloric acid and separating the aqueous layer, neutralised with soda lye or other alkali and dried; the fraction boiling up to 200° C. is treated with bleaching earths or other decolorising agents, and re-distilled. The fraction boiling above 200° C. may be worked up to lubricating oils and resins, e.g., by treatment with sulphuric acid. (See Specification 410,874 of J. Y. Johnson.)

Colloidal Sulphur

COLLOIDAL solutions containing 40 per cent. or more of sulphur are obtained by mixing creamy deposits of sulphur, obtained by decomposing ammonium polysulphide in presence of a protective colloid, with a vegetable mucilage and a strongly alkaline substance. Suitable mucilages are agar-agar and carrageenan, added in proportions of 0.2-5 per cent. of the dry sulphur. Alkaline substances are caustic alkalies, ammonia, alkali metal carbonates, and amines. They are added in proportions of 0.1-2 per cent. of the whole emulsion. (See Specification 411,241 of J. Y. Johnson.)

Complete Specifications Open to Public Inspection

DISTILLATION OF FATTY ACIDS and the products resulting therefrom, methods and apparatus. New Process Fat Refining Corporation. April 1, 1933. 18515/33.

REFINING MAGNESIUM and its alloys.—Oesterreichisch Amerikanische Magnesit A.-G. March 30, 1933. 1598/34.

HIGHER ETHERS, manufacture.—Henkel et Cie, Ges. March 28, 1933. 4079/34.

NEW REAGENTS and their applications, manufacture.—Laboratoires Français de Chimiotherapie. March 27, 1933. 6640/34.

MONOCALCIUM PHOSPHATE, production.—Kali-Forschungs-Anstalt Ges. March 31, 1933. 7400/34.

SUBSTITUTED PHENOLS, method of producing.—Röhm and Haas Co. March 28, 1933. 8040/34.

DECOLORISATION of crystal sugar.—J. C. Andriessen and A. Schweizer. April 1, 1933. 8050/34.

REFINING LIGHT OILS and distillates thereof obtained from the distillation or hydrogenation of coal or coal tars and products produced thereby.—W. A. Patrick. March 29, 1933. 8334/34.

TREATMENT OF MIXED FABRICS of cotton and cellulose ester (trifluoride) silk in alkaline liquors.—I. G. Farbenindustrie. March 25, 1933. 8340/34.

REMOVING ORGANICALLY-COMBINED SULPHUR from gases, method. Naamloze Vennootschap Machinerie-en Apparaten Fabriken. March 31, 1933. 9038/34.

DYEING of leather.—E. I. du Pont de Nemours and Co. March 30, 1933. 91930/34.

BARBITURIC ACID DERIVATIVES, manufacture.—I. G. Farbenindustrie. March 25, 1933. 9200/34.

CADMIUM, producing.—American Smelting and Refining Co. March 29, 1933. 9215/34.

SULPHATE SOLUTIONS of thallium and cadmium, treating.—American Smelting and Refining Co. March 29, 1933. 9216/34.

IMPREGNATED CELLULOSIC SHEET MATERIALS, manufacture.—E. I. du Pont de Nemours and Co. April 1, 1933. 9399/34.

PHENYLATED AND HYDROAROMATIC HYDROCARBONS and derivatives thereof, manufacture.—I. G. Farbenindustrie. March 25, 1933. 9415/34.

PIGMENT PREPARATIONS, manufacture.—Soc. of Chemical Industry in Basle. March 27, 1933. 9556/34.

COLOUR LAKES, manufacture.—Soc. of Chemical Industry in Basle. March 27, 1933. 9557/34.

TITANIUM COMPOUNDS or pigments, production.—Titan Co., Inc. March 30, 1933. 9613/34.

IMPREGNATING CELLULOSIC FABRICS.—Resines et Vernis Artificiels. March 31, 1933. 9734/34.

PROTECTIVE COSMETIC PREPARATIONS.—I. G. Farbenindustrie. March 31, 1933. 9795/34.

