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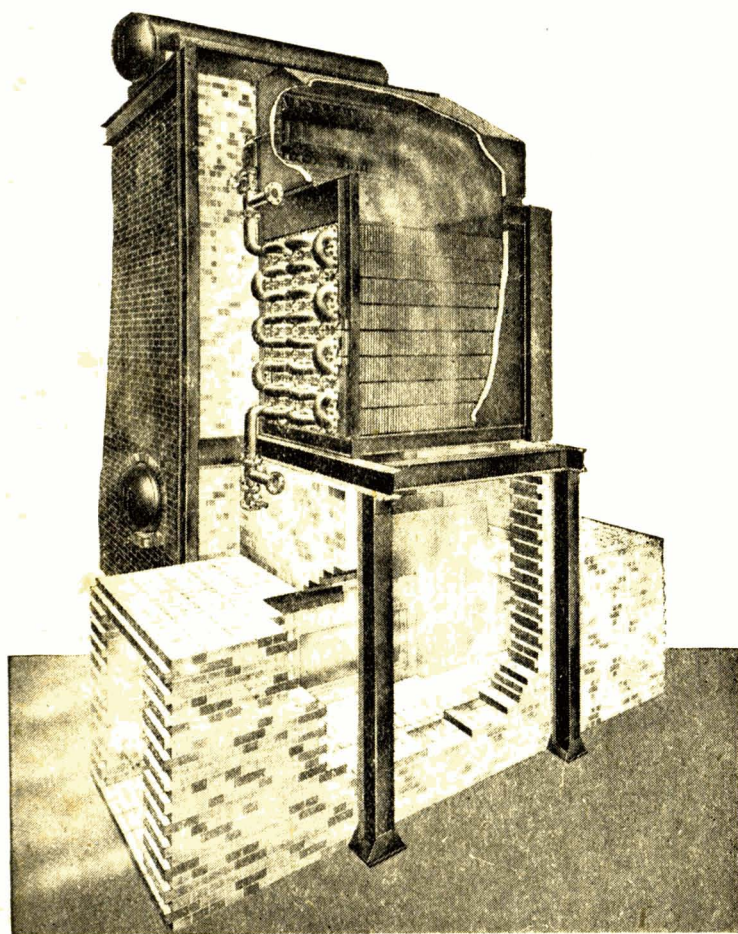
# The Chemical Age

VOL LXVIII

14 MARCH 1953

No 1757

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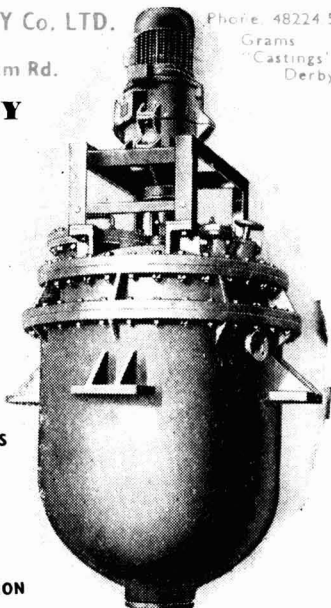
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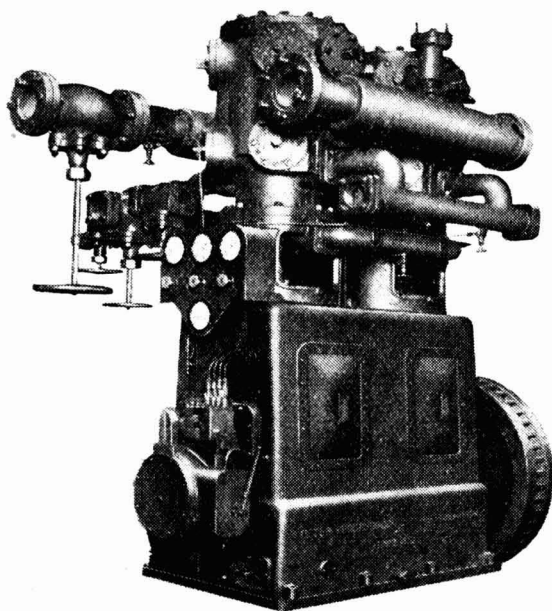
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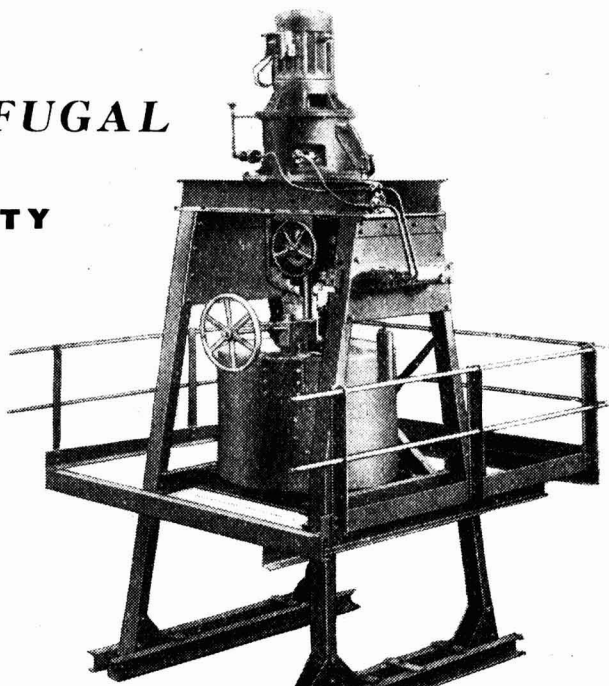
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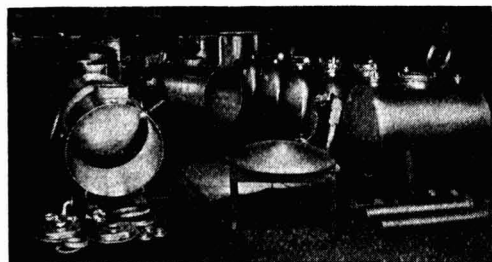


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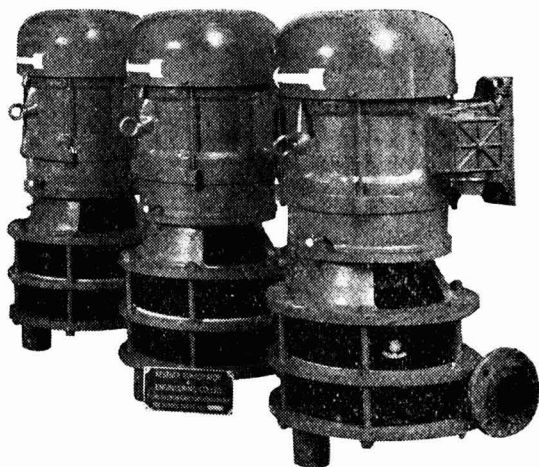
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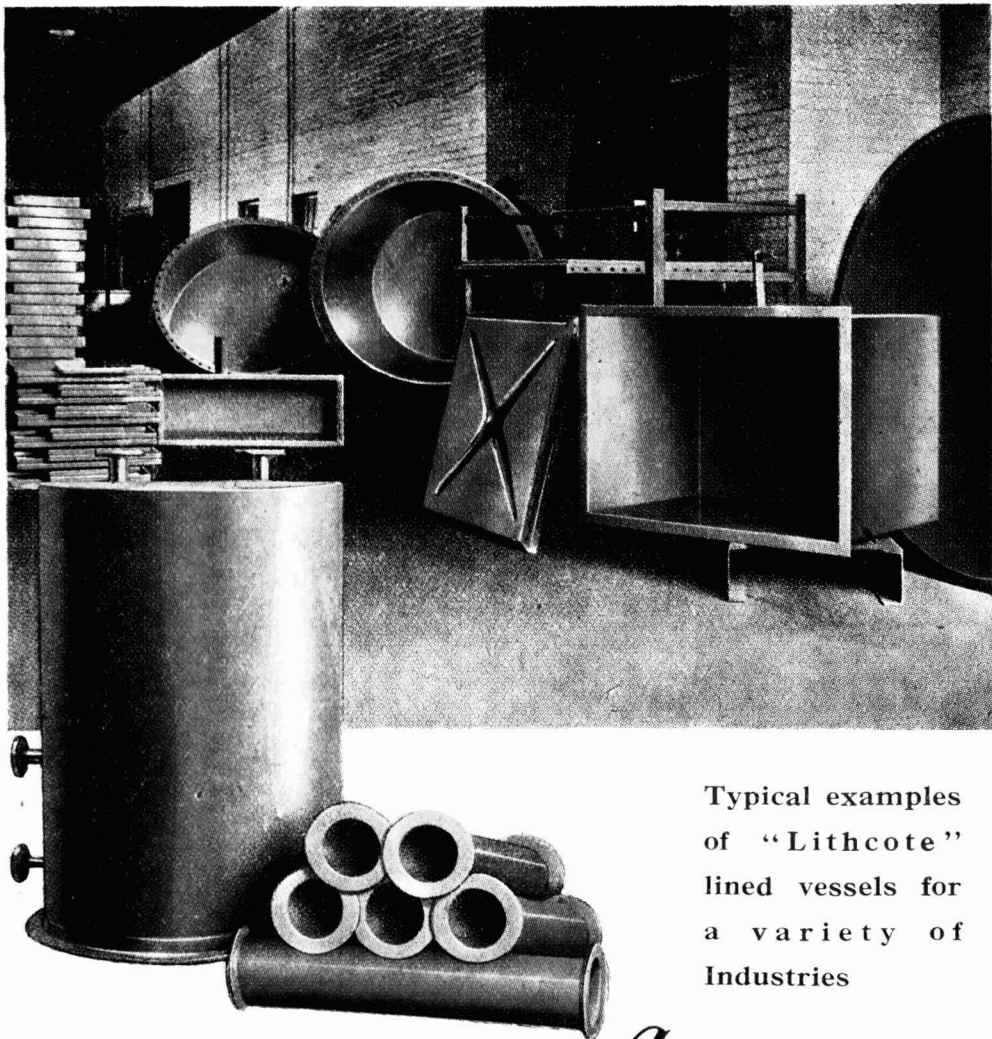
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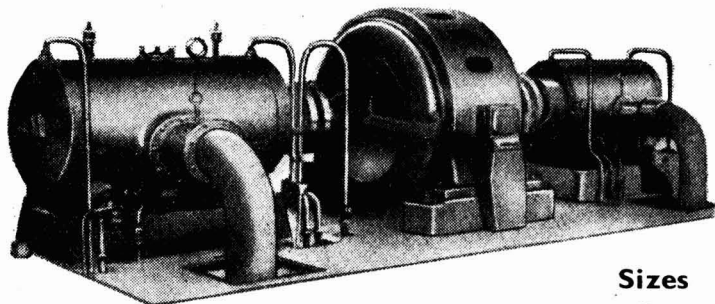
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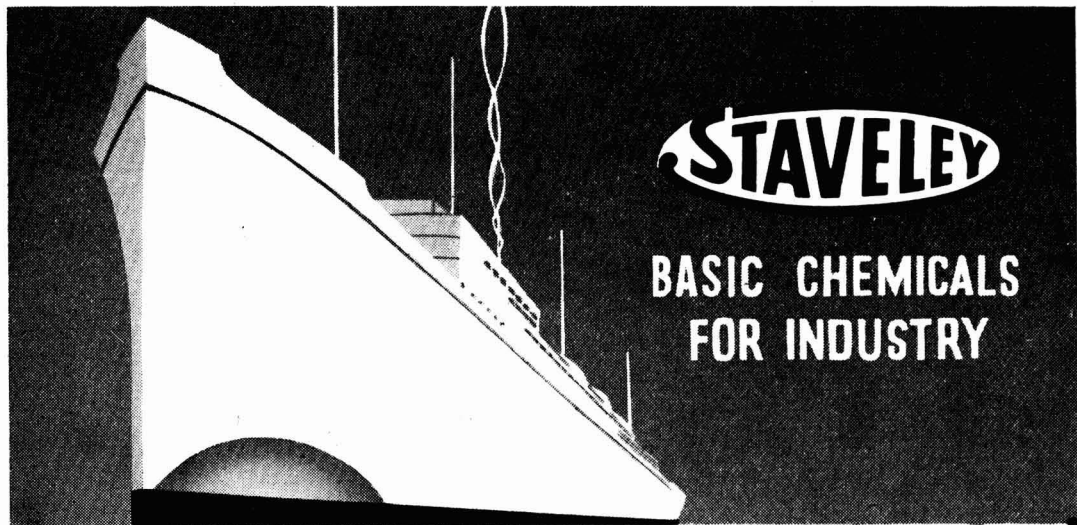
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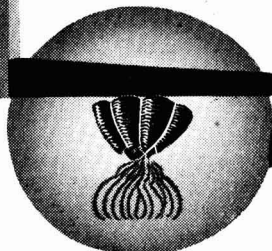
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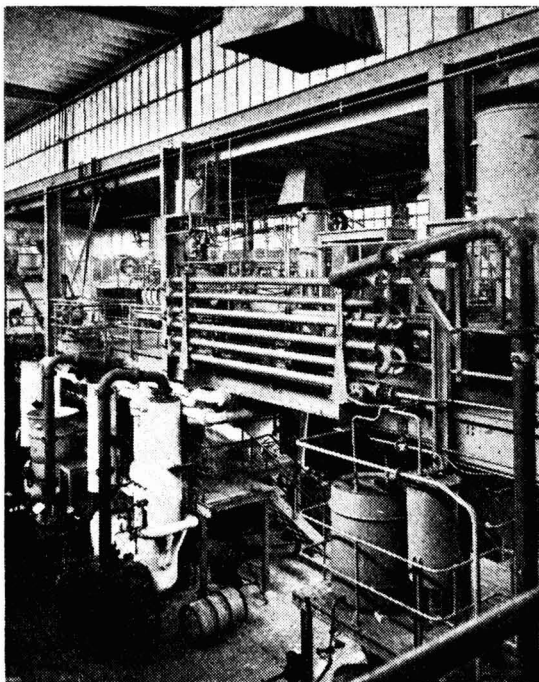
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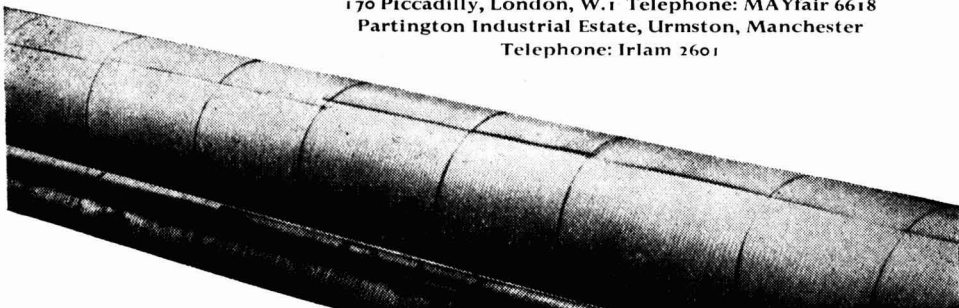


