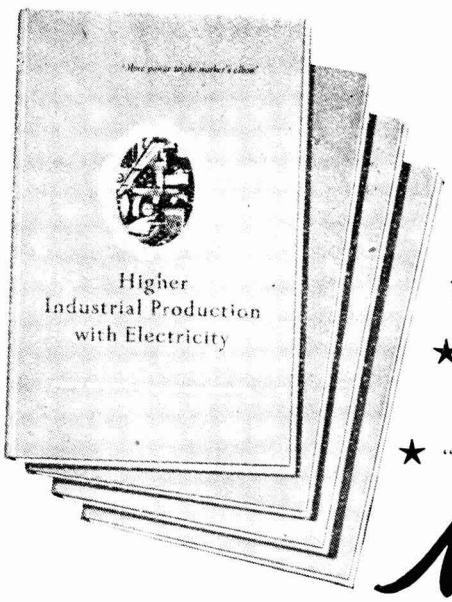
The
Chemical Age

VOL LXVIII 20 JUNE 1953 No 1771

Safety First

INDEX TO ADVERTISERS IN THIS ISSUE



★ "HIGHER INDUSTRIAL PRODUCTION WITH ELECTRICITY"

★ "LIGHTING IN INDUSTRY"

★ "MATERIALS HANDLING IN INDUSTRY"

★ "ELECTRIC RESISTANCE HEATING"

New BOOKS ON

Industrial Productivity

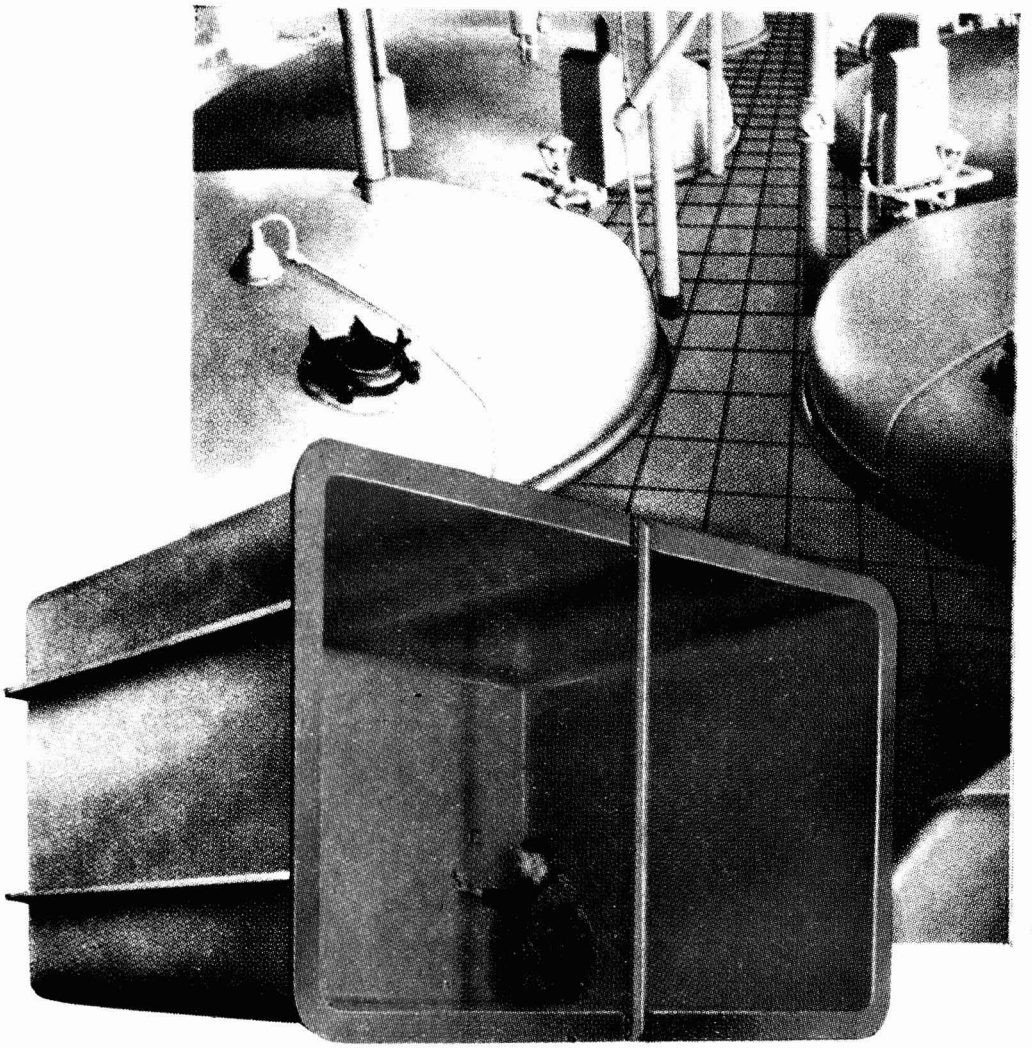
PRODUCTIVITY is one of the vital problems affecting Britain today. One way to increase productivity is to put POWER at a man's disposal; and the best way to do this is with electricity.

As a contribution to the solution of this problem, the British Electrical Development Association is now publishing a new series of books for management and executives in Industry. The first four are now available: "Higher Industrial Production with Electricity" describes a wide variety of modern production methods; "Lighting in Industry" shows how lighting can affect individual output, how its effectiveness can be assessed, and how improvements can be made; "Materials Handling in Industry" shows the way to increased productivity by improved handling; and "Electric Resistance Heating" indicates where, and how, this unique method of producing heat without combustion can be applied.

The post-free price of each of the books is 9/- and copies can be obtained from the British Electrical Development Association, 2 Savoy Hill, London, W.C.2, or from your Electricity Board.

The Association has produced a film called "A Case for Handling" which illustrates by practical demonstration the vital part that improved materials handling can play in all industries. It runs for 32 minutes, and is available on free loan.

Electricity for PRODUCTIVITY



One of a series of "Lithcote" lined tanks supplied to a well-known chemical manufacturing firm in the North of England.

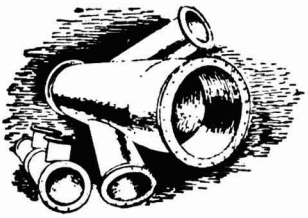
"Lithcote" linings are eminently suitable in the chemical engineering world as a resistant to corrosive attack of nearly all kinds. In the various food industries it is almost indispensable, since it gives freedom from metallic contamination, does not convey any foreign taste or odour, and is entirely hygienic.

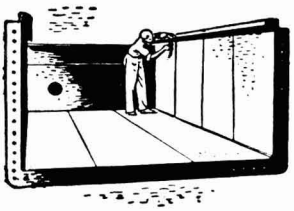
Furthermore, it does not star ,crack or craze.

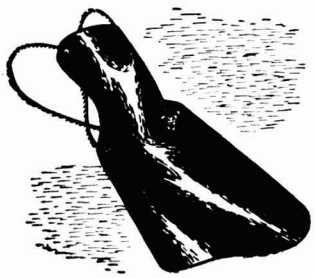
AN ENSECOTE PRODUCT

LITHCOTE

NEWTON CHAMBERS & Co. Ltd., THORNCLIFFE, Nr. SHEFFIELD.
LONDON OFFICE: GRAND BUILDINGS, TRAFALGAR SQ., LONDON, W.C.2







DUNLOP

Technical research facilities outstanding in British industry place Dunlop in a strong position to solve corrosion problems. The lining and covering of plant with rubber, synthetic rubber and plasticised P.V.C., is a sphere of activity in which the Company is particularly expert.

In addition to this service a range of accessories for use in industries using chemicals, is available including ebonite pipes, tees, bends, cocks and valves, "Nerflex" buckets, jugs and ladles, protective gloves and aprons.

Your enquiries for any of these products or services may be sent to any of the addresses shown below.

ANTI-CORROSION SERVICE

Dunlop Rubber Co. Ltd., (G.R.G. Division)
Cambridge Street, Manchester, 1

Telephone: Central 2131

Clerkenwell House, Clerkenwell Green, London, E.C.1 *Phone: Clerkenwell 3871*
Buckton's Chambers, 57 Meadow Road, Leeds, 11 *Phone: Leeds 34091*
Dunlop House, Livery Street, Birmingham, 3 *Phone: Central 8585*
Dunlop Rubber Company (Scotland) Ltd., North Wallace St., Glasgow, C.4 *Phone: Bell 3411*

3G/GMB

The
Chemical Age

Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE 154 FLEET STREET LONDON E.C.4.
Telegrams: ALLANGAS FLEET LONDON · Telephone: CENTRAL 3212 (26 lines)

Volume LXVIII 20 June 1953 Number 1771

The 'Agene' Question

IN the House of Lords last week an energetic debate* upon processed and chemically treated food took place. If some of the opinions that were expressed lacked an entirely accurate foundation or were deduced with some absence of logic, the discussion nevertheless revealed once more that in technical matters our second chamber is exceedingly well informed. The use of chemical additives suffered some particularly powerful hitting, notably the continued use of 'Agene' (nitrogen trichloride) as a flour improver. A recent paper in *The Lancet* (the quoted issue being for 21 March, 1953) by Drs. Sheldon and Yorke, appears to have rekindled the 'hot' campaign against 'Agene'. Hitherto it could be said that although experiments had shown that nitrogen trichloride had deleterious effects upon the health of dogs, no case of ill-effect upon human health had yet been established. This no longer is true. A case of skin disorder, loss of appetite, and mental depression, has been said to be caused by 'Agenised' flour. Lord Hankey cited the question asked in *The Lancet*: 'Is this a case of allergy or merely the first recognition of a common disorder?'

It must be recognised that a single case of unhealthy reaction to any widely-consumed substance hardly provides a fully-fledged argument against the general use of that substance. Many people are allergic to substances that are quite harmless or beneficial to the majority. For example, inumerable cases of allergic reaction to shellfish have been encountered. The modern rise in deaths from heart and circulatory ailments was presented as an 'invisible' consequence of the addition of 'Agene' to wheat products. As Lord Boyd pointed out, the use of electricity has greatly increased in the same period, and this, too, could be as logically correlated with the increase in thrombosis. However, Lord Hankey was able to show that in France, where nitrogen chloride is not used, the rise in mortality from heart and kindred diseases has been 9.8 per cent between 1938 and 1949, compared with 36 per cent in the same period for the United Kingdom. This, too, is much too sweeping a correlation of events, but it is at least an indication that health statistics for countries where nitrogen trichloride

* *Hansard*, Vol. 182. No. 73.

is banned—nine altogether in Europe and North America—might well be analysed.

While there is no direct evidence against 'Agene', it is reasonably fair to say that it is a food chemical 'under suspicion'. The alarming evidence that 'Agene' gave dogs hysteria has undoubtedly been exaggerated. A cynic could argue that more hysteria was caused in the United States by the publication of this piece of research than by 'Agene' itself, for although the United States Government could find no evidence of human health injury by 'Agene' in planned experiments, public opinion forced an over-swift ban upon 'Agene' and a change to chlorine dioxide. It might be noted in passing that the patient of *The Lancet* paper was as allergic to flour treated by this alternative improver as to 'Agenised' flour!

In this controversy it is as important to appreciate why 'Agene' or some other improver is required as to follow—with or without sympathy—the arguments advanced against it. Bread in a condition acceptable to the public cannot be made unless 'aged' or matured flour is used. Today adequate quantities of bread cannot be made if time is the only maturing influence. Moreover, in this country we must use wheats from a number of different world sources. If these different wheats had to be milled and matured in the old way—that is, by the effect of storage and oxygen—huge and impracticable increases in flour storage facilities would need to be created. Were this possible, the extra cost would still have to be met by the public. Why should the public accept higher charges for bread when experts disagree that the cheaper production made possible by chemical improvers is associated with hazards to health?

The Government's policy on 'Agene' seems soundly determined. 'Agene' will be banned as soon as a suitable substitute can be found; at present, less is known about other chemical improvers, and save for the recently reported instance of allergy, no case of human illness due to 'Agene' has been established in a period of just over 30 years use. There is some hope that a physical process that hastens maturing will eliminate chemical improvers altogether, but it was pointed out by Lord Horder that the 'batter' or oxygenising process requires machinery which only large-scale bakers could install. To ban chemical improvers and rely upon this type of physical treatment instead would at present put hundreds or thousands of small bakers out of business. A delayed-decision policy is undoubtedly correct. If chemical improvers—or one such substance in particular—are to be banned, let this be done when an alternative additive or process is no more costly, known to be non-injurious, and generally useable.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 42s. Single copies, 1s.; post paid, 1s. 3d. SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784/5). LEEDS OFFICE: Martins Bank Chambers, Park Row, Leeds, 1 (Leeds 22601). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

Notes & Comments

Silicone Progress

THE tenth birthday of the Dow-Corning venture into silicone production was recently celebrated in the United States. The original capital investment of the two parent companies—Dow Chemical Co. and Corning Glass Works—was $1,600,000. Today the expansion programme requires an investment of $16,000,000. This alone shows that silicones have been 'good business.' One of the major problems solved in recent years has been the large-scale production of high-purity silicon. For silicone production 95 per cent purity silicon is needed, whereas the previous major use of the element—in iron and steel alloy manufacture—called for purity standards of 80 per cent at the most and often a good deal less than this. Dow-Corning are now constructing an electric furnace with a capacity of 250 tons of high-purity silicon per month. Quartz rock, charcoal, and coke form the reaction mixture; at a furnace temperature of over 3,000° F. oxygen is removed by the charcoal and coke and molten silicon can be periodically tapped off. (*Chemical & Engng. News*, 1953, **31**, 20, 2074).

New Uses Suggested

NEW and perhaps unexpected uses for silicones have recently been suggested at a meeting of the American Association of Plastic Surgeons. Silicones as inert films to cover skin abrasions, as water-proofing films to protect the skin from moisture rashes such as those suffered by babies in napkins, and even as protective covers for burns—these potential medical uses are all being investigated with high promise. One of the advantages of silicones in this new field is that they are unaffected by climatic change and perform as efficiently in cold and dry conditions as in tropical heat and humidity. The deeper use of silicones in the body, as substitutes for bone and cartilage in surgical repair work, is also being studied. At present cartilage must often be taken from the patient's chest wall to re-build damaged or naturally defective parts of the body—ears, nose, chin, etc.—and the development of silicones as artificial cartilage may well make this type of operation much less cumbersome.

Gamma-Radiation v. Bacteria

THERE has been much talk in recent years of using gamma-radiation from atomic pile by-products for such important bactericidal operations as food sterilisation. Long-term preservation by processes much swifter and much less cumbersome than pasteurisation has been visualised. The possibility of eliminating chemical preservatives might not be remote, and this perhaps would please some of the peers who took part in the debate we discuss in our leader. A recent paper in the new American Chemical Society journal (*Agricultural and Food Chemistry*, 1953, **1**, 2, 142-4) at least damps this hope and some might go as far as saying it drenches it with cold water. Milk was used as the foodstuff and the fission product providing radiation was cobalt-60. The radiation intensity from this source is too low for food sterilising and it can be assumed not too unsoundly that the side-effects upon nutritional factors in milk would be more rather than less severe if an appropriately intense gamma-radiation treatment was given. In 12 hours 85 per cent of the vitamin A was destroyed, 100 per cent of the vitamin C, and 47 per cent of the riboflavin. Closely similar losses were found with evaporated milk; and severe vitamin A losses occurred with butter, cheese, cream, and margarine.

Of Dubious Value

PRESERVATION that involves such high losses for important nutritional factors is of dubious value to the consumer. Certainly in the pasteurisation process for milk vitamin C is also heavily

lost but the vitamin A and riboflavin contents are well maintained. Nor are there serious losses of vitamin A when permitted antioxidant chemicals are used to preserve the fatty products of milk. Although further results involving the use of higher radiation intensities have yet to be reported, it would seem from this preliminary paper that one of the much-vaunted hopes of the electronic age has taken a hard knock.