CHROMIFEROUS AZO DYE STUFFS, manufacture.—Soc. of Chemical Industry in Basle. March 31, 1933. 9841/34.

SYNTHETIC RESINS, manufacture.—Soc. of Chemical Industry in Basle. March 29, 1933. 9845/34.

DETERGENT, cleansing, emulsifying, softening and dispersing agents, manufacture.—Chemical Works, formerly Sandoz. April 1, 1933. 9917/34.

COMPLEX COMPOUNDS of alkali- and alkaline-earth-metal halides, manufacture.—I. G. Farbenindustrie. April 1, 1933. 10112/34.

Specifications Accepted with Dates of Application

CABLE LACQUERS.—J. S. Gourlay and Imperial Chemical Industries, Ltd. Feb. 28, 1933. 417,121.

PHENOLS FROM ALKALI ARYLSULPHONATES, process for the manufacture.—L. S. E. Ellis and G. B. Ellis (Soc. des Usines Chimiques Rhone-Poulenc). March 20, 1933. 416,930.

PHENOL ALDEHYDE RESINS, preparation of oil-soluble hardening. Dr. H. Honel, J. Ehrenfeld and O. Reichhold (trading as Beck, Koller and Co.). Aug. 30, 1932. 417,122.

CELLULOSE NITRATE, manufacture.—Du Pont Viscoid Co. March 25, 1932. 416,938.

SULPHURIC ACID ESTERS of leuco anthraquinone azines, manufacture.—I. G. Farbenindustrie. March 26, 1932. 416,939.

1,4-DIAMINOANTHRAQUINONE-2,3-DISULPHONIC ACID, process for the manufacture.—I. G. Farbenindustrie. March 26, 1932. 416,940.

WETTING, foaming, detergent, emulsifying, and dispersing agents and process of preparing them.—Chemical Works, formerly Sandoz. April 4, 1932. 416,943.

DEGREASING APPARATUS.—J. Savage and Imperial Chemical Industries, Ltd. March 30, 1933. 417,188.

CHLORINATED RUBBER and manufacture of same, compositions containing.—N. Bennett and Imperial Chemical Industries, Ltd. March 31, 1933. 417,194.

WATER-INSOLUBLE AZO DYESTUFFS on the fibre, manufacture.—I. G. Farbenindustrie. April 1, 1932. 417,197.

WATER-INSOLUBLE AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. April 2, 1932. 417,198.

VANILLIN and its analogues and other para-hydroxy aldehydes such as protocatechuic aldehyde, manufacture.—M. F. Carroll and A. Boak, Roberts and Co., Ltd. April 11, 1933. 417,072.

CELLULOSE-ESTER AND ETHER COMPOSITIONS, manufacture.—British Celanese, Ltd. April 16, 1932. 416,946.

SUGAR FACTORY and REFINERY JUICES, purification.—D. Teatini. May 19, 1933. 417,075.

MIXED FERTILISERS, production.—Kali-Forschungs-Anstalt Ges. Dec. 7, 1932. 417,149.

ARTIFICIAL MATERIALS, manufacture.—British Celanese, Ltd. July 20, 1932. 417,218.

ACID TRIPHENYLMETHANE DYESTUFFS, manufacture.—I. G. Farbenindustrie. Sept. 29, 1932. 417,014.

CONDENSATION PRODUCTS, manufacture and production.—A. Rieche. Dec. 3, 1932. 417,087.

PHOSPHORIC ACID, purification.—Victor Chemical Works. May 4, 1933. 417,226.

ISOMERIC PENTANONES, separation.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. March 27, 1933. 417,101.

ALUMINIUM BASE ALLOYS containing magnesium.—I. G. Farbenindustrie. June 17, 1933. 417,106.

Applications for Patents

(September 20 to 26, inclusive).

DYESTUFF SULPHONIC ACIDS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 27191.