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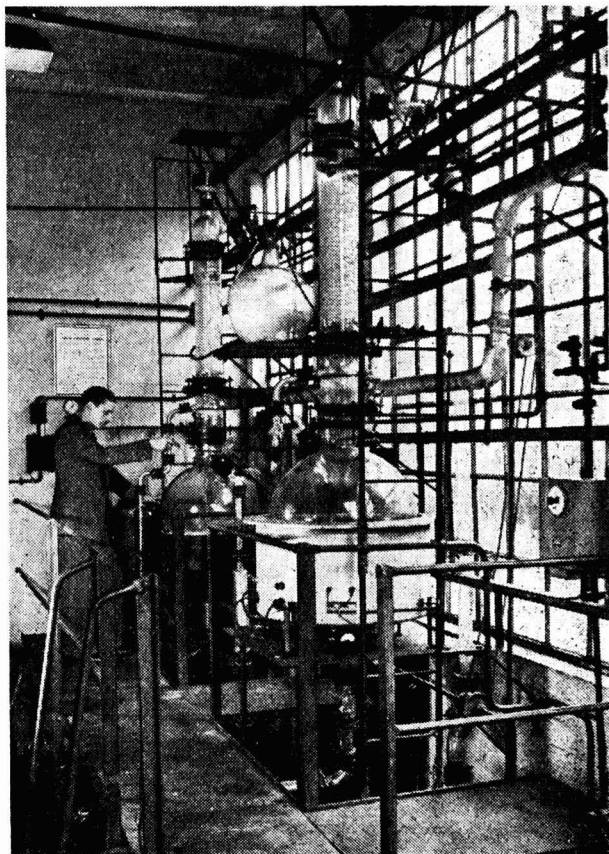
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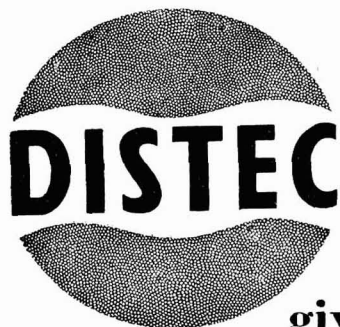
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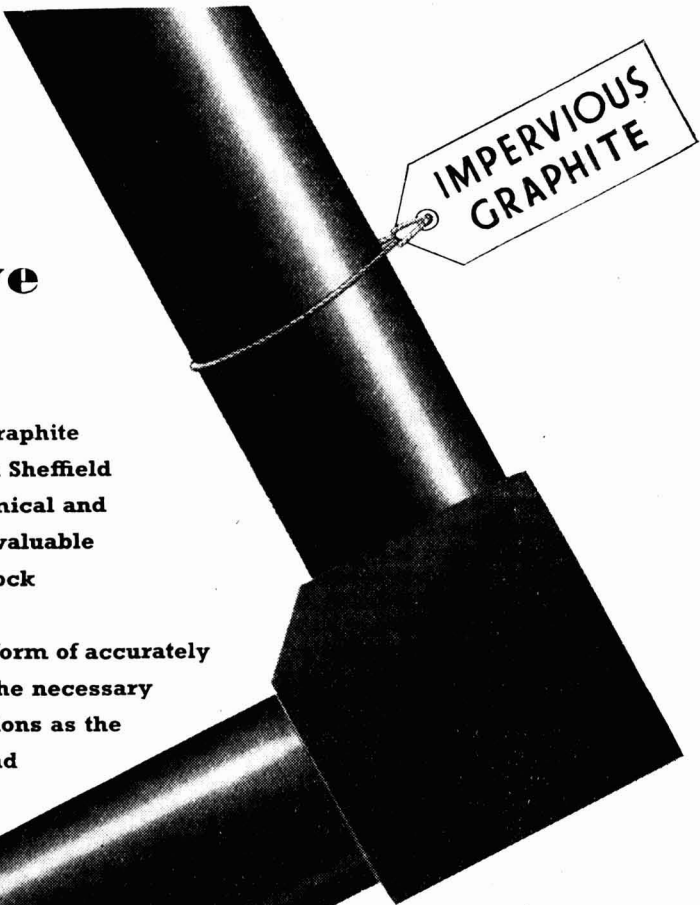
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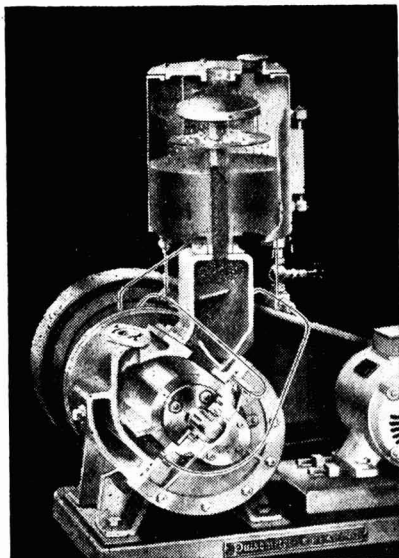
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Volume LXVIII

14 March 1953

Number 1757

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## Fuel, Fog and Death

**L**AST week we experienced a wide-spread and persistent fog, a fog that cleared by mid-day more kindly in less congested areas than in the greater centres of industry and habitation. Luckily some benevolent weather-change lifted the fog before it had accumulated a dangerous concentration of smoke particles. In December it is estimated that at least 4,000 people died in London because a persistent fog stayed long enough to acquire toxic properties. On the second day of that fog in London the weight of smoke particles per cubic centimetre was 0.49 milligrams; on the third day it was 2.64, on the fourth 3.45, and on the fifth 4.46. The death rate from respiratory failures rose similarly.

In no sense would we seek to make light of the tragic losses recently suffered on the East Coast. This disaster from the sea has rightly stimulated a national outburst of help and sympathy. But the loss of life in the December fog was greater, and it is a dubious argument to soften the hard texture of figures by saying that almost all who died were invalids with weak chests or hearts. A high proportion of the flood casualties

were also elderly people unable to survive violent and sudden changes in their environment. In drawing this difficult comparison we have but one object—to insist that the protection of the weak against toxic air conditions is as much a national responsibility as the protection of coastal inhabitants against the sea. Familiarity breeds indifference and acceptance. Fogs regularly visit our industrial centres, but an assault by tide and tempest such as that which so recently fell upon the East Coast has not occurred for centuries. There are limits to which floods can be controlled by sea-walls. It is within man's powers and scientific knowledge to control fog so that it does not accumulate high and deadly concentrations of solid particles.

In the leader on atmospheric pollution last year (CHEMICAL AGE, 1952, 57, 483-4) the view was expressed that 'we are near the point when greater industrial efforts to reduce pollution can make only a minor contribution towards the total smoke problem of a city or large town. when the remaining hard core... is the winter pollution from household chimneys.' A single ton of smoke per

year can be emitted by 120 domestic fires or by one small factory. Broadly speaking, the factory stack is controlled and the house chimney is not. Since then the results of a survey by the Coal Utilisation Council have been reported. Ninety-eight per cent of families use solid fuel to heat their main living room, and open fires are found in these main living rooms in 89 per cent of the higher income households down to 56 per cent in the lowest income households. The CUC comment upon these figures was to the effect that they confirmed its view that the two basic assumptions in any national fuel policy must be (1) that the main domestic space-heating load is to be performed by solid fuel, and (2) that 'the traditional love of the open fire is firmly woven into the pattern of family life.' But what is meant by a national fuel policy? Should it follow instead of lead? Should it be based upon existent and 'old patterns of habit or should it attempt to utilise the benefits of 1900-1950 science? The attitude of the CUC would seem to be based upon the adage that the customer is always right.

No one could sensibly ignore the public preference for an open fire, but there does not seem nearly sufficient educational effort to expose its economic wastefulness, its inefficiency as a space-

heating method, and its steady emission of air polluting dirt. The toll of human life in this winter's fog has been given all too little emphasis; much less, for example, than has been laid upon the toxic risks of DDT as a pesticide even though DDT has not yet accidentally caused a death in this country. It is certainly not enough to hope that a gradual increase in better open-fire and coal-burning grates will finally solve the problem. In many older houses these modern appliances are difficult to install; a number of city fire service officers recently pointed out that continuous combustion brings an increased fire-risk to older properties. The true solution is being evaded; that is, the pre-treatment of all, or almost all, the coal that is used as fuel, the removal from coal of much of its volatile and chemically useful ingredients before it is made available as smokeless and carbonaceous domestic fuel. We repeat our conclusion of last October—'In the ultimate, surely any national fuel usage policy must insist that all coal is processed as a raw chemical material . . .'. Such a policy cannot be turned into practice overnight. It would take at least 20 years for its fulfilment. But can we afford not to proceed nationally and determinedly with it now?

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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

### Better Petrol, More Sulphur

**P**ROBABLY at no time more than the present has the British public been regaled with information about the distinctions between one sort of petrol and another. It might even be said that never has so much money been spent upon publicising minute variations. But while the hoardings tell their violently arresting stories, we learn that a process called 'hydro de-sulphurisation,' in which the sulphur compounds in petrol are removed as hydrogen sulphide by passing them over heated vanadium oxide, produces a remarkable increase in the susceptibility of petrol to tetraethyl lead. The presence of complex sulphur compounds, particularly of thiophene, is now believed to have interfered seriously with the anti-knock effects of tetraethyl lead. The new process, developed at the Illinois Institute of Technology, has threefold possibilities; first, improvement in anti-knock qualities of petrol; second, up-grading of crude oils for use as high-quality petrols; and third, more recovery of sulphur.

### Attracting the Young

**E**DUKATION in chemistry, shortage of science teachers, the universities and industry, technological training and kindred topics have been much discussed, both verbally and in writing, as being vital to the future welfare of Britain. Whatever the differences may be as to the best way of dealing with these problems, the future must ultimately depend on the rising generation. It is therefore essential that the opportunities of scientific careers in all their aspects should be made adequately known and attractive to young people. Much more might well be done in a boy's last year at school in giving him some idea of the wide range of opportunities, the diverse professions, and the wide scope offered by industry today. Not every child is fortunate enough to know what he (or she) would like to be on 'growing up,' neither is every parent able to keep informed of all the latest developments.

To find the most fitting employment for a child's talents and temperament is no easy matter, and with the publication of the second edition of its 'Careers in the Royal Dutch/Shell Group,' the Shell Petroleum Company, Ltd., will assist many who are at the threshold of a career. Such an international enterprise offers openings both at home and overseas. In addition to this general survey two valuable supplementary booklets have been published, one 'Careers for Chemical Engineers and Chemists' and the other 'Careers in the Petroleum Chemical Industry.' Both booklets are well produced and illustrated and deal with how to join, minimum qualifications, starting salaries, technical positions, opportunities and so on both at home and overseas. These publications should attract many to the variety of employment offered by the oil industry today.

### Chlorophyll

**T**HE exaggerated claims made for chlorophyll since it was first alleged to have deodorising powers have appeared suspect to many—chemist and layman alike—both in Britain and the U.S.A. Doubts as to the efficacy of chlorophyll when used in toothpaste were raised in a light-hearted comment in THE CHEMICAL AGE as long ago as December, 1951. Reviewing the rise of chlorophyll in August last year we showed the tremendous increase in its production during the past three years under pressure advertising (in America by more than 700 per cent), and suggested that the devotion of one-twentieth of this effort and energy devoted to pure research would in the end yield greater benefits. At the beginning of this year, Professor A. H. Corwin, head of the department of chemistry, John Hopkins University, U.S.A., at a meeting of the American Chemical Society, made a forthright attack on the claims put forward for chlorophyll as a deodorising agent. Following a letter on this subject we asked where was the scientific evidence to support the reliability of such claims

and urged that a thorough study should be made of them. (*THE CHEMICAL AGE*, 68, 198). Now, as reported in the *British Medical Journal* of 7 March, 1953. Dr. J. C. Brocklehurst has described some experiments carried out to test the deodorant action of chlorophyll in an objective way, substituting a quantitative estimate for an olfactory impression, without proving its value. Another series of experiments revealed a deodorisation action in but one out of 22 tests, and it was felt that here the odour of the chlorophyll was probably masking that of methylmercaptan. Observations on

patients treated with chlorophyll preparations showed no modification of the smell of the urine. There is, it would seem, good reason for suspicion concerning the claims made on behalf of chlorophyll, but the evidence is not yet conclusive. We are told that Dr. William Mitchell of the Allen Chlorophyll Company has evidence which refutes both Dr. Corwin's and Dr. Brocklehurst's views and we hope to be able to publish his paper in the near future. In the meantime we would still like to see more independent research undertaken.

## Microbiology Group (SCI)

### Annual Report for Session 1952-53

**D**URING the second session of the Microbiology Group of the SCI the committee has pursued the same policy as previously in arranging the programme and has tried to blend the fundamental with the utilitarian aspects of the subject so as to appeal to industry. Subjects for four domestic meetings include the application of paper chromatography to microbiology, the behaviour of embryonic cells in tissue culture, microbiology and crime, and bacteriophage in relation to viruses and to lactic streptococci.

A discussion meeting, held jointly with the Food Group, on the subject of 'Technical Problems Associated with Microbiological Standards for Foods' attracted a large audience and induced some animated discussion. The joint meeting with the Society for Applied Bacteriology (now a well recognised annual fixture) took the form of a symposium on 'Recent Advances in Microbiological Methods.' A long tea interval, at which demonstrations were given, provided an opportunity for the discussion of new techniques. The third joint meeting this session was with the Food Group on the important subject of 'Pathogenic Organisms in Food' and appreciation was expressed of the three members of the Public Health Laboratory Service who gave such informative talks.

A new departure in this year's programme has been the inclusion of visits to places of interest, as distinct from paper-reading

meetings. At the Research Laboratory and brewery of Barclay Perkins & Co., Ltd., members of the Group saw the brewing process and the methods of laboratory control and of research into technical problems. A visit to the National Institute for Research in Dairying has been arranged for 9 June.