These 'Uncivilised' Times

IT always pays to look at both sides of a picture. In the past 50 years the world has lived in a whirl of scientific triumphs and it is salutary to realise the possibility of some scientist a century hence asking himself seriously if this was not the most uncivilised half-century of the past 500 years. Mr. R. G. Menzies, Prime Minister of Australia, used this as the theme of some remarks he made at the recent Coronation luncheon of the Advertising Association in London. He asked: 'How is it that we have fallen from war to war, hatred to hatred, and lived in a world perpetually filthy with propaganda of hostility?' Few will disagree with his statement that too little thought has been given to 'the greatest problems in the world, the problems of reconciling man with man, and man with his Maker.' On these, he contended, we must confess to 'the most terrible failure in our own lifetime.' Mr. Menzies went on to express the hope that in the second half of this century some of the remarkable talents in science would be used to advance the cause of understanding, not of hostility; of friendliness and not of hatred. These are truly sobering thoughts.

IN THE EDITOR'S POST

Maleic Hydrazide

SIR,—We notice that you have given some prominence to maleic hydrazide in 'Notes & Comments' in your issue of 23 May, but we should like to assure you that the question of the use of this material is not passing uninvestigated, and we have in fact several trials in progress at the present moment.

We feel that the time is now rapidly approaching when this material can be released on the market. We would also like to draw your attention to its value as a growth-inhibitor for uses other than on grass, such as the prevention of sprouting in potatoes, onions and sugar-beet clamps. Naturally, it is rather early to state anything definite at this stage, but we feel certain that there is a considerable future for maleic hydrazide for agricultural and horticultural practice in this country.

Yours, etc.,

N. G. SHREEVE.

Metallurgical Chemists, Ltd., London.

General view of the joint stand of Erinoid Limited, Utilex Limited, and Styrene Products Limited at the British Plastics Exhibition which ended on Thursday. The displays included casein, cellulose acetate, polystyrene, polythene and PVC, and demonstrated the exceptionally wide variety of grades, colours, uses and applications now covered by these materials

Fungicides in Paints

Improved Laboratory Research Methods Yield Some Results

TWO primary purposes of a paint, namely protection and decoration, may be defeated by the presence of moulds in the films. In order to obtain their food requirements, moulds tend to break down the organic compounds in the coating and they are also capable of penetrating the paint film. In hospitals and bakeries the presence of moulds on painted surfaces is insanitary as well as deleterious and unsightly, while moulds present in the wiring, terminal boards and switches of electrical and electronic material may have a serious effect on the operation of the equipment.

The problems presented by the growth of moulds on paints have long been recognised, and much effort has been devoted towards their solution. Various investigators have reported significant findings concerning mouldy painted surfaces, the fungi isolated from the mouldy paint films being mainly the *Aspergilli* and the *Penicillia*. More detailed studies have revealed that most of the pigments, with the exception of zinc oxide, have no effect on the mould resistance of paints. Zinc oxide has been reported to exhibit fungistatic properties proportional to the surface area of the materials.

Several methods have been suggested for reducing mould growth on painted surfaces, but a considerable proportion of the data describing the relative merits of various fungicides is either incomplete or not in agreement, probably because of the wide variations in the procedure used to evaluate these compounds. Within the last few years, operation in tropical areas has required new and improved mildew resistant paints. Fungicidal varnishes and lacquers have also become necessary, particularly for use on components of electrical equipment.

Field Exposures Unsatisfactory

Field exposures of painted wood panels in tropical or semi-tropical areas have been used extensively for determining the mildew resistance of protective coatings. This method is slow and lacks uniformity, however, so that it is not considered satisfactory for evaluation studies, for which a rapid and reproducible procedure is required. Various laboratory methods have been proposed which accelerate the mildewing of the coating material and exhibit greater reproducibility. These differ considerably as to the substrate to which the coating is applied for testing, the test organisms used, the test procedure, and the interpretation of the test results. Wood, paper, glass and metal panels are among the more common substrates to which the coating has been applied for these tests. The test organisms used also vary considerably, and both mixed and pure culture techniques have been employed.

Report Published

An investigation into fungicides for use in paints is described in Report No. 1118 of the Engineering Research and Development Laboratories, Fort Belvoir, Virginia. The report covers an investigation of the problems involved in determining the mildew resistance of coating materials such as paints, varnishes and lacquers, and the selection and development of a test method for evaluating compounds as paint fungicides. The workers were concerned primarily with fungus attacks on paints intended for use on porous substrates such as wood, rather than on impervious substrates such as metals and moulded plastics.

The investigation consisted essentially of two major phases. The first phase included the study of a variety of test methods and the selection of a basic test procedure. The second consisted of a series of studies intended to perfect the selected procedure, and correlation of the laboratory results with field exposures.

None of the published procedures was found to meet the major requirements of brevity, reproducibility, and uniformity of results. It was apparent that one of the major difficulties was the selection of a material which, when painted, would readily support mould growth and exert a uniform and reproducible effect on the mould resistance of the paint. Examination of several materials showed that filter paper met these requirements best and this led to the development of a test procedure based on its use. Various fungi, primarily isolated from mould strains in the field, were also studied, the

best results being obtained with *Aspergillus oryzae* and *Aspergillus niger*.

Of the constituents of paint films which provide the necessary materials for mould growth, linoxyn, the drying product of linseed oil, was found to be the chief food source. The paint selected for the experiments was an iron oxide-linseed oil paint, which proved very susceptible to mould growth, and was therefore ideally suitable.

The Test Method

In the test method developed at Fort Belvoir both *A. oryzae* and *A. niger* are employed. No. 30 Whatman filter paper is given one brush coat of the test paint on each side of the paper. The paint-impregnated samples are allowed to dry for 48 hours, after which they are marked and cut into 1¼ in. squares. They are then laid down firmly on the centre of a hardened culture medium. Both sugar and mineral agars were investigated and gave essentially the same results, the sugar agar being finally selected. The inoculant is distributed over the surface of the sample and the surrounding culture medium with a pipette. The inoculated plates are then incubated at 28-30°C. and at a relative humidity of 85-90 per cent, after which they are ready for examination. The results are recorded on an arbitrary numerical scale:

1, No mould growth on any portion of the sample within the guide lines. 2, Slight mould growth. 3, Moderate mould growth. 4, Heavy mould growth.

This test procedure has proved to be a rapid, reliable and reproducible method for evaluating paint fungicides, and it does not require the constant attendance of highly skilled staff. Another important advantage is that very small amounts of the compound under investigation are sufficient in evaluation. Sample preparation is not of critical importance. On the other hand, the method will not necessarily indicate the minimum concentration of a fungicide that will be required to protect the paint under various conditions, nor will it necessarily indicate whether a compound possesses the physical and chemical properties to make it a satisfactory paint fungicide.

After the more promising compounds have been determined by the laboratory procedure, field exposures in areas where the mildew problem exists must be used to obtain such pertinent data as the performance of the fungicide and the minimum concentration required. The correlation of laboratory results with exposures in the tropical testing chamber and in Panama was complicated by the influence of the wood panel itself on the mould resistance of the paint. Some of the variables in woods were therefore studied and a satisfactory correlation with the laboratory results was found when extreme care was used in the selection of white pine sapwood panels. It is considered that the laboratory procedure will greatly reduce the amount of work required in the field and will considerably accelerate the preliminary evaluation work.

In the second part of the investigation some eighty compounds were incorporated into a linseed oil-iron oxide paint in various concentrations. These compounds consisted primarily, though not exclusively, of commercially available materials. Many of the fungicides tested were subjected to heat and water-leaching tests in an attempt to determine their retention in the paint.

Effective Fungicides

Analysis of the test results showed the superior fungicidal activity of the copper salt of 8-hydroxy-quinoline over all the other compounds studied. In addition to its fungicidal effectiveness, this compound was reported to be comparatively non-toxic, and the results showed it to be resistant to water leaching. Its use in paints, however, is limited to colours where the green-brown colour of the compound can be tolerated.

Phenyl mercurials rank next in fungicidal activity in paints. Mercuric chloride is less effective than the phenyl mercurials, its activity approaching that of pentachlorophenol. Pyridyl mercurials are approximately as effective as mercuric chloride, with the exception of pyridyl mercuric chloride, the effectiveness of which approaches that of the phenyl mercurials.

Tetrachlorophenol is slightly more effective than pentachlorophenol. Salicylanilide and phenanthraquinone have an effectiveness approaching that of tetrachlorophenol. The effectiveness of 1-(4-chlorophenyl) 2,4-dimethyl-3-nitrosopyrazole is about equal to that of pyridyl mercuric chloride.

A report of this investigation is in the possession of the Technical Information and Documents Unit of the DSIR.

Popularising the Use of Rubber

Development Board Reports Year of Continued Progress

SPEAKING at the annual meeting of the British Rubber Development Board in London on 8 June, the chairman, Mr. H. B. Egmont Hake, referred to the heartening evidence that after years of Communist guerilla terrorism in Malaya, during which rubber plantations were in the forefront of the battle, the initiative had at long last passed to the forces of law and order.

Turning to technical matters, Mr. Hake said he shared the view expressed by the International Rubber Study Group that the use of rubber in roads was one of the most important potential outlets for rubber, but that its full development was a matter for further intensive study and promotional effort.

Referring to the annual report of Rubber Technical Developments, Ltd., the management of which was shared by that body and the Development Board, Mr. Hake said definite progress had been made during the first full year of the company's existence.

Special mention should be made of cyclised natural rubber. Manufacturers had had the opportunity of evaluating the cyclised rubber in master-batch form produced by the company's pilot plant and it had been established that the material was acceptable as an alternative to the synthetic copolymers now so widely used as the basis of shoe-soling compositions, with the result that demand for it was growing.

Three Main Lines

The annual report of the British Rubber Development Board stated that the Board's work in developing the use of rubber in road surfacing followed three main lines in 1952:—to confirm the advantages afforded by rubber in bitumen carpets and surface dressings, and to develop new uses, such as rubber in tar; to diffuse knowledge of the results achieved to date and new developments as they occurred with a view to stimulating an increased demand for rubber; and to give the technical advice required by road officials and contractors in laying rubberised roads.

The most important feature of the research scheme was the Board's co-operation in Great Britain with the Government's Road Research Laboratory, which should yield the scientific data essential to widespread acceptance of the value of using rubber in roads.

The comprehensive investigations embraced different road treatments—surface dressings and carpets, bitumen and tar; different types of rubber—both powdered and latex; and various methods and temperatures of mixing. The object of the laboratory work, which had continued throughout the year, was the provision of data necessary for the full-scale road trials.

Knowledge Improved

The improved knowledge of the function and behaviour of rubber in bitumen which had resulted was of great value in the full-scale surface dressing trials, laid on the Great South-West Road during the year, and would form the basis of the remaining road trials to be completed this year.

The British Rubber Producers' Research Association had rendered valuable assistance by conducting preliminary experiments on the use of rubber in tar and on the suitability of various types of rubber for incorporation into bitumen. Their advice had also been of service in regard to the third part of the research scheme—that carried out by the road laboratory established by the Board in the USA.

The Board's overall rubber road research scheme was closely integrated with those of the rubber development organisations in France and Holland, each unit concentrating on an agreed programme of research and exchanging results with the others.

The major publicity for rubberised roads had been concentrated in the USA, where the potential demand was the greatest and interest in the development was most advanced. Elsewhere in the English-speaking world, particularly in the USA, Australia, South Africa and Malaya, publicity had followed similar lines on a smaller scale.

A number of special uses of rubber in roads were the subject of practical trial during the year. An airfield surface was laid in the USA and one was projected in South Africa. Rubberised bitumen was used as a crack-sealer and, in conjunction

with the Road Research Laboratory, tests were being carried out to determine the resistance to cracking of rubber asphalt when laid on a concrete base.

Special efforts were being made to exploit the considerable potential market for rubber powder offered by Colonial roads, and ready mixed rubberised bitumen had been supplied to Nigeria and Sierra Leone for initial trials.

Soil-Stabilised Roads

A test had been carried out into the use of latex in soil-stabilised roads. In Great Britain, the soil-stabilisation process was used primarily for road foundations, but it was thought that a latex-cement soil-stabilised road might provide a greatly improved wearing surface for 'dirt' roads used overseas.

A successful latex foam sales promotion campaign was operated in Great Britain during the year, as a follow-up to the 'educational' campaign of the previous year. The scheme was national in scope and was supported by the distribution of three specially prepared brochures.

As part of a scheme to get furniture schools to treat latex foam as a standard upholstery material in the same way as hair and similar products, the Board's latex foam consultant delivered 33 lectures to about 1,700 people, including representatives and students of all branches of the furniture industry. Two prototype chairs, designed by the latex foam consultant, to stimulate interest in the future possibilities of latex foam, had been the means of securing valuable publicity.

There was still considerable scope in overseas countries for work to popularise latex foam and it was probable that efforts in those countries would be intensified.

Publicity for the many smaller rubber products which, however, represented a not inconsiderable outlet for rubber, had been limited mainly to displays at exhibitions. With regard to the campaign to persuade architects to treat rubber as a standard material, in the same way as timber, steel, etc., technical information sheets, brochures and a film had been distributed. Moreover, a series of lectures had been given to architectural associations and student groups.

The Board had co-operated with a committee advising the Government on the use of substitute materials alternative to those in short supply, by submitting the case for rubber, and a market research study on rubber floors had been completed.

The first effort in a campaign on behalf of rubber soles and heels took place late in the year, when the Board's stand at the Shoe and Leather Fair was devoted to the triple theme that rubber is hard-wearing, waterproof and comfortable. The Board also exhibited at two agricultural shows in Great Britain—the Royal Counties Show and the Great Yorkshire Show.

Forty-two publications had been produced to stimulate interest in the use of rubber in industry, there had been more than 5,000 screenings of the Board's films, and the Board participated in 19 major exhibitions. The information service handled 102,000 inquiries.

The Board had continued work on the problem of some form of tyre, involving rubber, for use on the millions of animal-drawn vehicles in India and other parts of Asia. Progress had been made with the development of a simple solid rubber tyred metal rim for attachment to existing vehicles and the idea was being worked out in co-operation with rubber manufacturers.

On the subject of finance, the Board's report stated that expenditure on the main income and expenditure account, at £103,000, showed an increase of £6,000 over expenditure for 1951. It approximated closely, however, to the average annual expenditure of £1,000 envisaged over the period of the Five-Year Plan.

Parliamentary & Scientific Committee

At a recent meeting of the general committee of the Parliamentary and Scientific Commitee, Mr. George Darling, M.P., was elected to serve on the committee. Organisations elected as members were the Institute of Brewing, the Institute of Metal Finshing, the National Institute of Industrial Psychology and the Production Engineering Research Association. It was reported that an invitation had been sent to Mr. F. J. Curtis, president of the Society of Chemical Industry and vice-president of the Monsanto Chemical Company, St. Louis, to address the committee at its meeting on 28 July on 'Executive Developments in Technological Industries in the USA and Aspects of Higher Technological Engineering Education.'

Tarnish & Corrosion Prevention

Work of the Design & Research Centre

PROBLEMS recently dealt with by the Design Section of the Design and Research Centre for the Gold, Silver and Jewellery Industries have included consideration of the potential value to the trade of a hydrogen sulphide absorbent paper and the rusting during storage of mild steel cutlery and flatware blanks. Reports on these problems are contained in Number 15 of *The Bulletin* of the Design and Research Centre for the Gold, Silver and Jewellery Industries which was published this month and from which the following abstracts are reproduced by kind permission.

Since June, 1952, the Design Section of the Centre has been considering the potential value to the trade of a hydrogen sulphide absorbent paper manufactured under the name of 'TarnO Tissue,' for which a patent is pending. In addition to carrying out practical tests reports have been received from three scientific sources—The Ontario Research Foundation, the Printing, Packaging and Allied Trades Research Association, and the Research Section of the Centre.

Four separate experiments were carried out by the Ontario Research Foundation: two to determine the ability of the tissue to decontaminate an atmosphere containing hydrogen sulphide and sulphur dioxide respectively; one to determine the capacity of the tissue for absorbing hydrogen sulphide, and one to test the anti-tarnish properties of the tissue when used to wrap a piece of silver.

It was found that 'TarnO Tissue' reacted very favourably to all these tests and that 10 gm. of the tissue would decontaminate approximately 30,000 cu. ft. of air in an average city atmosphere. This, of course, referred to the atmosphere of an average Canadian city.

Humidity Tests

No mention of the effectiveness of the tissue in varying humidities was made in this report, and as it had been found that the active properties of other anti-tarnish papers were greatly influenced by the humidity of the atmosphere, samples were sent to the Printing, Packaging and Allied Trades Research Association, with a request that the paper be tested in varying humidities.