PRINTING WITH VAT DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie). 27273.

CHLORINATED RUBBER, stabilisation.—Imperial Chemical Industries, Ltd., and J. G. Moore. 27387.

AZO DYESTUFFS.—Imperial Chemical Industries, Ltd., A. H. Knight and M. Mendoza. 27388.

BLEACHING FATTY ACIDS, ETC.—L. Mellersh-Jackson (Mathieson Alkali Works). 27187.

HYDROGEN SULPHIDE from gases, recovery.—J. Y. Johnson (I. G. Farbenindustrie). 27180.

POLYMERISATION PRODUCTS of acetylene, production.—J. Y. Johnson (I. G. Farbenindustrie). 27181.

POLYMERISED VINYL COMPOUNDS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 27266.

POLYMERISATION PRODUCTS of vinyl ethers, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 27375.

ORGANIC SULPHUR COMPOUNDS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 27376.

CONDENSATION PRODUCTS from hydrogen sulphide, etc., production.—J. Y. Johnson (I. G. Farbenindustrie). 27377.

CONDENSATION PRODUCTS containing sulphur, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 27378.

ACID TAR, treatment.—H. Lorimer. 26987.

HYDROCARBON MOTOR-FUEL, treatment.—A. L. Mond (Universal Oil Products Co.). 27663.

FERTILISERS, production.—P. Parrish. 27546.

ORGANIC DEODORISED SOLVENTS, production.—F. N. Pickett. 27044.

PRECIPITATED CALCIUM CARBONATE, production.—Union Chimique Belge Soc. Anon. (France, Sept. 23, '33.) 27299.

(September 27 to October 3, inclusive).

DEWAXING MINERAL OILS.—Aktiebolaget Separator-Nobel. (Germany, Sept. 29, '33.) 27177.

ARSENIC ACID, manufacture.—E. R. Boller and Grasselli Chemical Co. 28337.

CRYSTALLISING BORAX from solutions.—Borax Consolidated, Ltd. (Newman). 28188.

VITAMINE PREPARATIONS.—A. Carpmal (I. G. Farbenindustrie). 27952.

ANTHRAQUINONE DYESTUFFS.—A. Carpmal (I. G. Farbenindustrie). 27953.

SUBSTANCES DISPLAYING HORMONE-LIKE ACTION, manufacture.—A. Carpmal (I. G. Farbenindustrie). 28075.

IODONAPHTHOLSULPHONIC ACIDS, manufacture.—Chemische Fabrik vorm. Sandoz. (Switzerland, Oct. 4, '33.) 27976.

CUPROUS CYANIDE, manufacture.—C. Dangelmajer and E. I. du Pont de Nemours and Co. 27882.

ALKALI METAL ADDITION PRODUCTS of aromatic hydrocarbons, manufacture.—E. I. du Pont de Nemours and Co. (United States, Sept. 29, '33.) 28042.

HYDROCARBON OILS, treatment.—Gasoline Products Co., Inc. (United States, Oct. 5, '33.) 28054.

TAR PRODUCTS, manufacture.—J. R. Geigy A.-G. (Germany, Sept. 27, '33.) 27725.

AZO DYESTUFFS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 27726.

AZO DYESTUFFS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 27855.

1-(N)-ANTHRAPYRIDONESULPHONIC ACIDS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 27856.

DYESTUFFS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 27857.

6-NITRO-AND 6-AMINO-2:3-HYDROXY-NAPHTHOIC ACID, manufacture.—W. W. Groves (I. G. Farbenindustrie). 28199.

QUINOPHTHALONESULPHONIC ACIDS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 28311.

ACTIVATED CARBON, preparation, etc.—I. A. C. Soc. per l'Industria Articolli di Caoutchouc e per Materiali Protettivi e Antigas. (Italy, Sept. 28, '33.) 27834.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 27, '33.) 27724.

DYEING WOOL.—I. G. Farbenindustrie. (Germany, Sept. 30, '33.) 27728.