During the session two further representatives of provincial sections have been appointed to serve on the committee—Mr. P. McDonald (Edinburgh Section), and Dr. R. G. Ault (Birmingham and Midland Section). Membership of the Group now stands at 482.

A further recognition of the importance of the subjects covered by the Group has been the inclusion in annual reports on the Progress of Applied Chemistry (1953) of a chapter on 'Microbiological Processes (other than brewing).' It is intended that this chapter shall deal with microbiological aspects of particular interest in any field of chemical industry, whether the more technical aspects of that field are already covered by a separate chapter or not. It has not been found possible, in the space allotted to the new chapter, to review advances in the whole range of microbiology of interest to chemical industry. The general policy will be to cover as comprehensively as possible a few fields each year.

At the meeting of the committee held on 26 February the following officers were elected for next session:—

*Chairman:* Dr. L. A. Allen; *vice-chairman:* Mr. H. J. Bunker; *hon. secretary:* Mr. D. H. F. Clayson; *hon. treasurer:* Dr. A. J. Amos. Dr. R. J. McWalter was elected *hon. recorder.*

# The 'Porvic' Process

## Method for Making Thermoplastics Microporous

SOME ten years ago research being carried out at the Dagenham Dock factory of Pritchett & Gold and E.P.S. Co., Ltd., the oldest battery manufacturers in Britain, resulted in the discovery of 'Porvic.' Since then improvements in the processes of manufacture have been made and production greatly increased so at long last the firm now feels that it can safely release details of both the material and the method of manufacture.

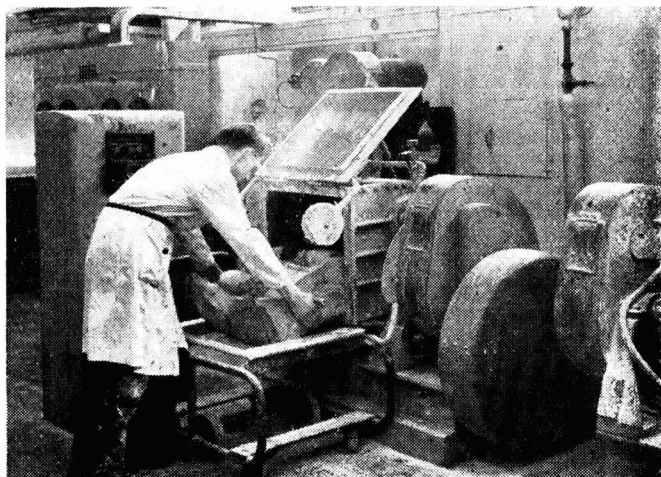
Last week a Press conference was held at the home of the well-known Dagenite battery and Pritchett & Gold technicians modestly explained what they had achieved since first they began to search for a new-type battery separator during the war. They explained, for instance, that a large proportion of batteries are now equipped with 'Porvic' separators since they are now being sold by the company to other battery manufacturers in this country and are being produced under licence in the United States. They also demonstrated and discussed a few of the wide uses to which this material could be put in other fields where rigidly controlled microporosity and extreme chemical resistance are wanted.

'Porvic' is a registered trade name for microporous thermoplastic materials and the standard grade is in the form of porous unplasticised polyvinyl chloride sheets of about 0.03 in. thickness. These sheets are

now being widely used to separate the plates in batteries and it is said that their use is saving the Government hundreds of thousands of pounds per year in American currency for formerly the separators were made from American cedar. It is also said that 'Porvic' is a great improvement over the wooden separator, being totally unaffected by the battery acid or by the chemical reactions occurring during charge and discharge. With it a closer assembly is said to be possible which lowers the internal resistance of the battery and gives improved performance. Batteries fitted with 'Porvic' are said to be free from separator failure so that the plates are able to give their full service life.

'Porvic' is entirely British in origin and the name and processes involved are patented throughout the world. Of the many British Patent Specifications No. 565,022 may be taken as generally typical, and a study of this will show what an amazingly simple and economic process it is for producing microporosity in thermoplastics.

The porosity of 'Porvic' is obtained by mixing into the plastic material a finely powdered substance which can afterwards be removed from it. For instance, powdered maize starch may be mixed into polyvinyl chloride and the mixture then treated with dilute acid to render the starch soluble by turning it into sugar. When the sugar has



*The ingredients having been thoroughly mixed together the 'dough' is being transferred to the extruding machines. In the background can be seen the dryer in which the solvent will be removed*

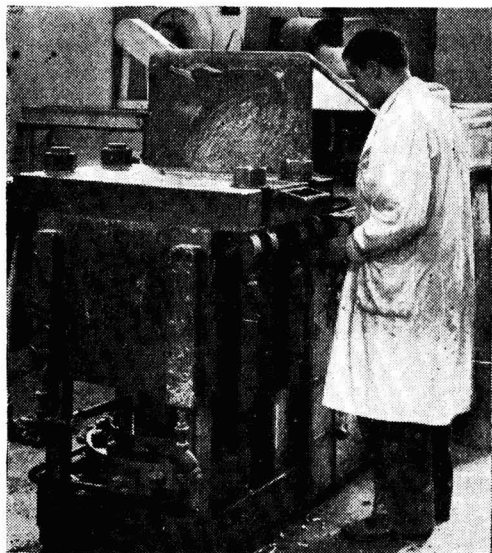


been leached out the polyvinyl chloride is filled with a series of holes equivalent in size and position to the starch particles in the original mixture.

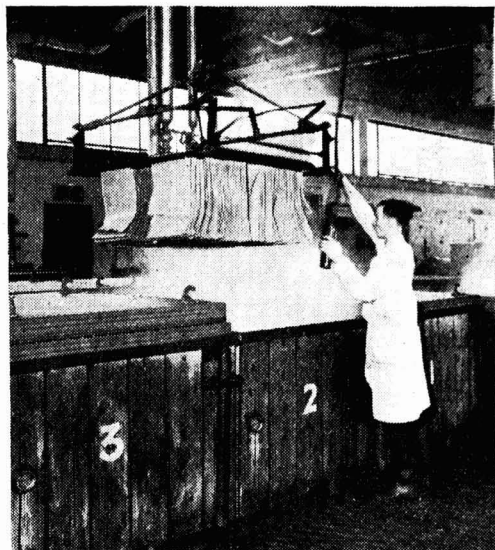
An essential feature of the 'Porvic' process is the use of a third ingredient, a solvent for the polyvinyl chloride, to facilitate the mixing of the ingredients and the fabrication of the diaphragms. When the solvent has done its work in this way it can be removed by the applications of heat, leaving an intimate mixture of polyvinyl chloride and starch. A treatment in hot dilute sulphuric acid then turns the starch into sugar and the sugar diffuses out leaving micropores in the polyvinyl chloride.

The porosity of 'Porvic' is thus obtained in a very positive manner, by putting in a pore-forming ingredient of known size. Starches such as maize starch are particularly desirable for this purpose, as the granule size is remarkably uniform. Providing the starch is thoroughly admixed with the polyvinyl chloride, the size and distribution of the pores are strictly controlled. The remaining factor, the percentage volume porosity, depends upon the ratio of starch to plastic which can be adjusted to suit requirements.

The structure of 'Porvic' consists essentially of a system of spherical cells of uniform diameter, each having openings into neighbouring cells. In standard grade 'Porvic'



*The plastic 'dough' is extruded from a specially designed press*



*The sheets being lowered into hot  $H_2SO_4$  to remove the starch*

the diameter of the spherical cells is approximately 0.015 millimetre, while the openings into adjacent cells are of the order of 0.001 millimetre. Combined with a volume porosity of 85 per cent, the structure of 'Porvic' gives it unique properties as a porous medium, capable of holding back particles larger than one-thousandth of a millimetre in diameter, while allowing free passage of gases and liquids. This contrasts with other porous materials in which there is often much variation in the size of the pores, causing uneven distribution of flow and giving rise to clogging by particles which penetrate the large pores and are then retained within the structure.

The uniform structure of 'Porvic,' however, is immediately selective as to the size of particle it will accept, and any particles too large to pass through are held up on the surface. It will be readily understood that such a material, with its excellent chemical stability has important uses outside the battery field.

The basic properties of volume porosity, pore size, permeability and retention can be controlled and varied to suit specific applications, a number of which are at present under development. Applications in which the properties of 'Porvic' are revealing new possibilities include filtration, aeration, electrolysis and aerodynamic research. The

company welcomes inquiries concerning these or other uses, and is always ready to co-operate in developing suitable products.

The 'Porvic' process can be applied to many materials to make them microporous, but for preference polyvinyl chloride is the material chosen. Made into a microporous diaphragm by the 'Porvic' process, polyvinyl chloride has excellent mechanical strength and chemical resistance. Normally, the pure polymer is used, without the usual plasticisers, although these can be added if the diaphragm is required to have extra flexibility.

'Porvic' is available in many thicknesses of plain or ribbed sheet, from 0.020 in. upwards, and in various porosities. Where it is desired that liquids shall flow through easily, larger pores are provided than where this is not required, but in every case the pore size and distribution are positively controlled in manufacture to avoid any variation within a batch or from one place to another.



*The sheets being placed in the dryer. All that remains is for them to be cut, inspected and packed*

## Davy's Service to Chemistry

A PORTRAIT of Sir Humphrey Davy as a romantic genius capable of extraordinary achievement when his effort was concentrated in one field, but apt to lapse into 'hasty and impulsive work,' was given by Sir Harold Hartley, F.R.S., when he delivered the Wilkins Lecture on Davy's life and work to a meeting of the Royal Society in London on 5 March.

Pages from Davy's notebooks were shown to give more intimate aspect of his work than would otherwise be possible.

The early years in Bristol at the Pneumatic Institute where Davy discovered the anaesthetic properties of nitrous oxide, and did researches on respiration and the oxides of nitrogen which made his reputation, illustrated his power when it was concentrated in continuous effort in one field.

His investigations at the Royal Institution in October, 1807, when he first separated the new metals potassium and sodium from potash and soda, and in a fortnight's work arrived at the principle of the safety lamp were examples of his more impulsive achievements.

Davy's greatest service to chemistry, said Sir Harold, was probably his recognition of

the elementary nature of oxymuriatic acid, to which he gave the name chlorine. Later, in Paris, in one of his best quick investigations, carried out with only such apparatus as he took travelling, he isolated most of the common compounds of iodine, then newly discovered, and showed their essential similarity with chlorine and fluorine.

The brilliant pioneer of electrochemistry, Davy also exposed the myth of oxygen as the constituent of all acids and he discovered the principle of the safety-lamp—on these his fame will rest.

## Allocations Discontinued

THE Sulphur Committee of the International Materials Conference on 2 March announced that its member governments have accepted its recommendation to discontinue international allocations for sulphur with effect from 1 March, 1953.

The committee noted that the substantial improvement which had taken place in the sulphur position over the last six months of 1952 was continuing in the current half year. The committee's review of the situation also indicates that there are reasonable prospects for a balance between world supply and demand for the remainder of 1953.

## Petrochemicals Research

### New Laboratories at Partington

**R**ECOGNISING that research—in such a comparatively new field of British industrial endeavour as petroleum-derived chemicals—is of paramount importance, Petrochemicals, Ltd., has concentrated for some time on establishing its own chemical research organisation. A further step towards this aim was taken on Saturday, 14 February, when new laboratories at its Partington, Cheshire, works were opened by Sir Robert Robinson, O.M., F.R.S.

After touring the well-equipped new quarters, Sir Robert, in a brief address to the senior technical personnel, stressed the need for Petrochemicals, Ltd., to do its own research. 'No chemical company worthy of the name,' he said, 'can hope to succeed unless it has established an active research department in constant touch with every field of industrial endeavour and able to open up new lines of development.'

'Although the greatest events are usually heralded by a fanfare of trumpets,' said Sir Robert, 'this particular occasion is significant because it contains the germ of something which will grow rapidly under the stimulus of concentrated effort. The opening of these laboratories can be taken as marking real progress in the formation of the Petrochemicals Research Organisations.'

The research laboratories together with laboratories engaged on product development, technical service and pilot plant work, form a division embracing all possible

aspects of scientific progress in the petroleum-chemicals field allied to industrial development. Investigations into new uses for existing products, the possibility of devising new processes and the production of further compounds of ever-widening application in the chemical industry, will have far-reaching effects on the future of Petrochemicals, Ltd.

Every effort is being made to put the company in the forefront of technical progress in the field of chemicals from petroleum.

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## Nicotine Sulphate Process

THE problem of how to extract nicotine sulphate from tobacco waste by a relatively cheap process has been exercising the minds of chemists at the National Chemical Laboratory, Poona, India, for some time. Because of the low nicotine content of Indian tobacco waste methods of extraction, up to now, have been too costly to make it worthwhile. It is now claimed that a simple and economic process has been evolved.

The initial stage of the treatment consists of pulverising the tobacco waste, mixing it with lime and saturating it in a solution of common salt. The resultant broth is suitably stabilised and extracted with kerosene in a specially designed column. The nicotine is recovered from the kerosene solution by fixing it with weak sulphuric acid. The process has been patented.

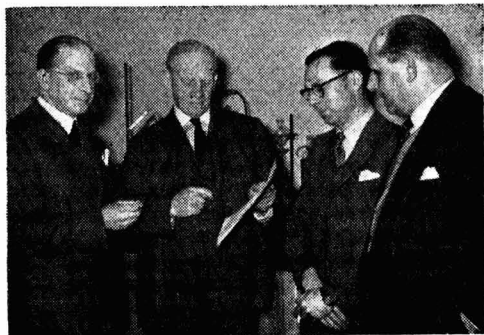
The extraction can be carried out either by tobacco curers themselves, who have adequate quantities of tobacco waste in hand, or by fine chemical manufacturers.

In its commercial form nicotine sulphate is a solution containing 40 per cent nicotine as a sulphate. Indian tobacco wastes are said to contain only about 1 to 3 per cent nicotine.

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## Midlands Analytical Society

The March meeting of the Midlands Society for Analytical Chemistry is to be held on Tuesday, 17 March, at 7 p.m., in the Mason Theatre of the University, Edmund Street, when a talk entitled 'Some Aspects of Absorptiometric Analysis' will be given by Dr. T. B. Smith, senior lecturer in analytical chemistry in the University of Sheffield. Dr. Smith is the author of 'Analytical Processes, a Physico-Chemical Interpretation.'