The apparatus employed by the Printing, Packaging and Allied Trades Research Association for its test consisted of a glass battery jar—volume 12,800 ml.—with a flat edge fitted with a glass cover. Means were provided of stirring the air in the tank and of introducing a known volume of H_2S. A dish in the bottom of the tank contained a saturated salt solution to provide the required relative humidity. The test specimens were supported on glass frames and consisted of pure silver sheets cut into rectangles 2 in. by 1 in.

Method of Test

In the method of test the specimens were wrapped in one, two or three sheets of the anti-tarnish paper, and placed in the tank. A control specimen unwrapped was always included. The specimens were then allowed to remain in the tank for a few hours to ensure equilibrium with the relative humidity of the air. The requisite volume of H_2S was then added while the air in the tank was agitated. The specimens were examined after 24 hours.

Experiments were carried out on two concentrations of H_2S, 0.075 per cent and 0.038 per cent. A further experiment was made in which the same quantity was added at the end of every 24 hours. The amount added in each instance was enough to give an initial concentration of 0.038 per cent H_2S.

It was concluded that the anti-tarnish paper was effective in retarding tarnish (by H_2S) of silver wrapped in it, under conditions varying from 44-100 per cent relative humidity. The effect was more marked at the higher humidities possibly because tarnishing occurs more rapidly at these humidities. The experiments showed that at least two thicknesses of the paper were required for effective use, and that it was capable of dealing with intermittent contamination of the atmosphere with H_2S provided some of the anti-tarnish agent in the paper was still available.

An analysis of the paper was made by the Research Centre, and to confirm this some tissue was actually made which proved

similar in appearance but was slightly less effective.

Tests were next carried out by the Design Section, using 2-ply sheets, in showrooms, factories and showcases, to discover whether or not the tissue was effective under practical conditions.

In London two showrooms, one displaying silver and the other EPNS, were fitted out to see whether or not the tissue would condition a whole showroom, and some effect in retarding the tarnish of the silver was noted. In one instance articles on the upper shelves of the showroom remained bright, but those nearer the floor became tarnished. This was probably due to the fact that cold moist air coming in through the windows and lying close to the floor affected the silver before it was decontaminated by the tissue.

Not Practical

The large quantities of paper required to treat a whole showroom effectively involved such problems of installation and display that it was not considered practical for general use.

Tests carried out in two domestic living-rooms, with a piece of silver standing on the tissue, showed that where the silver normally tarnished in two weeks, after the introduction of the tissue this period was extended for four weeks. An exception was found in the case of a cigarette box placed on a table with a rubberised fabric cloth containing a high concentration of reducible sulphur, against which the tissue afforded little protection.

No tests were carried out in store rooms, but provided these are fairly small with tightly fitting doors and windows, they should be fairly simple to treat, as no display problem is involved.

In only one instance did the tissue fail to be effective, and this was in a window which had recently been rebuilt and repainted. This is another pointer to the fact that the tissue, unless used in actually wrapping the article, will not combat high sulphur concentrations which are found in certain materials.

Tests made over a period of months in cases in the British Museum showed that there was less tarnish in the treated cases than in those containing the 'control' silver which was appreciably blackened. Trials and observations are being continued.

'TarnO Tissue' is at present only produced in Canada, and since the report was prepared, it has been learnt that the Board of Trade is not able to grant an import licence into the United Kingdom without direct evidence of loss of dollar earnings due to tarnish. The value of the tissue to the home market was not considered a factor which justified dollar expenditure.

The Design and Research Centre is convinced that the use of this tissue in showrooms, factories, and for export wrapping would facilitate increased sales in both the home and export markets, and would justify in terms of dollars the expenditure required to import it.

The Centre hopes to collect a sufficient volume of evidence to justify a further approach to the authorities in order to obtain for the trade adequate supplies of this valuable product.

The problem of rusting during storage of mild steel cutlery and flatware blanks was submitted to the Design Section by a Sheffield firm.

In some instances the interval between blanking and pickling prior to tinning was only a matter of an hour or two, but, from a production point of view, it was found convenient to store the blanks for a period of several weeks. During this time many of the spoons—which are stored in metal trays—were found to have rusted.

Apart from the fact that rust removal is an inconvenient and time-wasting process, the surface remaining after the rust has been removed is not an ideal plating surface.

The firm mentioned had tried out methods of rust prevention, among these being one of greasing the blanks. Although the plating surface is left undamaged, it is as difficult to remove the grease as to remove the rust. The grease application and removal was inclined to be expensive both in terms of time and materials.

Two Practicable Courses

After a visit to the firm and examination of the processes involved, tests were carried out by the Design Centre.

Investigation into the possibilities of various methods soon showed that one of two courses would be most practicable. Of these, one, which involved the coating with a proprietary strippable gelatine substance, had the disadvantage of leaving a thin film of lubricating oil on the blanks which was difficult to remove. This method also

involved a certain amount of capital outlay.

The course finally decided on was to use a vapour phase inhibitor. Tests were made in which Pliofilm 250 gauge P.4 grade, weighted with pegs at the edges, was laid over a tray containing mild steel specimens. Although the plastic film is in itself moisture-proof, no attempt was made to make the cover air-tight, as this would be impracticable in factory conditions. This purely physical barrier delayed the action of rust, but, of course, did not prevent it and it was found that under extreme and rapidly changing conditions there was a tendency for moisture to condense and drip on to the specimens. The test was repeated, but, in addition to the plastic film, a dish containing approximately 2 grams of Shell VPI 260 powder, a substance which gives off a rust-inhibiting vapour, was placed among the specimens.

Care was taken to see that this tray was no more air-tight than the first. It was found that the nails did not rust from normal atmospheric moisture, and the hygroscopic properties of the powder largely contributed to the prevention of moisture droplets under the film, and when these were forced to form and drip on the specimens, they still did not rust.

Control of Rodents

Paper Presented to Crop Protection Panel

AT a recent meeting of the Crop Protection Panel of the Agriculture Group (Society of Chemical Industry), a paper on 'The Chemical Control of Rodents' was given in two parts by Miss M. D. Lawrence and Dr. E. E. Turtle.

Miss Lawrence gave an historical introduction to the subject and in particular explained the use made of observations on the reactions of rats to new objects, to their taking non-lethal doses of various poisons and on the palatability of different bait bases.

Dr. Turtle outlined the properties of the principal rodenticides, considering them respectively as inorganic poisons, natural products, synthetic organic chemicals and fumigants. He described the main physical and chemical properties of each substance, together with their toxicities to rodents and other animals, and referred to the advantages and disadvantages of each substance as a rodenticide. He drew particular attention to the limitations in the use of substances of very high acute toxicity and to the advantages of anti-coagulants.

In reply to a question from Mr. Birkinshaw, Dr. Turtle said he did not think that physiological tests, such as could be carried out on muscles from frogs, would be acceptable in assessing the rodenticidal activity of samples of red squill.

Mr. H. E. Monk said his laboratory had sometimes to examine farm animals alleged to be killed by rat poison. Arsenic, barium carbonate and zinc phosphide presented no special difficulty, but he knew of no reliable chemical tests for red squill and was reduced to a search in the viscera for the characteristic calcium oxalate crystals. The manufacturers ground the material so fine that it was often a matter of extreme difficulty to find these crystals. He inquired whether it was in fact true that the toxicity of red squill was related to the fineness of grinding.

Suspected warfarin poisoning in animals, of which they had had several cases, also raised difficulties. The amounts involved were so small that it was doubtful whether they could be detected even by spectrophotometric means, although according to the literature the UV absorption offered the best possibility It had been suggested that coagulation time of the blood, although not a specific test for warfarin, might provide evidence of the presence of an anti-coagulant.

Mr. J. L. McGirr mentioned that tests on the toxicity of warfarin to farm animals had been carried out at the Veterinary Research Laboratories at Weybridge. He felt that the presence of an anti-coagulant would normally be decided by the post-mortem examination but he agreed that methods were needed for the detection and measurement of small quantities of warfarin. There was some discussion on the risks in using tracking dusts and on the value of different repellents.

Recovery of Pickle Liquors

An improved method for the treatment of pickle liquors from steel works involves the use of HCl which is constantly recycled. The American developers of the method claim that the entire sulphate content of the liquors may be recovered as re-usable sulphuric acid, and that iron is recovered as essentially pure iron oxide, which may be charged into the furnaces.

Antioxidants in Food

Recommendation That Regulations be Amended

THE Minister of Food has approved for publication a report which has been presented to the Food Standards Committee by its Preservatives Sub-Committee, recommending that the Public Health (Preservatives, etc., in Food) Regulations be amended so as to deal with and authorise the addition of selected antioxidants in certain foods. The full text of the report is published in the Ministry of Food Bulletin No. 706, dated 13 June.

The Sub-Committee was appointed in January 1951 and by its terms of reference was justified in including in its investigations not only the addition to foods of preservatives and colouring matters but also antioxidants, anti-staling agents, anti-mould agents and stabilising and emulsifying agents. It was decided to report upon each class of substance separately and this report on antioxidants is the first of a series.

Early Consideration Desirable

Early consideration of antioxidants was thought desirable because this subject was not dealt with by the Departmental Committee appointed by the Minister of Health in 1923. In view of the accepted use of these substances in some other countries and the possible importation into this country of foods so treated it was decided that the legal position should be clarified as soon as possible.

The Sub-Committee confined their attention to those antioxidants which are permitted in other countries, and took into account the biological, physiological and functional properties of such substances and the needs of the food industry.

The following are the recommendations of the Sub-Committee:—

(i) That the Public Health (Preservatives, etc., in Food) Regulations should be amended so as to deal with and authorise the addition of antioxidants to foods.

(ii) That 'antioxidants' should not be added to any foods other than to edible oils and fats (but not including butter) and to essential oils.

(iii) That for the present official approval should be restricted to the antioxidants propyl gallate and butylated hydroxyanisole, and that specifications as to the purity of these substances should be prescribed.

(iv) That either or both of the above-named substances may be added to the foods specified in (ii) above, in quantities not exceeding:—

Propyl gallate	0.01 per cent
Butylated hydroxyanisole	0.02 per cent

(v) That compound foods should be permitted to contain that amount of antioxidant necessarily introduced by the use of an ingredient specified in (ii) above.

(vi) That provisions similar to those contained in the Public Health (Preservatives, etc., in Food) Regulations for articles sold as 'preservatives' should be made to apply to substances sold as antioxidants.

(vii) That in general the notification of the nature and amount of the permitted antioxidants present should be given to the purchaser of any of the foods specified in (ii) above, except that in the case of retail sales a quantitative declaration should not be required.

(viii) That nothing in the above recommendations should preclude the use in foods of tocopherols, lecithin, citric, tartaric, ascorbic and *iso*-ascorbic acids, and the packaging of foods in inert gases such as nitrogen or carbon dioxide.

(x) That review of the above recommendations should be made periodically under official direction.

Sub-Committee Members

The members of the Preservatives Sub-Committee are:—Professor E. C. Dodds (chairman); Mr. C. A. Adams; Mr. P. N. R. Butcher; Professor S. J. Cowell; Mr. A. Glover; Dr. E. B. Hughes; Dr. J. M. Johnstone; Dr. H. E. Magee; Dr. J. R. Nicholls and Dr. G. Roche Lynch.

The Petrochemical Industry

Address by Dr. R. F. Goldstein on its Economic Importance

AT a recent meeting of the general committee of the Parliamentary and Scientific Committee addresses on 'The Economic Importance of the Petrochemical Industry' were given by Dr. R. F. Goldstein, of the Research and Development Department of the British Oxygen Company, Ltd., and Dr. R. Holroyd, Director of Research, Imperial Chemical Industries, Ltd.

The addresses were preceded by an introduction by Dr. F. Roffey, Controller of Research and Development, the Distillers Company, Ltd. In this he described the basis of the petroleum chemical industry and the relation of petroleum chemicals to other sections of the chemical industry.

Extracts from the address by Dr. Goldstein follow:—

Aside from some relatively minor operations, the British petroleum chemicals industry is based on five cracking plants built during or immediately after the end of the second world war. They are modern and up-to-date and in productivity stand comparison with any in the world. The primary object of these plants is to make and use the simple olefines. Originally, these plants operated on imported liquid feed stocks and have a maximum throughput of some 750,000 tons, 3-4 per cent of the present input of crude oil to United Kingdom petroleum refineries.

Capital Expenditure

The capacity for the three simple olefines, ethylene, propylene and the butylenes, is some 200,000 tons p.a. The total capital spent on these cracking plants and on the chemical utilisation plants associated with them is about £40,000,000 to £50,000,000, 20 per cent of the capital envisaged for expenditure on the whole of the chemical industry in the 1949 five years' expansion plan of the Association of British Chemical Manufacturers.

Petroleum chemicals are a branch of the chemical industry, and are used mainly as intermediates for making other chemicals. Chemicals themselves are neither raw materials nor finished end products. They are intermediates used by other manufacturers in the processing of the final end product, and in some form or other, chemicals are indispensable in almost every finished product. The amount employed in the final article is frequently out of all proportion to the upgrading in value, as in the finishing of textiles and rubber processing.

Not a Time Index

For this reason, the economist's net value is not necessarily a true index to the importance of the chemical industry. Nevertheless, I may mention that in 1948 the net value of the chemical and allied industries, which is some 50 to 100 per cent larger than the chemical industry as defined by the ABCM, was 7 per cent of the net contribution to the gross national product from all industries; this proportion is now higher, as the increase in volume of actual production of the chemical industry between 1948 and 1952 was greater than in any other of the 18 sections into which the data for all manufacturing industries is divided in official statistics.

In 1953 the total capacity of the chemical industry, as defined by the ABCM, was some £600,000,000 to £700,000,000 on today's values. Of this, some 25 per cent is credited to heavy organic chemicals, 30 per cent to inorganic chemicals, and 45 per cent to processed or fine organic chemicals. The bulk of petroleum chemicals probably goes into plastics, synthetic detergents, solvents and paints, the motor car industry and synthetic fibres. They are responsible for most synthetic detergents, which in this country are already a quarter of soap production, and provide the key intermediates for some of the newer plastics and synthetic fibres.

The target before the chemical industry and therefore also before petroleum chemicals, is twofold: to reduce dollar imports to the United Kingdom and to the rest of the sterling area, and to keep abreast of world chemical technology.

The functions of the British petroleum chemical industry itself are: To supply chemicals previously imported from abroad; to displace older and less economic raw materials; and to make new raw materials available to industry.

The second and third are obviously

aspects of keeping abreast of world technology.

In 1952, direct exports of petroleum chemicals were valued at about £5,000,000, about 5 per cent of all exports from the chemical and allied trades. Many chemicals consumed within Great Britain are exported as the finished article in the form of engineering goods, textiles, plastics and so on. The reduction in imports is difficult to assess, in view of the increased industrial activity in the last few years, but without our petroleum chemicals industry, we might have had to import some £5,000,000 more of chemicals per annum, mainly from the dollar area.

Competition Not Feared

In this industry, how do we stand in relation to other countries? The manufacture of petroleum chemicals has been started in several European countries since the war, on the same lines as in this country, but on a smaller scale. There is no reason to fear that we should not be able to meet their competition in world markets. I might mention the special case of Italy, which alone of Western European countries, has discovered vast reserves of natural gas since the war, and is busy building up a natural gas chemical industry; for her olefine chemicals, she is following the British pattern.

America, however, is the country where the petroleum chemical industry was created and where it has reached its highest level of development. It was started in the 1920's and until 1941 concentrated on the manufacture and use of the simple olefines, as in Great Britain and Europe since the end of the war.

From 1942 onwards, while manufacture and use of olefines continued to expand, natural gas was used instead of coal for the war-time and post-war new requirements of synthetic ammonia and methanol, and because of shortage of coal tar products, manufacture of aromatics from petroleum has also become a major industry; but the most important development was the use of petroleum chemicals from 1942 as the main raw materials for the creation of new industries, synthetic rubber, synthetic fibres, synthetic detergents and for a large part of the expansion of the plastics industry.

The significance of these new developments is that they open up immense new outlets for synthetic organic chemicals, for reasons which are, I think, important to us. The older organic chemicals are used as auxiliary agents in small proportion in the manufacture of the finished article; their prospects of growth are geared to the growth rate of the final article. With the new industries which I have named, the end-product is built up entirely from simple chemicals. A small change in making, say textiles from synthetic chemicals instead of from natural fibres, can therefore lead to a new demand for synthetic chemicals much greater in quantity than all the chemicals previously used in the textile industry.

