กรมวิทยาศาสตร์

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXVIII. January 7th, 1933 No. 706

The Backbone of British Industry

A GRANDIOSE manifesto on the management factor in industry was issued by thirty-one industrialists and public men on New Year's Day. Suggestions were made for the improvement of management, but they were not very practical as they were chiefly wrapped up in such well worn phrases as "higher control," "market research," and "planning." The Rev. Robert R. Hyde, the director of the Industrial Welfare Society, at once put his finger on the weak spot by pointing out to the writer of the essay that his reflections were based on a few large scale businesses to the entire exclusion of the smaller men who are the backbone of British industry. Mr. Hyde quoted figures which showed that the number of factories in this country having over 1,000 employees each is no more than 421, whereas those having from one to twenty-five employees reached the colossal figure of 97,463. As in between these extremes the total number of factories is no more than 30,000, Mr. Hyde has clearly established his contention that this country is still dependent upon the energy and enterprise of the small manufacturer.

Accordingly, if the heads of these smaller units are to improve their methods of management they can best be assisted by the knowledge and experience of the successful efforts of those similarly placed, rather than by the heads of concerns whose employees run into thousands. All can agree with the manifesto that the human factor is of predominant importance, and Mr. Hyde very properly points out that for fifteen years his Society has been collecting and collating information on this phase for the guidance of employers. Amidst all the vague talk about "rationalisation" it is good to be reminded of the unchallengeable fact that the small business with its individualist leadership is still the most certain contribution which Great Britain has made to industrial life.

Alcohol Through the Ages

A LARGE measure of success attended the series of Jubilee Memorial Lectures under the auspices of the Society of Chemical Industry in the year that has just ended. Following the discourse by Dr. A. E. Dunstan on "Fluid Fuels To-day and To-morrow," and by Dr. G. D. Bengough on "Corrosion of Metals in Salt Solutions and Sea Water," Dr. E. F. Armstrong took as his subject "Alcohol Through the Ages." He delivered the lecture before the Yorkshire Section on December 12, and before the Birmingham and Midland Section on December 15, and he will give it to other sections of the society in due course. The lecture first outlines the history of alcohol, its use and relation to knowledge from early times. Distillation of alcohol is an old process, of which the earliest records are found on Arabic medicine of the tenth century. The application of alcohol to medicine and other arts extended rapidly in the middle ages, when monastic production of spirit for medicine purposes became general, but on the dissolution of the monasteries the industry became disorganised until the formation of the Distillers' Guild. State control of alcohol as a means of revenue production was begun in this country by the parliamentary Government in 1643, when, as a result of the spirit duties imposed, methods of alcoholometry became necessary, and led to the formulation of the proof standard, the invention of Clark's hydrometer, and, later of Sikes' hydrometer, graded in proof degrees. In 1790-94 Bladgen and Gilpin made a careful study of alcoholometry, and introduced alcohol tables which were later revised by Thorpe. Denaturation of spirit by 10 per cent. wood-naphtha, legally permitted in 1855, rendered alcohol available as a raw material from many industrial chemical purposes, but prevented its use for others, and in 1902 alternative additions were allowed. To-day a wide range of denaturants is available without which the alcohol industry could not have progressed.

The chief sources from which alcohol is produced by fermentation are cane sugar molasses (in the U.S.A. and at Hull) from sugar beet (in France) and from potatoes (Germany). Other sources are sawdust and waste sulphite from the wood pulp industry. One factor aiding the cheap production of alcohol from molasses is the ease by which this material is handled, being transported in bulk like oil. Carbon dioxide, used as a refrigerant, is a valuable by-product of the fermentation industry. Successful processes for the conversion of sawdust into fermentation industry. Successful processes for the conversion of sawdust into fermentable sugars have been devised, but lack of sawdust and the present low price of molasses render this method non-competitive. Future production of alcohol will probably be mainly from ethylene and the economical basis of this process depends on obtaining ethylene at a suitable price. The supply of ethylene is limited in this country, but cracked tar fractions are a potential source. Dr. Armstrong describes the commercial production of absolute alcohol and shows how, by the use of azeotropic mixtures, absolute alcohol can be produced from a distillery mash at a single operation. The future importance of power alcohol is indicated. Several countries now legislate for a proportion of alcohol in petrol. In Germany a projected legal standard for motor fuel included ethyl, methanol and

synthetic petrol from coal, leaving about 35 per cent. only of imported spirit. The uses and potential significance of alcohol as a raw material for the synthesis of organic chemicals are considered in detail in the lecture.

This Year's World Power Conference

THE preparatory work of the organising committee of the World Power Conference which will be held this year in Scandinavia, proceeds steadily and successfully. The first plenary World Power Conference was held in London in 1924, and the next in Berlin, 1930. There have also been sectional meetings with concentrated programmes, for instance, at Basel in 1926, and London in 1928. The Scandinavian Conference will be such a special meeting, dealing with the energy problems of large industry and transport. Participation and collaboration of 15 countries outside Scandinavia has been assured.

About 40 reports to be published at the meeting deal with problems of energy supply in the large-scale industry, such as combined power and heat supply, the rôle of the large-scale industry in national power schemes, etc. Among these papers some studies suggesting new solutions of several important technical and economical problems are contained. In others are presented valuable technical and economical results and experience.

A considerable number of technical papers treat the problems of long distance gas transmission, now partucularly prominent in many countries. Other papers are devoted to more special power problems concerning iron and steel industry, pulp and paper as well as cement, sugar, textile and other steam heat consuming industries. Energy questions of transport yield subjects for 62 reports; railway and marine transport, peculiarities of city and suburban traffic are discussed with due emphasis on the keen competition which electric traction and Diesel engines have put up against the steam locomotive. In face of the difficulties of the world situation, there is more need than ever of rational planning in industry. The good support given the World Power Conference sectional meeting in Scandinavia shows that technical and economical circles fully appreciate this opportunity for the man of industry to meet the power expert in order to discuss common problems and exchange experience. The technical sessions will be held from June 29 to July 4, and between June 26 and 29 and July 4 and 10 there will be official visits and excursions.

A Draft Specification

THE Building Division of the British Standards Institution has issued for criticism a draft British Standard Specification for linseed oil putty, which deals with putty for use in wooden and metal frames. This work was undertaken as a result of a request to the Institution by the Government Inter-departmental Works Committee. Limits and conditions are specified for composition, consistence, skins and coarse particles, moisture, etc., together with a short specification for whiting.

The building industry has experienced numerous difficulties in the past resulting from the supply in most cases of unsuitable foreign putties. The new specification, it is felt, should do much to help the position. Copies of this draft British Standard Specification are available to readers whose co-operation in submitting criticisms is invited. These may be obtained from the Publications Department of the British Standards Institution, 28 Victoria Street, S.W.1.

Russian Patent Laws

ON the surface the Russian patent laws appear similar to those in other countries. The granting of patents, however, is sharply discouraged, whereas the conferring of "inventor's certificates" has been stimulated; patents seem to be retained largely in the interests of foreigners having industrial relations with Russia. An inventor may apply for a "certificate" or for a patent. The former certifies that he has been credited with the invention, but it also states that, within the boundaries of the U.S.S.R., the right to exploit the discovery rests with the State. The inventor may make purely personal use of his invention, but no other private individuals or corporations can use the invention without permission from the State. If the inventor made his discovery in connection with the work in some science research institute, construction bureau, experiment station or laboratory, he has no patent rights, and can apply only for an "inventor's certificate." This also holds true for inventors commissioned by, or receiving financial assistance from, some stage agency. The practical value of alleged discoveries is investigated by a Special Branch on Useful Inventions, which is affiliated with the Patent Office. Recognition of the usefulness of a discovery entitles the certified inventor to certain privileges. He may receive monetary compensation, paid in a lump sum; he may gain certain advantages affecting his private life (such as improved housing or preferential treatment in technical schools). Furthermore, his invention, is put to use by the State agencies, wherever its exploitation seems warranted. Relatively high fees are charged for patent grants. If the utility of the discovery is not apparent, the patent may be granted without delay. If, however, the usefulness of the invention is demonstrable, the Branch on Useful Inventions is required to treat with the inventor, seeking to gain his patent rights. In extreme cases, where the discovery seems important, the inventor may be dispossessed "under compulsion," or the patent licensed under compulsion, with a compensation fixed by a Central Committee on Inventions. Although protected, the patentee obtains none of the privileges of the "certified" inventor, but letters patent may be exchanged for "certificates," thus changing the inventor's status.

Inventions in 1932

ONE direction in which 1932 showed an improvement upon the preceding year was in connection with patent activity. Following the peak year 1929, when the highest number of patent applications was lodged the total for that year reaching 30,808, the succeeding years, 1930 and 1931, both showed a drop, the falling being as much as 3,000 in 1931 compared with the previous year. In 1932, however, approximately 1,000 more applications for patents were filed over the figure for 1931, and it is to be hoped that this may prove a satisfactory indication of the trend of industry in general. Against the increased activity indicated by the figures we have quoted, there has been a considerable diminution in the number of foreign patent applications emanating from this country.

Purchasing Chemical Plant: Tests and Guarantees

By J. H. WEST, M.I.Chem.E.

THERE are certain aspects of the purchasing of chemical plant, chiefly with regard to the giving of performance guarantees by the makers and the carrying out of tests after the plant is delivered, which badly need putting on a more rational basis.

When a chemical manufacturer requires new plant there are two courses open to him. His own technical staff may design the plant and send out working drawings and specifications to suitable makers for quotations, or alternatively he may send a statement of his requirements to the makers and leave them to design the plant. There are advantages and disadvantages in both methods. In the first, provided that the technical staff are competent, and sufficiently experienced in the design of that particular kind of plant, they are in a better position to produce a design which exactly fulfils the requirements, because they are familiar with the working conditions, which the plant maker is not. Added to this they have no reason to make the plant any larger or more expensive than is necessary, and this the plant maker sometimes does for reasons which will be discussed later. On the other hand, the design they produce will be a special design which will probably not fit in well with the plant standards, and may therefore cost more in comparison with a standard design. In this case no question of guarantees arises, for the maker has merely to construct the plant according to the drawings and specifications provided, and he takes no responsibility regarding the performance.

Need for Accurate Information

However competent the chemical manufacturer's technical staff may be, they cannot be specialists in all kinds of plant with lifelong experience in the design of each, and it is therefore the more common case that the design is left to the plant maker. This has the advantage that standard type of plant, made from existing patterns and with existing tools and jigs can be supplied, and can, if necessary, be backed up by a guarantee of performance. This course, however, leaves the purchaser to a considerable extent in the plant maker's hands, and in some cases the position may be abused. On the other hand, the plant maker is often given insufficient or inaccurate information to work on, and is then blamed for unsatisfactory results. My own experience has been almost entirely on the side of the purchaser of plant, but I have a very strong sympathy with the side of the plant maker, and the main object of this article is to draw attention to the handicaps of the latter, in the hope of persuading the purchaser to give him a fairer chance, to his own ultimate advantage.

The plant maker's first complaint, which is very often fully justified, is that the purchaser does not give him full and accurate information as to the conditions to be met. Sometimes this is due to ignorance or lack of appreciation of the importance of secondary factors, but more commonly it is due to a misguided fear of giving any more information than can possibly be helped about his methods of manufacture, for fear that this information should reach competitors. It is not an exaggeration to say that British chemical industry as a whole is permeated with this pernicious idea of secrecy, and that it is doing a great deal to prevent progress. Personally, I believe that any British chemical plant manufacturer who is given confidential information, or who is taken to a chemical works to study the working conditions on the spot, can be trusted implicitly not to make improper use of that information. At any rate, in my long experience, I have never come upon such a case. It is, indeed, my conviction that, if any two chemical manufacturers in the same line of business (supposing them to be fairly equally up-to-date in their methods) took each other round their respective works and explained every detail of their methods, they would each gain and not lose by the exchange of information.

Mutual Confidence and Co-operation

In the relations between makers and purchasers of plant there is urgent need for more mutual confidence and co-operation. How can the maker do his best for the purchaser if the latter will not tell him the whole story? At a recent meeting of the Institution of Chemical Engineers, the chairman, Mr. J. A. Reavell, cited a case where he was quoting under very strict guarantees for an evaporator to deal with a liquid stated by the prospective purchaser to contain 17 per cent. of solids. On being asked whether the liquid would always contain just 17 per cent., the purchaser replied "Oh, no, it will often contain over 25 per cent., and sometimes less than 3 per cent."

If the business of buying and selling chemical plant is to be carried out on an economic basis, which is really satisfactory to both parties, each party must put all their cards on the table unreservedly. The purchaser should, whenever possible, supply the plant maker with a sample of the material to be treated, or, if the material is liable to vary in composition or character, with several samples representing extreme conditions, at the same time stating what the average composition will be. Better still, he should in addition show the plant maker the material being produced in his works, and where the new plant is to go. He should further be quite frank as to whether the duties given represent the actual duties required, or contain any margin for contingencies or future expansion, and whether low capital cost or low running costs are the main consideration. The plant maker, on his side, should supply drawings which are not merely diagrams, but do show what is being offered, and should be equally frank as to what the plant he puts forward will really do, and how much allowance for contingencies is provided for. He should be willing to study and try to meet any special wishes or ideas the purchaser may have regarding the design or arrangement of the plant, and he should not be too proud to consider constructive criticism of his design. The attitude of "This is my standard design; take it or leave it," which is sometimes met with, does not make for good business.

Stringent Guarantees

Purchasers are very fond of asking for stringent guarantees as to performance, steam or fuel consumption, and so on. They feel that these guarantees are a protection against having an unsuitable or inefficient plant foisted upon them, but they do not realise how much extra they have to pay for this supposed protection. When a plant maker gives a guarantee it is only natural that he is going to cover himself for his own protection by putting in a plant that is amply big enough for the purpose. Not infrequently he offers a plant that is far too large for the specified duty; sometimes one which is three or more times too large. This may be due to the fact that he has not a standard unit which comes nearer to the purchaser's requirements, or he may feel that he has to provide heavily for contingencies because he cannot rely on the accuracy of the information given him by the purchaser. Now, occasionally, the latter may be glad to have a plant possessing an ample margin, if not at the moment then later on when production has to be increased, but as a rule he wants a plant which will do the required duty comfortably, without forcing, but not more, for the chances are that the other sections of his equipment could not keep step with a largely increased production, and further he does not want to spend more money on the new plant than he can help.