**Sir Robert Robinson, O.M., F.R.S. (holding paper), with Dr. H. Randnitz, chief research chemist (left), Dr. E. T. Borrow, chief chemist, and Mr. W. E. Huggett, technical manager, after the official opening of the new research laboratories of Petrochemicals, Ltd.**

# Chlorophyll Debunked Further

## Odours Not Removed says British Medical Research Worker

THE wild claims that have been made for chlorophyll since 1943 are gradually being tracked down and destroyed. (cf. THE CHEMICAL AGE, 68, 123.) In the current issue of the *British Medical Journal* (No. 4809, pp. 541-544), Dr. John C. Brocklehurst, of the Department of Materia Medica and Therapeutics, University of Glasgow, reports on a number of experiments (both *in vitro* and *in vivo*) which have convinced him that chlorophyll does not banish odours.

Four *in vitro* experiments are described. In the first two of these methylmercaptan gas was exposed in a closed system to various water-soluble chlorophyll solutions and it was found that chlorophyll did not reduce the amount of gas passing over to an iodine indicator, compared with a control. In the third experiment very much smaller quantities of mercaptan and other odorous vapours such as syrup of garlic and ether were exposed for up to three days within a bell-jar with a complete water seal to filter paper soaked in various chlorophyll preparations. In only one case out of the many was a complete deodorant effect possible and because of the presence of a strong smell of chlorophyll on this occasion it was felt that it could hardly be significant. It was concluded by Dr. Brocklehurst and his colleagues that chlorophyll, when exposed in this way to an odour, does not remove the odour from the air.

### Smell Removal Experiments

Experiment No. 4 proved that mixtures of water-soluble chlorophyll and various strong-smelling solutions did not remove the smell of the solutions even after exposure for one or more months. Three jars were set up containing 4 ml. of concentrated solution of chlorophyll, 4 ml. of dilute solution of chlorophyll and 4 ml. of water respectively. To each was added one drop of perfume. The liquid evaporated within 14 days, but in all jars the perfume strongly persisted even after five months. A similar experiment, using slices of onion instead of perfume, showed no difference between the jars after 24 hours when the smell was so

offensive that the experiment had to be abandoned. Stoppered test-tubes containing mercaptan solution and either chlorophyll solutions or plugs of cotton-wool saturated with chlorophyll solutions were set-up. Even after 72 hours the smell of mercaptan was perceptible. Quantities of syrup of garlic were placed in stoppered test-tubes with various chlorophyll solutions. These were left in an ordinary warm room and even after a month the smell of garlic was present in the test-tubes.

### Clinical Tests Undertaken

In one clinical test a patient was given three-day courses of (1) chlorophyll solution, (2) proprietary chlorophyll tablets and (3) periods with no chlorophyll. An observer was not aware of which days were chlorophyll-free was unable to detect any change in the characteristically unpleasant odour of the patient's urine. In another, chlorophyll taken in doses at least 25 times greater than those usually recommended was found valueless in preventing the characteristic smell of the urine following ingestion of asparagus. It was also found that oral administration of 800 mg. of chlorophyll daily for a week did not remove the odour of urine, faeces or axillary perspiration.

In Dr. Brocklehurst's experiments four different chlorophyll solutions were used. The first of these consisted chiefly of sodium copper chlorophyllin and was made up in a solution containing 1 g. in 10 ml. Another was a crude commercial preparation of water-soluble chlorophyll intended for use as colouring matter. The third was a proprietary preparation intended for use as an atmospheric deodorant by means of a wick. The fourth solution was a proprietary water-soluble preparation sold for dispensing purposes and reported to contain 12.5 per cent of water-soluble chlorophyll.

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*Editor's note: It is understood that Dr. W. Mitchell, chief chemist, The Allen Chlorophyll Co., Ltd., London, has written a paper replying to recent criticisms of chlorophyll and we hope to be able to publish this in a future issue.*

## Petrochemicals' Difficulties

### Independence or Link-up?

**M**ISFORTUNE seems to have befallen Petrochemicals, Ltd., ever since it was registered in 1946. A loss of £1,339,340 was incurred in the year ended 30 June, 1952, compared with a loss of £986,063 in the previous year. With a deficit of £2,032,186 brought into the accounts, the debit balance to be carried forward by the parent company is £3,371,526.

Some of the main causes of this disaster can be attributed to delivery delays and heavy cost of new plant; the expected 'teething' troubles or running-in plant of revolutionary design which did not always come up to expectations; and the recession in the chemical and allied trades.

The project was not really suited to the private investor, it was said, and support had been obtained from the Finance Corporation for Industry.

### New Managing Director

Mr. Godfrey H. Owtram is the new managing director following Sir Robert Renwick, who resigned owing to ill-health. The debt to the FCI, with accrued interest now stands at £8,256,546 and there seems to be no prospect of profits on a scale large enough to resume service at the contractual rates of four and five per cent. Of last year's loss about £900,000 arose from interest charges and depreciation.

The company now appears to be covering its working costs, and the first six months of the current year (begun in July, 1952), have shown a small gross profit before charging interest or depreciation.

Reorganisation methods taken by Mr. Owtram include the severance of the connections with Petrocarbon, Ltd., and the Manchester Oil Refinery, Ltd., which involved the resignations of Dr. Kind, Mr. M. A. Colefax and Mr. Stuart Ebben.

Two main issues are said to face the company. Either it can endeavour to go forward alone, which would require further capital investment or it can link-up with some large company for the production of specialised end-products.

Despite a report that an independent policy is being adopted, it is believed that the board is hoping for a possible joining

up with one of the world's large oil or chemical combines. Discussions are known to have been entered into last year with the Mathieson Chemical Corporation.

## Laporte Chemicals Re-Groups

**A**N INTERNAL reorganisation of the Group is being proposed by the directors of Laporte Chemicals, Ltd., which is to be turned into a holding company.

A subsidiary is being formed with a similar title to take over the whole of its manufacturing business, including the factories and properties at Luton and Warrington, in exchange for shares in the new subsidiary.

The effect will be that the company will be a holding company with four subsidiaries, the new Laporte Chemicals, Ltd., Laporte Acids, Ltd., National Titanium Pigments, Ltd., and the Australian subsidiary, Crystal-Laporte Proprietary, Ltd. The boards of the operating subsidiaries, including the new Laporte Chemicals, Ltd., will concentrate on the business of their respective companies, enabling the board of the holding company to supervise and control the affairs of the Group as a whole.

Mr. L. P. O'Brien, the chairman, states that it appears necessary for this reorganisation to take place during the present financial year of the company ending on 31 March, 1953, since it is probable that taxation disadvantages would occur if it were undertaken at any later time. In order that the new subsidiary can be formed with the name 'Laporte Chemicals, Ltd.' it is necessary for the company to change its name and an extraordinary general meeting will be held on 27 March, 1953, at Winchester House, London, E.C.2, at which a special resolution will be proposed to change the name to 'Laporte Industries, Ltd.'

While the main object of the scheme is, of course, to suit the structure of the company to changing circumstances, an incidental effect of interest to shareholders is the saving of tax which may result from timely reorganisation.

### Demand for Instruments

New Expansion by the Foxboro Co., Ltd., Montreal, has doubled its Canadian facilities and reflects the growing demand in Canada for indicating, recording and controlling instruments.



# The Effects of Ball Mill Vibration

## Other Factory Processes Must be Considered

**T**HE demand for finer particles in the chemical, foundry and powder metallurgy industries has led to a greater increase in crushing and grinding processes. This has, in turn, increased the acuteness of the problems of vibration and noise emanating from such processes. With the present tendency for manufacturing set-ups to be in the form of self-contained units, incorporating raw material conversion and precision machining on one site, the effects of crushing and grinding mills on other factory processes should be investigated.

Judgment of the degree of vibration emanating from crushing and grinding machinery by the normal human senses of feeling and hearing are apt to prove very erratic. For instance, although noise is a manifestation of vibration, it is not safe to assume that vibration is a problem just because a noise is clearly audible. There is a common human tendency, however, to blame the noisiest machinery for any production troubles, such as poor surface finish in precision machining of metal parts.

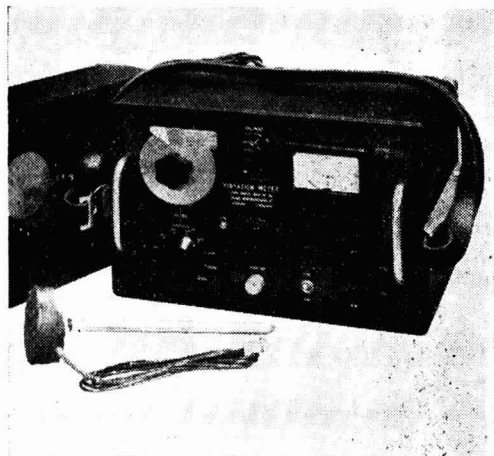
### Accurate Measurements Advisable

In the interests of factory planning, the prevention of inter-departmental friction and, in some cases, the avoidance of complaints from people living within the vicinity of crushing and grinding machinery, it is advisable that accurate vibration measurements be taken. With scientific test data to hand, the operators of such plants are in a strong position to know the true facts of the vibration situation and to refute the complaints which may arise. On the other hand, accurate vibration measurement figures will indicate whether or not remedial action should be taken to reduce interference from crushing, grinding and similar plant. Even though no complaints about vibration may have been made, it is often profitable to undertake vibration measurements: obvious improvements may at once suggest themselves even though the need for them may not have been apparent.

Some degree of vibration is unavoidable in a machine such as a ball mill, but it is a well known engineering fact that vibration can cause rapid deterioration of machinery

by giving rise to fatigue in the metal structure and resulting in its ultimate breakdown. Wear of moving parts is manifested in an increase of vibration and accurate vibration measurement can indicate that wear is taking place and can also pin-point the actual part of the machine which is deteriorating. Thus, routine vibration tests taken at pre-determined intervals can act as a preventative maintenance check on the condition of a machine and can anticipate breakdowns in many instances.

In the case of the 'mixed' manufacturing unit, where grinding and crushing are performed on the same site as precision machining, it is most important to ascertain whether the quality of finish desired in the machine shop can be obtained despite the disturbances arising from the crushing plant. If human judgment is relied upon in such matters, it is highly probable that the engineering production executives would say that their standards of work would be unattainable if a crushing plant were operating in the vicinity. If this opinion were accepted then the original plans for the factory unit would have to be abandoned and enormous expense would be involved in isolating the two plants from one another.



**The Dawe Type 1402 Vibration Meter used in the tests described in this article. Built-in batteries render it completely self-contained and portable**

A problem of this nature occurred recently at the works of Murex, Ltd., Rainham, Essex. It was proposed to bring back into use two ball mills of 2½- and 3½-ton capacity. Since they had last been used a number of new workshops had been erected in the vicinity, including a shop housing precision grinding machines. Naturally, the engineering production side were apprehensive about the effects of the vibrations from the mills on some of the precision grinding work on which they were engaged. A very high degree of finish was required of the precision grinding operations, with tolerance on size in the region of plus or minus 0.0001 in. Vibration is the enemy of success in this kind of work and it was therefore decided to carry out an investigation into the vibratory situation existing on the site with a view to ensuring that the ball mills did not interfere with production in the machine shops.

### Only Six Man Hours

The investigation was carried out by two operators in about three hours using a vibration meter—the Dawe Type 1402 made by Dawe Instruments, Ltd., London. This instrument is portable, weighs only 30 lb., and is operated by self-contained batteries. It will measure acceleration, velocity and displacement of vibrations in the frequency range from 2 to 1,000 c/s. It is provided with an inertia-operated crystal-type probe pick-up which delivers a voltage proportional to the acceleration of the surface to which it is clamped. The quantities of acceleration, displacement and velocity can be measured independently of one another by the operation of a selector switch on the instrument. An extension probe is also provided for hand use in awkward situations.

Acceleration was selected as the basis for measuring vibration at various parts of the site. The reason for this was that the grinding machines in the machine shop are particularly sensitive to the rate of change of the surface under vibration and are not greatly affected by the amplitude of the vibration.

It is interesting to note that the factory is situated on reclaimed land below the high water mark of the near-by river Thames. The buildings are supported on piles driven into the rocky sub-stratum.

The first test point was a stanchion in the

ball mill shop, situated between the mills themselves.

Readings were then taken progressively at increasing distances from the ball mill shop and revealed some interesting aspects of the vibratory conditions. For instance, the second reading was taken with the probe clamped to a girder outside the ball mill shop and here the vibration was found to be higher than it was in the actual shop. This was due to the downward transmission of vibration through the piles supporting the building and subsequent emergence of the vibration through other piles.

Another hidden source of trouble was in the corner of the furnace shop nearest to the ball mills. Here, at two points the vibration was found to be more intense than that prevailing over the rest of the floor. Investigations showed that a section of the concrete floor had been taken up and relaid some time previously and the high degree of vibration was due to a cavity which had formed below the new concrete.

Arising out of this discovery came an explanation of the erratic behaviour of some electric furnace control gear which was housed in the furnace shop. The gear was mounted on racks running along the wall of the shop one end of which stood directly over the unsupported concrete slab. The control gear was caused to operate every few seconds instead of about once per minute, which would be the normal rate of operation, and there was no doubt that this irregular behaviour could be attributed to the vibration of the concrete in which the rack leg was anchored.

### Work Not Interrupted

All the readings were taken with both ball mills running. There were two readings from the head of an external grinding machine. The first was taken while a similar machine a few yards distant was also operating, and the second when the neighbouring machine had been switched off.

Two readings were also taken at two other points in the machine shop. The first were made while all the machines in the workshop were operating, whereas in the second all machines were switched off (during the tea break). During all the above tests both ball mills were running.

All the readings for the tests in the machine shop were repeated when the ball mills were stopped. This made no difference

to the readings whatsoever. This was precisely the information it was hoped to obtain from these tests: whether or not the ball mills would interfere with the grinding machines. Quite unequivocally the answer was that they would not.

The test accomplished what it set out to do, namely, to ascertain if any effect would be produced on the machine shop work by the ball mills, but in the course of the investigation, other valuable information was brought to light. One detail was the cavity under the furnace shop floor, another was the high rate of vibration on the girder outside the ball mill shop which revealed the possibility of downward transmission of vibration from the mills.