The effect on the demand for hydrocarbons from petroleum for chemicals is shown by the approximate figures for American production in 1951:—

Ethylene, 750,000 tons, mainly from ethane and propane from natural gas.

Propylene, 400,000 tons and butylenes 500,000 tons, both from refinery off gases.

Benzene, toluene and xylenes, 500,000 tons, from chosen American crude oils.

Methane for making ammonia and methanol—excluding that used for fuel and power in these and other chemical operations—1,000,000 tons p.a.

Since 1945 the American chemical industry has spent on new plant an average of $1,200,000,000 p.a., of which some 25 per cent has been on petroleum chemicals. Bearing in mind that the American chemical industry is five times the size of ours, her capital expenditure on chemicals and petroleum chemicals has been twice ours.

Turning to the future, what will happen when our present petroleum chemical plants are working to capacity? Here the only guide we have are American plans. The Paley report surveys raw material requirements in 1975. It predicates that the demand for goods and services then will be twice that in 1950, but estimates an expansion in petroleum chemicals by a factor of 5 to 10, the principal growth being in plastics, synthetic rubber, synthetic fibres and agricultural chemicals. The first leg of this expansion, scheduled for 1955, is 80 per cent completed. The estimated annual expenditure on new capital for petroleum chemicals alone is $200,000,000 every year for 25 years. The comparable British figure would be £14,000,000 p.a. for petroleum chemicals, which will call for an effort similar to that put out in our present five-year expansion.

Dr. Holroyd's Address

DR. R. H. HOLROYD, Director of Research, Imperial Chemical Industries, discussed recent developments in the British

petrochemical industry and the following has been extracted from his address:—

The petroleum chemical industry is essentially a new large capacity source of the raw materials and intermediates required by the organic chemical and allied industries. Its economic importance therefore depends on the rate of development of these other industries and on the competitive power of the more old-fashioned methods of producing these same raw materials. My object now is to discuss how these and certain other more technical considerations affect the pattern of development of the petroleum chemical industry in this country.

First Major Development

The first major development to take place was a fairly obvious one once it was decided to erect large-scale oil refineries in the United Kingdom. Modern oil refineries give rise to by-product gases from which propylene and butylenes can be separated easily and cheaply. For some considerable time a large range of organic chemicals, including for example isopropanol, acetone, butyl alcohols, methyl isobutyl ketone, etc., have been made in America from propylene and butylenes, whereas in this country the same or equivalent products have had to be made much more expensively by starting with molasses or in some cases carbide as basic raw material.

Production of a range of chemicals based on propylene and butylenes was therefore a very logical basis for Shell's petroleum chemical project at Thornton which came into operation in 1949. Since then other operators, for reasons which I shall discuss later, have also entered the field of propylene and butylene based chemicals and now, not only is this country independent of foreign imports of this class of product, but there has already been a marked lowering of prices to the consumer.

The second and more expensive and complicated entry into petroleum chemical activities had for its object the provision of ethylene to meet the rapidly growing demand for polythene, styrene, ethylene glycol, and a large range of products based on ethylene oxide and ethyl alcohol. Until about 1950 the consumption of ethylene in chemical synthesis in this country was only 6-7,000 tons a year and all this was made from alcohol obtained from molasses. At the end of this year the consumption is likely to be approximately ten times this amount and between then and 1960 the demand could easily double itself again.

The normal oil refinery is not the obvious source of ethylene as it is for propylene and butylenes. By-product refinery gases contain relatively little ethylene, which is difficult to separate from the other components. Large quantities of ethylene can be made economically in conjunction with oil refining, but it is necessary to produce ethylene deliberately by secondary cracking of other by-product gas components, such as ethane and propane and expensive separation techniques are involved. Moreover, most of the ethylene consumption plants are not situated adjacent to oil refineries and the transport and storage of ethylene are both difficult and costly.

For these reasons ethylene production from oil has so far in this country been undertaken by the ethylene users in plants specially designed for the cracking of oil fractions such as naphtha or gas oil to give a maximum yield of ethylene and a minimum yield of fuel by-products—that is, the complete reverse of the normal oil refining operation. This method is more costly in raw material, but this is off-set by a greater ease of separation of pure ethylene.

Three Plants Erected

Three plants have been erected so far, one by Petrochemicals Ltd., at Partington, near Manchester, to produce ethylene for glycol and other ethylene oxide derivatives; one by British Petroleum Chemicals at Grangemouth, where ethylene is converted to ethyl alcohol and styrene; and the third by I.C.I. at Wilton to produce ethylene for polythene and to a lesser extent for ethylene oxide products.

These three plants, although aimed primarily at the production of ethylene and its products, also engage in other activities.

Unfortunately, even under conditions for maximum ethylene yield, oil cannot be cracked without the simultaneous production of other products, including propylene, butylenes, butadiene and a series of liquid hydrocarbons. In order to achieve a reasonably low ethylene cost, there must be an outlet for at least the greater part of these by-products commanding a realisation higher than fuel value.

In due course there should be no difficulty in disposing of butadiene. This is extract-

able in greater quantity and with greater ease from the products of special oil cracking than it is from oil refinery gas and is rapidly becoming an extremely valuable chemical raw material. Extraction of butadiene is planned at Wilton and I understand that a similar scheme is being looked into at Grangemouth.

Other By-products

The remaining by-products of ethylene manufacture, such as propylene and butylenes, are however materials which are obtainable quite cheaply and easily as by-products from oil refinery operations and therefore operators of special cracking processes cannot expect in the long run to obtain a realisation for these products much greater than what might be termed their oil refinery value. Nevertheless, even this order of realisation is considerably higher than fuel value and it is a great advantage for the operator of special ethylene from oil projects to have an assured outlet for chemical products which can be based on these raw materials.

The three special cracking projects already operating in this country include facilities for converting by-products into chemical products. The I.C.I. plant at Billingham produces *iso*propyl alcohol, normal butyl alcohol and acetone from propylene and the company has an internal requirement for a large proportion of the make of these products. The liquid hydrocarbon by-products are disposed of as petrol.

The Grangemouth plant of British Petroleum Chemicals also disposes of liquid products as petrol and has, through the Distillers Company, an established market for acetone which it makes from propylene. The Petrochemicals plant at Partington makes *iso*propanol from propylene for external sale and by virtue of operating a modified cracking process, which gives rise to a highly aromatic liquid hydrocarbon by-product, it can separate from the liquid product, benzene, toluene, xylene, napthalene, etc., for sale as such.

When we come to consider extensions of special oil cracking for ethylene production, it will be appreciated that ability to utilise still further quantities of by-products is an important economic factor. Much research is therefore being undertaken to find new outlets for propylene, butylenes, etc.

A third important development for which a plant is at present being erected by the Shell Company aims at the production of xylenes. These have in the past been provided by the coal carbonisation industry, but the availability from this source is now inadequate because of a large increased demand for xylene as one of the main raw materials for the new synthetic fibre Terylene.

The Shell Company is in a particularly favourable position to make this product because in connection with its refinery operations it will shortly subject the higher boiling fraction of its petrol product to hydroforming treatment. This converts many of the petrol components into aromatic hydrocarbons which have a favourable effect on the anti-knock quality of the final petrol. It is a comparatively simple matter to extract a number of certain aromatic hydrocarbons, including xylene, from this hydroformed product.

Benzene and toluene could be produced in the same way and in my view this is the optimum method for their production when the necessity arises. At present, however, the requirement of these products for chemical purposes can easily be met from coal benzole at lower cost. This is one of the big differences between this country and the USA, where more than half the benzene requirement has to be provided from petroleum chemical sources.

American Use of Natural Gas

Another big difference between the two countries is that in America large quantities of natural gas are available, as well as refinery gas. Often these gases have a value considerably below the fuel value of the refinery gas in this country and they are utilised extensively for production of hydrogen for the manufacture of ammonia, methanol, etc. In this country it would seem likely that manufacture of ammonia and methanol will continue to be based largely on coal and coke as far as the immediate future is concerned.

Similarly in the USA active steps are being taken to produce acetylene from methane derived from natural and refinery gases. The absence of natural gas and the high fuel value of refinery gas in this country might well result in the continued use of carbide as a source of acetylene.

These differences in conditions rather than any lagging behind in technical capability or

in initiative, are responsible for the fact that less than 20 per cent of the heavy organic chemical industry in this country is based on petroleum, whereas the corresponding figure in the USA is approximately 70 per cent.

I have been unable in the time available to cover the whole of our petroleum chemical activities, but I have possibly said sufficient to draw certain conclusions. The petroleum chemical industry in this country is clearly already of very considerable economic importance and this importance will certainly grow. The rate of growth, however, is unlikely to be as rapid as it has been in the USA.

One of the main reasons for extending petroleum chemical activity in the immediate future is likely to be the production of more and more ethylene which, so far, has been produced in special cracking plants not intimately connected with oil refineries. The economics of petroleum chemical schemes involving such separate plants is extremely complicated, largely because so much depends on ability to utilise all the by-products, production of which it is impossible to avoid. For this reason, to ensure economic success, extension of petroleum chemical activities in this country has to be timed and planned with even more than average care.

The Discussion

DURING the discussion which followed, Dr. Holroyd, in reply to Mr. Hervey Rhodes, M.P., said that as far as this country was concerned, the amount of petrochemicals going into synthetic fibres at the moment was extremely small. It was only in 'Terylene' that petrochemicals were used to any substantial extent. No petrochemicals were used in nylon.

Dr. Roffey said this would always be a question of economics, as long as natural fibres were relatively cheap.

Dr. Goldstein said that the reference to America not requiring any natural fibre in ten years' time related to the new acrylonitrile fibres in which the Monsanto Company were interested, and which would be made from petroleum chemicals. These were wool-like in nature and intended to be used in partial or complete replacement of wool.

Replying to Mr. R. Fort, M.P., Dr. Holroyd said that as long as their requirements of benzene could be obtained from coal, from the real cost point of view it was better to get it that way.

Dr. Holroyd, in answer to Dr. R. Lessing, said that in spite of the fact that to date ethylene manufacture from oil in this country had been carried out in special cracker plants, it was technically feasible to make it in conjunction with oil refinery operations. In order to extend production of ethylene in this country most economically it would be necessary to consider each extension most carefully, bearing in mind both the special cracker and oil refinery routes.

Refinery Ethylene

Dr. M. A. Matthews (The Shell Petroleum Company, Ltd.), said his company would be producing ethylene some time this year as a by-product from oil refinery operations, for use in chemical syntheses in an adjacent factory. The major factor which Dr. Holroyd had brought out was that the location of the consuming plant must be relatively near the producing plant, if it was intended to utilise ethylene taken from oil refining.

When the present oil expansion scheme was completed in two/three years there would be an oil refining capacity of about 29,000,000 tons a year of crude oil, which should give a total hydrocarbon gas availability of something of the order of 1,500,000 tons a year. Some of that gas had to be used in the refinery operations and some of the unsaturated gases could be converted back into petrol again. There still remained 800,000 tons a year of hydrocarbon gas which would be available from the refineries. They were, however, rather scattered about the country.

Professor Sir Robert Robinson said he agreed that the most economic method would obviously be to marry these industries to refineries. If this country proposed to stay in the chemical industry a great deal of money and energy must be spent in developing the petroleum chemical industry, because there was no question whatever but that the chemical industry of the future was closely linked with the production of chemicals from petroleum.

A great deal had been rightly said about the part played in this country by chemicals from coal. The production of chemicals from coal was, however, dependent on coal carbonisation, and it was very likely that progress in that field would tend to lead to total gasification. Whether that happened

or not he was perfectly convinced that the trend of the organic chemical industry was towards petroleum chemicals, and they in this country must play their part. Parliament had already taken steps regarding the duties on light hydrocarbons, and there might be further opportunities for analogous legislative action in the future. They had done a great deal of pioneer work in this field as in others, but had not always taken advantage of the developments as quickly as the Americans.

Dr. Lessing said it would be interesting to know what proportions of crude oil and coal could be converted into chemicals.

Dr. Holroyd said the figure from oil was a good deal higher than that from coal.

Dr. Matthews said that theoretically there was no limit to the amount of chemicals to be made from either oil or coal.

Professor Sir R. Robinson said that the actual production of butadiene alone in the USA was 600,000 tons a year. They in this country had not really started, since the throughput of feedstock in all plants amounted only to 760,000 tons a year.

Synthetic Rubber

Dr. T. J. Drakeley referred to the statement that the future development of the industry in this country might follow the pattern of the industry in the USA. He said the normal development in the USA had probably been distorted by war requirements and consequently a large synthetic rubber industry had been created. Was the development of a synthetic rubber industry likely in this country? Incidentally, carbon black manufactured from gas was also used in the rubber industry; would this country be independent in the future of supplies from the USA?

Dr. Goldstein, replying, said that approximately 70 per cent of UK requirements of carbon black was now manufactured from imported crude oil. With regard to the possibility of manufacturing synthetic rubber in this country, the position was bound up as much with politics as with economies. At present 5/6,000 tons a year of speciality synthetic rubbers was imported and these could not be replaced by natural rubber.

Dr. Roffey, in reply to the chairman, said there was no evidence of any important natural gas discoveries in this country. An investigating body was being set up to look into the subject.

Acetyl Derivatives

Of Moderately Strong Organic Bases

THE following method of obtaining acetyl derivatives of moderately strong organic bases such as aniline, the toluidines, xylidines, etc., has been communicated by M. A. Phillips, D.Sc., F.R.I.C. (Dr. M. A. Phillips & Associates, Romford). It does not appear to be at all well known, although it has the advantage that the acyl derivative is usually obtained in excellent yield and in a very pure condition.

The base is suspended in about 10 parts of water and sufficient concentrated hydrochloric acid is added to give solution at room temperature or a little higher. About 1.1 mol. of the mineral acid is required.

A little good quality charcoal (say, 0.1 to 0.2 g. per 10 g. base) is stirred in and the mixture is shaken for some minutes and filtered and, if need be, re-treated with charcoal and re-filtered until it is as colourless as possible. To the solution is then added 1.1 or 1.2 mol. of acetic anhydride, followed at once by sufficient solid sodium acetate crystals to reduce the acidity from acid to Congo-red to acid to litmus. Except on large batches, the heat of reaction is controlled by the negative heat of solution of the sodium acetate; on large batches, some cooling may be required.

The acetyl compound separates as white or near white crystals, which are filtered off by suction, washed free from soluble salts with water and dried.

On occasion, the di-acetyl compound may be formed to some extent and the product must then be treated in the cold with dilute sodium carbonate solution to give the required mono-acetyl derivative.

The above method has been successfully applied to the laboratory preparation of acetanilide, *o*-, *m*-, and *p*-toluidines, *o*-, *m*- and *p*-acetamidophenols and N,N′-di-acetyl-*p*-phenylene diamine (from *p*-amino acetanilide), N,N′-diacetyl-*o*-phenylene diamine (from *o*-phenylene diamine) and many other similar organic bases.

The Research Association of British Rubber Manufacturers is moving in the autumn from 105-107 Lansdowne Road, Croydon, to Shawbury, Shrewsbury, Shropshire.

The Impact of Synthetic Detergents

Chairman's Views at Unilever Meeting

THE development of synthetic detergents and their impact on the soap market was commented upon by Sir Geoffrey Heyworth, chairman of Unilever Limited, when speaking at the annual meeting of the company in London last week.

A world universally seeking to improve its standard of living, pointed out Sir Geoffrey, provided an expanding market for the soap trade, and the discovery of new types of detergents which appeared to compete with soap for the customer's favour should be viewed in that light.

The point was that soap and synthetic detergents were not competing for a share of a static market. He believed that each had their place in the expanding market, although synthetics might tend to replace soap in some parts of the world, while soap was likely to continue as the principal washing medium in other parts.

Within limits the new synthetic substances resembled soap in that they would do a washing job, but nevertheless they were less versatile as dirt removers than 'straight' soap. The main reason for their popularity was the fact that they did not form insoluble precipitates with the salts responsible for the hardness of the water, whereas soap formed an insoluble scum tending to adhere to the washing utensils, and made a lot of rinsing necessary.