It is usually the non-technical directors and managers who are so keen on guarantees, and not the purchaser's technical staff. The latter, left to themselves and given a free hand, would make a better bargain with the plant maker, and one far more satisfactory to both parties, than those arrived at by the present methods of stinting information and demanding guarantees. They would, or should, know enough to give the plant maker full and accurate information, but it is much better to let him get his information at first hand in the works. He knows exactly what to look for, and the snags that might otherwise pass unnoticed. He will then have no excuse if his plant fails to come up to expectations, but under these conditions it is exceedingly unlikely to do so. It would

be safe to say that of 50 plants by reputable makers which fail to give complete satisfaction under the usual conditions of purchase, the failure in 49 cases is due to the design being based on faulty information.

The Mania for Secrecy

It is due to the unfortunate mania for secrecy that the plant maker is hardly ever allowed to see his plant after it is delivered—unless something goes wrong. This is almost incredible, but any plant maker will tell you that it is so. How, under these conditions, can he be expected to improve his designs and cheapen them by cutting down that wasteful factor of safety? The plant maker would, in most cases, be only too pleased to carry out complete tests and provide special instruments for doing so, with the result that the purchaser would have a much better idea of what the plant was doing and was capable of than he would ever be likely to get otherwise. But, no! It would never do to let the plant maker loose in the works! Consequently next time he quotes for a plant he again has to put on a big factor of safety, and the purchaser again pays heavily for his secrecy. This is altogether a stupid business. How much more sensible it would be if plant purchasers and plant makers got together as reasonable men and helped each other to make a deal on an economic and efficient basis? At present they are often inclined to regard each other as natural antagonists, each trying to get the best of the bargain.

Friendly co-operation between buyer and seller should not end with the delivery of the plant and the first test. It would be of the greatest assistance to the plant maker to see his plant after one, two, or five years' operation, and to be kept in touch with repairs that are carried out. In this way he can learn which parts are liable to fail, and which wear out first. In case of renewals he can introduce the user on to any improvements which have been made since the plant was delivered, and tests carried out after a long period of use will often reveal causes of loss of efficiency of great importance to both user and maker.

The Institutes of Chemistry—VI

By Professor H. E. ARMSTRONG

In resorting to the hospitable columns of THE CHEMICAL AGE, I had no thought of courting general publicity; the dulcet strains of my homilies have been strummed to catch professional ears. My sense of modesty is shocked, therefore, in finding myself "billed" everywhere, thus., "Criticisms by Armstrong" ("Evening news"), "Test Pottering" ("The Star"); this week— "England's Task Now." A note of colour is added by surprised references, of an inspired inaccuracy, whereby sartorial magnates are perturbed, to the chromatic efforts of some of the young bucks of the chemical world at a recent societies' dinner and dance. These are days in which no one is taken otherwise than seriously. The High-brow Press is less instant in its recognition of merit—thus the "Morning Post," in its issue of December 12, had a Miltonian leader headed "Wanted—a Pamphleteer," evidently by a thirsty writer, beginning:—

"In these days of limits and restrictions, oh! for a muse of fire that would ascend to the highest heaven of denunciation. Other ages have felt the knees of the bureaucrat in the small of the public back but other ages have had their pamphleteers—a company who defended liberty with their pens, better than a regiment of musketeers with firelocks." The question finally asked is—"Will not some pamphleteer arise, some one to lash out and 'suppress the suppressors.'" I am passed over and Mr. Shaw is suggested. The appeal is evidently from pen to pen, not to science. A mere ink-spilling cynic, setting no constructive example, can do nothing in times such as ours, paint he black as he will. The sense of professional responsibility has to be awakened and exorcised into doing something. Here's to the charge.

The Worst Form of "Test Pottering"

The knees of the pseudo-scientific bureaucrat have too long been digging very hard into more than the small of the back of chmeistry, *at great public expense*. The worst form of "test pottering" yet developed is that practised by bodies such as the Fuel Research Board, the Safety in Mines Research Board, in the blessed name of Agricultural research and of much Medical research, Cancer research, in particular. In all these, we have the old story of the Blind attempting to lead the Halt. All suffer from lack of competent technical leadership and a clearly conceived policy of action as well as from lack of outside criticism. It isn't thought to be nice of anyone to criticise institutions working with reputed Hell-pavement material at public cost. When I see in my "Sunday Times," music, the stage, even the "pictures," every form of art, literature and politics systematically reviewed and criticised, I seem to sense a great blank. Whilst the nations come under review, the nation behind all nations, if there be any meaning in modern progress, the Nation of Science, is left unnoticed, uncriticised, unknown. A poor testimonial this for schools and universities and the many hundred science masters scattered about the country.

We shall have to go far, in our study and criticism of the outcome of research, on the grand scale, at public expense, if we are to arrive at safe enough conclusions to reform the present system. Even the policy of so august a body as the Royal Society must needs be considered. Not a few of us have grave doubts as to the wisdom of establishing Professorships of Research, whereby men of special ability are withdrawn from general service and the inspiration of students. The end thus far reached scarcely seems to have justified the means. Ideas, too, soon peter out and cease to be fashionable.

D.S.I.R. Red Tape

The initial organisation of the D.S.I.R. was in the hands of a "literary gent," without training in experimental science. Therefore, it is easy to understand that it was administered on red tape lines from the outset and soon became a typical bureaucracy. It was unqualified itself to organise a Fuel Research Board and never called to its aid those who might have helped to develop such an enterprise, with some consideration of the coal interests, the fuel needs of the country and the problems of coal generally. The Fuel Research Board has spent nigh on a million without contributing anything to an advance in the scientific use of coal. It began with a fatuous study of the low temperature carbonisation of coal, without ever calling into consultation those already concerned in the enterprise. The most Sir George Beilby did—to repeat words I used several years ago, in criticising Lord Balfour's inspired Messel Lecture—was to make sponge cakes of coal! All the money he spent was wasted. I doubt if the Board has spent ten thousand pounds effectively in developing fuel or even in other ways.

It is difficult to discover that the chemical work of the Safety in Mines Research Board has even a colourable connection with safety anywhere. No progress seems to have been made in studying the way in which explosions of coal-dust are propagated. The work on gaseous combustion and on coal has been not only very unsystematic and incomplete but better done elsewhere.

Industry Sets an Example

On the other hand, industry has set an example how such work may be done. Much has been said, at one time or another, about the wonderful enterprise shown abroad in producing first indigo, then ammonia, synthetically. The former was a slow business and the performance perhaps overrated, as a whole. What cannot be overrated is the foresight displayed by the German industrialists in determining to carry the enterprise through, at whatever cost and the general efficiency of the scientific organisation engaged in the tasks. The nitrogen problem was far the simpler and was soon solved when undertaken seriously, with the aid of real engineering skill and the unwearied perseverance of a competent directing intelligence. When the hydrogenation of coal came under consideration, in this country, it was forthwith undertaken, in a practical way, under industrial conditions but under skilled scientific management: the problem

was solved without delay. What counts most of all is the will to do. Given the conception of a possibility, thoughts are soon turned to ways and means.

The feeble attempts of the Fuel Research Board, in this field, were uncalled for and nothing short of misdirected energy, without any element of imagination. Coal research should be primarily in the hands of the coal industry, not a State charge—if only as an indirect means of importing an element of sound scientific thought into an industry hitherto carried on without any form of scientific control, apart from engineering. The argument is equally applicable to safety in mines. It should be an obligation upon the industry to provide its own safety measures.

Medical Research

The Medical Research Council has necessarily promoted not a little good work but it has entrusted its inquiries far too much to untrained academic workers, not in touch with clinical needs and practice. Cancer research, to the outside observer, seems to have been carried on without inspiration or imagination—without any clear cut policy. Why the work should be divorced from that of the Medical Council is not obvious. The preparation of substances likely to promote superficial cancerous effects does not seem to be a promising way of discovering either the cause of the disease or its cure; such work belongs to the dyestuff industry. In like manner, the synthesis of natural glucosides is scarcely a contribution to pathological science.

The fact is, workers in these difficult fields are simply beating the air, vainly searching for a call and a cue. They indisputably lack the necessary training in scientific method and the required breadth of knowledge. There is no efficient leadership—the Medical Council has only known one chemist and takes no outside advice. It asks for no constructive criticism of its work. The art of medicine was revolutionised by Pasteur; we have extended the use of his methods, without improving upon them. Neither have we learnt to understand them.

Not a few of those who might have vision are losing all power to exercise it under the depressing yoke of a Civil Service administration. Officials knowing little of science and without outlook administer with the cold hand of discouragement, depriving the workers of the proper incentives to action; the spirit of emulation is killed by the system.

The world perishes for lack of men of vision. We have to ask ourselves why it is that we have had no second Pasteur, no second Lister—whether we may not be engaged, in school and university, in preventing their awakening—in crushing out all freedom of spirit.

A Surfeit of Undigested Knowledge

As far back as 1885, in my address to the Chemical Section of the British Association at Aberdeen, I contended that medicine was mainly applied chemistry. I was then intimate with Lauder Brunton, who in his mild way was seeking to force chemistry into medical practice. At the same time, I urged that we should introduce the spirit of research into all our chemical teaching. We have gone back rather than forward since those days. Whilst medicine is far more a subject state of chemistry than it was, if possible, the medical man has less feeling for our science now than he had in Pasteur's day, owing to his surfeit of undigested knowledge. He is so covered in with wood that he cannot see a single tree; he wanders in an uncharted field with at most an occasional *pH* to guide him.

We have to institute a research into the art of discovering researchers and leaders of research. We should begin probably by burning all external examiners, at the stake. We have only to think of what Pasteur has done for the human race. It would be worth while to divert all the funds now mis-spent on other lines of work to this particular line of inquiry. Surgery has been developed to a consummate art by reasoned experimental study. To serve the ends of medicine, a far higher art, that of using the powers of observation and reasoning, must be intensely developed, in connection with clinical practice, in a way that is impossible so long as the present system of cram is allowed to continue, defiling intellect as it does.

Our Fate in the Hands of the Farmer

The industry that is most delayed in scientific advance today is farming. It is fast becoming clear that, if we were properly fed, we should have little need for the doctor—that the ideally grown apple (with trimmings) a day *would* keep him away, barring accidents.

Our fate, therefore, rests not in the lap of the gods but of the farmer. The training of his leaders should therefore be far higher than that of the medical man. Unfortunately, agricultural research is chiefly remarkable for having nothing to do with constructive agriculture. With few exceptions, the work done in agricultural centres is pottering at its worst, mere wasted effort—in the hands of undeveloped, unguided workers, without the knowledge and critical power essential to agricultural inquiry. Year in, year out, sulphur sprays, Bordeaux mixture, this, that and the other wash, is taken in hand, rarely if ever in any sufficiently thorough or scientific way. Meanwhile, practice goes ahead—soon the leaf will only be known to us through a screen of Bordeaux mixture; one stops to ask whether the conditions of cultivation be not such as to induce the evils for which it is a remedy.

The curse of mathematics is coming upon farming, much as it has upon chemistry, to the great detriment of the art. I have before me the July issue of the Journal of the Wye Agricultural College, containing a super-highbrow description of the "Technique of a Barley Manuring Trial," an account of experiments made at Wye on the child's garden scale (whether with spade and pail also is not stated) at the request of Sir John Russell, to test the effect, on yields of corn and straw, of sulphate of potash, superphosphate and nitrogen, in various forms—as if the value of nitrogen to barley had not been ascertained by Lawes and Gilbert 80 years ago and since confirmed in each succeeding year. Sheer pottering! The paper is an ornate, statistical maze, which no agricultural reader can fathom, enabling the young man who did the work to show his learning and, I suppose, to get his degree, leaving him, at the end, only fit for an accountant's post or a stool in the College office. The work is entirely without agricultural feeling or sense of proportion and is great waste of money to print.

Fostering a False Objective

The danger of all such work is that it fosters a false objective. The conclusion stated in the summary is amusing—"that nitrate of soda and sulphate of ammonia gave higher yields than calcium cyanamide and that nitrogen in any of the three forms increased the yield over the no nitrogen plots." Great Heavens! This in the sacred name of science. Since Adam, probably the cereal has been observed to depend upon added nitrogen.

Unfortunately, Sir John Russell has developed a mania for unripe barley. He has led farmers to grow it all over the country, to placate the brewers, who now ask for more nitrogen than a properly ripened grain affords—because they starve the yeast they use of malt and also give it sugar, so that it hasn't a sufficient ration of nitrogen, for it to get through its work, when a high-class starchy malt is used. To such base ends has agricultural research descended. It may well cover its shame with a statistical garment. Of course, the brewers are happy. They can speak, on state occasions, of the assistance they have received from that great institution, Rothamsted. Reciprocally, Rothamsted can proclaim that it is helping the brewing industry by its researches. Honours are easy, because both parties get the wished for advertisement. If the brewing industry had a man in it who could read, the whole story might be got from Lawes and Gilbert's archives, at no expense.

Vital Issues in Agriculture

The day of statistics is fast passing in agriculture. The cry of the future must be quality, not quantity. The issues are vital, not numerical; how vital only the few realise. The plant is one with us, being alive. Sooner or later, we make it part of ourselves; we cannot enter into communion with it through a yard stick. Agricultural research has to be reconstituted from this point of view; to continue it on the present fundamental lines is sheer waste of money. The committee recently appointed by Government is not likely to save the situation. Life has to be put into the work—not figures.

We have no slight task before us, if we are to put the House Chemical in order, so that it may produce the new race of competent leaders so sorely needed in every quarter—men of vision, properly informed. A complete change of heart is called for; a stern sense of duty; great self-abnegation.