QUINONES, manufacture.—I. G. Farbenindustrie. (Germany, Oct. 7, '33.) 27920.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 29, '33.) 28049.

COATING LIGHT METALS with chlorinated rubber.—I. G. Farbenindustrie. (Germany, Oct. 3, '33.) 28208.

MERCURATED ALIPHATIC COMPOUNDS, ETC.—Imperial Chemical Industries, Ltd., and F. L. Sharp. 27880.

ALCOHOLS FROM FATS, ETC., manufacture.—Imperial Chemical Industries, Ltd., R. J. Rosser and H. Swann. 27881.

DYESTUFF FOR ACETATE ARTIFICIAL SILK.—Imperial Chemical Industries, Ltd., G. C. Semple and C. Shaw. 28236.

DISTILLABLE CARBONACEOUS MATERIALS with hydrogenating gases, treatment.—International Hydrogenation Patents Co., Ltd. (Germany, Nov. 18, '33.) 27938.

DESTRUCTIVE HYDROGENATION of carbonaceous materials.—International Hydrogenation Patents Co., Ltd. (Germany, Nov. 11, '33.) 28134.

SEPARATION OF PROPYL ETHER from mixtures of same with propyl alcohol.—J. Y. Johnson (I. G. Farbenindustrie). 28043.

DERIVATIVES OF ANTHRAQUINONE SERIES, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 28044.

CONCENTRATING FORMIC ACID.—R. Koepf and Co. Chemische Fabrik. (Germany, Sept. 30, '33.) 28086.

ORGANIC COMPOUNDS, manufacture.—H. C. Olpin and G. Reeves. 27714.

ACIDIC, ETC., REAGENTS, recovery.—H. F. Oxley. 28172.

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 22 tons permanganate of potash, B.P. Sample required with tender. Tenders due Tuesday, October 16, 1934. Forms of tender obtainable from the above at a fee (which will not be returned) of 5s.

Canada.—A recently-established firm of manufacturers' agents at Toronto has applied for United Kingdom agencies for rubber goods for the drug trade, and lines for sale to hospitals, etc., on a commission basis, throughout the Dominion, with the exception of British Columbia. (Ref. No. 314.)

South Africa.—A Durban firm of manufacturers' agents, with sub-agents in the main towns of South Africa, desires to secure United Kingdom agencies for edible oils, on a commission basis. (Ref. No. 319.)

Belgium.—A merchant and agent established at Brussels wishes to obtain the representation of United Kingdom manufacturers of nickel oxide. (Ref. No. 322.)

France.—An agent established at Paris wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of polishing products (abrasives). (Ref. No. 323.)

Ecuador.—A well-known British business man, resident in Guayaquil, desires the representation, on a commission basis, of United Kingdom exporters of chemicals, drugs and paints. (Ref. No. 332.)

New Companies Registered

F. Chorley Drysaltery Oil and Colour Co., Ltd., 35 High Street, Poole.—Registered October 6. Nominal capital £1,000. To carry on the business of paint, oil and colour manufacturers and merchants, etc. Directors: Francesco Covaccioli, 35 High Street, Poole.

Newell (Chemicals), Ltd.—Registered October 3. Nominal capital £500. To carry on the business of manufacturers of and dealers in detergents, chemicals, ointments, etc. A subscriber: Chas. G. F. Beer, 21 Bond Street, Leeds, 1.

Schori Metallising Process, Ltd.—Registered October 4. Nominal capital £1,000. To carry on the business of metal spraying of any article (including all metals, wood, glass, earthenware, fabrics and textiles) and the spraying of paints of all kinds, etc. Directors: Charles F. Lamb, Ballard Combe, Coombe Warren, Kingston Hill.