A Disadvantage

One disadvantage of the blended synthetic products was that they were somewhat more expensive to produce than a corresponding soap washing product, so that a packet of the synthetic product was retailed at a higher price. The fact that the synthetic product went further when used in hard water might compensate for the higher price, but to some consumers the initial outlay was an important factor in determining a purchase. Another limiting effect on the acceptance of blended synthetic products was the prevailing impression that they are 'hard on the hands.'

Most of the reputable manufacturers, he imagined, had satisfied themselves by practical tests—as had Unilever Limited—that the synthetic products did not involve greater risks that were incurred with blended soap products. Nevertheless, more clinical research as to the effect of detergents on the skin was necessary and this had been planned by Unilever Limited and other manufacturers on a substantial scale.

At present it was impossible to say when equilibrium would be reached between sales of soap and the synthetic detergents. Some authorities felt that the sale of soap would be reduced to a small residual figure. Others considered that soap would continue to hold a significant share of the market, although smaller than today.

Effect of New Discoveries

In any event, new discoveries in the laboratories might change the position yet again. They might swing the balance back in favour of soap, or still more in favour of synthetics. In the meantime, the fact that some consumers preferred blended synthetic products and others soap made it clear that the soap industry must continue to back both.

As might be expected, the new detergents had stimulated scientific thought on detergency and the washing process. There had been a marked re-emphasis of the more fundamental chemical aspects of the industry. The work involved in determining new analytical procedures was considerable. Each new synthetic substance presented a fresh problem that had to be dealt with on its own merits.

Sir Geoffrey went on to point out that the manufacture of synthetic substances was not confined to the chemical industries, nor was the creation of blended synthetic detergents a matter only for the soap industry. There were chemical manufacturers who produced blended synthetic products for retail sale and some soap manufacturers now produced part of their own requirements of the synthetic substances. A new competitive element had thus been introduced into the detergent industry.

In conclusion, Sir Geoffrey said the new synthetic products had created a demand for important new chemicals and they had made the soap industry as a whole much more dynamic.

Phenol From Petroleum

Details of New Canadian Process

WE reported last week (p. 892) the opening of a new plant at Montreal by B.A.-Shawinigan Ltd., the first to produce phenol and acetone from petroleum by oxidation of cumene. In view of the interest of this developement we have obtained further details of the process.

Cumene is produced by alkylation of benzene with propylene: a mixture of propane and propylene containing more than 20 per cent of the latter reacts with benzene under pressure of several hundred pounds, at a temperature of about 200°, and in the presence of a sulphuric acid catalyst. A fairly high yield of cumene is obtained and any unconverted benzene is fractionated and recycled.

Work on the oxidation of cumene to the hydroperoxide, and the subsequent hydrolysis to phenol and acetone, was carried out in Germany by Hock and Lang up to 1944, but the yields obtained were extremely low, and the process was particularly slow. Further research was done by the Distillers Co., Ltd., and by the Hercules Powder Co., in the USA, resulting in the development of a satisfactory commercial process.

Direct Oxidation

Cumene is oxidised directly by atmospheric or pure oxygen, the reaction being catalysed by typical free-radical-producing agents, such as UV light or a suitable peroxide. At Shawinigan's plant air is employed for the oxidation, and the conditions are carefully controlled to give minimum by-products. Cleavage of the hydroperoxide is achieved with dilute sulphuric acid.

After cleavage, the crude mixture is separated into its components in suitably designed fractionation and purification units. The fractionation is carried out in a series of columns from 50 ft. to 100 ft. high, where acetone and unused cumene are separated. In the purification stage phenol is separated from a number of by-products, including α-methyl styrene, acetophenone, and mesityl oxide.

When the plant reaches its production target of 13,000,000 lb. per year of phenol and 8,000,000 lb, per year of acetone, it is hoped also to produce nearly 1,000,000 lb. of α-methyl styrene.

Organo-Mercury Fungicides

FOLLOWING the annual general meeting of the Crop Protection Panel of the Agriculture Group (Society of Chemical Industry) recently, a lecture on 'Organo-Mercury Fungicides' was given by Dr. J. R. Booer. He described the development of the modern fungicides, giving details of the chemical, physical and toxicological properties of compounds used in the transition period.

Dr. Booer described in detail the properties of the general group R-Hg-X, and the relation between chemical composition and fungicidal properties. After dealing briefly with the use of compounds of this group in seed disinfectants, he detailed the properties of the phenyl mercury compounds and described their use as foliage fungicides, with particular reference to the diseases of apples, pears and potatoes.

Recent work on the reaction between thiol compounds and mercury compounds was shown to have an important bearing on both phytotoxicity and fungitoxicity.

In reply to questions, Dr. Booer stated that organo-mercury fungicides are not recommended for spraying plums at present because this is still under investigation. With regard to mammalian toxicity and the risks from residues, he pointed out that the mercury compounds are slightly volatile, phenylmercury compounds having been found to disappear from plants in 10 to 14 days. He also pointed out that the organo-mercury compounds have very little effect on the insects or nematodes associated with sprayed plants. In amplifying this specificity towards fungi, Dr. Kirby pointed out that the mercury compounds will control apple scab but not mildew.

The chairman, Dr. R. A. E. Galley, closed the meeting with a vote of thanks to the lecturer.

Coal Gas for Balloon

Hydrogen being unobtainable, coal gas from Hythe gas works was used to fill the balloon in which a New Zealander, Mr. D. Cunninghame-Black, and two Germans, Herr H. Eimermacher and Herr F. Waltermann, flew recently from Hythe to Bexhill. Originally, they intended flying across the North Sea to Munster, but the official permit allowing them to leave did not arrive in time.

British Carbon Black

A Great Saving in Dollar Expenditure

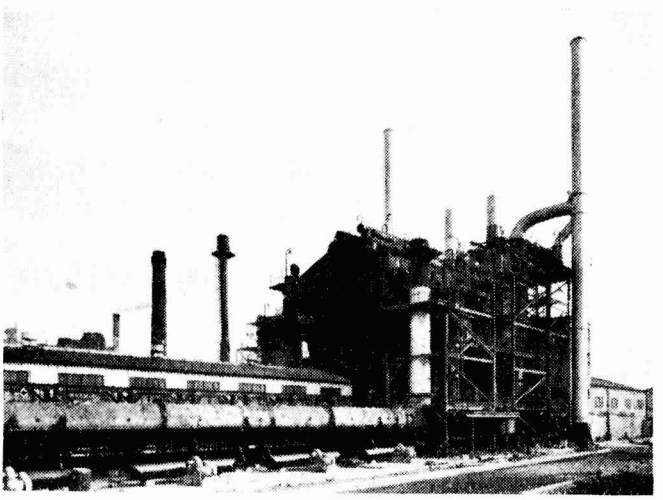
SAVING 4,000,000 dollars in less than three years represents a major contribution to the country's economic recovery, and this is the proud claim of Cabot Carbon Limited, of Ellesmere Port, British subsidiary of Godfrey L. Cabot, Inc., of Boston, Mass. The first carbon-black unit at Cabot went into operation in July 1950 with an estimated capacity of 20,000,000 lb. per year; a second similar unit was begun in September 1951 (THE CHEMICAL AGE, **64**, 932) and opened on 6 April this year, doubling the capacity of the plant.

Carbon blacks are used chiefly as rubber reinforcers and as black pigments for paints and inks. They differ from other carbons such as charcoal and bone char by being nearly pure elementary carbons with varying amounts of adsorbed hydrogen and oxygen, and with ash contents of < 1 per cent. Physically, they are essentially spherical particles, quasi-graphitic in structure, of colloidal dimensions ranging from 50-5,000 A. diameter. The grain size will affect not only the properties of the black, but of the rubber with which it is incorporated. Thus, a large grain or 'soft black' will give a rubber with low-reinforcing qualities and low abrasion resistance, but with good resilience, and this cheaper product is suitable for such manufactures as garden hose, soles and heels. The use of smaller grain gives stock of high reinforcement and abrasion resistence, but it requires more work to process, and the vulcanised rubber has greater hysteresis and heat build-up; this is more suitable for heavy duties such as vehicle tyres. The two grades produced at present by Cabot in England are the most appropriate for these two classes of application: Vulcan 3 has a mean-grain diameter of 265 A., and a surface area (by nitrogen adsorption) of 77 m^2/gm; and Sterling SO has a mean diameter of 412 A., and surface area 41 m^2/gm.

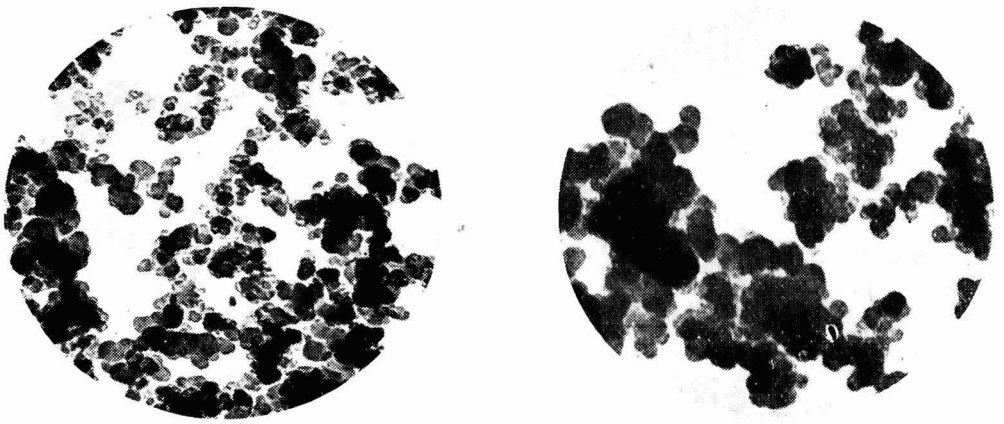
The grade of black is determined entirely by the conditions under which it is produced. At the Ellesmere Port plant the black is manufactured by incomplete combustion of the liquid hydrocarbon residue from catalytic cracking; this is fired as a fine spray mixed with air, and the input rates and relative quantities of hydrocarbon and air determine the grain size of the black. Formerly the quality was controlled by furnace temperature, but much pilot-scale research carried out in America has given a complete set of operating conditions, and a correspondingly closer control of output grade.

The process employed by Cabot Carbon is a continuous one: the plant is only out of action for routine maintenance, and otherwise operates 365 days a year.

The liquid fuel is unloaded from tankers



The new Cabot Carbon unit, with, in the foreground, the horizontal main leading to the vertical cooler and cyclones



Electron micrographs of the two grades of black produced at Ellesmere Port. Left: Vulcan 3; right: Sterling SO

and pumped through 1½ miles of steam-traced pipe-line to storage tanks, where it is further heated by bayonet heaters, and before passing to the furnaces its temperature is raised still higher in a column heater. The fuel is mixed with part of the calculated quantity of air in an atomiser jet, and the rest of the required air is blown in to feed the partial combustion flame, which maintains a temperature of 1,400°-1,500°. The furnaces are set parallel to one another, and exhaust into a communal main, where a water quencher reduces the temperature, and from there to a vertical cooler, in which the temperature falls to about 260°. At least 40 per cent of the black is removed from the exhaust gases by four cyclones in series, and the rest, after further cooling to 125°, is removed in a bag filter consisting of five compartments. In each compartment are hung bags, ten feet long by five inches in diameter, made of Orlon. This is the only fibre found suitable so far—Terylene and others have been tried without success—to withstand the temperature and moist acid conditions of the gases present. The filter unit is fully automatic, the bags in each compartment being shaken and reverse blown in a fixed cyclone.

The exhaust gases are passed to a dehumidifyer which lowers the temperature to about 38°, then slightly reheated and flared in a stack. The black is conveyed from the cyclones and filters by screw conveyors and bucket elevators to micropulverisers which break up any large aggregates; from dry drum pelletisers the pellets of black are discharged through magnetic separators and screens on to belts feeding the storage hoppers. Bags are filled from the hoppers by machines which automatically weigh out the required amount and then sew off the bag top.

Cabot carbon black has been made since 1882, and the success of the plant at Ellesmere Port is attributable, in part, at least, to this long experience of its manufacture. Apart from profitable business in Great Britain, the company is having some success in the export market; competition, of course, is very keen, and British black has to meet the challenge of American black produced on a larger scale and therefore at lower cost, but there is considerable hope for the future.

Venezuelan Discoveries

VENEZUELA will probably become one of the principal sulphur producing countries in the world following the discovery of vast sulphur deposits in the State of Sucre. At an estimated cost of 15,000,000 bolivares, the Venezuelan Sulphur Corporation is installing plant which is expected to produce annually 250,000 tons of 95 per cent pure sulphur.

From Venezuela also comes news of the discovery of extensive deposits of phosphate rock in the State of Falcon. It is estimated that there are approximately 15,000,000 tons of high-quality rock and another 5,000,000 tons of lower quality rock.

Dechema Monographs

Publication Resumed : Latest Volumes Reviewed

MANY readers will recall the high reputation attained before the war by the DECHEMA Monographs published in German by the DECHEMA (German Association for Chemical Apparatus and Equipment for the Promotion of Chemical and Industrial Practices and Technique), of Frankfurt/Main.

After the appearance of Vol. 13, in 1943, publication of these monographs, dealing with a variety of subjects of great interest to the chemical and allied industries, was discontinued until 1950, when Vol. 14 covered a wide range of papers on such subjects as measurement of *p*H values, laboratory pumps and apparatus, and electrochemical controls and various measurements.

Copies of subsequent monographs—reviewed below by Dr. Felix Singer—are obtainable from the DECHEMA, Frankfurt/Main, W 13, at the prices indicated in each case.

Vol. 15 (299 pp., DM18.0) contains the lectures given to members at their 1949 congress. The field covered is very considerable, ranging from the more general—such as the task of the chemical engineer—to the specific, such as chemical methods in a vacuum, calculations of heat exchange, etc. Individual problems of technique and materials are extensively dealt with, so that it is an unenviable task for a reviewer to chose one or another for special attention.

A number of new laboratory methods and apparatus are dealt with, as well as the greater industrial possibilities for the use of carbon and graphite in apparatus, various lacquers for surface protection and development in acid-resisting constructions. There can be no doubt that these monographs are of the very highest standard in the field of chemical engineering.

Volumes 16-19

Vols. 16-19 contain the papers given at the 1950 Congress of the DECHEMA and Vol. 17 (197 + 16 pp., DM21.60) is devoted mainly to those 16 papers which deal with laboratory technique. As this is linked closely with production control, it should therefore be of interest to the works manager as well as the laboratory staff.

Various methods of micro and electronic analysis are discussed, as well as an evaluation of analytical methods in general. In the ceramic field the importance of the *p*H value is becoming recognised so that quicker and more accurate *p*H measurements are always welcome.

Optical Instruments Described

While it cannot be claimed that flame photometers have as yet reached perfection, the description of recent improvements shows that they are becoming far more reliable. A number of important optical instruments are also described and discussed in this volume, including refractometers, colorimeters, etc.

The last three papers deal with the important field of viscosity and rheological measurements and the surface behaviour of liquids.

While it is unlikely that all these papers will appeal to and instruct every reader, their very range must make these monographs of value to many.

Vol. 18 (150 + 16 pp., DM16.80) contains ten lectures given at the 1950 meeting of the DECHEMA in Frankfurt and on the whole covers materials of construction, their application and their testing. Metals and their alloys, their treatment and improvements in order to make them more resistant to acids in general and to hydrochloric acid in particular, are studied from various angles.

Inevitably, reference is made to plastics. Not only are the possibilities of plexiglass, the polyethyl plastics and others discussed, but also various methods for testing these materials for tempering, etc. Contrariwise, the many ceramic materials which show such excellent acid-resisting properties are given scant attention and deserve better treatment than they receive.

Vol. 20 (112 pp. DM11.90) consists of a complete report by Dr. Georg Winckelsesser on experiments and investigations carried out on heat radiation and loss of flowing superheated and saturated steam. The work is characterised by its clarity and descriptions of experiments which in many ways are of fundamental importance.

Results of the work can be summarised briefly as follows:—

Assuming the same pressure in the steam chamber and the same condensation form of the steam, the heating effect of superheated steam is better than that of saturated steam when account is taken of the speeds and temperature gradient usually employed. Deviations of the heat radiation figures measured from those calculated have led to conclusions on flow occurrences inside the watery skin on the cooling surface.