The situation could never have arisen had the Royal Society done its duty—if the leaders in science had not been satisfied merely to sit upon silken cushions in chairs of State but had organised themselves socially as a body of critical and constructive scientific opinion. To my great sorrow, I have seen the Society steadily decline in social influence with the years. It no longer calls experience to its Council and committees. The latest comer is taken whilst those who have gone grey in its service are left. Its sectional committees tend to be cliques. Perhaps the greatest mistake it has made has been to allow the D.S.I.R. to come into existence as a separate body.

The work was better done, in the old days, under the Government Grant Committee. The situation is now Gilbertian—a Box and Cox business. The two chief officials, the secretaries, serve both bodies. The late president of the Society is chief officer of the Government Department. Members of Council also hold positions on the departmental committees. In some way, science must purge itself of such incongruity, if we are to merit public esteem. We cannot allow anw Government Department to hold us in the land of make believe so beloved of politicians. At present, we have no common purpose—no desire to work together. We shall inevitably go under unless we organise our forces up to the hilt. In my humble opinion, the Lords should set the example. If they do not, the Commons must ultimately force their hand.

What! are men mad? Hath nature given them eyes
To see this vaulted arch and the rich crop
Of sea and land, which can distinguish 'twixt
The fiery orbs above and the twinned stones
Upon the numbered beach and can we not
Partition make with spectacles so precious
'Twixt fair and foul?

Cymbeline.

Economic Conditions in Venezuela

Decreased Imports

THE Department of Overseas Trade has issued a report on Economic Conditions in Venexuela, by R J. Kirwin, Acting British Consul at Caracas (H.M. Stationery Office, 1s. 6d.). Though there has been a considerable drop in the import figures generally during the past year, the percentage of imports from the United Kingdom remains much the same. A considerable amount of the cement used in Venezuela is produced locally, but there are also imports to the value of £275,000 annually, and, as long as the Government persists in its policy of road-making, there will always continue a steady demand for this commodity. The principal exporter is Germany, who supplies some 33 per cent. of the total market, followed by Belgium with about 22 per cent., and the United States with 20 per cent. Smaller exporters are Denmark, Holland and the United Kingdom, our share being about 5 per cent. About £360,000 worth of drugs and medicine are imported annually, of which some 57 per cent. come from the United States. Some six or seven years ago the trade was mainly in the hands of the French, but through extensive propaganda the market is being gradually captured by the United States. Certain German products have been widely advertised, but it is early yet to see what results are being obtained. Importations are shared in the following proportions:—United States: 57 per cent., France: 25 per cent., Germany: 7 per cent., United Kingdom: 5 per cent., Italy: 4 per cent.

Paint Imports

The imports of paints are principally shared between the United States, Germany and the United Kingdom as shown in the following table:—

	U.S.A.	Germany.	U.K.
Oil	£15,000	£7,100	£12,400
Water	£ 8,100	£4,200	£ 2,100
Enamel	£13,200	£ 300	£ 500
Preservative ...	£14,200	—	£ 7,400

The petroleum industry is, of course, an important factor in the economic life of the country, giving employment to large numbers and contributing considerably to the nation's revenue, in the shape of taxation. At present, however, owing to the world depression and the consequent falling off in the demand for petroleum, production has been restricted and large numbers of employees have been dismissed. Except in Eastern Venezuela, where new fields are being surveyed, exploration work and fresh drillings have been suspended. Although the curtailment of production has been only some 15 per cent., the numbers who found themselves without employment are very much in excess of this figure, the companies in the fields now maintaining little more than skeleton staffs. As all the demand for petroleum is met from wells already brought into production, the personnel required is relatively small. The total production of petroleum for the year 1931 was 17,191,872 tons, or 120,343,109 barrels, showing a reduction of 2,962,040 tons on the figures for the year 1930. The revenue to the Government from petroleum for the economic year (July 1, 1930, to June 30, 1931), was £1,920,000, as against £2,280,000 for the previous twelve months.

Sugar is grown in considerable quantities in the Maracaibo district and also in Valencia, Barquisimeto and Caracas. Figures are not available for the amount of sugar grown in the country, but the latest returns show exports to the value of £40,000, half going to the United States and the remainder to Curaçao.

Forthcoming Events

Jan. 9.—Institution of the Rubber Industry (London Section). "Sulphur and Vulcanisation." Fordyce Jones. 7.30 p.m. First Avenue Hotel, High Holborn, London.

Jan. 9.—Ceramic Society (Pottery Section). "Ostwald Colour System." J. M. Preston; "The Colorimetry of Pigments." G. F. New. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Jan. 10.—Institute of Chemistry (Huddersfield Section). "The Analyst in the Witness Box." J. A. Foster.

Jan. 10.—Hull Chemical and Engineering Society. "The Elements of Alternating Currents." C. J. Shuttleworth. 7.45 p.m. Grey Street, Park Street, Hull.

Jan. 10.—Institution of Petroleum Technologists. "Aircraft in Relation to Petroleum Technology—Use for Survey and Transport." H. Hemming. 5.30 p.m. John Street, Adelphi, London.

Jan. 11.—Electroplaters' and Depositors' Technical Society. Joint meeting with the Faraday Society. 8.15 p.m. Northampton Polytechnic Institute, St. John Street, London.

Jan. 11.—Institute of Fuel (London Section). "Manufacture of Organic Products from Coke-Oven Gas." T. E. Oesterrieth and G. Descamps. Burlington House, London.

Jan. 11.—Institution of the Rubber Industry (Midland Section). "Some Physico-chemical Aspects of Rubber and Rubber Latex." Dr. Paul Klein. Grand Hotel, Birmingham.

Jan. 11.—Institute of Fuel (N.. Section). "The de-dusting of Coal." A Grounds.

Jan. 11.—Society of Dyers and Colourists (Midlands Section). "Colour and Colour Fastness from the Point of View of the Retailer." J. G. Williams. Nottingham.

Jan. 12.—Society of Chemical Industry (Birmingham and Midland Section). Lecture by Dr. Alexander Fleck. 7.30 p.m. University Buildings, Edmund Street, Birmingham.

Jan. 12.—Institute of Metals (London Section). "The Zinc Industry." Stanley Robson. 7.30 p.m. 83 Pall Mall, London.

Jan. 12.—Society of Chemical Industry (Bristol Section). "Alcohol through the Ages." Dr. E. F. Armstrong. 7.30 p.m. University, Bristol.

Jan. 13.—Institute of Metals (N.E. Coast Section). "Corrosion of Metals in Salt Solutions and Sea-Water." 7.30 p.m. Armstrong College, Newcastle-on-Tyne.

Jan. 13.—Society of Chemical Industry (Chemical Engineering Group). "Corrosion Research on Light Metals." Freeman Horn. 8 p.m. Burlington House, London.

Jan. 13.—The Institute of the Plastics Industry (Midland Section). "The Phenol-Formaldehyde Side of the Plastic Industry" E. K. Smith. 7.30 p.m. Imperial Hotel, Birmingham.

Jan. 13.—Society of Dyers and Colourists (London Section). "Fur Dyeing." E. Beeley.

Jan. 13.—Institute of Metals (Sheffield Section). "Metal Spraying." Kenneth Gray. 7.30 p.m. University, Sheffield.

Jan. 13.—West Cumberland Society of Chemists and Engineers. "Fracture and Analysis of Pig Irons." A. L. Norbury. 7 p.m. Workington.

Jan. 13.—Oil and Colour Chemists' Association (Manchester Section). "Linoleum and Oilcloth Manufacture." Dr. J. Allan.

Physical Instruments for Modern Industrial Needs

The Physical Society's Twenty-third Annual Exhibition

THE twenty-third annual exhibition of scientific instruments and apparatus, organised by the Physical Society, was held at the Imperial College of Science and Technology, South Kensington, from January 3 to 5, when about ninety firms exhibited in the trade section, whilst many interesting items were contributed to the research and experimental section.

The trade section, which forms the principal part of the exhibition, included many new developments. There were new designs of comparators, dial micrometers and an electric type distance indicator for registering the density of

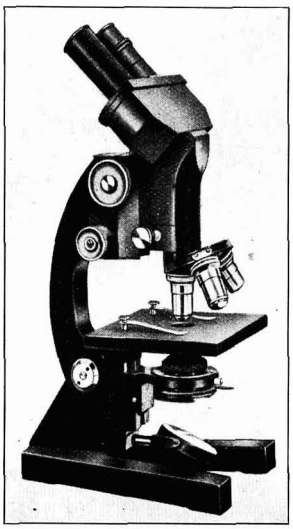

Fig. 1. The new GSET Binocular Microscope (Bausch and Lomb Optical Co., Ltd.)

liquids. In another instrument the properties of the photo-electric cell were used for recording smoke and other suspensions of solid particles in air, gases or liquids. Smoke is measured by light diffracted from the smoke particles which behave as secondary light sources whose image is formed in the plane of the photo-electric cell. By using a diffraction as against a transmission method zero errors are avoided and the effect of soiled optical elements on the records is minimised. An indicator designed for precision measurement of low pressures or vacua was also shown. It contained no liquids, and could be used to indicate either draught, pressure, reversion pressures, differential draught or differential pressures.

Rapid absorption spectrophotometry in the visual and ultra-violet spectral regions, permitting the user to obtain complete data for drawing the absorption curve of a solution in about one-fiftieth of the time required by other methods was demonstrated by one firm. The device used was a small fused silica cell so constructed that the light passes through a series of different lengths of solution arranged *en echelon*. The use of two cells in parallel, one of which is cut in notches on one edge, together with a revolving sector disc produces a series of ten pairs of spectra on a photographic plate in the spectrograph. Each pair of spectra consists of one that has passed through a known thickness of solution and one that has been reduced in intensity by the revolving sector disc. The positions of equal density can readily be determined by inspection, and hence the absorption curve may be plotted. This is an important development in dealing with substances which are photochemically active.

Thermal instruments were well represented and many types of furnaces, with all the modern accessories for their control and the recording of their temperatures, were to be seen. One particular bomb calorimeter had several novel features which will appeal to those who have to use such instruments.

The copper oxide photo-electric cell shown at the last exhibition, which has a maximum sensitivity in the infra-red part of the spectrum is now available in a commercial form, and in addition there is another type of these copper oxide photo-electric cells having its maximum sensitivity in the green portion of the spectrum.

The value of the exhibition generally was enhanced by the excellent response of those taking part in it to the desire expressed by the organising committee, that the working parts of instruments or apparatus should be exposed to view. In some instances exhibitors provided a working model or set of components to explain an action or movement. This practice could be highly commended for other exhibitions.

Balances were exhibited by L. Oertling, Ltd., exhibits shown for the first time including a balance for weighing electric lamp filaments (sensitivity 0.005 mg.); a special balance with protected beam, for the calibration of weights from 100 g. to 1mg.; and an instruments constructed for the London Exhibition of 1862, which has been used in the laboratory of a well-known London firm for seventy years.

The new binocular miscroscope shown by the Bausch and Lomb Optical Co., Ltd. (Fig. 1) has an inclined body tube which permits the observer the same ease of position as if he tilted the instrument itself, yet the stage remains horizontal for solution, oil immersion and dark field work. This is an important consideration when the microscope is to be used for prolonged periods with the stage in a horizontal position. Being a binocular instrument there is also little or no eye strain, more detail can be observed and a stereoscopic effect is easily achieved by proper adjustment of the eyepiece tubes. This firm also exhibited a research and photomicrographic microscope with several distinct departures from the existing types of such instruments. Here again, the eyepieces are inclined at a natural angle, whilst the stage remains in a horizontal position and provided easy access to the specimen and adjustments. The convenience of instantaneous change from binocular to monocular vision is also included, whilst an auxiliary condenser, which may be swung in and out of the optical axis, enables the user to turn from high to low power objectives without removing the ordinary condenser which is in immersion contact, or

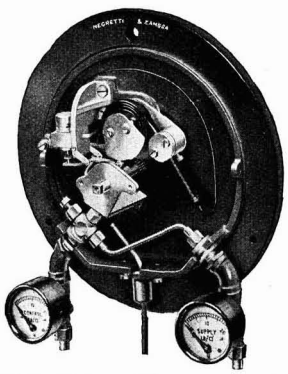

Fig. 2. Air Operated Temperature Controller (Negretti and Zambra)

interfering with any of the substage adjustments. When the instrument is used photomicrographically, the entire microscope is placed in a horizontal position, resting upon three supports and leaving each part of the microscope intact and the stage vertical.

Electric furnaces, wire wound for maximum temperatures of 1,000° C., and of the tube, muffle, crucible and universal types,

with thermostatic control up to maximum temperature were shown by A. Gallenkamp and Co., Ltd. On this stand there was also electrically heated ovens with thermostatic control for temperatures from 50° C. up to 300° C. with a new style finish in matt aluminium to resist corrosion and deterioration. Apparatus for the electrometric determination of hydrogen-ion concentration formed the subject of another exhibit.

Baird and Tatlock (London), Ltd., exhibited a new gas-heated muffle furnace. This furnace is intended for use at all temperatures up to 1,000° C. It will be found

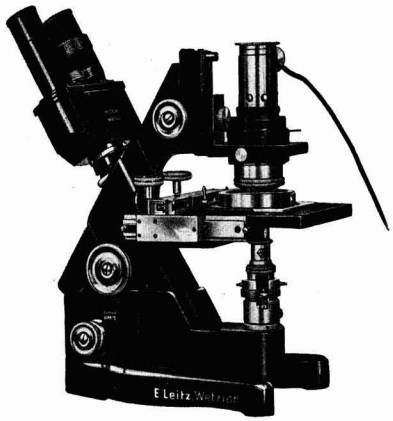

Fig. 3. Inverted Microscope
(E. Leitz, London)

suitable for many kinds of laboratory and experimental work such as testing materials at high temperatures, assaying, heat treatment of steel, enamel work, china and glass heating and analytical work, etc., for which this range of temperatures is required. The temperature in the muffle will be found very uniform, with a maximum variation of ± 5° C., so that accurate work can be carried out with all confidence. The heating up from cold is unusually quick, the furnace requiring only ½ hour to reach 1,000° C., though higher temperatures are actually obtainable. A ¼ in. gas supply is ample for the requirements of the furnace, the gas consumption being only 12 cu. ft. per hour. No flue connection is required

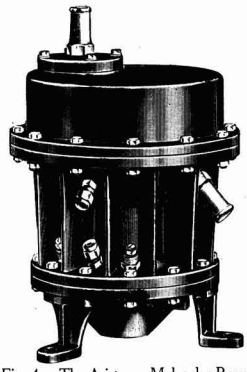

Fig. 4. The Aristovac Molecular Pump
(W. Edwards and Co.)

owing to the small quantity of gas burned (less than a boiling ring on a cooker). Provision is made for attaching a temperature-indicating equipment, if desired.