Forthcoming Events

- Oct. 15.**—Lecture and film dealing with Gutta Percha. Dr. H. R. Braak. Reynolds' Hall, College of Technology, Manchester.
- Oct. 16.**—Hull Chemical and Engineering Society. "Modern Whaling in the Antarctic." R. A. Bellwood. 7.45 p.m. Municipal Technical College, Park Street, Hull.
- Oct. 17.**—Society of Glass Technologists. 2 p.m. University, Sheffield.
- Oct. 17.**—Society of Chemical Industry (Plastics Group). Informal dinner, 6.45 for 7 p.m. Stewarts Restaurant, Piccadilly, London. Informal discussion on the progress of plastic materials in the past year. Speakers: Dr. L. A. Jordan, H. V. Potter, Foster Sproxtton, A. J. Gibson. 8 p.m. Burlington House, London.
- Oct. 17.**—Institute of Fuel. "Coal Cleaning by Gravity Methods." A. A. Hirst. 6 p.m. Burlington House, London.
- Oct. 18.**—Society of Chemical Industry (South Wales Section) and Institute of Chemistry. "The Functions of a Colliery Chemist." T. G. Watts. 7 p.m. Thomas' Cafe, High Street, Swansea.
- Oct. 18.**—Chemical Society. "Induced Radioactivity." Professor P.M.S. Blackett. 8 p.m. Lecture Theatre of the Royal Institution, Albemarle Street, London.
- Oct. 19.**—Institute of Chemistry (Glasgow Section). Annual General Meeting. 7 p.m. Exhibition of Balances. Institution of Engineers and Shipbuilders, 39 Elmbank Crescent, Glasgow.
- Oct. 19.**—West Cumberland Society of Chemists and Engineers. "Recent Developments in Special Cast Irons." F. K. Neath. 7 p.m. Workington.
- Oct. 19.**—Society of Dyers and Colourists (Manchester Section). "Some Observations on Kier Boiling Efficiency." D. Ward. 7 p.m. 36 George Street, Manchester.

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Oct. 19.—Andersonian Chemical Society. Presidential address.

J. G. Duncan. 3 p.m. Royal Technical College, Glasgow.

Oct. 19.—British Association of Chemists (London Section). Concert. 7.45 p.m. Broad Street Station Restaurant, London, E.C.

Company News

Borax Consolidated, Ltd.—The directors decided at their meeting on Wednesday to postpone the consideration of a dividend on the preferred ordinary shares until after the completion of the accounts for the past financial year.

Midland Tar Distillers.—The profit for the year ended June 30, 1934, including interest on investments, was £43,128 (against £33,252 in 1932-33). The directors recommend a final dividend on the ordinary shares of 2½ per cent., making 5 per cent., free of tax, for the year; to investments reserve, £2,500; to general reserve £15,000, carrying forward £19,610.

Burt, Boulton and Haywood, Ltd.—A final dividend of 3 per cent., less tax, for the year to June 30, 1934, is recommended on the ordinary shares. This dividend, with the interim payment of 2 per cent. declared in March, will make a total of 5 per cent., less tax, for the year. Last year a final dividend of 3½ per cent., being the total for the year, was paid. The annual meeting will be held at Brettenham House, Wellington Street, W.C.2, on October 16, at 12 noon.

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 November 3, 1934.

Ultravon. 552,214. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including paints or enamels and not including any goods of a like kind to any of these excluded goods. Society of Chemical Industry in Basle (a joint stock company organised under the laws of Switzerland), 141-227, Klybeckstrasse, Basle, Switzerland. June 27, 1934.

Enzel. 552,576. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, Howards & Sons, Ltd., Uplall Works, Uplall Road, Ilford, Essex. July 12, 1934.

Gloy. 553,297. Class 1. Glue and size, for sale in the United Kingdom of Great Britain and Northern Ireland, and for export to and sale in the Irish Free State. Gloy & Empire Adhesives, Ltd., Acme Works Rendlesham Road, Clapton, London, E.5. August 15, 1934.

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Write for particulars to:—

C. B. WOODLEY,

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