There can be no doubt that this work is a most important contribution to fundamental knowledge in the construction and handling of chemical apparatus and that it contains a mass of interesting observations under a variety of conditions.

Vol. 21 (464 pp., DM37.50) contains 22 of the papers presented at the European Congress for the Chemical Industry which was held at Frankfurt in May, 1952. It should be pointed out that the papers have been extended and revised since the meetings and discussions, so that it has been possible to include second and even third thoughts. Experts from nine European countries and the USA have contributed and papers are printed in English, French or German respectively (with abstracts in the two other languages).

Expertly Handled

Fundamentals such as automatic measuring devices, continuous operation, materials and corrosion are as expertly handled as particulars such as the newest developments of producing nitric acid from air. American authors deal with fluid hydroforming and chlorination, whilst the German contributions include the reactions of acetylene and carbon monoxide under pressure as well as the calcining of pyrites in a whirling layer furnace.

In the British section is a paper by Aikman on the demands made on the design of modern installations by the increasing use of automatic controls, while Salsas Serra, of Paris, deals with the production of sulphuric acid in steel chambers and another Frenchman, Cl. Duval, describes experiences in the use of the thermoscales for analytical work, which reveal some unexpected results. The book concludes with a short English-French-German dictionary of technical terms.

It is impossible, in a short review, to do full justice to this excellent collection of papers.

Nationalisation of Chemicals?

THE attitude of the British Labour Party towards nationalisation of the chemical industry is shown in the party's policy statement, 'Challenge to Britain,' published on Wednesday.

Among the 'principal aims and objects' is the following:—

'To establish positive control over the size and direction of the chemical industry's investment programme, and to overcome the dangers inherent in private monopoly power, a substantial degree of public ownership is required. This will be achieved in a way that will not disturb the smooth functioning of the industry at home or abroad.

'Final decisions as to the boundaries of public ownership must rest on technical and administrative considerations. A Labour Government will obtain from the industry itself such information and records as will enable it to determine the most appropriate sections to be acquired, and the most appropriate methods of acquiring them.'

River Pollution

IN the House of Commons last week, Mr. A. Woodburn asked the Secretary of State for Scotland whether he was aware of the plant established at Gœttingen and elsewhere in Germany for the production of methane gas from town sewage, and whether he would give consideration to this possible economic ancillary advantage from the removal of pollution from Scottish rivers.

Mr. J. Stuart replied that a number of sewage disposal works in this country already used the methane gas produced in the course of treating domestic sewage and he encouraged local authorities to adopt this practice wherever economically advantageous.

Mr. Stuart also assured Mr. Woodburn that he would certainly encourage local authorities to make a contribution to the avoiding of pollution by making economic use of their sewage.

Carborundum in Brazil

The Carborundum Company, Niagara Falls, New York, has joined with two South American concerns in forming a new company in Brazil to manufacture and sell Carborundum products. The new Brazilian company is Carborundum S.A.

The Chemist's Bookshelf

GOUDRON-BENZOL. Vols. I and II. By A. Marty. Presses Documentaires, Paris. 1953. Pp. 153 and 178.

The text of these two volumes is in French and written essentially for the technician in the coal tar industry.

Volume I is concerned with the production, evaluation and utilisation of coal tar and its products, and is in three sections. The first chapter treats the subject from a historical and qualitative point of view, followed by a description of the main sources of coal tar in chapters two and three. Chapters four and five describe the separation of coal tra into fractions. The treatment of the various coal tar fractions is covered in chapter six. The second section of the book briefly describes the production of benzol. The use of coal tar products is the main theme of the final section. This portion of the book comprises three chapters in all. The first covers the principal uses of various fractions, such as light oils, bases, phenols, etc., while the second chapter is concerned mainly with the uses of benzol and its derivatives. These uses include the production of fuels, synthesis of phenol, production of benzene and benzene derivatives. Chapter three gives details of the quantities of coal tar and coal tar products produced, imported and exported in France.

The second volume is the French equivalent of 'Standard Methods of Testing Coal Tar and its Products.' The tests are in two sections, the first consisting of 22 so-called chapters on the testing of crude tar. The second consists of 24 chapters describing current French tests for examination of benzol.

The material contained in these two volumes represents a technical course suitable for a non-graduate type of student in the French coal tar industry. The author has presented his subject well and illustrated it wherever possible. Its use to the English reader will mainly be confined to those specialists who find the need for conversing or corresponding with their French equivalents.—E.J.C.

RADIOISOTOPES IN INDUSTRY. Edited by J. R. Bradford. Reinhold Publishing Corporation, New York. Chapman & Hall, London, 1953. Pp. 309. 64s.

The textbook in the form of a symposium, a style of presentation which has become increasingly popular on the other side of the Atlantic in recent years, suffers from as many faults as it possesses virtues. On the credit side the book may be written by a number of authors, each an expert on a subsection of the main subject and edited by an authority. On the debit side there is the possibility of a lack of coherence, an irritating contrast of styles, and repetition. The present volume is no exception to these generalisations; it is based upon a series of lectures delivered at the Case Institute of Technology and as such has the merit of clear presentation within each separate chapter. There are, however, far too many of these chapters and several, such as Radiochemical Laboratories and Design of Laboratories for the Safe Use of Radioisotopes, and Applications of Radioisotope Techniques and Radioisotopes in Physical and Chemical Research could be telescoped with advantage.

As an example of this type of overlapping, the thickness gauge, which apart from its use of a radioisotope is of no great fundamental importance, is described in no less than five separate chapters. In spite of this, however, there appear to be omissions. Photography, which plays a great part in the study of radioactive materials, might well have been given a chapter to itself, but in fact it is not even mentioned as such in the index. There is also no extended description of how labelled organic compounds are made. It is true that familiar synthetic methods are often used but the techniques are markedly different, and some descriptive material on the lines of the Ministry of

Supply pamphlet describing the preparation of compounds labelled with C^{13} would have been satisfactory.

The section contributed by the editor upon the Fundamentals of Radiochemistry is easily the best in the book, and the text is accompanied by a number of explanatory diagrams and graphs which are extremely helpful. The following chapter on Radiation Protection is a sober, balanced account of the development of what has been named 'Health Physics' in the United States. It gives a historical survey of the emergence of the concept of the maximum tolerable dose and the change in its value brought about by the discovery of fresh information. There is a grateful reference to the Rontgen martyrs, one of whom, an early associate of Rontgen himself, died recently in a British hospital from the effects of X-ray burns.

The picture drawn elsewhere in the book of the position of the industry in America does not reveal any startling differences except in scale with that in Britain at the present time; most of the applications of radioactive materials to instrumentation and tracer work will be familiar. However, the impression which the book leaves with one, though it may be false, is that American manufacturers are far more ready to test out the possibilities of radioisotopes in their factories. Thus although radon gas has been used as a tracer by the British Iron and Steel Research Association to study the flow of furnace gases, and can be envisaged as a general tracer in all problems of gas flow, the economics of the preservation of fruit and vegetables with crude fission products seem very much more remote. Both these aspects of the subject can be of service to the community and both have equally great potentialities. It is to familiarise the manufacturer with these potentialities that the book has been written.

Photographs, diagrams, graphs and tables illustrate the text throughout, and there are appendices giving the properties of radioisotopes produced in the atomic pile or the cyclotron.—J.R.M.

Change of Address

Elliott Brothers (London), Ltd., manufacturers of electrical, electronic and process control instruments, have transferred their Newcastle branch office to larger and more modern premises at 34-36 Scotswood Road, Newcastle-on-Tyne (Tel.: Newcastle 23811).

Iron & Steel Research

Substantial Savings in Coal

DEMONSTRATIONS of research in the making of iron and steel and its results in practice were given recently by the Swinden Laboratories, Rotherham, Yorkshire, of The United Steel Companies Ltd., and the works of Appleby-Frodingham Steel Company at Scunthorpe, Lincs.

A potentially far-reaching project seen at the laboratories was a reconsideration from the beginning of the form of the open-hearth steel furnace, with the object of increasing the efficiency of the furnace and reducing wear on its roof. The origin of this work was a suggestion by the chairman, Sir Walter Benton Jones.

Flow patterns are being studied in models using air and water at room temperature, and in a large 'hot model,' into which flames are introduced. Aspects of design which are receiving attention are the mixing of gas and air on introduction to the furnace, the shape of the roof, and its protection by the injection of a high-speed blanket of air between it and the flames beneath.

Close touch is maintained with the British Iron and Steel Research Association, which is also working on the problem.

Wear in Furnace Linings

For the study of wear in the lining of a blast furnace arrangements have been made for the insertion of a pellet of radioactive cobalt at a known depth in the lining of an actual furnace. Release of the pellet by wear will be followed by a small but detectable radioactivity in iron from the furnace. In later experiments, it is hoped to follow in detail the whole course of wear.

Practice at the Appleby-Frodingham works illustrates the value of research on the pretreatment of low-grade iron ores by 'sintering' with flue dust and ground coke. This process has been applied in the past only to the 'fines' left over from crushing and screening. By sintering the whole or the greater part of the ore a substantial saving in coking coal has been achieved.

Whereas, with the ore used, 28 cwt. of coking coal was formerly required for each ton of iron produced, by the increased use of 'sintering' this quantity can be reduced to 18 cwt. with a further 4 cwt. of low-grade coke or coke-breeze used in the sintering process.

HOME

The BIF in 1954

The next British Industries Fair will be held in London and Birmingham from 3-14 May, 1954. Announcing this in the House of Commons, the President of the Board of Trade, Mr. Peter Thorneycroft, added that he had set up a committee to consider the future of the Fair.

Sludge Scheme Postponed

At a meeting of the Birmingham Tame and Rea Drainage Board recently, it was reported that construction of a £738,900 sludge digestion plant at Minworth has been postponed as the necessary Government authority has not been forthcoming.

Zinc Stocks to be Sold

The Ministry of Materials has announced that when the present arrangements for zinc stock disposal end in July, and after transfers to strategic reserves, their stocks remaining for sale will be limited to about 70,000 tons. These stocks are to be sold gradually over a period and the Ministry is satisfied that with world production running at an annual rate of about 2,000,000 tons the effect on the balance of supply and demand will be insignificant.

Controlling Interest Acquired

A London merchant banking company, Singer and Friedlander Limited, has acquired the controlling interest in the Pyrene Company, Limited, the British concern manufacturing fire-fighting equipment, from the original American owners, the Pyrene Manufacturing Company, Delaware. The total amount involved in the purchase is stated to have been more than £1,000,000.

'Terylene' Plant Doubled

It was announced on Tuesday that I.C.I. have decided to double the size of the 'Terylene' plant now being built at Wilton, Yorks. The original plant, with a scheduled capacity of 11,000,000 lb., will begin production early in 1955, and the new extension will be ready a year later. For the last three years supplies of 'Terylene' have been limited to the output of a pilot plant near Fleetwood, which has been mainly use for the evaluation and testing of potential uses.

Effects of Detergents

Hawick Town Council has called for a survey of the effect of detergents, used in local textile industries, passing into the sewerage system. This decision follows the formation of scum on the River Teviot and the danger of adverse effect on the aeration tank system at the sewerage works.

Chemical Spray Danger

Wider use of chemical spraying systems to kill weeds in Scotland has provoked a plea from horticultural interests that due caution be observed in the choice of weedkiller and in the method of application.

Chemical Fertilisers or Sludge ?

Opposition to the use of chemical fertilisers was expressed at the recent International Conference on Public Cleansing in Edinburgh. It was stated that there is a growing preference towards the use of compost based on a mixture of domestic and trade waste with sludge from sewers. It was stated that a £79,000 depot for large-scale composting had been completed at Kirkconnel by the County Council.

Travellers' Car Allowances

The United Commercial Travellers' Association has drawn up a scale of allowances for commercial travellers who provide and maintain their own cars for the purpose of transacting business for their employers. The scale, relating to an 8 h.p. car, is as follows: Depreciation, £66; Road Tax, £12 10s.; comprehensive insurance, £15; repairs (average p.a.), £50; tyres, £15; servicing and cleaning, £15; home garaging, £15; batteries, £4; sundries, £2 10s.; total, £200 per annum. For cars of higher horse power the allowances should be computed *pro rata*.

Inter-Company Sports

The annual inter-company sports meeting arranged by British Driver-Harris Company, Ltd., Manchester, and Ripaults Limited, Enfield, was held recently at Enfield. The latter achieved their ambition by winning for the third time running the Parry-Roberts Trophy. This was presented to them by Mr. R. M. Parry, managing director of British Driver-Harris, who thanked Mr. G. A. Roberts, managing director of Ripaults, for their hospitality.

OVERSEAS

USA Magnesium Output

A statement issued by the Magnesium Association in the USA shows that USA output of magnesium during 1952 was more than double the 1951 production, totalling 105,833 tons as compared with 40,881 tons. During the fourth quarter of 1952 production amounted to 27,436 tons, compared with 27,222 tons in the third quarter and 18,080 tons in the fourth quarter of 1951.

Australian Antimony

Continuous commercial production of antimony in Australia is expected in the State of Victoria in July, when equipment now being installed at the Victorian Antimony Mines, Ltd. site at Costerfield is in operation. The company has constructed a power house, store and laboratory, and has erected a smelting treatment plant. A new steam-driven air compressor is another unit of the equipment. The plant has been designed to treat a wide range of antimony ores which are available in the field.

Showing the Flag

Fielden (Electronics), Ltd., were the only exhibitors from Great Britain in the section devoted to electronic instruments and control apparatus, at the 1953 International Fair of Liege, and Monsieur Duvieusarts in his speech opening the Fair, referred to Fieldens as being the only foreign firm whose stand staff spoke the language. The Fielden stand showed textile instruments, temperature measuring instruments and materials handling equipment.

Indian Aureomycin

A modern pharmaceutical plant, which will include aureomycin among its products, was opened recently at Bulsar, 130 miles from Bombay. The plant and laboratory, erected by Lederle Laboratories (India), Ltd., as a result of Indo-USA co-operation, will manufacture—besides aureomycin—liver extract, sulpha drugs and other Lederle products. The plant has been dedicated to the memory of the late Dr. Y. Subba Rao, the Indian scientist who was instrumental in discovering aureomycin in the Lederle Laboratories in the USA.

Italian Methane Exhibition

The second national methane exhibition in Italy, organised by the Chamber of Commerce, Industry and Agriculture, will be held from 12-27 September. At the same time the second national congress on the utilisation of methane will be held.

Belgian Germanium Process

The Belgian firm La Vieille Montagne has announced successful experiments on its special process to recover germanium. The total production in 1952 was not disclosed, but it is believed to have been an important amount. Indications are that the output will rise.

Swedish Chemical Pulp Exports

Preliminary Customs figures, just published, show that in April Sweden exported about 150,000 metric tons of chemical pulp, compared with 83,000 tons in March and 55,000 tons in February. The corresponding figure for April, 1952, was 109,000 tons.

New Zealand Water Plant

An £80,000 contract for a water purification plant at the £27,000,000 project of the Tasman Pulp and Paper Company in New Zealand has been awarded to Filtration and Water Sifting (Pty.), Melbourne, a fully-owned subsidiary of Sulphates Ltd. The contract was awarded—against competition from USA firms—on the recommendation of a Vancouver firm who are consulting engineers to the project.

PVC in Hungary

PVC plastics are now being used in Hungary for a wide range of industrial products, state reports in the Hungarian Press. It is said that at a factory in Nagytétény, water piping is being produced by extrusion moulding. Plastic sheeting is also manufactured. Plastics are being used for tooth-paste and other tubes, and the production of shoe soles and machine belting is said to be projected. The moulding powder is at present being imported from Eastern Germany but plans are said to be afoot for manufacturing it in Hungary, where existing supplies of coal, petroleum and natural gas are said to provide ample raw materials.

• PERSONAL •

PROFESSOR H. W. MELVILLE, Mason Professor of Chemistry at Birmingham University, and PROFESSOR A. R. TODD, professor of organic chemistry at Cambridge University, have been appointed to the Minister of Supply's Advisory Council on Scientific Research and Technical Development.

SIR MAURICE HUTTON, a director of Glaxo Laboratories, Ltd., has been appointed a member of the board of the Colonial Development Corporation. The appointment, which is made by the Colonial Secretary, is for three years as from 19 May, 1953.