Air-operated temperature and humidity controllers (Fig. 2) for the control of tanks, vats, air conditioning, etc., were shown by Negretti and Zambra. For temperature control, the mercury-in-steel system is used, where the bulb is exposed in the medium to be controlled, and is connected to the controller by capillary tubing. The controller is set to the required working temperature and the mercury-in-steel thermal system controls the supply of compressed air to a diaphragm operated valve, which in turn controls the supply of heating or cooling medium. The control of humidity is obtained by either the wet and dry bulb, psychrometric type of controller, or the hygrometric type, where a sensitive element of goldbeaters' skin controls the supply of compressed air. These controllers are suitable for temperatures between −40° C. and 650° C. and relative humidities between 20 per cent. and 100 per cent. Another feature at this stand was a new design of the N. and Z. patented mercury-in-steel temperature recorder, in a circular case with a disc chart. This instrument has been designed for more economic production consistent with the same accuracy and reliability of previous types.

At the stand occupied by Bellingham and Stanley, Ltd., there was a newly designed polarimeter with a divided circle and verniers of glass, read by transmitted light. The circle was enclosed, with the exception of sufficient for the finger to turn it, and was mounted on ball bearings. The telescope did not rotate with the circle, thus facilitating observations when a spectroscopic eyepiece is employed. A unit polariser was fitted, which with its quartz condensing lens is transparent to the ultra-violet down to 2,200 A. The framework of the instrument was in one casting, and the trough held in place by two screws could be removed to make room for accessory apparatus. Photographs were shown which were obtained by using this instrument in conjunction with the B-S quartz spectrograph No. 2, when measuring the rotatory power of quartz in the ultra-violet, down to wavelength 2,200 A.

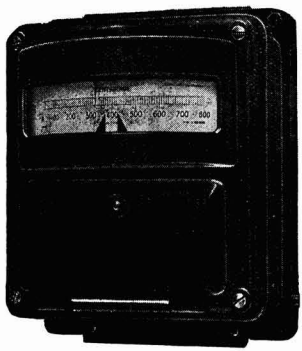

Fig. 5. Automatic Regulator
(Elliott Bros., London, Ltd.)

Chance Brothers and Co., Ltd., exhibited a large block of optical glass in a single piece as obtained from the pot after melting and cooling. This exhibit serves to illustrate the extreme care which has to be taken to exclude impurities, the pronounced blue colour of the glass being the result of the addition of less than 0.0004 per cent. of cobalt.

The Lovibond tintometer for measuring and recording the colour of liquids and solids was shown by The Tintometer, Ltd. The improved model of the Lovibond tintometer (British Drug Houses pattern Pat. No. 299194, is especially applicable for the determination of vitamin A content of cod-liver oil by the method laid down in "The British Pharmacopœia"; the determination of minute amounts of copper in the presence of iron and certain other metals; the testing of oils, waxes, fats, soaps and similar substances; the testing of paints, dry, papers, etc.; the testing of foodstuffs, beverages, cordials, etc.; and for tanning analysis. A special attachment can be provided to give a white light of even illumination approximating daylight.

Specialisation in vacuum practice and the exacting demands of commercial work have led W. Edwards and Co. to the recent development of many new types of pumps, each suited to a particular need. The Aristovac molecular pump (Fig. 4) has the motor entirely enclosed within the housing of the pump, and operates in the vacuum produced by the backing

pump (0.001 mm.). The absence of air resistance enables it to be run at a speed of 10,000 r.p.m. or more. The pumping speed is 1,600 c.c. per sec. at 0.001 mm. or less, and the vacuum is 0.000001 mm.

Exceptionally pure and accurately compounded salts and solutions specially devised for use in Dr. Judd Lewis's "ratio-quantitative" method of quantitative spectrographic analysis were exhibited by Adam Hilger, Ltd. These "Specpure" substances include solutions in which the chlorides of certain metals are contained in definite proportions (either with reference to the amount of the chloride or the metal) and a series of powders (called "ratio powders") in which salts of various metals are mixed in prearranged proportions. Com-

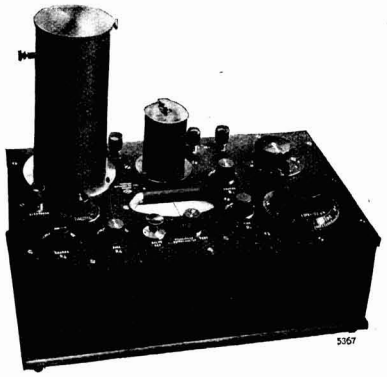

Fig. 6. Direct-Reading pH Meter
(Cambridge Instrument Co.)

parison is made between a spectrum of the substance and either a "ratio powder" of similar composition having as base an element dominant in the specimen or with a solution, closely similar in composition, compounded volumetrically from ratio solutions. Once similar spectra have been obtained it is but a step to the determination of the proportion of a minor substance in a specimen from a knowledge of its relation, in the powder or solution, to the major substance and the chemical determination of the same major substance in the specimen. The method can be used to deal with very minute specimens in which the total quantity of the minor substance is too minute for quantitative chemical determination.

A new inverted microscope (Fig. 3) constructed for use with Chambers' micromanipulator was exhibited by E. Leitz (London). The principal features of this instrument are that the objective is underneath stage, whilst the condenser and illuminant are above the stage. This arrangement enables one to operate upon bacteria in a lying drop which for natural reasons is a flat stratum, as compared with the centre of a hanging drop where too much freedom exists and the object under investigation may be difficult to focus. Unlike the general microscope construction, the fine adjustment is at the foot of the stand, an arrangement which will be found extremely convenient. The microscope is also equipped with a dark-ground illuminator with working aperture 0.85, with one or two sections of the periphery cut out so as to enable the operator to manipulate on micro-organisms in a dark field.

Elliott Bros. (London), Ltd., were showing heat economy and control apparatus, a number of instrument panels of a type suitable for a central station being erected in cubicle form, giving the latest practice of flush mounting with simplicity of design and uniformity of appearance. A boiler control panel was included where all the readings necessary for the complete supervision of a boiler were collected on one panel, facilitating efficient control by enabling the various quantities measured to be correlated and necessary adjustments made with ease and rapidity. At this stand there was also a humidity meter giving a direct reading of percentage relative humidity without the necessity of referring to tables or curves. This instrument operates on the wet and dry bulb principle and utilises a second dry bulb electrical thermometer which, in combination with a special measuring bridge and indicator movement, gives automatic compensation for variation of ambient temperature. The automatic regulator (Fig. 5) is an instrument for contralling and maintaining conditions, such as temperature, humidity, pressure, etc., at pre-determined values or between defined limits. The measuring system is operated electrically and so can be used with any physical condition which can be measured by electrical means, *i.e.*, by pyrometers, electrical thermometers, etc.

The Foster Instrument Co. were also showing automatic temperature controllers. A standard "Resilia" automatic temperature controller was demonstrated in conjunction with an electric furnace. The same instrument can be used for controlling oil, gas and steam-heated apparatus by the use of suitable valves, a large selection of types being available to cover practically every class of application.

C. F. Casella and Co., Ltd., made a special feature of a new spectrometer for students and research workers. This instrument is very solidly constructed and supported on a heavy cast-iron base. The telescope and prism table turn very easily on a central spindle, and are fitted with tangent screws. The circle is 8 in. diameter, divided on chromium plate, and the positions of the telescope and prism table are each read by two verniers; it may be rotated when required, thus allowing different parts of the dividing to be brought into use. The telescopes and collimator are fitted with coarse and fine focussing adjustments, and they are so mounted that they may be turned about a vertical axis over a range of 10°. They have the usual adjustments for collimation, and may be raised or lowered in relation to the prism table. The third telescope is mounted on the base, and may be clamped at any angle to the collimator.

Bakelite, Ltd., devoted their stand to bakelite moulding materials of various grades, including special materials having high impact strengths, exceptional resistance to moisture, etc.; bakelite varnishes for coil impregnation, etc.; cements; laminated sheet, rod and tube; transparent rod and slab; oil-soluble resins and varnishes; and bakelite mouldings. A variety of instruments by well-known makers, embodying bakelite parts, were shown.

The Griffin - Sutton bomb calorimeter exhibited by

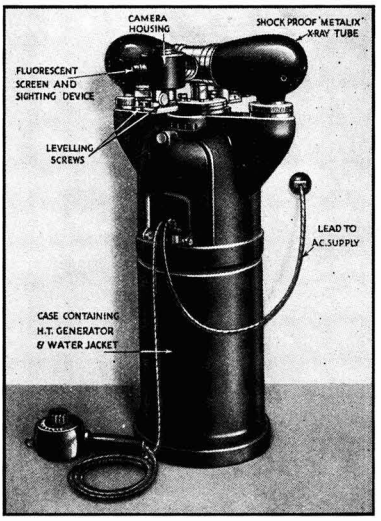

Fig. 7. X-Ray Apparatus for Crystal Analysis
(Philips Industrial)

Griffin and Tatlock, Ltd., is a new design constructed in highest grade stainless steel. This bomb has several novel features, including a new type of sealing by internal pressure which enables the ends to be screwed in lightly by the fingers and as easily removed after the pressure has been released; even distribution of the incoming oxygen round the internal wall of the

bomb, thus completely avoiding distrubance of the charge; unusually large area of contact between outer wall of bomb and water owing to long length and small diameter; a clean straight cylindrical section, ensuring against water pockets; very efficient stirring arrangement; and a new and convenient form of pellet press. They were also showing the Callophone, a new device for the examination of substances under ultra-violet light from daylight, consisting of a case with appropriate fittings for the enclosure of the sample to be observed and a filter plate through which the sample is illuminated.

At the exhibit staged by the Cambridge Instrument Co., Ltd., one of the chief features of interest was a direct-reading *pH* meter (Fig. 7). In conjunction with the Morton glass electrodes this instrument forms a combination which possesses all the advantages of the glass electrode method, while

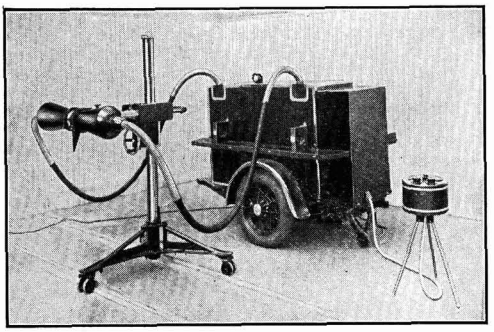

Fig. 9. Metalix Transportable Industrial X-ray Apparatus (Philips Industrial)

simplifying the technique to that of an ordinary potentiometer measurement. It is particularly suitable for routine measurements, and may be used with any type of electrode system over a wide range of temperature. The calibration has been arranged to give direct readings in *pH* units over a range of 14 *pH*, each division of the circular dial corresponding to 0.02 *pH*; readings can also be made by estimation to 0.01 *pH*. At this stand there was also a moisture meter which depends for its operation on the high dielectric constant of water. The material under test is used as a dielectric in a test condenser, the capacitance of which will depend upon the moisture content of the substance. The meter comprises an electrical resonance circuit which included the test condenser, an internal condenser controlled by an external dial, a sensitive micro-ammeter, and a zero-setting adjustment, the necessary l.t. and h.t. batteries being fitted internally, so that the instrument is entirely self-contained. It can be applied to measure the moisture content of tea, coffee, cocoa, flour, cereals, beet pulp, tobacco, clays and other substances.

Photo-electric cells and X-ray apparatus for industrial purposes were shown by the Philips Industrial company. The range of X-ray apparatus included a self-contained unit for crystal analysis (Fig. 8) by Debye-Scherrer and Seemann-Bohlin methods. With this apparatus photographs can be taken with the film on the exterior surface of the camera, or with the film passed in contact with the interior of the camera by means of springs. Once the apparatus has been earthed all external parts can be handled with perfect safety, and notwithstanding the very high tension the unit is even safer than many types of domestic electrical appliances. The h.t. transformer is surrounded by a jacket containing the circulating water for cooling, and provision is made for focussing by means of a fluorescent screen with cross wires. The exposure times are considerably less than those required with earlier types of apparatus and there is no necessity for continuous observation. There was also a transportable industrial X-ray apparatus (Fig. 9) suitable for the examination of welds and other metal structures by the absorption method. The Philips sodium lamp and rectifier has been specially designed to give a source of high intensity for methods of analysis involving the use of polarised light.

Hypochlorite Disinfectants

Application in the Dairy Industry

CIRCULAR No. 160 of the Agricultural Experimental Station, Kansas State College, describes the preparation and use of solutions of calcium hypochlorite and sodium hypochlorite for disinfection in the dairy industry. This disinfectant solution pumped through pipelines, vats, etc., should still contain at least 50 parts per million of available chlorine as it leaves the last piece of apparatus. The available chlorine (parts per million) content of the solution used for submerging well-cleaned bottles, pails, separator parts, etc., should be at least 50 when the time of action exceeds 1 minute, and at least 100 when the period is less than 1 minute. When applied as a spray, the solution should contain at least 200 parts per million of available chlorine. The solution must be clear, and should be used cold.