Effect of the ball mill vibrations on the furnace control gear was considered to be a serious matter as further equipment is to be installed in the furnace shop extension. A temporary relief would be afforded to the existing equipment by placing it on anti-vibration mountings, but it was considered that a better solution would be to tackle the vibration from the mills at its source and to isolate in some way the complete mill installation, together with the driving gear.

One way of doing this would be to mount the mills on anti-vibration foundations, such as cork, bonded rubber or metallic spring fittings. Some vibration was emanating from the mill gear drives and this was considered capable of alleviation by fitting fibre or spiral toothed driving pinions in the gear train.

This speedy test of the conditions prevailing at this particular factory site demonstrates the importance of obtaining accurate, impartial data before embarking on costly measures.

Dawe Instruments, Ltd., state that it will gladly place its experience in sound and vibration problems at the disposal of firms faced with problems in these fields.

## British Metal Finishing

### Attacks on Quality Unjustified

A STRONG defence of the quality of British metal finishing was made by Dr. S. Wernick, honorary secretary of the Institute of Metal Finishing, in an address delivered in Birmingham on Thursday, 5 March, at the works of W. & T. Avery, Ltd.

Referring to the recent controversy on the

alleged deterioration of chromium plating and metal finishing generally on British cars, Dr. Wernick said:—

‘It has been suggested in some quarters that the finish on post-war cars is inferior to that which was applied before the war. This contention is against all the facts. Important advances which were developed in the laboratory and introduced in the factories just before the war produced superior finishes to those applied in the early 30’s. This was indeed fortunate as it enabled cars of the 1937-40 vintage to stand up so well since and compare favourably with American cars of the same period.

### Finishes—Up to Standard

‘Finishes on post-war cars, having regard to the high rate of production which was necessary to take advantage of export markets immediately after the war, and also the baneful restrictions on the supply of nickel with which the industry has been faced, have been well up to standard. Manufacturers of car accessories have used every scientific advance and invested considerable capital in the most up-to-date plant, and British cars in consequence have little to fear in comparison with their American counterparts. Indeed, the Americans consider that we are inclined to over-finish cars by giving them what they call a “jeweller’s finish” rather than the “kerb-side finish” which is favoured over there. There may be something in this contention.

‘As regards the finish on car bodies, the Rotodip process, which is widely applied on many makes of car in this country and ensures the protection of the body on parts which are not seen as well as those which are visible, undoubtedly produces a superior finish to that applied by the spray processes commonly used in American car plants.

‘We have no reason for complacency, and never has finishing been so important as it is today to keep our place in highly competitive world markets. On the other hand, we have much to be proud of in the advances in metal finishing practice which have been developed in this country.

‘It is not fair that the metal finishing industry should be condemned because an occasional spot of rust is seen on a car. Often this is the result of the negligence of the owner of the vehicle.’

## Rubber Literature

### Revised System of Classification

**P**ROVISION of an efficient intelligence service on any subject necessitates that all the available information shall be classified on a systematic and logical basis.

Where, as in the case of rubber science and technology different countries are interested, the benefit of using one standard system for classifying rubber literature, is obvious.

### The Dawson Code

The Research Association of British Rubber Manufacturers, Intelligence Division, many years ago produced a code devised by the late T. R. Dawson for the use of its own library. It was based on the extensive collection of information already in the files of the RABRM, and when after several years its suitability had been demonstrated, it was printed in 1937, together with a discussion of the philosophy of class formation and an appraisal of the systems then available.

Additions to include developments in the industry were published later and the full code, incorporating these amendments, was published in 1942. It was adopted by some scientific institutions interested in rubber on the Continent and in the U.S.A.

During the last war developments were made by the Rubber-Stichting (Delft) and the Institut Français du Caoutchouc (Paris) but difficulties in communication made cooperation between these bodies and the RABRM impossible. Consequently considerable differences in practice arose. Strenuous efforts have been made recently by the three organisations to arrive at an agreed and uniform code.

### Meetings Achieved Aim

With authority to act on behalf of the Planting Research Organisations in the Far East, meetings were held in Delft in November, 1951, and in Croydon in May, 1952. Thanks to the operation of a generous degree of give and take the meetings achieved their aim and a revised system was agreed upon by the three bodies. Provision is made for annual consideration of proposed changes and additions, the secretariat being located in Delft. Such changes may be made only after authorisation by the secretariat, in consultation with the three bodies.

The new system has been issued by the

RABRM as its Information Circular No. 410, 'Systematic Classification of Scientific, Technological and Commercial Information on Rubber,' together with an introduction on the history and use of the system.

The code is still in the form of the Dawson system, though Section-1 Planting has been re-written according to the French pattern and in 3S-Synthetics there has been a change in the method of dealing with copolymers. New major classes are 2S-Synthetic Latex, 3N-Reclaim, and 3SN-Synthetic Rubber Reclaim.

It is proposed eventually to issue the system in printed form, and also in French and German versions, together with an index now in preparation. The object of issuing as an information circular first is so that interested librarians and rubber technologists may be able to submit comments and suggestions in time for them to be considered before the final edition appears in print.

Copies of Information Circular No. 410 may be obtained free of charge on application to the secretary, Intelligence Division. The Research Association of British Rubber Manufacturers, 105-7 Lansdowne Road, Croydon, Surrey.

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## Obituary

### Sir Victor Dunn Warren

The death occurred in Glasgow on 3 March of SIR VICTOR DUNN WARREN, M.B.E., T.D., formerly Lord Provost of Glasgow, following an operation. He was 49. Born in May, 1903, Victor Dunn Warren was educated at Kelvinside Academy, Warriston, and Rossall. In early manhood he entered the family business of Hunter & Warren, Ltd., explosives merchants, of which he was chairman when it was taken over by Imperial Chemical Industries, Ltd. In 1949 he was appointed regional manager for Scotland and Northern Ireland of I.C.I. He received the M.B.E. in 1939 and was knighted in 1951. Sir Victor had a meteoric rise in the public life of Glasgow, attaining the post of first citizen at the early age of 45. In discharge of his duties as Lord Provost his vigorous personality and frank views sometimes drew criticism from friends and foes alike. In 1950 his attempt to save a man from drowning while on a fishing trip at Loch Arkaig gained for him the Bronze Medal of the Royal Humane Society.

# Heat Transfer Coefficients Evaluated

## Climbing Film Evaporator Tests Described

**H**HEAT Transfer Coefficients in a Climbing Film Evaporator and Natural Circulation in External Evaporators were the subjects of two papers read at a meeting of the Institution of Chemical Engineers held in London on Tuesday, 10 March.

In the first paper by J. M. Coulson, M.A., Ph.D. (Associate Member) and R. R. Mehta (Chemical Engineering Department, Imperial College of Science and Technology, London), the authors began by saying that since its introduction by Paul Kestner in 1899, the long tube or climbing film evaporator had been used to a continually increasing extent in the chemical industry. The short time of contact, the low hold up and relatively simple construction were among its prime advantages. Its use was not now confined to the concentration of aqueous liquors; the same form of unit was also employed as a reboiler on fractionating columns.

Despite its industrial importance there were relatively few papers in the literature in which precise performance details were available, and these evaporators were designed largely from experience and not from any established relationship between the operating conditions, physical properties of the liquors and the consequent heat flux or transfer coefficient.

### Results Described

The paper described and discussed the results obtained with a small stainless steel unit with a tube length of 5 ft. 3 in. and tube diameter of  $\frac{1}{2}$  in. The influence of the operating factors feed rate, temperature difference and temperature level had been examined and some assessment had been made of the effect of the physical properties viscosity and surface tension of the fluids. The tests had been made with water sucrose solutions and with isopropyl alcohol, and the results expressed by calculating the heat transfer coefficients and the heat flux.

After referring to the previous work of Reavell, Badger, Brookes, Rumford and others, the authors showed how the correlations outlined were empirical and covered the actual experimental data only with moderate success. In relating the influence of such factors as temperature difference,

feed rate, and temperature level the relations offered were not in agreement and certainly formed no sound basis for design.

### Main Design Features

Main features in mind in the design of the present apparatus had been:—

(1) It was important to determine film coefficients since, if they were known a much better understanding of the process could be obtained. The expressions for overall coefficients in which the feed was cold were unsuitable for use in any altered conditions of the feed.

(2) The feed should be at its boiling point at the bottom. This evaporator was a poor heater since the liquor rate was usually low. This avoided all doubt about dividing the tube into heating and boiling sections.

(3) Hot water was a better heating medium than steam, for with steam it was very difficult to get reproducible results and to know what was the condensing film coefficient.

(4) Good control of all rates and temperatures was essential since the hold up in the unit was so small that any fluctuations in conditions soon upset any equilibrium state.

In the evaporator as constructed the tube was 5½ ft. long,  $\frac{1}{2}$  in. diameter, 20 s.w.g. wall thickness stainless steel polished outside and descaled inside. The jacket was 1 in. diameter, 16 s.w.g. stainless steel, so that the width of the annulus was only 0.186 in. With a jacket length of 5½ ft. the ratio of tube length to inside diameter was 147 and the heat transfer surface based on the mean diameter of the tube was 0.637 sq. ft. The thin wall of the tube was necessary in view of the thermal resistance of stainless steel, and the narrow annulus enabled high velocities to be obtained. The equipment was run under a vacuum of about 26 in. of mercury.

### Tangential Inlet

The separator was 7 in. in diameter and was fitted with a tangential inlet from the top of the evaporator tube. The feed tank was an 8 gallon round bottomed copper tank fitted with a 2 kW. immersion heater controlled by a thermostat.

Fittings were provided for liquor inlet and outlet, for a drain connection and for a stirrer. The feed was sucked into the



evaporator through a rotameter with a nominal range of 2.20 g.p.h. for water. Three 7 gallon stainless-steel pressure vessels, available in the department, were adapted for use as receivers for the concentrated liquor and the condensed vapour. The condenser and cooler had 10 sq. ft. and 1 sq. ft. of heating surface respectively.

### Rate of Evaporation

Rate of evaporation was found by measuring the condensate in a brass cylinder 4 in. diameter and 2 ft. long fitted with gauge glass and scale and suitable connections for liquor and vacuum. A tank of 60 gallons capacity was used to provide a reservoir for the circulating hot water. The water was heated by condensing steam in a coil near the bottom of the tank.

A pressure gauge was fitted in the steam line and a needle valve used for final control of pressure. The water was kept agitated both as a result of the rapid circulation and by means of a simple stirrer. The feed tank, separator, evaporator tube, feed lines were lagged with asbestos sections or mattress and the hot water tank with asbestos sheet.

Thermocouples were fitted to the tube wall to determine the boiling film coefficient by direct measurement of the temperature difference across the film, but the high velocity of the water in the annulus made their use too difficult and in the end they were abandoned. The boiling film coefficients were later determined by means of an indirect method described later.

Development of a suitable travelling thermocouple which could be moved up and down in the evaporator tube was made in stages, and only the final stage was described. The thermocouple wires of 36 s.w.g. copper and constantan were passed through a fine stainless steel tube of 0.028 in. bore and 0.047 in. diameter. The junction of the wires was made about  $\frac{1}{4}$  in. beyond the bottom end of the fine tube to eliminate thermal conduction errors.

An arrangement of spiders was fitted to retain the fine tube in the centre of the evaporator tube, and brass hooks were fitted at each end for attachment of pull wires. The movement of the junction was effected by pull wires of 26 s.w.g. nichrome wire which passed over two pulleys held from the ceiling and two others fixed just below the bottom of the evaporator. The thermocouple wires at the hot junction were sealed in place with bakelite cement drawn into the fine tube by

means of a vacuum. This cement was baked hard at 135°C. for about half an hour.

The thermocouple wires passed through gland packings at each end of the tube, and the position of the junction was shown by an indicator soldered to the pull wire which moved over a scale. The cold junction was held in ice in a thermos flask. The ice rested on a gauge fitted in the flask, so that as the ice melted the condensate drained away from the thermocouple junction.

Temperature of the hot water was controlled by a needle valve in the low pressure steam line, and it was possible to keep the temperature within  $\pm 0.1^\circ\text{F}$ . by this method. The temperatures of the hot water inlet and outlet from the jacket were shown by special short temperature range mercury thermometers with graduations of  $0.1^\circ\text{F}$ . Two sets of thermometers were required to cover the experimental range. The temperature of the boiling liquid in the tube was measured with the travelling thermocouple, the E.M.F. being determined by a normal Cambridge potentiometer. Other thermometers were fitted at various places.

### Constant Flow Rate

Flow rate of the hot water was maintained constant at about 4,000 lb./hr., the bye-pass valve on the pump outlet being kept closed. The rate was measured by direct weighing. The feed to the evaporator was shown by a Rotameter and controlled by a needle valve. The Rotameter was calibrated for each of the liquids used at several different temperatures. The pressure in the system was shown by a simple mercury manometer.

The variables selected for study were:—

- (1) Overall temperature difference.  $T$   $15\text{--}62^\circ\text{F}$ .
- (2) Feed rate  $W$   $24\text{--}180$  lb./hr.
- (3) Surface tension  $\sigma$   $21\text{--}68$  dynes/cm.
- (4) Viscosity  $\mu$   $0.45\text{--}2$  centipois.
- (5) Boiling temperature  $T$   $110\text{--}160^\circ\text{F}$ .

Variations in viscosity were made by using solutions of sucrose, and of surface tension by addition of 0.01 and 0.1 per cent of Teepol to water. Isopropyl alcohol was used to give a high Prandtl group and also to show the marked effect of boiling a non-aqueous liquid. The water used was obtained from a simple laboratory still.

Overall temperature difference and the feed rate could be considered as operational factors and the Prandtl group and the surface tension represented variations in the liquid

phase. The average boiling temperature was included in the variables since it influenced the physical properties of the two phases and it was useful to have a direct relation between the transfer coefficients and the boiling temperature.

A test consisted of operation under constant conditions for a period of 20 minutes. About 15 minutes were required to reach steady conditions. The conditions to be kept steady were feed rate and temperature, hot water rate and inlet temperature and temperature of vapour-liquid mixture at the separator. The temperatures of the boiling liquid were read at seven equidistant points along the tube. These were taken twice, once moving the couple upwards and again moving downwards. The other temperatures were read four times during a run and the average value used in the calculations.

Some 200 tests had been made with this unit. In each test the overall and boiling film coefficients had been calculated as well as the heat flux and the rate of evaporation. The general method of working was to vary one of the main factors and to keep the others constant. This proved to be much more difficult than was expected, since many of the factors are interrelated in operation.