MR. P. W. HOWARD, managing director of the British Tyre and Rubber Co., Ltd., succeeds Mr. John H. Lord, the Dunlop director, as president of the Federation of British Rubber Manufacturers' Associations. Mr. Howard began his business career with the Hoffmann Manufacturing Co., Chelmsford, and was sales manager of the Pyrene Company and of Pirelli Ltd., before joining the British Tyre and Rubber Co., as sales manager in 1926. After becoming their general sales manager and, in 1949, sales director, he was appointed managing director in 1951.

MR. K. W. MACNEE, M.A., B.Sc., A.M.I.Mech.E., M.Inst.P., has joined Flexibox Limited, manufacturers of mechanical seals, as technical representative for the London and Home Counties area. Mr. Macnee graduated at Edinburgh University in 1913, as M.A. and B.Sc. (Engineering) with special distinction. He worked for many years with Mather and Platt Ltd., attaining the successive positions of chief estimator in the Pump Department, technical sales representative to the Pump and Electrical Departments and manager of the General Engineering Department in London. In 1950, Mr. Macnee was appointed special director and at the end of 1952 he retired. Mr. Macnee's profound experience of engineering and pump practice will be valuable to all users of Flexibox mechanical seals in the London and Home Counties area.

MR. H. RANDS, who has retired as chemist to Wellington Gas Co., Ltd., New Zealand, has been elected a life member of the New Zealand Institute of Chemists.

Mr. P. A. Singleton, managing director of Monsanto Chemicals Limited, has announced the transfer of MR. J. M. KERSHAW to the Overseas Division of Monsanto Chemical Company, St. Louis, as its London development representative. He will be stationed in London and will be responsible to Dr. W. D. Scott, director of development of the Division.

MR. T. HESELTINE, vice-president of the Pharmaceutical Society, was elected president for the ensuing year at the monthly meeting of the Council on 10 June. MR. ERIC BROCKLEHURST succeeds Mr. Heseltine as vice-president and MR. W. SPENCER HOWELLS continues as treasurer for the seventh successive year. The retiring president; ALDERMAN W. JOHN TRISTRAM, was presented with a gold replica of his badge of office.

DR. K. I. NARASIMHAN, B.Sc., Ph.D., A.R.I.C., of Bombay, has been elected a Fellow of the Textile Institute. Dr. Narasimhan is deputy dyeing and printing master with the Bombay Dyeing and Manufacturing Co., Ltd. He graduated from the University of Bombay in 1942, and from 1942-45 was the Byramji Lentin Scholar and Singhanee Fellow at that University. He was at the same time awarded a fellowship by the Board of Scientific and Industrial Research to carry out work on the utilisation of indigenous raw materials during the war. He received his doctorate from Bombay for work on synthetic dyes from catechin. In 1948 he received a further doctorate from Manchester College of Technology for his work on the fine structure of viscose rayon fibres with special reference to swelling and dyeing. A senior member of the American Association of Textile Chemists and Colourists, Dr. Narasimhan was chosen to represent Indian textile chemists at the Diamond Jubilee Celebration of the American Chemical Society and International Congress of Pure and Applied Chemistry, held in 1951.

MR. JOHN R. CHARLTON, senior chemists' representative for Evans Medical Supplies, Ltd., completed 50 years' continuous service with the company on 5 June. In the whole of his service, he has only had three days' absence through sickness.

The Robert Blair Fellowship in Applied Science and Technology for 1953 has been awarded to DR. JOHN T. STOCK, vice-principal and head of the Chemistry and Biology Department at Norwood Technical College. The Robert Blair Fellowship, the most coveted of all the Scholarships awarded annually by the London County Council, enables the holder to pursue a course of advanced study or research in applied science and technology in the Dominions, in the United States or in other foreign countries.

Dr. Stock intends to spend a year in the Division of Analytical Chemistry at the Institute of Technology, University of Minnesota, U.S.A., working in conjunction with Professor I. M. Kolthoff on the chemical aspects of an applied project such as emulsion polymerisation (plastics), reactions of sulphydryl groups (cancer), etc. Dr. Stock's researches in connection with polarography and allied electro-chemical topics, together with his invaluable contribution to the field of micro-chemistry, have already brought him world-wide fame.

His connection with Norwood Technical College dates back to 1928 when he entered the College as an evening student. He was appointed to the full-time staff as a lecturer in chemistry in 1946, was promoted to the position of head of the Chemistry and Biology Department in 1950, and made vice-principal in 1952. Dr. Stock has contributed a large number of articles to THE CHEMICAL AGE and other trade and scientific journals and has developed many original laboratory and teaching techniques.

Obituary

PROFESSOR DANIEL HANSON, D.Sc., Professor of Metallurgy and Director of the Department of Metallurgy in the University of Birmingham, whose death on 12 June at the age of 61 we record with regret, made a notable contribution towards the remarkable expansion of metallurgical studies at Birmingham during the past two decades and during his long tenure of office achieved a considerable reputation which went far beyond this country.

Educated at Wallasey Grammar School and Liverpool University, he was for a time a member of the research department of Woolwich Arsenal. Going on to the National Physical Laboratory at Teddington, he became principal assistant to the late Dr. Walter Rosenhain and principal scientific officer in the department of metallurgy. He went to Birmingham University as head of the department of metallurgy in 1926.

Dr. Hanson was a member of several scientific societies and the author of numerous papers on metallurgical subjects, chiefly concerning original research in which he took part. In 1950 he was appointed a member of the British delegation which discussed with USA and Canadian scientists the release of further details concerning atomic research carried on in the USA. That year also, he was given leave of absence for six months to visit universities and other centres of higher technological education in the USA, Canada, New Zealand and Australia. He gave the annual lecture to the American Institution of Metallurgical Engineers in 1953.

The death occurred on 10 June at the age of 62 of MR. R. LESLIE BEATTIE, vice-president and general manager of the International Nickel Co. of Canada. Mr. Beattie joined the Canadian Copper Co., which later became the International Nickel Co. of Canada, at the age of 20. He was appointed assistant to the general manager in 1935, and in 1940 was appointed assistant vice-president. In the spring of 1943 he was elected to the board of directors.

MR. ARTHUR TROBRIDGE, of Darlington, a foundation member of the Society of Chemical Industry, died on 9 June, at the age of 94. He started business in Gateshead in 1900 as a chemical manufacturer and merchant, later moving to Felling. He succeeded the late Dr. J. T. Dunn as chairman of the Newcastle section of the Society of Chemical Industry and helped in the foundation of the Newcastle Chemical Industry Club, of which he was president for several years. He was president of the Anti-Vaccination League and carried on an unceasing campaign on its behalf.

Publications & Announcements

THE latest issue of 'The Nickel Bulletin' includes a summary of the properties of spheroidal-graphite cast iron. This material has double the strength and from four to 12 times the toughness of flake graphite iron, thus largely eliminating the brittleness normally associated with iron castings. Items of particular interest in the Abstract Section include the announcement of a revised edition of the Institute of Metals Monograph on Atomic Theory for Students of Metallurgy, which reviews the physical basis on which the fundamental theories of metals are now being built. A further item in the same monograph series deals with equipment for thermal treatment of metals and alloys. In the nickel-iron section attention is directed to a comprehensive review of the development and present position of permant magnet alloys from both the practical and theoretical aspects.

* * *

THE resistance to chemicals afforded by PVC plastic sheet materials, coupled with their toughness and light weight, makes them a popular choice for industrial protective clothing. To obtain the full advantage of the material, however, it must be fabricated by means other than stitching. This requirement is now achieved in the Plysu range of protective clothing, which is fabricated throughout by H.F. welding. From elaborate quick release suits for workers in radioactive atmospheres to simple boiler suits, aprons and gloves, the Plysu range covers most industrial needs. A well-illustrated booklet 'PVC Clothing for Industry and Agriculture' has just been issued by Plysu Products Limited, Woburn Sands, Bletchley, Bucks. Copies are obtainable on request.

* * *

A SELECTION of equipment manufactured by Rose Downes & Thompson Ltd., Hull, who have more than 150 years' experience in the development of oil-mill machinery, is described and illustrated in their latest publications — General Lists 51 and 51A. Both lists have particular reference to the company's specialist interest in the edible and technical fatty oil industries and are identical in subject matter, but the first is in English and French and the second in English and Spanish. Copies are obtainable from the company on application

* * *

AN eight-page booklet on Lindol HF, a flame-resistant hydraulic fluid, has been published by the Chemical Division, Celanese Corporation of America, 180 Madison Avenue, New York. Lindol HF is tricresyl phosphate, which is stable, odourless, non-volatile and non-corrosive. The booklet lists physical properties and specifications, and gives information on its uses, application and installation.

* * *

A PATTERN card issued by the Clayton Aniline Company, Manchester, shows specimens of Cibalan dyeings on nylon. These represent an entirely new range of pre-metalised dyes applicable to nylon from a neutral to a slightly acid dyebath and are claimed to give dyeings of good all-round fastness properties. Besides giving dyeings on nylon of excellent fastness to light, they have the advantage of not exhibiting anomalous fading when dyed in compound shades, a fault shown with several other classes of anionic dyes on nylon.

* * *

AN improved sulphosuccinate wetting agent, 'Manoxol N,' is being produced by Hardman & Holden, Ltd. The product, chemically sodium dinonyl sulphosuccinate, is similar in structure to the firm's well-known wetting agent, 'Manoxol OT' (sodium dioctyl sulphosuccinate) but is even more active in certain respects. 'Manoxol N' is, in fact, said to be one of the most powerful surface tension reducers available commercially, only 0.025 per cent (one part in 4,000 parts) dissolved in water being sufficient to reduce the surface tension from 72 to 30 dynes/cm. It is sold in three grades, which are from 6d. per lb. (for the grades containing 60 per cent 'Manoxol N') to 10d. per lb. (for 'Manoxol N' pure 100 per cent) cheaper than the corresponding grades of 'Manoxol OT.' For many purposes it can be employed at a lower concentration than 'Manoxol OT,' and is therefore more economical in use. Samples are available on request from Manox House, Miles Platting, Manchester 10.

CORROSION LIMITED announce the introduction of 'Glopane Stoving,' a fundamentally new type of zinc-rich anti-corrosion paint with the most outstanding properties. It is claimed that it is one of the most significant developments in anti-corrosion paint technology of the past fifty years. It is said to make it possible to produce galvanised iron and steel by the use of simple and cheap paint techniques instead of the complicated and frequently expensive hot-dip galvanising process universally employed at present. The 'Glopane Stoving' coating is said to consist almost entirely of metallic zinc and to have the true galvanic action of a metallic zinc coating on iron and steel applied by conventional techniques, e.g., hot-dip galvanising. It is only necessary to wire brush or sand blast the surface thoroughly. No chemical pre-treatment is required. It is baked at normal paint stoving times and temperatures and is said to have excellent resistance to impact, abrasion and mechanical abuse generally.

* * *

THE proceedings of the first Plansee Seminar 'de re metallica' held 22-26 June, 1952, in Reutte, Austria (THE CHEMICAL AGE, **67**, 743, 770) have now been published by Metro-Tutanit, Ltd., Warrington, Lancs, in the form of a book of 316 pages, copiously illustrated, price £2 15s. In accordance with the organisation of the Seminar, the proceedings are divided into three parts, the first being devoted to General and Physical Metallurgy and the Physics of Solids; the second to Powder Metallurgy in general and the third to Cemented Carbides and other Hard Metals. The papers and the discussion are printed in the language in which they were given, but every paper given in French or German is preceded by a summary in English.

* * *

A NEW booklet entitled 'Erinoid Polystyrene Materials For All Purposes,' has been issued by the manufacturers, Styrene Products Limited, Stroud, Gloucestershire. It points out that the many available grades of this material permit the choice and use of the correct type to suit each specific application. Both the uses and applications for which each grade is suited are outlined in the booklet, which also gives the technical properties and relevant information to assist in manipulation of the material. A particularly interesting section is 'Correction of Moulding Faults,' which gives the reasons for various 'complaints,' together with their cures.

* * *

THE Copper Development Association publication No. 26, 'Brass Pressings,' has been thoroughly revised and brought up to date, and is now issued under the title of 'Copper & Brass Pressings and other Products Cold Formed from Strip and Sheet.' This title expresses the scope of the text matter, much of which is new. The book includes a bibliography and an index, both of which add to its usefulness as a text book and as a work of reference. Like all other CDA publications, this latest one is available free on application to the Copper Development Association at Kendals Hall, Radlett, Herts.

* * *

A NON-BREAKABLE polythene graduated beaker, marked with clear raised figures, is a new product developed by J. F. Kenure Limited, Faggs Road, Feltham, Middlesex. As polythene is not affected by acids, alkalis, oils or spirits, this beaker can safely be used for food products and drinks, as well as for all laboratory and industrial uses. It is described in a leaflet which is obtainable from the manufacturers.

* * *

AS part of their 12th Edition Catalogue, 'Laboratory Equipment and Scientific Apparatus,' A. Gallenkamp & Company, Ltd., 17-29 Sun Street, London, E.C.2, have now published a section entitled 'Petroleum and Tar Testing Apparatus.' This is a portion of Volume II—Industrial Section—and gives details of apparatus based chiefly on 'Standard Methods for Testing Petroleum and its Products,' published by the Institute of Petroleum; 'Standardisation for Testing Tar and its Products,' published by the Standardisation of Tar Products Tests Committee; and various standards published by the British Standards Institution. In addition, apparatus for a number of the American Society for Testing Materials standard methods are included, but these are mostly methods adopted for general use in this country. The company gives the assurance that apparatus supplied to a recognised standard will conform to the latest version of the standard, irrespective of the present catalogue specification. The section, which has just been published, is Catalogue No. 544 and consists of 83 pages.

Law & Company News

Commercial Intelligence

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

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, 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 debt due from the company in respect of all Mortgages or Charges. The following Mortgages or 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.)

SURFACE PROTECTION, LTD., London, E.C., manufacturers of chemical preparations. (M., 20/6/53.) 12 May, £1,015 mortgage, to Sun Life Assurance Society; charged on 3 Grenfell Terrace, Bradford. £15,370. 17 April, 1952.

AUXILIARY PRODUCTS & CHEMICALS (LEEDS), LTD. (M., 20/6/53.) 13 May, mortgage, to Leeds & Holbeck Building Society, securing £4,000 and further advances; charged on property known as Low Farm, Linton, Nr. Wetherby. Nil. 11 July, 1952.

W. A. C. MOUNTAIN, LTD., Hyde (Ches.), soap, starch and chemical manufacturers. (M., 20/6/53.) 11 May, mortgage, to District Bank, Ltd., securing all moneys due or to become due to the bank; charged on land at Gee Cross, nr. Hyde (Ches.), with mill and other erections thereon. Nil. 15 August, 1952.

SILVERCROWN, LTD., London, S.W., manufacturers of mineral and chemical substances, etc. (M., 20/6/53.) 13 May, debenture, to S. G. Warburg & Co., Ltd., further securing all moneys due or to become due from London and Scandinavian Metallurgical Co., Ltd., to the holder and secured by a debenture, dated 5 May, 1953; general charge. £10,000. 18 November, 1952.

Satisfactions

ADVANCED ANODISING & PLATING CO., LTD., London, N. (M.S., 20/6/53.) Satisfaction, 14 May, of mortgage registered 4 October, 1948.

VITAX, LTD., Burscough Bridge, fertiliser manufacturers. (M.S., 20/6/53.) Satisfaction, 19 May, part of property comprised in charge registered 16 July, 1951 (house and shop comprising ground floor or adjoining property belonging to the company), has been released from the charge.

New Registrations

Hornett Bros. & Co. Ltd.

Private company. (520,212). Capital £5,000. Manufacturers and processers of and dealers in oils, fats and chemicals, tallow and oil refiners, etc. Directors: F. W. Hornett, E. E. Hornett. Reg. office: Manor Way Farm, Goosely Lane, Barking Bypass, Barking, Essex.

Canisius Ltd.

Private company. (519,950). Capital £10,000. Manufacturers of and dealers in tar products of all kinds, chemical and metallurgical products, mechanical, electrical and scientific devices, instruments, etc. Subscribers: E. Feist, G. Snijders. First directors are to be appointed by the subscribers. Solicitors: Mount Sterry & Co., 24 Martin Lane, E.C.4.