Manufacture of Sodium Nitrate

New Development in Norway

THE Norwegian Hydro-Electric Nitrogen Corporation (Norsk Hydro-Elektrisk Kvaelstofaktieselskab) is a large producer of synthetic nitrogen fertilisers, chiefly calcium nitrate. The calcium nitrate is produced by neutralising nitric acid with limestone; the former is obtained partly by the older Birkeland-Eyde electric arc process, and partly by oxidation of ammonia produced by the Haber-Bosch process, using hydro-electric energy for the production of the hydrogen. In both cases the nitric acid is obtained by absorption of the nitrogen oxides in water and in dilute nitric acid, respectively, the nitrous gas being passed in counter current to the acid. Finally, the gas is passed through an aqueous solution of sodium carbonate for complete absorption. The resulting neutral solution is converted to sodium nitrate, and partly to sodium nitrite. Considerable quantities of sodium carbonate are used for this purpose, the annual consumption being estimated at about 60,000 metric tons. In the attempt to avoid importation of sodium carbonate, the company has developed a process for utilising the sodium content of sea water. The construction of a plant for this purpose has been started. It is expected that the production of sodium nitrate will be increased at the expense of calcium nitrate, because the former is a better-selling product.

Low Temperature Laboratories

Precautions against Explosions

A NEW cryogenic or low temperature laboratory is now under construction at the California Institute of Technology. Its output is expected to be about five liters of liquid hydrogen an hour at a cost of two dollars per liter. This capacity may be compared to the plant in Berlin, the largest in the world, which can produce twenty liters an hour.

Professor A. Goetz, who is responsible for the Pasadena low temperature work, has pointed out that guarding against explosions is the first consideration in the design of these cryogenic laboratories. Operating at very high pressures, it is almost impossible to prevent some leakage, and if the operators are not careful, hydrogen constantly evaporating from the liquid containers, will collect in the topmost corners and recesses of the room or building. In the cryogenic laboratory of Cambridge, England, miners' safety lamps of the type invented by Sir Humphrey Davey are installed in corners of the ceiling where hydrogen is most likely to collect. When 1 per cent. of this gas collects these lamps give a signal which automatically throws open the doors and windows. In the German Physikalische Technische Reichsanstalt, which corresponds to the United States Bureau of Standards, Washington, the cryogenic laboratory has a very light roof merely resting over the building. In case of an explosion this roof would be blown off before a high pressure could be built up. At the Pasadena laboratory the room in which the hydrogen is liquefied has no sharp corners and the ceiling slopes upwards towards the window which runs from floor to ceiling and is almost half as wide as the room. This window is to be kept open at all times of the year.

Letters to the Editor

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

Academical Analysis

SIR,—In my previous communication concerning test work carried out for neighbouring firms by technical college staffs I certainly appeared to give the pros without the cons of the problem. Your correspondent "S" has now presented the latter, and although he has given a number of examples, yet these are entirely concerned with abuses which may arise in the case of teachers with a liking for pecuniary reward but with an ill-developed sense of duty.

I am confident from experience and contact with the staffs of a number of colleges that "S" has pictured what is far more the exception rather than the rule; that his reminiscences are unfortunate in that amongst a large majority of conscientious teachers he appears to have encountered only the wrong 'uns! Neglect of students is improbable if the test work is occasional and is carried out in the lecturer's spare time—authorities should insist on this latter condition. There are certain individuals who constantly preach that teachers should have no spare time beyond the minimum granted in other professions. This dictum is upheld by those who have never experienced the harassing effect of continuous teaching without a break. It may be argued that test work, being technical in character, does not constitute a change from duties, and that it will not prove beneficial other than in a pecuniary direction. This is not the case, however, for most teachers find complete relief in work which is totally different in type from that of the daily routine.

"S" asks if it is possible to ensure that no student will be put to do the work. The answer is that no lecturer would be willing to stake his reputation on work which a student has carried out. In my previous letter I pointed out that it was fame rather than fortune which the academic person sought in such work; it would therefore be risky indeed to set a student to carry out part of the work, especially since checking the result would mean repetition of this part by the lecturer. "S" seems to have attached too much emphasis to my suggestion of increasing salary scales by extra work. This suggestion aimed at securing a good salary in order to attract the best men into technical education, rather than a moderate scale which may attract those who have failed in industry.

With regard to the Dickensian analogy pictured by "S," it may be possible to-day to find similar "weeding of the garden" activities in certain private schools, but a technical college is the last place to find this condition of affairs. And as for the analogy with an engineer, I fail to see it. The municipal engineer is at all times in contact with practical problems and is for ever *doing* things. But the teacher fails to find any salutary effects (other than an increased technique in manipulation) from demonstrations in the lecture theatre and in the laboratory. If he be engaged in research he may avoid the dangerous path which leads to staleness, provided the research is of practical worth (*vide* the writing of Professor H. E. Armstrong on this). With no research to show that he can *do* as well as *teach*, a man who has successfully tackled major problems of local industries will still be able to exert a beneficial influence on students engaged in those industries.—Yours faithfully,

A.I.C.

Science and Progress

SIR,—Recent reports from America indicate that there is a greater appreciation of the influence of modern invention and research on industry there than in this country. Undoubtedly in the future a scheme must be devised so that on the one hand the inventor secures fair play, and on the other industry is not subject to paralysing changes in process and the continual replacement of existing plant and machinery in our older industries, under conditions where the demand for labour is reduced enormously at the same time. This condition only applies to the older or basic industries which have invested huge sums in plant without writing down the cost to a point where such plant can be replaced without dislocating the balance sheet. Even in many such cases, there is the additional difficulty of the saving in labour generally present in the case of modern plant. This may in some cases be reduced by 90 per cent.

Unfortunately the new industries generally require less labour for their working than that displaced in the older industries, but it is quite obvious that their rapid development is an important factor to-day. It was recently pointed out that in the case of the weaving industry in Lancashire it was necessary to realise that in some other countries one man could operate no less than 40 looms and that we were only considering the working of six looms. In Belgium, the writer was told a year ago that that country, with Germany and France, had displaced ten million operatives by automatic machinery during the past five years. Attention was drawn two years ago to the fact that Germany's unemployed practically corresponded with the four million hands no longer required in their "rationalised" works. The problem of controlling industry so that this important development can be fostered on the one hand and recognition given to inventors on the other is a difficult one to solve. Regarding unemployment this country is in a better condition than many others, for its agricultural industry is only half developed, and is capable of employing half a million extra hands at reasonable wages if we only develop it on right lines.

Germany is self-supporting in this direction and Italy has made great progress of recent years. It is evident that a system must be devised under which invention is encouraged and the patentee receives in this country equally satisfactory treatment as he does in the U.S.A. Patent Office and also the advantages secured in Germany in the direction of facility of defending his rights before the Patent Office at a reasonable expense, and also has the advantage given there, that any opposition must be taken within the first five years of the life of the patent.

This general problem of the efficient use of new invention, and the protection of labour against displacement, can only be solved when our legislature realise what is before us if this main problem remains unsolved. Politicians must turn statesmen, and give less time to scoring of their opponents, and more to the realities of modern life. Finance must give more attention to the opinions of practical scientific men, and work hand in hand with them in the reconstruction of industry; which after all is the basis of modern life and civilisation as we known it to-day.—Yours faithfully,

W. P. DREAPER,
London, N.W.3. Hon. secretary, League of Science.

Manufacture of Pure Tungsten

Decomposition of the Hexachloride

A NEW process for the manufacture of pure tungsten has been based on the dissociation of tungsten hexachloride at high temperatures. As described by A. L. van Arkel in "Revue universalle des Mines," 1932, pages 37-41, the reaction is carried out in a chamber resembling a large electric bulb containing a single tungsten filament which is electrically heated to 1,500° C. A mixture of tungsten hexachloride and commercial tungsten powder with which the vessel is filled is heated to 300° C. when a cyclic operation is initiated, the hexachloride coming into contact with the strongly heated tungsten filament splitting up into the pure metal and chlorine, while the latter reacts with the impure tungsten on the floor of the chamber with reformation of the hexachloride. A feeble current is required at the outset for heating up the tungsten filament to the required temperature of 1,500° C., but the steady increase in the thickness of the filament as the result of continuous deposition of pure tungsten calls for an increase in the current strength to 300 amperes after the reaction has been in progress for 3-5 hours. It is said that the method has also been extended to the production of zirconium and titanium in the pure form.

The British Synthetic Fertiliser Industry

Progress at Home and Overseas

IN spite of the doubts and difficulties which beset present day industry, it is pleasing to notice the continued advance of the fertiliser section. The hope expressed in a corresponding article last year that the home market was improving has been more than justified and there is increasing evidence that with some kind or another of Government intervention in agricultural affairs the world over, the fertiliser industry will continue as a main plank in the structure of the British chemical industry.

The world production figures for synthetic and by-product nitrogen reveal that stocks have been allowed to decline by some 150,000 metric tons of nitrogen. This decrease is reflected proportionately in all types of nitrogen fertilisers with the exception of Chilean nitrate, stocks of which have probably increased by at least some 140,000 tons of product, a figure suggesting either that production has not yet been sufficiently reduced or that there is a marked diminution in sales.

Ammonium Sulphate

The outstanding feature of the ammonium sulphate market was the large increase (37.6 per cent.) in home consumption in a single year. Except for the boom years (1917-1919) the tonnage consumed, namely, 228,338 tons, has never before been reached. This sudden leap in consumption cannot, of course, be attributed entirely to an increase in knowledge on the part of the farmers but to a combination of the two factors, education and price reduction, with the latter vastly in excess of the former. The low price of ammonium sulphate for agricultural use, which ruled for some months, has resulted in a national swing-over at the expense of other popular but higher priced nitrogen fertilisers.

Exports, although slightly down on the year, still form a very large part of the trade in this fertiliser. As examples it may be mentioned that over 250,000 tons were sold in Spain, about 18,000 tons in Portugal, some 27,000 tons in India and 50,000 tons in China.

On the technical side, no effort is being spared to improve the physical condition of ammonium sulphate—the larger crystal evolved last year being a great success and leading to a marked diminution in caking troubles and the other difficulties likely to be encountered during transport.

Nitro-Chalk

Nitro-chalk is now firmly established in the home market as a nitrogen top-dressing. In spite of price differences it has maintained and improved its position against all other forms of nitrogen primarily intended for top-dressing and the consumption increase this year of nearly 40 per cent. is strong evidence that the market for this product will continue to expand for a number of years. Further improvements continue to be made in the physical properties of nitro-chalk, the latest being the addition of a chalk coating to the granules to bring about a condition better suited for prolonged storage or sea voyages.

The six grades of concentrated fertiliser, primarily intended for the home market, are becoming increasingly popular, and fresh outlets are constantly being discovered in overseas countries for all four grades of ammonium phosphate. The field for nitrogen-phosphate fertilisers is large, based doubtless on the fact that potash is not generally the limiting factor in the manuring of tropical and sub-tropical crops.

A new development in the synthetic fertiliser industry—garden and lawn fertilisers—met with an immediate response from the public and on the introduction of these fertilisers in time for the opening of the spring gardening season, it was found difficult to keep abreast of demand. The garden fertiliser is a typical concentrated product, analysing N 11.5 per cent. P_2O_5 (water soluble) 13.75 per cent. and K_2O 17.25 per cent. A plant food in small packages up to 1 cwt., offering 42.50 per cent. total plant food units, is obviously something entirely new to the British gardening public and there is no longer any doubt that in its limited sphere, the garden fertiliser will be a conspicuous success.

Especially interesting, technically, is the new lawn fertiliser, which consists primarily of a granular mixture of nitrogen and ferrous sulphate with the addition of small quantities of ammonium phosphate and potash. This fertiliser is also marketed in small packages and is already firmly established all over the country both for playing turf and the ornamental lawns of private owners.

The work at Jealott's Hill continues to expand and, with the passing of years, conclusive results from various experiments are beginning to appear. The work on grassland and on the lodging of cereal crops, to name but two general examples, is likely to have far reaching effects, within a short number of years, on the conduct of British agriculture as a whole. Special investigations continue to occupy an important place in the work of the station, amongst which may be mentioned the vigorous investigation throughout the British Isles of the A.I.V. acid system of silage making; various systems of preparing artilcially dried grass; the effect of cow rations on the colour and vitamin content of winter-made butter; and the possibilities of controlling pasture species by the manipulation of grazing stock.

An interesting sidelight on the national utility of the station is provided by the large numbers of visitors who come to Jealott's Hill during the summer months. Well over 2,000 farmers from all parts of the British Isles were received this year in addition to scientific visitors from nearly every country in the world.

British Road Tar Association

The Year's Activities

THE British Road Tar Association has been actively engaged throughout the year on propaganda, technical, experimental and research work on behalf of the British road tar industry. The most important propaganda development during the year has been the exhibition of the Association's industrial talking film, "Coal Mine to Road," which has aroused extensive interest not only among highway engineers and those concerned with the purchase of road tar, but in the national and technical Press. The short talking version, "Tar," is being shown under contract at a minimum of 300 halls throughout the country. In addition, "Coal, Mine to Road" is being exhibited at a minimum of 120 educational centres. The advertising and propaganda value of the Association's films has led the council to decide upon the production of a further "interest" film, which is now in course of preparation.

Subsequent to the issue of British Standard Specifications for Tar Nos. 1, 2 and 3, progress is being made with the proposed standard specification for the construction of road with tar-macadam and the maintenance of roads with tar. The Association is assisting through the British Standards Institution in devising methods both for the sampling and examination and also for the mechanical testing of bituminous road mixtures.

The Association's proposals for co-operative research on road tar having received the sympathetic consideration of the Committee of the Privy Council for Scientific and Industrial Research, a special Road Tar Research Committee has been appointed to supervise a general programme of research. This committee consists of five representatives each of the Association and the Department of Scientific and Industrial Research. The work is being carried out at the Chemical Research Laboratory, Teddington, under the direction of Professor G. T. Morgan. Current research work is conducted in the laboratories of some of the constituent members of the Association, but there is great scope for centralised research, which has certain obvious advantages over uncorrelated individual effort.

The Association took the initiative in creating an International Road Tar Conference. This conference is now firmly established and recently a plenary session of the conference was held in London. The usefulness of this conference lies in the opportunity it affords for those engaged in the road tar industry in different countries to exchange views and experiences, and thus encourage action and co-operation for the purpose of promoting the use of road tar in each country.