### Effects on Climbing Film

It was shown that the transfer coefficients in the boiling section were influenced by the temperature difference and feed rate, and by the viscosity of the liquid. A comparison was made between these results and those obtained in submerged boiling, and it was shown that the climbing film was particularly efficient when the temperature differences were small.

The authors concluded by expressing their thanks to Professor D. M. Newitt, in whose laboratories the work was carried out, for his assistance and encouragement. Gratitude was also expressed to Mr. A. C. V. Sweeting for his help in construction of the equipment.

Introducing their paper on Natural Circulation in External Evaporators, F. E. Warner (member) and K. A. R. Julian (student), pointed out that a study of conditions for the transfer of heat in natural circulation evaporators shows at once that the rate of circulation can be expected to influence the mechanism by which heat is transmitted to the boiling liquid. The effect of the factors controlling heat transmission varies up the length of a vertical tube.

At the bottom inlet, for a distance depending on the extent to which the temperature of the feed is below the boiling point, a section of the tube will be transferring heat to a continuous stream of liquid moving relatively slowly.

As boiling begins, the rate of flow of the liquid increases, until a point is reached where there can be complete vaporisation if the tubes are long enough or the feed rates low enough. The effect of this speeding-up inside the tube can be expected to thin down stagnant films on the tube walls and to affect the rate of heat transfer. The amount of liquid fed to, and evaporated in, each tube is clearly important.

### Method Still Rudimentary

The method of analysis of the factors affecting heat transfer in these conditions was still rudimentary and no advance in understanding was to be expected from the mere accumulation of data for correlation by dimensional analysis.

Conditions were so complex that a careful study of some elementary aspects was necessary to understand the physical mechanisms which operated. This paper was, therefore, confined to an examination of the energy changes when liquid circulated naturally in vertical evaporator tubes with steam heating on the outside. No attempt would be made to explain the mechanism by which circulation was produced although some of the factors might appear in the course of noting the energy changes.

Labelling of evaporators as 'natural circulation' or 'thermosyphon' tended, particularly in the latter case, to obscure the forces causing the motion. In fact, however, the results given in the paper showed that these 'natural circulation' evaporators could be regarded as pumps.

### Heat Energy for Pumping

The motion was caused by a vapour-lift action in which addition of vapour took place continuously up the tube, instead of at one point through a foot-piece as in the air-lift pump. The energy for pumping was derived from some of the heat transferred through the tubes and was the energy, beyond that required for latent heat and sensible heat changes, for generating vapour bubbles against liquid/vapour interfacial tension and for expanding them up to their final volume.

Apparatus used for the experiments was

a batch still of 5,000 gallons capacity connected by a 3 in. i.d. circulation line to an external evaporator. The evaporator consisted of a vertical cylindrical shell with tube-plates at each end into which ninety  $1\frac{1}{4}$  in. o.d. x 10 s.w.g. steel tubes, 8 ft. long, were expanded. Steam for heating was supplied to the top of the shell from a 100 p.s.i. main through a control valve. The rate of flow was kept constant by a 2-term recorder-controller. Circulation of the vapour and entrained liquid was completed in a 6 in. i.d. main.

For these experiments, the still was charged with a coal-tar fraction, containing benzole, toluole, xylol and higher boiling materials. The vapour from the still was passed up a fractionating column, condensed in a total condenser, and the condensate split between two rotameters for reflux and product.

### Density Differences

From the energy changes worked out it was seen that density differences could not account for the driving forces in establishing natural circulation in an external evaporator. The potential energy gain alone excluded a thermosyphon mechanism but the kinetic energy gain was much more considerable. It appeared reasonable to look on this type of evaporator as a vapour-lift pump. It was a pump of low efficiency, if this was calculated as the ratio of useful energy gain to total energy gain.

Concept of the evaporator as a vapour-lift pump did not, unfortunately, allow calculations of circulation ratios to be made, nor of the circulation rate. More work on the mechanism of vapour-lift pumps was required for this. The variables were similar to those affecting the operation of air lifts; submergence, viscosity and surface tension of the liquid, tube diameter and pressure. The submergence was the head available from the still less the resistances in the connecting line, while pressure could probably be replaced by heat flux.

The original object of these experiments was to study the effect of variables on heat transfer in an external evaporator. Further work was planned on the basis of results already obtained. This short note was presented to clarify one aspect of the operation of a natural circulation evaporator.

Thanks were due to the Hope Chemical Works, London, for permission to describe this work.

## New Fellows Elected

A MEMBER of the original I.C.I. team concerned with the development of 'Terylene' polyester fibre, MR. A. H. LITTLE, B.Sc., has just been elected a Fellow of the Textile Institute. Mr. Little, educated at Manchester Grammar School and Manchester Municipal College of Technology, started work as a laboratory assistant with the British Cotton Industry Research Association, later becoming manager of the 'Terylene' experimental spinning plant. He was responsible for the development of processes of yarn manufacture, and later established production at the pilot plant. He is holder or joint holder of various patents, and has contributed papers in collaboration with others to several learned journals.

Another recently elected Fellow, MR. C. F. WARD, M.Sc., who last year delivered a paper at the annual conference of the Institute in Edinburgh on the dyeing of blended fibres, is Chief Chemist and Technician with W. E. Saxby (Nottingham), Ltd. Mr. Ward, who is chairman of Nottingham University's Kipping Memorial Fund, and chairman and treasurer of the Nottingham Section of the Society of Chemical Industry, holds several patents, and has been recently concerned with the development of processes for controlling the dyeing of wool with 'neutral' and meta-chrome colours using boric acid and borax.

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## Sampling Fats and Fatty Oils

A REVISION of B.S. 627 which was first published in 1935, has now been issued by the British Standards Institution. The revised standard (B.S. 627: 1953) provides methods for sampling oils in road and rail tanks and also includes a greater number of sampling instruments than in the original edition.

As before the standard provides for the sampling of liquid or semi-solid oils in bulk in shore tanks or ships' tanks, oil in course of transference from one tank to another, oil or solid fat in small tanks, drums, barrels and other small packages, and loose solid fats. Methods of collection and reduction are specified.

Copies of B.S. 627: 1953 may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1 (price 3s.).

# American Agricultural Chemicals Field

## Plant Protection Experts Give Views

**T**HIRTEEN months ago Mr. Leslie R. Read, technical liaison officer at the Fernhurst Research Station of Plant Protection Limited, left Britain to take up a position as consultant to the Chipman Chemical Company Inc., Bound Brook, New Jersey. This was the first step towards closer co-operation between Chipmans and Plant Protection and arose from an agreement signed in 1951.

On 5 March Mr. Read returned for a month's visit to study developments in this country and on 9 March a small press reception was held at the London offices of Plant Protection Limited during which Mr. Read gave some of his impressions of the American agricultural chemicals market.

At the same time it was announced that Mr. Alexander David St. Clair, head of the American Section of the Export Department of Plant Protection Limited, is leaving the company to take up the post of personal assistant to the general manager of Chipman Chemicals Limited in Winnipeg. Chipmans are agents for Plant Protection Products in Canada as well as the U.S.A.

Mr. A. R. N. Roberts, director of publicity for Plant Protection Limited, introduced Mr. Read and Mr. St. Clair. The weed killing and insecticide trade depended upon service, he said, and it was in this direction that it was felt the British company could help their American agents.

When asked to give some of his im-



*Mr.  
Alexander  
St. Clair*

pressions, Mr. Read said that the United States was ahead of Britain in one important respect. There was a very much closer liaison there between industry and what we called pure research. This was achieved by holding joint conferences. These took up a lot of time but they were a wonderful opportunity to meet people and exchange ideas and knowledge. He thought that the British could well take a leaf from the American's book.

As far as education was concerned the United States Department of Agriculture did a great deal of research and maintained a close liaison with the research workers in the various states. State extension workers made sure that the information reached the farmer. There was excellent co-operation between all concerned and often the extension workers were housed in the same building as the research workers so they could follow developments closely. Educating the farmer was extraordinarily well done.

Government control was strict in the United States. No agricultural product could be sold outside of the state in which it was manufactured without the permission of the United States Department of Agriculture. The label and all claims on it had to be approved by the Department and any infringement of its regulations was quickly picked up. A list of the firms which had been found guilty of infringement was published regularly.



*Mr. Leslie  
R. Read*

The Chipman Chemical Company was originally British and had a company here. They had headquarters in Bound Brook, New Jersey and Winnipeg in Canada and factories and offices in six other cities throughout the States. The factories had to be decentralised owing to the extremely high freight rates.

### Low Volume Spraying

One of the main features of American agriculture was the use of low volume spraying on practically all crops but particularly on cereals. Dusting by aeroplane was forbidden and spraying was rigidly controlled by the authorities. Land machines were very common, however, and many farmers had home-made ones. Ninety per cent of the chemical weed killing was being done by 2,4-D but Methoxone and other MCPA derivatives were being used to an increasing extent owing to the safety factor. It was, however, an uphill fight to convince the farmers that it was a safer product for certain crops. In Canada it had been officially found that yields were not depressed when using MCPA on small grains and this was being brought to the attention of the American authorities.

The rates of application of 2,4-D and MCPA was very much lower in the U.S.A. than here. The farmer often used as little as one-eighth of a lb. per acre and was satisfied if the level of the weeds was below the crop level at the time of harvest. The American farmer was very conscious of any danger to his crops and Mergamma had caught their imagination when wireworms became a threat.

Mr. St. Clair said that Chipmans were anxious to strengthen their Winnipeg establishment both commercially and technically and although he was not a technical man he was glad to be able to accept the opportunity to assist them in other directions. Progress from the commercial angle had been much quicker in Canada than it had been in the United States and the company was hopeful that they would be selling \$1,000,000 of seed dressing this year. As this was only their third selling season this was a great achievement.

In Plant Protection's export department one of the most difficult problems had been American competition, but they had been able to advance along the narrow front in which they were experts and leaders. This

was in the seed dressings field and particularly with Mergamma. The reason why the co-operation of Plant Protection, Limited, had been welcomed by the Chipman Chemical Company was that the latter realised that with the Imperial Chemical Industries research organisation behind them they might be able to bring out one or two real winners.

Mr. Read obtained the degree of B.Agric. Sc. from the National University of Ireland and on his return to Plant Protection after war service he acted as roving adviser on crop protection problems and made extensive visits to overseas countries. He was a member of the Government commission which toured West Africa to investigate swollen shoot disease of cocoa. He subsequently became deputy head of the technical department.

Mr. St. Clair has been head of the American section of the export department of Plant Protection, Limited, and has twice toured Central America, Mexico, the West Indies, the United States and Canada to investigate markets and agents. He is a graduate from Oxford and speaks Spanish, French and German.

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### West Canadian Oil Reserves

The Canadian Petroleum Association reports that over 300,000,000 barrels of oil were discovered in 1952 in Western Canada. Total reserves of crude oil at the end of the year were estimated at 1,680,000,000 barrels, compared with 1,377,000,000 at the end of 1951. Alberta's reserves increased from 1,328,000,000 barrels to 1,526,000,000; Saskatchewan from 21,000,000 to 124,000,000 and Manitoba from 500,000 to over 2,000,000 barrels. Reserves in the North West Territories were unchanged at 26,700,000 barrels.

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### Australia's Largest Pipeline

An oil pipeline, eight inches in diameter and 58 miles long will shortly be constructed in Victoria, between Corio and Newport, near Melbourne. It will be built by the Shell Company of Australia, Ltd., at a cost of £A.600,000 to carry oil from its proposed £A.10,000,000 refinery at Corio. The steel pipeline will be bound with fibre glass as a protection against corrosive elements in the soil.





VINYL AND RELATED POLYMERS. By C. E. Schildknecht. New York: John Wiley and Sons, Inc. London: Chapman & Hall, Ltd. 1952. Pp. 723. 100s.

The idea for this book was first conceived in 1946 when the author had the intention of compiling a monograph on the production and properties of polymers derived from acetylene. Much of this information was then being disclosed in the post-war reports on the German high polymer industry made by Allied investigators. Later at the suggestions of Professor Marvel it was decided to broaden the scope of the work by the inclusion of addition polymers and copolymers derived from vinyl compounds. In recent years many of these polymers have found very important industrial applications in the field of rubbers, plastics and textile fibres. Some of these may be mentioned here. Polystyrene and the synthetic rubbers, Buna S and Buna GR-S, produced by the copolymerisation of butadiene and styrene, the transparent plastics (e.g., Perspex) derived from methyl methacrylate, polyacrylonitrile (Orlon textile fibre), and polyethylene are only a few of these important products. Because of the wide applications of addition polymerisation as a reaction for the synthesis of macromolecules, it is likely that the subject matter of the present book will remain of considerable interest for some time to come.

In his treatment the author has emphasised the practical chemistry and physics of polymerisation and polymers, the methods of synthesis, and the advantages and limitations of the resulting products. He has kept to a minimum the theoretical and mathematical aspects of polymerisation, which are often a source of difficulty to many students of the chemistry of high polymers, so as to make the book useful to as wide a circle of readers as possible. The treatment given is extremely comprehensive, and the author has dealt with more than four thousand references to the literature, ranging in period

from 1835 to the second half of 1951. In spite of this the interest of the reader is held throughout by the very lucid manner in which the book is written.

The polymers and copolymers considered in detail by the author are those derived from styrene, methacrylic and acrylic esters, acrylonitrile and acrylic acid, vinyl acetate, vinyl chloride, vinylidene chloride, ethylene, isobutylene, vinyl ethers and vinyl ketones.

Although many books have been published in the last few years on the subject of high polymers, the present volume can be confidently recommended as a valuable addition to the literature on macromolecular compounds.—G.S.E.

STRUCTURAL CARBOHYDRATE CHEMISTRY. By E. G. V. Percival. J. Garnet Miller, Ltd., London. Distributed by Quality Press, Ltd. New edition printed 1953. Pp. viii + 248. 25s. net.