Company News

Powell Duffryn Limited

Powell Duffryn Ltd. have announced a $2\frac{1}{8}$ per cent actual dividend, less income tax at 9s. in the £, on the £3,600,000 $4\frac{1}{4}$ per cent Cumulative Preference stock for the six months ending 30 June, 1953. Payment to be made on 1 July, 1953, to holders registered on the books of the company at close of business on 1 June, 1953. Transfer books to be closed for one day on 2 June, 1953.

Taylors Drug Co. Ltd.

The directors' report and accounts of Taylors Drug Company, Ltd., for the year ended 27 December, 1952, show that profit, including dividend from its subsidiary, interests, etc., and after providing for management remuneration, administration expenses, depreciation, debenture interest and taxation,

amounted to £96,127, as compared with £80,809 for the previous year. Dividends paid and accrued to date on the 6 and 7 per cent cumulative preference shares totalled £10,500 and the directors recommend a dividend on the ordinary shares which will account for £82,500.

British Alkaloids Ltd.

In a statement presented at the annual meeting of British Alkaloids, Ltd., the chairman, Mr. E. Oswald Toft, said it was disappointing to have to report a slight falling-off in their export trade, but this emphasised the difficult conditions which still prevailed in many overseas markets. Home trade, on the other hand, had shown a pleasing expansion so far as their main product (TCP) was concerned. There was a gratifying increase of £17,618 gross profit on trading compared with that for the previous year. The credit balance on the profit and loss account was £8,534, as against £6,852 brought in. A final dividend of 2.1d. per share, less tax, was approved, this making a total of 3.6d. per share, less tax, for the year.

Market Reports

LONDON.—The volume of inquiry for industrial chemicals shows a distinctly improved outlook. Undoubtedly many of the leading consuming industries are anxious to replenish depleted stocks of raw materials and this movement more than offsets any adverse influence which may result from a peace in Korea. An active demand is reported for textile chemicals and colours, and deliveries against contracts are well up to schedule. There has also been an improved demand from the plastics industry. Prices generally remain steady and unchanged and there have been no outstanding movements on the week, other than a further adjustment in the convention quotations for red and white lead, the basis prices of which are quoted at £120 5s. per ton and £136 5s. per ton respectively. The position of coal tar products has been unchanged on the week. The undertone of the market is steady although phenol is reported to be slightly lower.

MANCHESTER.—Trading conditions on the Manchester chemical market during the past week have been fairly active on home-trade account. Contract deliveries to the textile industries in Lancashire and the West Riding have been maintained at a reasonably satisfactory level and there has been an improvement in the demand from some of the other leading industrial outlets. New buying during the week for shipment to overseas outlets has been on a moderate scale. Most sections of the fertiliser trade are now seasonably quiet. In the tar products market creosote oil, road tar and most of the light distillates are going steadily into consumption.

GLASGOW.—Prices have remained steady throughout the week and business has been extremely brisk in the majority of the consuming trades, both for spot and forward delivery. There is very little change to report as far as the export market is concerned and with continental prices remaining at a very low level, business is still inclined to be slow.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

CHEMICAL ENGINEERS are required at various levels in the design and development department of a well known chemical manufacturing company in South Lancashire. Starting salary will depend upon qualifications and experience but will not be less than £600 per annum. The company encourages effort and enterprise and promotions are strictly by merit and ability. Write, stating age, qualifications and experience to **BOX No. C.A. 3229, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

CHEMICAL ENGINEER (JNR.) required for vital development work on high temperature process in East London. Must be keen, practical man with sound mechanical training to H.N.C. or equivalent. Write **BOX No. C.A.3228, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

DRAUGHTSMAN for progressive department designing equipment for treating air and gases. H.N.C. standard required with experience of structural and sheet metal work. Pressure vessel and/or electrical knowledge an advantage. Good salary and conditions. Apply in writing to **PERSONNEL OFFICER, BIRLEC LIMITED, TYBURN ROAD, ERDINGTON, BIRMINGHAM, 24.**

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL. JONES, BOCHURCH LONDON," TELEPHONE 3285 EAST.

DELAFILA, THE INERT FILLER. Used in the manufacture of Fertilisers. Insecticides, Paints, Plastics and Insulating and Sealing Compounds. Prompt supplies in a wide range of fineness grades. **THE DELABOLE SLATE CO., LTD., DELABOLE, CORNWALL.**

FOR sale, Brand New **PETROL-ENGINE** Driven Pumping Sets, comprising Continental (U.S.A.) Model M330 38.4 h.p. engine driving through link belt; (U.S.A.) Model S-10 double helical speed reducer, 1,500-215.8 r.p.m.; a National Transit (U.S.A.) 500 Model F positive pump, 8 in. suction, 6 in. discharge, delivering 270 g.p.m. of liquid having sp. gr. = 1 to 360 g.p.m. of liquid (petroleum) having sp. gr. = 0.75 against 70 lb. p.s.i. pressure. Mounted on skid bedplate containing fuel tank. Packed in export case 14 ft. 6 in. by 6 ft. 9 in. by 5 ft. Eight sets available at much less than half original cost.
W. H. COLLINGBOURNE & CO., LTD.,
1481, STRATFORD ROAD, BIRMINGHAM, 28.
'Phone: Shirley 3303.

FOR SALE

600

MISCELLANEOUS PROCESS PLANT

VERT. **COPPER STILL** 6 ft. dia. by 6 ft. deep on straight with domed top and concave bottom. 18 in. bolted cover on top. Bolted manhole cover in centre of side. Fitted L.P. 2½ in. dia., steam coil, 4 ft. p.c.d., 7 turns, fractionating column 15 ft. by 1 ft. 9 in. dia. of copper constr. and contains 30 trays.

3 steam heated **WATER STILLS** by Manesty, type 4, cap. 50-g.p.h. each. Steam consumption 667 lb. hr. at 20/45 lb. sq. in., 450-gals. cooling water required per hr.

SOLVENT RECOVERY PLANT by British Carbo Union, comprising 2 horiz. carbon charged M.S. Absorbers each 6 ft. dia. by 3 ft. with 18 in. bolted manhole, four 8 in. dia. inspection covers, brass tube condenser, separator and distillate collection tank. 20 in. input fan and all connecting pipework. Recovery rate for naphtha 10-gals. per hr.

Scott triple effect **EVAPORATOR** unit, comprising 3 pans each 4 ft. 7 in. dia. by 13 ft. deep on straight with calandriad of 300 M.S. tubes 2 in. dia. by five 4 in. dia. tubes. 6 ft. long between tube plates. 1 vert. M.S. condenser 3 ft. 9 in. dia. by 11 ft. deep, with 250 M.S. tubes 2 in. dia. by 9 ft. 1 horiz. steam driven wet vacuum pump, including pipework, valves, thermometers, etc.

2 single effect **VERT. EVAPORATORS** by Worthington Simpson. Output of each 50-tons fresh water per 24 hrs. 12 internal steam coils coupled to cast steam and drain headers. Test pressures. Steam and drain headers 200 lb. sq. in. Body and dome 60 lb. sq. in. Overall height 12 ft. Weight approx. 5½-tons.

Portable **DISTILLED WATER EVAPORATING PLANT** by G. & J. Weir. Double effect 180-gals. distilled water per hr. Complete with condensers. Mounted on 4 wheeled trailer.

3 recessed plate type **FILTER PRESSES** by Manlove Alliott, with 60 plates 24 in. sq., 1 in. thick. Hand op. ratchet and pinion closing gear.

GEORGE COHEN SONS & CO. LTD.
WOOD LANE, LONDON, W.12
Tel.: Shepherds Bush 2070 and.
STANNINGLEY, NR. LEEDS
Tel.: Pudsey 2241

STORAGE
USE BOILER TANKS
WE SPECIALISE IN

30 ft. by 8 ft. Tanks
each 9,000 gallons
capacity.

Supplied promptly and ready for use.

MADEN & McKEE, LTD.,
317, PRESCOT ROAD,
LIVERPOOL, 13.

STILL AVAILABLE
7-TONS **CERIUM FLUORIDE** from **MULTIPLE ACTING FLUX LIMITED, SHEFFIELD, 10.**

FOR SALE

3 **JACKETED INCORPORATORS,** double "Z" arms, double geared, power-driven tipping motion, with counterbalancing weights.

3—Baker Perkins and Werner Jacketed **MIXERS,** screw tipping pattern, friction pulley drive, single geared, with double-fin type agitators.

4—Gardner **RAPID SIFTER MIXERS** and **MIXERS** only, various sizes, one with brass fitted interior and glass-lined end plates.

27—Various **POWDER DRESSING** or **SIFTING MACHINES,** totally enclosed, with barrels from 80 in., long by 22 in. diam. to 120 in. long by 30 in. diam., belt driven with collecting worm in hopper bottoms.

4—Recessed Plate **FILTER PRESSES,** 30 in. square 70 plates in each, centre fed.

4—Johnson **FILTER PRESSES,** 24 in. square, side feed and enclosed delivery, fitted 29 plates and 30 frames.

1 Johnson **FILTER PRESS,** 36 in. square, plate and frame type, double inlet and enclosed delivery ports.

Johnson Oil **FILTER PRESS,** Premier type, plates 2 ft. 8 in. by 2 ft. 8 in., of which there are 45, with angle lever closing gear.

1—Johnson **FILTER PRESS,** 42 cast-iron plates, 32 in. square, centre feed.

Steam-heated **FILTER PRESS,** Premier type, 32 in. square, with 30 recessed plates

1—Johnson **FILTER PRESS,** 46 plates, 32 in. square centre feed, bottom corner open delivery.

Wood **FILTER PRESS,** fitted 69 ribbed plates, 2 ft. 8 in. square, with top centre feed and bottom enclosed delivery channel.

1—24 in. and 1—30 in. **HYDRO EXTRACTOR,** self-balancing, swan-neck type, self-emptying bottom, belt driven.

1—30 in. and 2—36 in. Ditto with enclosed motors, 400 volts, 3-phase, 50 cycles.

Heavy Cake **CRUSHING MILL,** 2-pair high, by Nicholson, for cake up to 3 in. thick, rolls 30 in. long, top with coarse teeth 9 in. diam., bottom, with finer teeth 12 in. diam..

5—sets A.A. **CRUSHING ROLLS** for linseed, cottonseed, etc., 48 in. long, belt driven, with feed hopper, side frames, baseplate and striking gear.

Bennett Copper-built **EVAPORATOR,** 4 ft. diam. by 4 ft. 6 in. high, steam-jacketed bottom, mounted on legs, with swan-neck vapour pipe and separate vertical belt-driven vacuum pump.

Douglas **ROTARY PUMP** for oil, soap, etc., belt driven.

6 various Horizontal Duplex **STEAM PUMPS,** Worthington and Tangye pattern, 1 in. to 2½ in. suction and delivery.

"U"-shaped Horizontal **MIXER,** 7 ft. long, 3 ft. wide, 3 ft. 3 in. deep, belt and gear driven, end outlet, square horizontal centre shaft with cast radial type mixing arms, last used for linoleum paste.

4—5-roll **REFINERS,** fitted chilled iron, water-cooled rolls, 40 in. long, 16 in. diam., belt and gear driven with clutch drive suitable for motor, by Baker Perkins, Ltd.

No. 2HS Hammamac **HAMMER MILL,** No. 1 size, Standard Miracle Mill, No. 2 size Standard Miracle Mill and a No. 3 Super Miracle Mill, with fans, piping and cyclones.

7 ft. Torrance Positive-driven **EDGE RUNNER,** 2 vertical Paint Pug Mills, 2-bar Disc Paint Grinding Mills, and 2 Horizontal 40-gallon capacity Cox Pug Mills for paint.

1—No. 1A Water-cooled **CIRCULATOR MILL.**

2—4½ Christy & Norris **DISINTEGRATORS** with 60 h.p. A.C. motors and starters.

RICHARD SIZER, LTD.,
ENGINEERS,
HULL.
Telephone: 31743.

FOR SALE

MORTON, SON AND WARD LIMITED
offer
HYDRO EXTRACTORS

72 in., 60 in., 48 in. and 36 in., by **BROADBENT,** 48 in. and 42 in., by **WATSON LAIDLAW,** and 42 in., by **MANLOVE ALLIOTT.** All electric 400/3/50, with starters.

JACKETED PANS

100g., 150g. and 200g. new **JACKETED PANS,** all welded on three legs—with or without mixing gear.

One 350g. Totally Enclosed **HOMOGENEOUS LEAD-LINED JACKETED PAN.** arranged with lead-covered agitator driven through bevel gears from fast and loose pulley.

MIXERS

"MORWARD" "U"-shaped TROUGH POWDER MIXERS, made to requirements up to 3 tons capacity.

3 cwt. Second-hand **MIXERS** by **CHALMERS** and **GARDNER** in stock, stainless steel lined.

PUMPS

Large selection of **MONO** and other **PUMPS** in stock, 2 in. to 6 in. New and second-hand.

INQUIRIES INVITED.

MORTON, SON AND WARD LIMITED,
WALK MILL,
DOBCROSS, NR. OLDHAM.
LANCS.
'Phone: Saddleworth 437.

NEW CAST-IRON FLANGED PIPING, CLASS "B"

10 in. **BORE**—12 in. **BORE**

Lengths 5 ft. to 12 ft.

1,500 lengths in all.

IMMEDIATE DELIVERY.

MADEN & McKEE, LTD.,
317, PRESCOT ROAD,
LIVERPOOL, 13.

ROTATING PAN MIXER by **ARTOFEX.** Two **PANS,** 47 in. diam. by 22 in. deep: 2-sack capacity. Human arm type blades. Fast and loose pulley drive. £100 ex-works.

One Ditto by **T. COLLINS, BRISTOL.** Two **PANS,** 47 in. diam. by 24 in. deep; 2-sack capacity, with automatic feed. Chain drive to 5 h.p. motor. £85 ex-works.

THOMPSON & SON (MILLWALL), LIMITED,
CUBA STREET, LONDON, E.14.
TEL. EAST 1844.

SERVICING

CRUSHING, GRINDING, MIXING and DRYING for the trade.
THE CRACK PULVERISING MILLS LTD
Plantation House,
Mincing Lane,
London, E.C.3.

PULVERISING of every description of chemical and other materials for the trade with improved mills, wharfage and storage facilities. **THOS. HILL-JONES LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON." TELEPHONE: 3285 EAST.**

SERVICING

WET AND DRY GRINDING Micronising, Grading and Mixing of Minerals and Chemicals for all trades. Also suppliers of ground zircon, sillimanite, fused silica, precision casting materials and a wide range of ground minerals.

W. PODMORE & SONS, LTD.,
SHELTON, STOKE-ON-TRENT
Phones STOKE-ON-TRENT 2814 & 5475

WANTED

NICKEL RESIDUES, VANADIUM RESIDUES, TUNGSTEN RESIDUES, PURE NICKEL SCRAP, MONEL SCRAP, TUNGSTEN SCRAP, MOLYBDENUM SCRAP. BOX No. C.A. 3226, THE CHEMICAL AGE 154, FLEET STREET, LONDON, E.C.4.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON
(Established 1855).

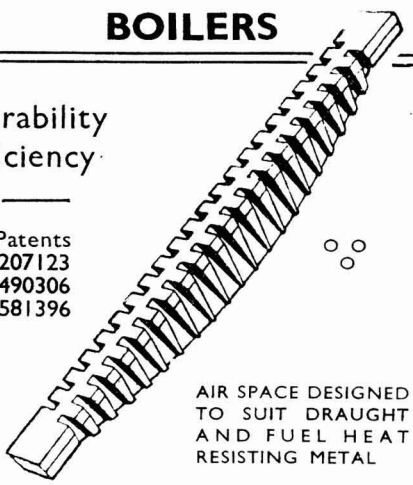
Auctioneers, Valuers and Fire Loss Assessors of
CHEMICAL WORKS, PLANT AND MACHINERY
York House, 12 York Street, Manchester.

Telephone 1937 (2 lines) Central Manchester.

FOR ALL TYPES OF BOILERS

Durability
Efficiency

Patents
207123
490306
581396



AIR SPACE DESIGNED TO SUIT DRAUGHT AND FUEL HEAT RESISTING METAL

COLLINS IMPROVED FIREBARS, LTD.
51, THE MALL, EALING, LONDON, W.5

Printed in Great Britain by THE PRESS AT COOMBELANDS Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 20 June, 1953. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.