The Association of British Chemical Manufacturers

Principal Events of 1932

FISCAL changes and the Imperial Conference at Ottawa were the outstanding problems handled by the Association of British Chemical Manufacturers in 1932. Apart from the bigger questions, however, the Association has continued its extremely useful routine work in connection with legislation, safety activities, standardisation (in co-operation with the new Chemical Division of the British Standards Institution) and patents.

The economic crisis of August, 1931, gave rise to the preparation of a statistical analysis of the position in regard to the chemical industry based on the official import data for 1929, the last year for which the full data were then available. The analysis showed that the imposition of a system of tariffs on chemicals might quite well result in the direct additional employment of 20,000 to 25,000 men, quite apart from other accruing advantages in regard to reduction of costs, increase in export trade, etc. The Council therefore decided that immediate action should be taken to evolve a system of emergency tariffs for the chemical industry on the lines advocated by the fiscal policy committee of the Federation of British Industries, on which the Association was represented, and to this end appointed a tariff sub-committee consisting of certain members of the council and the group chairman to formulate a scheme. The recommendations of the Association were largely responsible for securing the additional duties imposed on chemical products by the Imports Duties Advisory Committee in April.

The Import Duties Act provided for additions to the Free List, but only in cases of special urgency during the first six months. The Association, by immediate action, was able to secure the addition of a number of important raw materials, and after the first six months' period, it submitted cases which could not previously have been justified on the grounds of special urgency. The Association has assisted its members in connection with the provisions of the Finance Act, 1932, for the free importation under licence of plant not obtainable in this country. It also took steps to bring before its members a list of chemicals either not being made in this country or being made in insufficient quantities to meet the demands, and suggested a procedure by which duplication of effort in manufacture could be avoided.

Imperial Economic Conference

When the Imperial Economic Conference at Ottawa in July was commenced the Association circulated detailed import statistics for 1930, the last year for which available, in respect of Australia, Canada, India, New Zealand, and South Africa. The statistics showed not only the total imports under each heading, but also the amount imported from the United Kingdom and the existing duties against British and foreign products. The figures revealed that this country was getting only about 40 per cent. of the chemical trade of the Empire. Members were asked for their suggestions as to the tariff changes and British preferences necessary to secure a larger share of this import trade for the United Kingdom. These suggestions were considered by the tariff sub-committee, and memoranda were submitted to the Board of Trade showing in detail for each of the Dominions the requirements of the British chemical industry.

When it was learned that official industrial advisers had been appointed by the Government, and that it was desirable that the more important trade organisations should be represented at Ottawa in order to supply expert advise to these advisers, the Council decided that its chairman and general manager should represent the Association at Ottawa. Their report justified the council's action. Apart from the benefits in the way of increased preferences which will accrue to the chemical industry from the conference, and towards which the Association's representatives were able to make a valuable contribution, the friendly contacts which they were able to establish with the chemical industry of Canada and the United States and the promises of co-operation for the future would, by themselves, have been sufficient justification for their visit.

In addition to the activities in connection with Ottawa, members had brought to their notice the reports of the Federation of British Industries' Mission to Canada in 1931 and of the United Kingdom Trade Mission to Egypt. They were also kept in touch with the work of the Argentine Committee of the Federation of British Industries and were supplied with detailed statistics in respect of chemical imports and with information regarding the co-operative arrangements made by the British Electrical and Allied Manufacturers' Association to increase their trade in that market. Suggestions were also collected from members as to the tariff and other conditions necessary to enable them to get a larger share of the Argentine market.

The Association was represented on the Federation of British Industries' Committees dealing with Russian trade and Russian dumping. The object is to secure a larger share of the Russian import trade, to reduce the need for long credits, and to stop the dumping of Russian goods which are competitive with our manufactures.

A Group Sales Organisation

At the annual meeting of the Association in October, Dr. E. F. Armstrong submitted a proposal that British chemical manufacturers should enter the Canadian market as one sales organisation, reprpesenting a number of houses who would sell it on an agreed basis approximating to cost, and share in the expenses and profits according to their respective turnover or other convenient plan. One such organisation is already in being in the form of Canadian Industries, Ltd. Another is required for the fine chemical industry, and perhaps a third at a later date for those miscellaneous chemicals which do not fall into the other group.

A central organisation carrying stocks and ordering only to replace these will, in Dr. Armstrong's view, avoid the present expensive mistakes in shipping and the charge for cables. It is a commonplace that agents are prone to accept orders for impossibly close delivery, but it is the only way they can secure the business in competition with America. A central organisation, once established, will be able to launch new lines at a minimum of expense.

Dr. Armstrong is convinced that the Empire markets must be entered boldly if at all, with a good deal of initial expenditure, otherwise they are best left alone. He also feels strongly that the present is the best moment to begin to attack them, with the possibility that the depression has ended and with the knowledge that the British goodwill arising out of Ottawa, together with the concessions secured, will be of enormous help in building up the new organisation and ousting the foreigner.

Australian Sulphur Industry

Development of Volcanic Deposits in the Pacific

ACCORDING to the "Chemical Engineering and Mining Review" (Australia), inquiries are being made by various parties in regard to the possibility of developing the sulphur deposits of New Guinea and the volcanic islands of the Pacific. The principal use of sulphur is in the manufacture of sulphuric acid for the fertiliser industry, and it is estimated that Australian requirements are at least 100,000 tons annually. Portion of the supply is obtained from the roasting of zinc concentrates, whilst the remainder is imported. In 1922 a duty of £2 10s. per ton was placed upon imported sulphur in order to encourage the recovery of sulphur from Australian minerals. However, this duty was removed in 1923, and a bounty of £2 5s. per ton on the sulphur equivalent was substituted. This bounty was reduced by 20 per cent. as from July 20, 1931. In view of the increase in landed cost of foreign sulphur (at present approximately £8 15s. per ton), due principally to the incidence of exchange, attempts are being made to substitute pyrites for brimstone sulphur in the manufacture of the acid. Large deposits of pyrites occur in various parts of the Commonwealth, and under present conditions their exploitations should prove profitable.

The New Benn Journal

"The Laundry World" published To-day

BOUVERIE House welcomes the arrival this week of a new member of the Benn family of trade and technical journals. "The Laundry World," No. 1 of which appears to-day (Saturday) is the sixteenth member of the family, which even before its arrival was the largest trade paper organisation in the world. It has been known for a considerable time that Benn Bros., Ltd., had plans for entering the laundry field. The need for a vigorous modern weekly record of developments in this great and growing industry is admitted on all hands, and the only question for some time past has been the date on which the new journal should be launched. The very depth of an economic depression would not at first sight appear to be the most auspicious moment at which to launch a great new enterprise of this kind, but on deeper reflection it will be seen that no better moment can be chosen.

The publishers have taken the view that the necessary spade work can be done with better service to the nation as a whole in a period like this than at a time when more rapid financial benefits might be looked for. This is above all others the moment to start an enterprise which involves steady employment, and in launching a new journal at this time Benn Brothers are only following the splendid example of most of the trading houses of the nation, on whose efforts to maintain economic activity the welfare of all of us depends. "The Laundry World" is the second addition to the Benn group of technical papers made within the last few months. "Television," the organ of the latest and newest of the sciences was acquired in the summer, and is already giving a good account of itself.

Institution of Chemical Engineers

Plans for Annual Meeting

THE eleventh annual corporate meeting of the Institution of Chemical Engineers will be held on February 17 at the Hotel Victoria, Northumberland Avenue, London. In this connection the following retirements from Council take place:—The president, vice-presidents, hon. secretary, hon. treasurer, and Messrs. H. J. Pooley, F. S. Sinnatt, H. Talbot, and H. J. T. Ellingham, of whom the vice-presidents are ineligible for re-election to the office from which they retire. An additional vacancy on the Council is created by the transfer of Mr. E. A. Reavell to membership. The nominations of the Council for these offices are:—President: Viscount Leverhulme; vice-presidents: Dr. H. Levinstein, Mr. H. Talbot; hon. secretary, Mr. H. W. Cremer; hon. treasurer, Mr. F. A. Greene; members of Council: Colonel E. Briggs, Messrs. H. J. Pooley and S. Robson, and Dr. F. S. Sinnatt; Associate Members of Council: Messrs. C. C. H. Brazier, H. A. S. Gothard and A. F. Jacobs.

The annual corporate meeting will follow the procedure of previous years. After the formal business has been transacted the president will deliver his presidential address, which he will illustrate by lantern slides. After an adjournment for lunch, a paper will be read by Mr. L. Singlehurst-Ward on "Metallurgy from the Standpoint of the Chemical Engineer." The annual dinner will be held in the evening, at which the principal speaker will be Sir Frederick Gowland Hopkins, president of the Royal Society.

The Season's Greetings

Calendars and Diaries Received

SEVERAL firms in the chemical and allied industries have again embraced the opportunity afforded by the festive season to send to their clients tangible expressions of their good wishes for the New Year in the form of diaries, calendars and other gifts. The following have been received by the Editor of THE CHEMICAL AGE, who reciprocates the good wishes expressed.

BARTER TRADING CORPORATION, LTD., 14 Waterloo Place, London, S.W.1.—A Conway Stewart writing set, comprising a fountain pen, propelling pencil and pen knife.

BROTHERTON AND CO., LTD., Leeds.—A large wall calendar.

CAMBRIAN WAGON CO., LTD., East Moors Road, Cardiff.—A daily calendar.

CARTY AND SONS, LTD., Harders Road, Peckham.—Refills for their calendar.

CROFTS (ENGINEERS), LTD., Bradford.—A wall calendar illustrating their geared motors, variable speed gear and other products of this firm.

DEXINE, LTD., Stratford.—A pocket diary containing much useful information, and a wall calendar.

FOSTER INSTRUMENT CO., Letchworth.—A refill for their magic ring calendar.

JONES AND CO. (METHYLATORS), LTD., Regent Wharf, London, E.3.—A New Year card wishing us prosperity for 1933.

KING'S PATENT AGENCY, LTD., 106a Queen Victoria Street, London, E.C.4.—A desk diary with a glossary of commercial phrases and other memoranda.

THE STAVELEY COAL AND IRON CO., LTD., Chesterfield.—A pocket wallet with diary and chemical memoranda.

WOOLWICH EQUITABLE BUILDING SOCIETY, Bush House, Aldwych, London, W.C.2.—A wall calendar.

Rubber in the Chemical Trade

Its Substitution for Lead

AN account of the development of rubber as a substitute for lead in chemical plant was given by Mr. Norman Swann at a joint meeting of the Bristol Section and the Plastics Group of the Society of Chemical Industry. The lecturer described how original work on the process of rubber lining came to be carried out in the treatment of complex sulphide ores—a process which included treatment with acidulated brine, which soon became charged with chlorides of iron, and exerted a corrosive action in vessels. Lining the vessels with pure rubber was first tried, but this material was found to contract on heating. This difficulty was overcome by "loading" the rubber with other materials; but here again a difficulty was experienced in that there was no satisfactory method of jointing the material. This difficulty was overcome in rather an extraordinary way. One day it became necessary to use uncured rubber for lining some vessels, and it was found not only that it was very resistant to corrosion, but also that the edges of the sheets could be joined simply by cleaning and champering the edges and pressing with heated tools. With this knowledge considerable research was started which led to the production of a material which could be cured quickly and at a low temperature, and which was tough and resistant to corrosion and erosion. This material was then applied as a liner in many chemical plants, necessitating in many cases radical changes in design of the plants. "Nine-tenths of all chemical plant consists of pots, pans, and kettles," said the lecturer, and there is now no limit to the size, shape and complexity of vessels which can be satisfactorily lined with rubber.

In applying the rubber-lining process to the trade it was soon found that for every new lined vessel supplied, there were fifty old ones that required to be lined, and the difficulty arose of attaching linings to surfaces that were often damp, uneven, dirty and rusty. This difficulty was overcome by the preparation of a cement composed of stabilised emulsified rubber, Portland cement and sand, and this proved an excellent basis on which the rubber could be worked. The defects of rubber lining were in the liability to mechanical damage and the danger of excessive corrosion of the undersurface if the rubber was punctured. Various means had been adopted to eliminate and lessen this danger. Recently vessels had been made of rubber staves, bound together as in the case of ordinary wooden vats, and cemented together with a rubber cement. Such vessels were excellent for work at varying temperatures. Rubber linings had been applied in numerous instances in chemical plant—in the vessel for electrolytic work, in galvanising tanks, and in the food industries, where vessels resistant to the corrosive action of fruit juices and also to fungus attacks were needed. Lining with milled sheets was somewhat expensive, and considerable development was taking place in the use of simpler processes, such as spraying and pasting—such plastic material being supplied quickly and cheaply.

News from the Allied Industries

Safety Glass

AT THE ANNUAL GENERAL MEETING of Acetex Safety Glass, Ltd., held on December 29, shareholders, by an overwhelming majority, refused to adopt the report and accounts. An amendment was moved by Mr. L. D. Botibol, a former director, that the accounts be not adopted and that a committee of three shareholders be appointed to inquire into the finance, administration, and management of the company, and that the meeting be adjourned until the report of the committee be received. This was carried with three dissentients. The retiring director, Mr. G. E. Banner, failed to secure re-election, and two nominees of Mr. Botibol were appointed to the board.

Matches

PREPARATIONS FOR ESTABLISHING A MATCH FACTORY at West Hartlepool are now well on the way. Structural alterations to the building selected will cost between £4,000 and £5,000, and the contract for the work has been secured by Harland and Parker, a local firm of builders and contractors. The match-making machinery is being brought from Sweden.

EIGHT AMERICAN DIRECTORS of the bankrupt International Match Corporation, which was a subsidiary of Kreuger and Toll, are accused of "misfeasance and nonfeasance" in two suits filed in the Supreme Court at New York by the Irving Trust Co., the trustees for the International Match Corporation. The sum of 249,981,000 dollars (about £50,000,000 at par) damages for disbursements from unearned dividends is demanded, and accounting is demanded of a sum of 100,000,000 dollars (£20,000,000 at par) which is alleged to have been wrongfully paid out by the company in the course of a variety of consolidations.