Carbohydrate chemistry is a specialised and highly practical subject, which in the reviewer's opinion is often introduced far too early in university courses. The usual introduction to the subject is *via* non-existent and stereochemically misleading chain structures; at a later stage in a course, it would be possible instead to introduce the monosaccharides as substituted  $\alpha$ -hydroxyfurans and  $\alpha$ -hydroxypyranes. This excellent book follows the conventional pattern, starting with stereoisomeric monosaccharides considered as chain structures, and proceeding to ring structures and then to polysaccharides. About half the book is concerned with starch, cellulose, and other polysaccharides: this is appropriate in view of the important advances being made in this field and the tremendous biological importance of polysaccharides. Anhydro-, amino- and deoxy-sugars are discussed, although perhaps not always in the detail which some would like. The inositols are surveyed succinctly, but there is no reference to the important monograph by Fleury and Balatre

(1947). Streptomycin is mentioned once only, and then as a glucosamine derivative. In reprinting this book, first published in 1950, the opportunity has been taken to add references to more recent work, but there are no major changes. The typography and formulae are exceptionally clear, and errors appear to be few; on page 221, L. F. Wiggin's initials are incorrectly given. This book will be greatly appreciated by many Honours students, and by those engaged in industry and in research who desire an outline refresher course. As the title implies, the main emphasis is on the elucidation of structures. The book is a worthy successor to Sir Norman Haworth's classic 'The Constitution of the Sugars'; it can also be regarded as a memorial to the late Dr. Percival.—W.W.

**HISTORICAL METROLOGY.** By A. E. Berriman. J. M. Dent & Sons, Ltd., London; E. P. Dutton & Co., Ltd., New York. 1953. Pp. 224 + 65 photographs and line drawings. 16s.

'Historical Metrology,' by A. E. Berriman, O.B.E., M.I.Mech.E., F.R.Ae.S., is described as 'a new analysis of the archaeological and the historical evidence relating to weights and measures.' The author has collected fascinating data on systems used in earlier civilisations of the Far East as well as Babylonia, Egypt and the Mediterranean. The book is well illustrated with photographs of archaeological examples.

The author has not been content merely to record the facts he has obtained in a long period of research. He is a mathematician and has evidently taken delight in probing possible connections between the systems, and in developing his theories of geometric and geodetic origins of measurements.

It is interesting to realise how the growth of world trade brought firstly an increase in the number and variety of standards (and there were others not included in this book), then more recently a strong movement towards simplification, by standardisation of a few systems.

The book contains an account of the development in recent centuries, of the English system and its U.S.A. variant, and of the metric system.

The history of metrology as shown in this book points logically to the universal adoption of one system for world trade. Part of the report of a recent Government Com-

mittee on our own weights and measures system endorsed many previous opinions by recommending the adoption of the metric system within the next 25 years. Those agreeing or disagreeing with this suggestion may find in 'Historical Metrology' a useful background to enable them to put the problem in the right perspective.—G.O.

**THE CHEMIST & DRUGGIST POISONS GUIDE.** Vol. 2.—Poisons Provisions and Explanations. Compiled and co-ordinated by W. A. Watmough. The Chemist and Druggist, London. 1953. Pp. 235. 40s. 6d.

This volume is in direct succession to 'The Chemist & Druggist Poisons Guide' of 1936. That manual provided the first detailed and comprehensive information to the pharmacist on how to supply poisons under the Pharmacy and Poisons Act of 1933 and the Poisons Rules. Since then the system of poisons control has become so complicated that the retail chemist as well as the wholesale druggist have found it practically impossible to understand. Volume 2 of the Poisons Guide is intended to co-ordinate 'the whys and wherefores of the "regime" applicable to each 'class' of poison. It consolidates poisons law by bringing all poisons and dangerous drugs law provisions, as amended, up to date as at 1 January, 1953. It co-ordinates the innumerable requirements and ranges them in a series of 'key' classes. It clarifies and explains the provisions and systematises labelling and registration requirements. With Volume 1 it makes up an encyclopaedia of poisons law. While intended for the practicing pharmacist it must be of equal interest and value to the manufacturer or wholesaler.—A.S.R.

### Big Extensions Planned

The Steel Company of Wales recently announced plans for big extensions at their works at Port Talbot which will add more than 500,000 tons a year to pig iron production, and will provide work for a further 2,500. Main feature is a fourth blast furnace which will be the biggest in the world and which will have an output of 10,000 tons a week. When the four furnaces are working together the pig iron output of the plant will be around 1,500,000 tons a year. Other developments include a new power station, and a by-products plant.

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# HOME

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## Brotherton Memorial Lecture

The Fourth Brotherton Memorial Lecture will be given by Professor J. B. Speakman, in the Textile Lecture Theatre at the University of Leeds at 6 p.m. on Monday, 13 April, it has been announced by the Yorkshire Section of the Society of Chemical Industry.

## I.C.I. Workers Redundant

Two hundred employees of the aluminium factory of Imperial Chemical Industries at Waunarllywyd, Swansea, have been declared redundant. Last week the I.C.I.'s Metals Division announced that the factory is temporarily to work only four days a week because of 'the general recession for wrought aluminium light alloy products.'

## Duty on Linseed Oil

The Treasury has made the Import Duties (Drawback) (No. 4) Order, 1953, which increases from £15 10s. to £20 a ton the rate of drawback of Customs duty allowable in respect of imported linseed oil used in the manufacture of linseed oil fatty acids which are exported or shipped as stores. The Order came into operation on 10 March and has been published as Statutory Instruments, 1953, No. 315.

## OCCA Exhibition

The fifth technical trade exhibition of raw materials and equipment used in the paint, varnish, and printing ink industries, organised by the London section of the Oil and Colour Chemists' Association will be held at the Borough Polytechnic, London, S.E.1, from 30 March to 1 April. The official opening this year will be by Mr. Lawrence Turner, M.P., who will also attend the luncheon at the Criterion Restaurant, Piccadilly, W.1 preceding the ceremony.

## Sales Divisions Move

As from 1 March the Sales Divisions of R. H. Windsor Ltd., the manufacturers of plastics machinery, were transferred from Royal London House, Finsbury Square, London, E.C.2, to the company's head office and works at Leatherhead Road, Chessington, Surrey. Simultaneously with the move, and operating from the same date, the telephone number of the head office and works at Chessington was changed to Epsom 5631.

## New Consulting Firm

Dr. M. A. Phillips and Associates, consulting chemists and chemical engineers, have entered into an arrangement with Archibald Raynor, analytical, consulting and research chemists, Manchester Analytical Laboratories, of 17 Queen Street, Deansgate, Manchester 2, by which a new firm has been formed. This firm will be known as Harris & Phillips and will be concerned with the chemistry of textiles, principally viscose rayon. The principals are Tennyson Harris, Ph.C., F.R.I.C., and M. A. Phillips, D.Sc., F.R.I.C., A.M.I.Chem.E.

## Record Steel Output

For the second month in succession steel production in the United Kingdom reached a new high level in February. The average weekly output reported by the British Iron and Steel Federation was 352,400 tons compared with 346,300 tons in the previous month, and 313,100 tons in February, 1952. Last month's production was equivalent to an annual rate of 18,325,000 tons which indicates that the target of 17,500,000 set for 1953, should be within reach. Pig iron production at a weekly average of 213,500 tons in February compared with an average of 213,900 tons in January and 197,400 tons in February, 1952.

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## Heat Treatment Practice

PRELIMINARY notice is given by the British Iron and Steel Research Association, of a conference on Heat Treatment Practice to be held on 15, 16 and 17 June, at Ashorne Hill, Leamington Spa. It is intended that there shall be papers and discussion on the heat treatment of engineering steels and large forgings and sections, surface treatments, isothermal heat treatment and temperature measurement and control. The conference, which is being organised by the Metallurgy (General) Division of B.I.S.R.A is expected to provide a meeting ground for engineers and steelmakers affected by these problems. Any persons wishing to attend should apply to Mr. A. M. Sage, B.I.S.R.A., 11 Park Lane, London, W.1.

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# OVERSEAS

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## Production of Trioxane

Commercial production of trioxane has been started by the Chemical Division of the Celanese Corporation of America. Trioxane, which is the crystalline form of formaldehyde, is being used by the government as the standard Army heating tablet. Shipments to industry will be made in 20 and 50 gallon fibre drums.

## Micromolecular Still

How to distill very small samples of oils that normally defy distillation was the problem facing Dr. R. P. A. Sims, of the fats and oils section, National Research Council, Ottawa. He developed a 'micromolecular still,' consisting of a tiny glass pan suspended from a quartz spiral. This sensitive spring operates in a vacuum, with a built-in heating coil and a device for measuring temperature. With this apparatus, it is said, he can distill a single drop of an oil or liquid and measure the quantity of each fraction.

## PVC in Australia

Production and application of PVC (polyvinyl chloride) has recently been extensively developed in Australia. One company in New South Wales has a machine capable of treating 72 in. width of material with either plastic coating or proofing material. The manufacture of unsupported films of PVC for floor coverings are included among the latest plans of the Australian plastics industry.

## American Prices Raised

Permission has been given by the U.S. Government to allow manufacturers and processors of nickel, chromium, beryllium and cobalt products to raise their prices to cover recent rises in the cost of basic metals.

Nickel, chromium and beryllium are still under price control. Cobalt is not subject to a price ceiling, but there are still controls on most products in which cobalt is used. For stainless steel, the Office of Price Stabilisation has authorised manufacturers and sellers to raise ceiling prices by approximately 2 to 3 per cent, to cover the higher costs of nickel and chromium used in the metal.

## New Flour Improver

Climaxing a six-year research project, Sterwin Chemicals, Inc., has perfected a process which is said to make available a complete flour maturing and bleaching service providing new efficiency and safety for U.S. and Canadian mills. Development of the new process was achieved by Sterwin in close co-operation with the Cardox Corp. of Chicago, manufacturers of dry ice and chlorates for varied industrial usages. The process and equipment will be fully covered by patents.

## Sugar Cane Virus Cure

A cure for a virus disease which causes ratoon stunting of cane crops is claimed to have been found by Australian research workers in Queensland. The method consists of hot-water treatment of cane setts (short cuttings of cane used for planting). The water must be at 50°C. as it was found that higher or lower temperatures either killed the plant or failed to destroy the virus. This treatment, it is said, will enable the production of sugar in the State to be increased by some 40,000 tons a year.

## New Acid Plant

More than £100,000 worth of steel fabrication has been ordered for Sulphuric Acid, Ltd.'s new acid plant at Birkenhead, South Australia, the erection of which began last month. The acid plant and its associated fertiliser plant will cost about £2,500,000 and covers 48 acres of land situated between Caltex Oil Birkenhead installation and I.C.I. Alkali, Ltd.'s plant. With a capacity of 300 tons a day, it will be one of the biggest single acid manufacturing units in the world.

## Synthetic Rubber Plant Disposal

The Reconstruction Finance Corporation in America set forth a report to Congress on 3 March on the procedures it believes should be followed to sell rubber plants to private industry. The RFC plans call for Congress to authorise the Government to negotiate the sale of rubber facilities, subject to final Congressional approval of sales contracts. Officials estimate that acceptance of the RFC suggestions would enable the Government to dispose of its plants by the end of June, 1954.

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## • PERSONAL •

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MR. ROBIN THOMSON, C.A., of Dundee, has been appointed to the board of Henry Balfour & Co., Ltd., in place of MR. WILLIAM WATSON, who recently resigned to take up his post as Treasurer of the Bank of Scotland.

MR. JAMES RUSSELL, who has been a student at the Bradford Technical College for six years, including three years of research work, has been awarded a two-year research associateship to Cornell University, Ithaca, New York. At the Bradford Technical College, under DR. W. R. MOORE, Mr. Russell has been exploring the physical chemistry of cellulose derivatives as they affect the textile and synthetic fibre industries. He is hoping to leave for America in November.

At the Spring Convocation of the Textile Institute on 13 March, MR. WALTER ENGLISH, M.Sc.Tech., F.T.I., of Leek, Staffs., was presented with the Institute Medal. Mr. English, director and general manager of Brough, Nicholson & Hall, Ltd., Leek, has been a member of the institute for more than 30 years. He was elected a Fellow in 1925. He played an active part in the formation of the Macclesfield, Leek and District Section immediately after the war, serving as its honorary secretary until 1949, when he became chairman of the section. In the same year he was elected a member of the Council of the Textile Institute. The Institute Medal is awarded in recognition of distinguished services to the textile industry in general, and to the institute in particular.

MR. J. K. DAVIES, of Manchester, has been appointed manager-chemist of Shipley Council's sewage works at Dockfields, and he is to take up his duties there on 23 March. Mr. Davies, who is 37, is at present manager of the Roch Mills and Castleton sewage works, Rochdale. At one time he was an analytical chemist on the staff of the C.W.S. Research Department. He was formerly assistant sewage works manager and chemist at Burnley.

MR. R. W. L. RAMSDEN has joined the board of directors for Brotherton & Co., Ltd., Leeds. Mr. Ramsden has been works

manager of the company's ammonia and sulphuric acid works in Birmingham since 1917.

MR. G. H. OSBORN, F.R.I.C., chief analyst of the British Drug Houses, Poole, Dorset, and formerly chief chemist to International Alloys, Ltd., S'ough and Aylesbury, will be giving up his present appointment shortly to take a partnership with MR. A. S. CARLOS, B.Sc., F.R.I.C., 25 Keswick Road, Boscombe, Hants., Public Analyst to the boroughs of Bournemouth and Poole. Mr. Osborn was a member of council of the Society of Public Analysts 1951-1953 and was secretary of the newly formed Mid-Southern Counties section of the Royal Institute of Chemistry, 1947-1952.

MR. G. H. BEEBY has been appointed I.C.I. salt division director and chairman of the divisional board at Winsford, in succession to Mr. C. E. Pritchard, who was recently appointed to the board.

MR. W. K. DAVEY retired from the board of Associated Lead Manufacturers on 2 March.

MR. J. E. GREENWOOD, joint vice-chairman of Boots Pure Drug Company, has tendered his resignation from the board of the company and its subsidiaries upon medical advice. MR. F. A. COCKFIELD has been appointed a director of the parent company as from 1 April. Previous to joining Boots Group last autumn, Mr. Cockfield was secretary of the Board of Inland Revenue and Director of the Statistics and Intelligence branch of the board.

The following appointments have been announced by the Manufacturing Chemists' Association, New York: PAUL LOGUE, of Monsanto Chemical Company, has been named chairman of the association's Committee on Chemicals in Foods. New members appointed to this committee are HARRY A. KUHN, Allied Chemical & Dye Corporation; PAUL D. V. MANNING, International Minerals & Chemical Corporation; ROTHE WEIGEL, Victor Chemical Works; and ERNEST W. REID, Corn Products Refining Company.