Rubber

IN THE RUBBER MARKET the opinion is growing that another attempt is about to be made to control output. It is felt that from sheer necessity some steps will have to be taken to place the industry on a sounder footing, and the possibility of this is strengthened by the favourable attitude adopted by the Dutch East Indies Government towards the tea control plan now being arranged. With rubber there is no register of estates or native holdings, and the native can dispose of wet rubber without handing it over to a European estate for treatment. This situation is given as the official reason for not initiating a scheme for restriction. The Rubber Growers' Association in London is unlikely to take the initiative. Its attitude is unchanged from that it announced in April last, which was to the effect that it would not put forward any recommendations for reopening negotiations with the respective Governments. Its view is that any fresh proposals must originate with the Dutch and would require to have Government support.

Iron and Steel

ACCOMPANYING THE REPORT of Sheffield Steel Products, Ltd., are details of a scheme formulated by the directors, in consultation with nine of the largest debenture stockholders, for meeting the situation which may arise should the present exceptional trading conditions continue. Although the company has a large surplus of liquid assets over current liabilities it might become inadvisable to deplete the liquid resources by the continued payment of debenture interest, and it is therefore proposed that interest for the three years ending November 21, 1935, shall only be paid if a committee of four debenture stockholders, which is to be formed, considers this can be done without detriment to the carrying on of the business. No distribution is to be made on the ordinary stock until all debenture interest has been paid in full and all deferred interest is to become payable in any event on November 21, 1935.

AFTER TWO AND A HALF YEARS of inactivity, blast furnaces of the Low Moor Iron Co., Ltd., which have a wide reputation, were relit on December 31 in readiness for casting. Employment, it is understood, will be given to about 70 men, who will be recruited locally.

Artificial Silk

THE BRITISH OUTPUT OF RAYON yarn and waste in November was 6,590,000 lb., against 6,320,000 lb. in October and 6,260,000 lb. a year ago. These figures compare with a monthly average production of 4,550,000 lb. in 1931, 4,060,000 lb. in 1930 and 2,110,000 lb. in 1924.

AT THE LONDON BANKRUPTCY BUILDINGS, on December 30, the statutory meetings of the creditors and of the shareholders were held in the compulsory liquidation of Rayon Manufacturing Co. (1927), Ltd., silk mercers and weavers, etc., of Leatherhead, with a factory at Ashstead, Surrey. The Official Receiver said that the company was incorporated as a public company in August, 1927, with a nominal capital of £330,000. Its objects were to purchase the undertaking, etc., of the Rayon Manufacturing Co., Ltd., in voluntary liquidation. Approximately £80,000 of fresh capital was obtained. The issued capital amounted to £150,075. The balance sheets showed that until March 31 last the company had made a gross profit of £256,910, but £223,064 had been paid in Excise duty, with the result that it had incurred a net loss of £79,301. A draft statement of affairs showed gross liabilities £243,582 and assets £38,598. The assets were subject to the payment of preferential claims £1,330, leaving £37,262 available for the debenture holders. Since the sum due in respect of principal on the first debenture alone was £104,000, there was no possibility of any fund becoming available for the unsecured creditors or for the shareholders.

Prices of Chemical Products

Current Market Conditions

IN LONDON there has been quite a good demand for chemicals and prices remain very firm. There are no price changes to report in the markets for general heavy chemicals, rubber chemicals, wood distillation products, perfumery chemicals, essential oils and intermediates. Business has opened rather quietly on the Manchester chemical market after the holiday interruption, and it is not expected that trade will be fully into its stride again until about next week. In the meantime, buying operations during the past few days have only been on a moderate scale, with prices steady in most sections although here and there slight easiness is recorded. Business in Scotland is practically at a standstill this week, owing to the new year holidays. With the following exceptions, the prices of chemical products remain the same as reported in THE CHEMICAL AGE of December 24 (pp. 610-611).

General Chemicals

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80%, £38 5s. to £40 5s.; tech., 40%, £19 15s. 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 97/100%, £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, CITRIC.—LONDON: 10d. less 5%. MANCHESTER: 10¼d.

ACID, TARTARIC.—Eo½d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10½d.

AMMONIUM CARBONATE.—SCOTLAND: Lump £32 per ton; powdered £34 in 5 cwt. casks delivered buyers' premises U.K. or ex quay Irish ports.

ARSENIC.—LONDON: £22 13s. c.i.f. main U.K. ports for imported material; Cornish, nominalfi £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £24 at mines.

POTASH, CAPSTIC.—LONDON: £42. MANCHESTER: £40 to £41.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. crystals, 8¾d. MANCHESTER: Commercial, 8¼d.; B.P., 8¾d.

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

SODIUM ACETATE.—£22 per ton.

SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.

Pharmaceutical and Fine Chemicals

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb.

ACID, SALICYLIC, TECHNICAL.—1s. 2d. to 1s. 4d. per lb.

AMIDOPYRIN.—20s. per lb.

PHENACETIN.—3s. 10d. to 4s. 6d. per lb.

PHENOLPHTHALEIN.—3s. 10d. to 4s. 6d. per lb.

SODIUM SALICYLIC.—Powder, 2s. to 2s. 8d. per lb.; crystal, 2s. 1d. to 2s. 1d. LONDON: Powder, 2s. 1d. to 2s. 8d., including packing and delivery; crystals 1d. extra.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—9d. to 10d. per lb. Crude, 60's 2% water, 2s. per gal. MANCHESTER: Crystals, 8½d.; crude, 2s. 1d. SCOTLAND: Sixties, s. 7d. to 1s. 8d.

PITCH.—Medium soft, £4 17s. 6d. to £5 per ton. MANCHESTER: £4 15s. to £5 5s. f.o.b. LONDON: £4 14s. to £4 16s. 6d. f.o.b East Coast port.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The export market has been quiet over the holidays and the price remains steady at £5 10s. per ton for neutral quality, basis 20.6% nitrogen, f.o.b. U.K. port in single bags for January shipmen and £5 12s. 6d. for February shipment. The home price for January delivery is £6 5s. per ton delivered in 6-ton lots to consumers' nearest station. The price advances to £6 7s. 6d. for February and £6 10s. for March/June.

NITRATE OF SODA.—£8 14s. per ton for January and £8 16s. per ton for February/June, delivered in 6-ton lots to farmers' nearest stations.

NITRO-CHALK.—£7 5s. per ton for delivery up to June next in 6-ton lots.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

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

Preserving Pulverulent Chemicals

PULVERULENT materials which are acted upon by liquid can be proofed against such action by coating each particle of the material with a thin film of a substance insoluble in the liquid in such a manner that the film is destroyed by stirring the material. The process may be applied to building materials such as lime, fireclay, and other earths, gypsum, and limetone. The coating substance may be animal, vegetable, or mineral gums or oils, varnishes, lacs, resins, copal, solid or liquid paraffin, gelatine, glue, enamel, etc. The coating may be effected by the aid of heat, with or without pressure, and by mixing the protecting substance with the material. The protecting substance may be vapourised in order to apply it to the material. Lime, for example, is treated with a water-insoluble substance such as paraffin, so that it is protected from the action of water during storage or handling. When the lime is mixed with sand or gravel, the film of paraffin is destroyed by friction. (See Specification No. 370,878 of J. Crabbe, G. Pierard and F. Nisot.)

Specifications Accepted with Dates of Application

ANTICORROSIVE PAINTS OR PIGMENTS. F. Rahtjen and Dr. M. Ragg. March 16, 1931. 385,310.

PREPARATION OF TITANIUM OXIDE. J. Blumenfeld. April 17, 1931. 385,315.

PROCESS FOR THE MANUFACTURE AND PRODUCTION OF PRODUCTS OF THE ANTHRAPYRIMIDINE SERIES. J. Y. Johnson (*I. G. Farbenindustrie*). May 18, 1931. 385,295.

MANUFACTURE OF CYANINE DYES, AND THE APPLICATION THEREOF IN PHOTOGRAPHY. Kodak, Ltd., June 11, 1930. 385,320.

STERILISATION OF ORGANIC SUBSTANCES. E. Schulze and Pharmaceutical Corporation, Ltd. June 12, 1931. 385,323.

REDUCTION OF VISCOSITY OF GREASY OILS. H. Eisner and H. Vollmer. June 18, 1931. 385,306.

DYES AND DYEING. D. A. W. Fairweather, R. F. Thomson and Imperial Chemical Industries, Ltd. June 19, 1931. 385,307.

PROCESS FOR THE MANUFACTURE OF AMMONIA. E. Rabetrano. July 12, 1930. 385,330.

PROCESS OF PRODUCING RESIN EMULSIONS. Chemische und Seifenfabrik R. Baumheier A.-G. Aug. 6, 1930. 385,344.

PURIFICATION OF SULPHUR. J. Y. Johnson (*I. G. Farbenindustrie*). Aug. 24, 1931. 385,352.

MANUFACTURE AND PRODUCTION OF DRESSINGS WHICH ARE FAST TO WASHING. J. Y. Johnson (*I. G. Farbenindustrie*). Oct. 14, 1931. 385,378.

MANUFACTURE OF COLOURED LACQUERS AND PLASTIC MASSES. Soc. of Chemical Industry in Basle. Nov. 25, 1930. 385,409.

THERMAL TREATMENT WITH HYDROGEN OF CARBONACEOUS MATERIALS. J. Y. Johnson. (*I. G. Farbenindustrie*). Jan. 4, 1932. 385,433.

REMOVAL OF FREE CHLORINE FROM CHLORINE-CONTAINING MATERIALS, AND THE PRODUCTION OF CHLORINE-REMOVING MATERIAL THEREFOR. Deutsche Gold- und Silber Scheideanstalt Vorm. Roessler. Jan. 26, 1931. 385,455.

PRODUCTION OF ALCOHOLS. H. T. Böhme A.-G. Nov. 14, 1931. 385,488.

PHOTOGRAPHIC EMULSIONS. I. G. Farbenindustrie. July 4, 1931. 385,545.

PRODUCTION OF CARBONYL COMPOUNDS. H. T. Böhme A.-G. Nov. 14, 1931. 385,551.

Applications for Patents

DISTILLATION. Bakelite, Ltd. (*Bakelite Corporation*). Dec. 29. 36817.

PRODUCTION OF HIGHLY CONCENTRATED NITRIC ACID. N. Caro. Dec. 30. (Germany, Dec. 30, '31.) 36941.

MANUFACTURE OF VAT DYESTUFFS CONTAINING NITROGEN. A. Carpmael (*I. G. Farbenindustrie*). Dec. 29. 36783.

MANUFACTURE OF SOLUBLE CALCIUM SALTS, ETC. Chemische Fabrik vorm. Sandoz. Dec. 28. (Switzerland, Dec. 30, '31.) 36674.

PREPARATION FOR REMOVAL OF SULPHIDE DEPILATORIES. Dae Health Laboratories, Ltd. Dec. 31. 37056.

ANTHRAQUINONE DYES, ETC. S. Ellingworth, C. H. Lumsden, and Imperial Chemical Industries, Ltd. Dec. 30. 36905.

MANUFACTURE OF DYESTUFF PASTES. W. W. Groves (*I. G. Farbenindustrie*) and N. H. Haddock. Dec. 30. 36909.

MANUFACTURE OF THE TETRASULPHURIC ACID ESTER OF LEUCO-1.2.2^1-1^1-ANTHRAQUINONE AZINE. I. G. Farbenindustrie. Dec. 29. (Germany, Dec. 29, '31.) 36785.

PRODUCTION OF DETERGENTS CONTAINING ALKALI SILICATES. I. G. Farbenindustrie. Dec. 30. (Germany, Jan. 20). 36900.

MANUFACTURE OF NITROGENOUS CONDENSATION PRODUCTS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 28. 36682.

MANUFACTURE OF PHARMACEUTICAL PREPARATIONS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 29. 36772.

APPARATUS FOR HALOGENATION OF ORGANIC COMPOUNDS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 30. 36917.

MANUFACTURE OF CHRYSENE. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 31. 37021.

ALUMINIUM. A. H. Stevens (*Aluminium, Ltd.*). Dec. 30. 36894.

ALUMINIUM BASE ALLOYS. A. H. Stevens (*Aluminium, Ltd.*). Dec. 30. 36895.

Liquidation of Cosach

Reorganisation Rendered Necessary

A DECREE for the liquidation of Cosach, the £75,000,000 nitrate combine, was signed at Santiago de Chile, on Monday, January 2. The decree says that "liquidation is ordered in accordance with the law." It provides that liquidation be entrusted to a commission consisting of three members, one appointed by the President of the Republic, one by the majority of holders of "B" shares, and the third by the Supreme Court of Justice. The decree also appoints Señor Aureliano Burr (former president of the Central Bank of Chile) as the President's nominee. The decree states that liquidation will be followed by reorganisation, which is rendered necessary (1) because the company has become insolvent, (2) because it is at present working unconstitutionally; and (3) because the national interests demand revision. Liquidation will be carried out in accordance with the statutes of the company.

The Compañia de Salitre de Chile ("Cosach") was constituted in March, 1931, to combine all interests in the natural nitrate of soda industry from the moment the mineral was extracted from the fields in Northern Chile. American, British, German, Chilean, French, and Spanish interests were all represented in the merger. The capitalisation was £75,000,000, with the Chilean Government controlling 50 per cent. of the total issues. British interests ranked third in the concern, coming after the interest of the Chilean Government and the American group.

The Chilean Finance Minister stated a few days ago that a definite statement on reorganisation was to be expected. The project would involve a new company with a capital of 1,400,000,000 pesos. At the annual general meeting of Cosach held on December 30, Mr. Medley Whelpley, the president, said that concern had sustained a net loss of 110,020,805 Chilean gold pesos during the year. He concluded with a strong appeal for a definite settlement of the question of the combine's future. A member of the board of directors of the combine is reported to have stated that in the event of the liquidation of Cosach there would be no disturbance to the market, as the Chilean Government's policy presumably was to maintain "unity of sales," so that whatever form reorganisation took there should be no change in marketing.

Lautaro Nitrate Accounts

A Heavy Deficit Reported

THE accounts of the Lautaro Nitrate Co., Ltd., for the year to June 30 have been prepared in Chilean gold pesos and United States currency in order to present the accounts as reflected by the books in Chile. The year's operating income was £321,078 at par, and to this is added £339,716 special credits. Total outgoings were £1,876,768, leaving a deficit of £1,200,507, which is deducted from the capital surplus reducing it to £6,365,533. The principal items of the year's charges were £274,811 for adjustment on re-valuation of nitrate stocks, and £482,267 for interest on funded debt. In 1930-31 trading resulted in a loss of £81,662, and the total loss was £054,907.

In the balance sheet, nitrate reserves are shown at £17,141,485 after charging £272,544 for depletion. Production during the year, mainly produced under the Guggenheim process, was 623,280 tons. At present only the "Chacabuco" plant in Antofagasta and the "Santa Luisa" plant in Taltai (both Shanks process) are working, both at reduced capacity. The "Pedro de Valdivia" plant (Guggenheim process) was shut down at the beginning of November.

It was pointed out that under the merger scheme, Lautaro has this year had the benefit of a participation in world sales of over 34.58 per cent., as compared with 25.14 per cent. in the previous nitrate year under the regime of the Nitrate Producers' Association.

From Week to Week

THE FINSBURY OLD STUDENTS' DINNER will take place at the Trocadero Restaurant on March 18.

MR. F. J. BAILEY HAS BEEN APPOINTED LECTURER in Chemical Engineering at Imperial College of Science and Technology.

A MEETING OF THE INSTITUTION OF PETROLEUM TECHNOLOGISTS will be held at the Royal Society of Arts on January 10 at 5.30 p.m. A paper on "Aircraft in Relation to Petroleum Technology: Use for Survey and Transport" will be read by Mr. H. Hemming.

A £5,000 CONTRACT WAS ENTERED UPON AT WEST HARTLEPOOL on January 2, for the conversion of a big warehouse on the docks into a new match factory for the North of England Match Company. Match making will begin in three months' time.

MR. CHARLES MAKINSON, of Bradford, engineer, manager of the Bradford Dyers' Association's workshops and at one time a superintendent of the Wallasey Corporation Electricity Department, son of the late Richard Makinson, of Liverpool, has left £4,810 (net personalty £3,101).

HIGH GRADE PURE SILK FABRICS and exclusive silk and rayon mixtures and novelties of a kind previously imported largely from France and Switzerland, are now being manufactured in Lancashire. This is a new industry there, and the Calico Printers' Association is responsible for its creation.

AN EXTRAORDINARY GENERAL MEETING of the New G. and S. Processes Syndicate is to be held on January 12, to consider a scheme of reconstruction. It is proposed to form a new company with a capital of £22,000 in 440,000 shares of 1s. each. Shareholders in the present company will be entitled to one share in the new company, credited with 9d. paid, for each share now held. The company was formed in 1928 to exploit and develop chemical processes in connection with the manufacture of safety glass, rayon and paints.

THE IRAQ GOVERNMENT HAS RECEIVED INFORMATION that the British Oil Development Company has paid a sum of £100,000 in gold as its first instalment for the concession granted by the Iraq Government last year for an area of oil exploitation on the west bank of the Tigris. The dead rent is £100,000 for the first year, rising by £25,000 a year to an ultimate total of £200,000. Royalty payable is at the rate of 4s. per ton, and dead rent ceases when the transport of oil begins.

WITH BOTH PRODUCTION AND CONSUMPTION of British rayon substantially larger than in any previous year, and important new processes introduced on a large commercial scale, the year just concluded has been one of exceptional development in the rayon industry. The use of rayon in Lancashire and Yorkshire has steadily gone ahead, and, in addition to finding new uses for the fibre, the quality and prestige of rayon, both from a utility and decorative standpoint, has steadily improved.

ACCORDING TO THE PRELIMINARY ESTIMATES of Canada's mineral production for 1932, issued on December 30, by the Dominion Bureau of Statistics, the total mineral production of the Dominion is valued at £36,540,000 compared with £45,600,000 in 1931. Metals totalled £20,600,000 compared with £23,700,000 in 1931. Non-metals, including coal, natural gas, petroleum, asbestos, etc., totalled £11,400,000 compared with £13,100,000 in 1931. The nickel production amounted to 13,070 tons, worth £1,307,400, compared with 29,320 tons, worth £3,055,500 in 1931. A decrease in the fabrication of steel by Canada's principal customers caused the decline in the nickel production.

PRICE, STUTFIELD AND CO., LTD., announce that eight solvent recovery plants operating by the acticarbon system have been put into operation in this country in the past eight months. These are recovering solvent naphtha, benzine, acetone, ethyl acetate, etc., used in very varied manufactures. Several more plants are in course of construction. Abroad, many plants, including large installations for gasoline recovery, explosives manufacture, rubber works, leather cloth, dry cleaning works, etc., have also been completed, and new developments are rapid. Recovery of alcohol from fermentation vats, drying of air for compressors in caisson work and purification of carbon dioxide are among the latest processes working on a commercial scale.

AMONG THE NEW YEAR HONOURS are the following.—Mr. Lawrence Ennis, who was associated with the building of the Sydney Harbour Bridge as constructing engineer for Dorman, Long and Co., is made a C.M.G., and Mr. William James Uglow Woolcock, who acted as chairman of the committee of non-official advisers associated with the industrial advisers of the United Kingdom Delegation at the Ottawa Conference. Mr. Woolcock is a member of the Dyestuffs Advisory Licensing Committee, and chairman of the Dyestuffs Industry Development Committee, is also made a C.M.G. Mr. Sydney William Smith, chief assayer, Royal Mint, president of the Institute of Mining and Metallurgy, is made a C.B.E. Mr. Alfred Vincent Elsden, War Department Chemist, Royal Arsenal, Woolwich, is made an O.B.E.

MR. JAMES KEWLEY, OF THE ANGLO-PERSIAN PETROLEUM CO., has been elected president of the Oil Industries Club.

AN EXPLOSION IN THE FABRIC DEPARTMENT of the Michelin Tyre Co.'s works at Stoke-on-Trent on December 29 resulted in three persons receiving severe burns.

KIRKPATRICK, BARR AND PATON have admitted into partnership Mr. Gordon Stuart Paton, son of the principal, who has taken an active interest in the business for the last fourteen years.

THE FOLLOWING OFFICERS OF THE BRITISH SECTION of the International Society of Leather Trades Chemists have been elected for 1933: President, Dr. A. Turnbull; vice-president, Mr. N. C. Lamb, F.C.S.; treasurer, Dr. D. Burton; hon. secretary, Mr. R. Faraday Innes, F.I.C.

SPAIN DOES NOT PRODUCE sufficient nitrogen to cover her consumption, and has, therefore, to import some. The total annual production is between 10,000 and 12,000 tons. Three factories manufacture synthetic nitrogen and puts on the market about 6,000 tons yearly.

LOUIS LIGHT, of 12 Gray's Inn Road, London, W.C.1, has taken up an agency for the sale of Tekaol stand oil extracts in Great Britain. These extracts are claimed to be superior to ordinary stand oils in respect of gloss, paleness, speed of drying, hardness of film and resistance to weathering, as they enable the resin content of varnishes and enamels to be considerably reduced with a corresponding gain in durability.

THE NEWLY-FORMED CUBAN SUGAR GROWERS' ASSOCIATION has published a manifesto demanding that an end be put to artificial restrictions of the sugar crop, and attacking in particular the Chadbourne Plan. Agreement was reached at Brussels in February on the quota scheme produced by Mr. Chadbourne, the quota allotted to Cuba being 2,350,000 tons. Cuba has never been satisfied with her quota, and at subsequent conferences the matter has never been satisfactorily cleared up.

THE SCOPE OF SOVIET CHEMICAL INDUSTRY was shown by an exhibition of chemical products at the Sixth Mendeleen Congress on Chemistry at Kharkov. The synthetic rubber was the most remarkable exhibit. There were motor tyres which had been run 18,000 kilometres without wearing off the tread, made from two sorts of synthetic rubber, and exhibits made from plant gums not previously used as a raw material for rubber. There were also chromium-plated nickel teeth and some new molybdenum ores.

PRESIDING AT THE GENERAL MEETING OF THE BRANSTON ARTIFICIAL SILK CO., LTD., held on December 30 at Beaver House, Mr. M. C. Harman, the chairman, said that the rayon industry had made enormous strides during the last year or two, and the directors had been constantly examining the question as to when they could reopen the factory. The trend of events, notwithstanding the extremely low price of rayon, was such that they felt that before they met shareholders again they would be able to say they had taken the first steps to re-enter production.

THE ANNUAL CONFERENCE OF THE REPRESENTATIVES of the mechanical rubber and ebonite goods department of Redfern's Rubber Works, Ltd., was held at the works on December 29 and 30. Mr. T. H. Redfern, director of the company, received them, and Mr. R. Breerton, sales manager of the department, outlined the selling programme for next year. He gave particulars of progress made in the use of rubber and ebonite in industry, especially among electrical and mechanical concerns and firms handling acids of various kinds and announced that Redfern's were extending their plant to increase production of mechanical goods both in rubber and ebonite.

SIR HARRY MCGOWAN, CHAIRMAN OF IMPERIAL CHEMICAL INDUSTRIES, writing in "Lloyd's List" annual review, considered that during 1932 the home chemical trade had improved, but that the export trade was far from satisfactory. He added that on balance there was a net improvement, and indeed the value of this was enhanced by the healthier tone which had been noticeable of late, the product of a variety of confluents, among which the first fruits of our tariff policy and the promise of Ottawa were prominent. There were undoubtedly sound reasons why we may look forward to better results in the future.

ASHMORE, BENSON, PEASE, AND CO., LTD., constructional engineers, of Stockton, have secured a contract from a Midland firm for the construction of a set of bunkers for handling raw material, such as iron ore, coke and limestone, for blast furnaces, and crushing plant dealing with 2,400 tons of ore and limestone per day. About 1,000 tons of steel work will be used, and the contract will take about eight months to complete. Other important contracts which the firm have secured in the last few days include a chemical plant for Japan and an ore transporter bridge crane of the rope-trolley type for South Africa, which has a span of 160 feet, and a capacity of 200 tons per hour.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

ADLEY, TOLKIEN & CO., LTD., Blackburn, chemical manufacturers. (M., 7/1/33.) Registered December 23, £2,500 debentures authorised by resolution; December 14, 1932, confirming charge registered October 14, 1932; general charge.

ALLENS (DISINFECTANTS), Ltd., Liverpool. (M., 7/1/33.) Registered December 17, £300 (not ex.) debentures; general charge.

BASE METALS PRODUCTS, LTD., London, E.C. (M., 7/1/33.) Registered December 13, series of £2,500 debentures, present issue £1,900; general charge.

CALMIC, LTD., Liverpool, chemical manufacturers. (M., 7/1/33.) Registered December 23, £2,220 debentures; general charge.

MINERALS CONCENTRATION CO., LTD., Birkenhead. (M., 7/1/33.) Registered December 14, mortgage by way of additional and substituted security, supplemental to mortgages dated May 9, 1929, June 6 and September 23, 1923, securing £15,000, to G. H. Appleton, J.P., Wilton Grange, Meols-drive, West Kirby; charged on Dinmor Park Quarries, Pennon. *£15,000. October 14, 1932.

NATIONAL GLASS WORKS (YORK), LTD., Liverpool. (M., 7/1/33.) Registered December 16, series of £30,000 debentures and 5 per cent. premium, present issue £6,000; general charge. *£72,500. November 10, 1932.

REINFORCED GLASS CO., LTD., London, E.C. (M., 7/1/33.) Registered December 14, £1,500 and £500 debentures, parts of £10,000 (not ex.); general charge. *£8,200. October 7, 1932.

SHAW CHEMICAL CO., LTD., Leicester. (M., 7/1/33.) Registered December 14, mortgage, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land in Percy Road Extension, Aylestone, &c. *Nil. December 21, 1931.

Satisfaction

MINERAL OILS EXTRACTION, LTD., London, E.C. (M.S., 7/1/33.) Satisfaction registered December 22, of debenture registered April 2, 1931.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

KRUSADOR PRODUCTS CO., 16 Harmer Lane, Sheffield. (C.C., 7/1/33.) £20 11s. 6d. November 15.

London Gazette, &c.

Companies Winding Up Voluntarily

CHEMICALS AND COKE OVENS, LTD. (C.W.U.V., 7/1/33.) By special resolution December 20. Mr. George Augustus Brigstocke, Basildon House, Moorgate, London, E.C.2, appointed the liquidator. Creditors' debts or claims to the liquidator by January 16.

STANDARD SOAP CO., LTD. (C.W.U.V., 7/1/33.) By reason of its liabilities, December 21. Mr. H. A. McCann, Revenue House, 7-8 Poultry, London, E.C.2, appointed liquidator.

Company Winding Up

BOLGAR OIL PROCESSES, LTD. (C.W.U. 7/1/33.) Statutory meetings at 33 Carey Street, Lincoln's Inn, London, W.C.2, January 11; creditors at 11.30 a.m.; and contributories, 12 noon.

SCOTTISH COAL PRODUCTS, LTD. (C.W.U., 7/1/33.) Winding-up order, December 19.

Partnership Dissolved

F. S. BAYLEY, CLANAHAN & CO. (Hugh Cumming Clanahan and Francis Price Bayley), carrying on business as chemical merchants, at 1 Dickinson Street, Manchester, by mutual consent, December 31, 1932. Debts received and paid by Francis Price Bayley, who will continue the business under the style of F. S. Bayley, Clanahan & Co., at the same address.

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).

CHEMICAL TRADE INQUIRIES

Canada.—A well-known firm of chemical importers and manufacturers' agents in Vancouver desires to obtain the representation of a United Kingdom manufacturer of casein glue, presumably on a commission basis, in the Province of British Columbia. (Ref. No. 5.)

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