# Publications & Announcements

THE 'Calendar of the Pharmaceutical Society of Great Britain 1952-53' was published on 27 February and copies are available from The Pharmaceutical Press, 17 Bloomsbury Square, London, W.C.1. The price is 12s. 6d., postage 10d. As usual the Calendar contains a great deal of useful information including a diary, a list of officers, details of the administration of the Society and reports on its various activities. A section on education contains examination regulations, details of scholarships, prizes and research awards, including all the winners since 1876. The section of statutes and regulations covers pharmacy and poisons, dangerous drugs, penicillin, streptomycin, aureomycin and ch'oramphenicol from 1852 to March, 1952 and makes a useful reference.

\* \* \*

NEW entries in the B.D.H Catalogue (February, 1953), are announced by the Laboratory Chemicals Group of British Drug Houses, Ltd., Poole, Dorset. Organic and inorganic chemicals include: ammonium citrate for copper determinations (Cu less than 1 p.p.m.); carborundum powder available in four different grades of fineness (24, 80, 180 and 300 grit); glucose-1-phosphate (dipotassium salt) an important intermediate in the enzymatic synthesis and breakdown of a variety of carbohydrates; and extra pure lead fluoride. Additions to solutions for analytical use include N.1436 ammonium borate solutions 0.8N and N.1434 ammonium carbonate solution 2N for use with the BDH Lovibond Nessleriser in the determination of aluminium in water by the haematocytin method (disc NX). In materials for microscopy the restoration of 'Polyric' immersion oil to the catalogue a useful alternative to cedarwood immersion oils which has been unobtainable for some years. Full summaries of the information in the literature about boron trichloride and semicarbazide hydrochloride are also available on request to the laboratories.

\* \* \*

CHOICE of adhesives is made simple in a ready-reference guide in tabular form recently published by Aero Research, Ltd., of Duxford, Cambridge. Figures are also given for the recommended curing temperature in degrees Centigrade, curing time and

curing pressure (p.s.i.), thickness of glue film (inches), maximum operating temperature (degrees Centigrade), pot and shelf life of the company's 11 different adhesives. It is pointed out, however, that these figures should be regarded as a guide only, as the maximum operating temperature, thickness of glue film and so on, are bound to be affected by the particular application. Copies of the guide may be obtained on request.

\* \* \*

ANTIOXIDANTS (trihydroxybenzoates), preservatives and antiseptics (parahydroxybenzoates), also pure fine chemicals and specific antiseptics and fungicides are contained in the new price list for January, 1953, issued by Nipa Laboratories, Ltd., London and Cardiff. The list contains 63 items, prices being quoted in shillings per kilo, 500, 250 and 100 grammes, except phenoxetol and propylene-phenoxetol which are shown per 1,000, 500, 250, and 100 cc. It is felt that the advantages of the Metric system outweigh any disadvantages and metric weights have therefore been adopted for standard packages. A list is given to show the deliveries made in metric weights when avoirdupois quantities are ordered.

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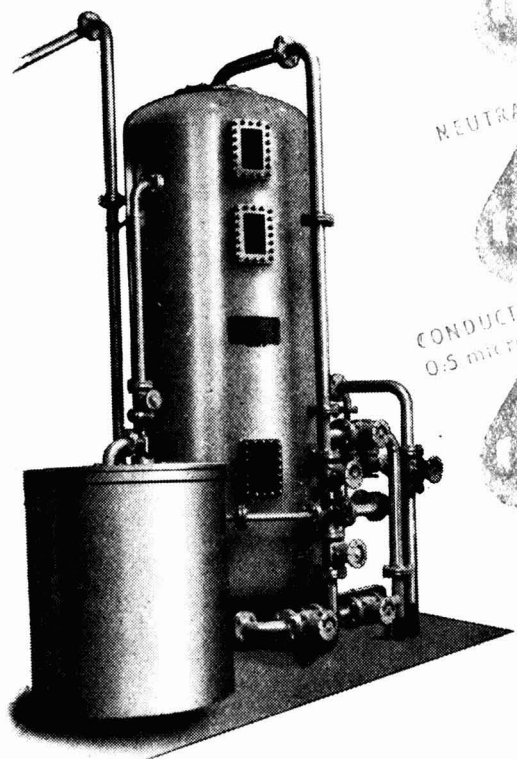
MORE than 1,500 trade names of manufacturers of diamond tools, abrasives, and so on, are listed in the revised fourth edition of the 'Industrial Diamond Trade Index and Year Book for 1953' (price 3s. 6d.), compiled jointly by the Industrial Diamond Information Bureau and the Industrial Diamond Review. The Industrial Diamond Trade Names Index was first published in 1945 as an eight-page data-sheet containing about 200 names and addresses. In the new edition not only trade names have been listed but also generally used abbreviations and names of firms which have a special standing in the trade. Many sources of information both in Britain and overseas have been consulted and a classified index has been prepared according to subject matter. Users and readers are invited to submit suggestions for additions or improvements to be incorporated in future issues.

\* \* \*

A FIVE colour chart showing the structure of plastics and the most important types in use has been compiled in German by Dr.

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*For full details of Permutit Mixed Bed 'Deminrolit' please write for Technical Publication No. 63.*

Hans Orth. The raw material basis, the processing, uses and names of the finished products are given for each plastic group. In addition to the modified natural materials given in the first edition the new table shows the monomers, polymers and high polymers. The distinctive colouring and large format (approximately 5½ ft. by 3 ft.) makes the new edition of more help to the user. The table, which is published by Carl Hanser Verlag, Munchen 27, Leonhard-Eck-Strasse 7, costs DM. 8 unmounted and DM. 12.80 mounted on a plastic sheet.

\* \* \*

EFFECTIVE sifting at low or medium capacities is achieved by the new 'Junior Sifter' developed by the Simon Engineering Group as a small, flexible, dustproof and efficient machine for screening and grading powdered or finely granulated materials. There are eight sieves, enclosed in a steel case suspended by canes from a steel frame, and driven through an eccentric mechanism mounted on a frame beneath the case. The sifting covers are attached to wooden frames, of uniform size so that they can be easily interchanged, and the frames are fitted into 'drawer-type' trays of non-corroding aluminium alloy. The trays are fitted with fabric cleaners, which by reason of their superior efficiency have entirely superseded brushes. Clothing of the sieves can be of wire, silk or nylon bolting cloth according

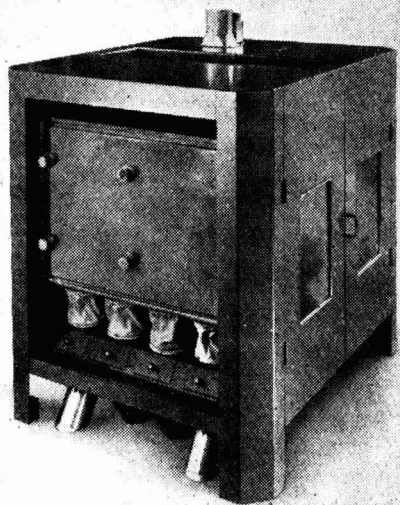
to the type of material to be treated. The sieve trays may be arranged in any of three different schemes in order to make different separations. The machine normally requires a motor of only ¼ h.p. and is only 3 ft. 10 in. high and 3 ft. 11 in. long.

\* \* \*

NOW in its 23rd year, The British Plastics Year Book was the first reference work to be devoted to the plastics industry, and has grown steadily in its scope to keep pace with the expansion of plastics applications. Introduced for the first time in the 1953 edition is a list of new companies registered during the past year, which shows that 70 new firms with a capital of £161,330 were formed in 1952, compared with 61 with a total capital of nearly £250,000 in 1951, and 55 with a total capital of £187,900 in 1950. The book of more than 550 pages is divided into nine sections, three of which are devoted to classified lists of manufacturers of plastic materials, products and equipment. Other sections deal with proprietary names, a directory of manufacturers giving more than 3,500 firms, and a 'Who's Who' of prominent figures in the plastics industry. A special feature is again the annual review of patents. The Year Book is published by Iliffe & Sons, Ltd., price 30s. (postage 1s. 3d.).

\* \* \*

ALTHOUGH chlorinated rubber paints have been in general use in Britain for some years their good acid, alkali and corrosion resistance as well as great impermeability, are not perhaps as fully appreciated as they might be. To provide further information on their various properties and uses a technical memorandum has been written by M. W. Heilbrun, B.Sc., technical director of Allweather Paints, Ltd. Although called a 'technical' memorandum, explanations of properties, specification and so on are all in the simplest form. In dealing with the protection of individual surfaces, four divisions are considered: iron and steel (ferrous surfaces); alkali containing surfaces; wood; and miscellaneous such as hardboard and non-ferrous surfaces. It is admitted that chlorinated paints are not really suitable for the exterior painting of woods, though it may be excellent for interior wooden roofs where severe conditions make the use of other paints undesirable. Copies of the memorandum may be obtained on request from Allweather Paints, Ltd., 36 Great Queen Street, London, W.C.2.

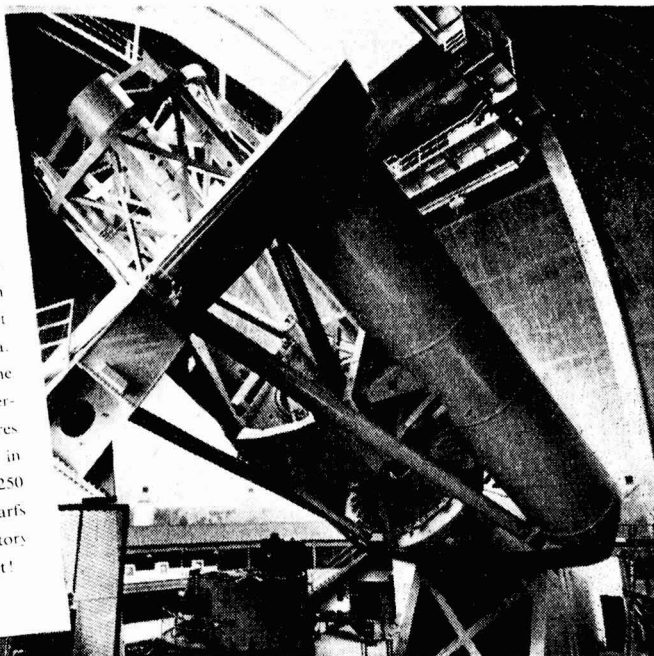


*The Simon 'Junior Sifter'*

# A GREAT RANGE

## In Astronomy it's Mount Palomar of California

Scientific advances yet undreamed of are expected from the new 200 inch telescope at Mount Palomar, California. Largest of its kind in the world, this giant aid to interstellar exploration measures 55 feet in length, 20 feet in diameter and weighs 250 tons. No wonder it dwarfs members of the observatory staff who stand beside it!

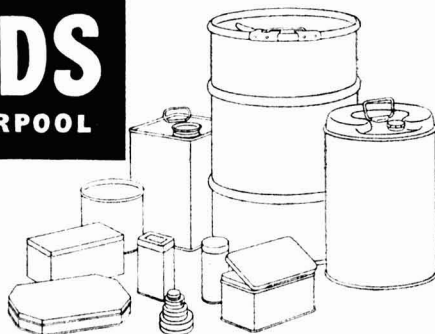


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## Next Week's Events

### MONDAY 16 MARCH

#### The Chemical Society

Cardiff: University College, 5.30 p.m. Professor M. J. S. Dewar: 'Some Recent Developments in Theoretical Organic Chemistry.'

#### Society of Chemical Industry

London: Burlington House, Piccadilly, W.1, 5.30 p.m. Crop Protection Panel of the Agriculture Group. Dr. E. E. Turtle: 'Rodenticides.'

London: Burlington House, Piccadilly, W.1, 6.30 p.m. Special meeting of the London Section. B. A. J. Lister: 'The Chromatographic Purification of Inorganic Salts on Activated Alumina'; J. C. McGowan: 'The Physical Toxicity of Chemicals'; F. E. T. Kingman, E. H. Coleman and Z. W. Rogowski: 'The Ignition of Inflammable Gases by Sparks from Aluminium Paint and Rusty Steel.'

#### Institute of Metal Finishing

London: Northampton Polytechnic, St. John Street, E.C.1, 6 p.m. F. H. Bell: 'Detergents—with Special Reference to Metal Finishing.'

### TUESDAY 17 MARCH

#### Royal Institute of Chemistry

Welwyn Garden City: The Cherry Tree, 8 p.m. Dr. J. Haslam: 'The Importance of Analytical Chemistry in Industry with Some Observations on the Training of Analytical Chemists.'

#### Chemical Engineering Group (SCI)

London: Burlington House, Piccadilly, W.1, 5.30 p.m. Stanley Robson: 'Objectivity in the Design of Sulphuric Acid Plants.'

#### Incorporated Plant Engineers

St. Albans: The Peahen Hotel, 7.30 p.m. Hertfordshire discussion group. R. E. Reynolds (Andre Rubber Co., Ltd.): 'Rubber in Industry.'

#### Institute of Petroleum

Manchester: Engineers' Club, Albert Square, 6.30 p.m. E. A. Evans: 'Lubrication—Chemist or Engineer.'

#### Society of Instrument Technology

Manchester: College of Technology, 7.30 p.m. R. P. Kinsey: 'The Application of Self Balancing Mechanisms to Precision Instruments.'

### WEDNESDAY 18 MARCH

#### Royal Institute of Chemistry

London: University College, Gower Street, W.C.1, 6 p.m. Joint meeting with the London Section of the SCI. Dr. F. Sanger: 'The Chemistry of Insulin.'

#### Incorporated Plant Engineers

Bristol: Grand Hotel, 7.15 p.m. Western Branch annual general meeting. J. Hinde: 'Some Aspects of Metallurgy in Plant Engineering.'

#### Society of Leather Trades' Chemists

Leeds: The University, 2 p.m. Manchester Group. G. W. Vivian (New Zealand Leather Research Association): 'Theoretical and Practical Aspects of Chrome Retannage'; E. L. Yoh and J. P. Danby: 'Recent Investigations on the Particle Size of Vegetable Tannins.'

#### Institute of Welding

Glasgow: 39 Elmbank Crescent, C.2. West of Scotland Branch. D. M. Young: 'Recent Developments in Arc Welding Electrodes.'

London: South West Essex Technical College, Walthamstow, 7 p.m. North London Branch. M. Riddihough: 'Hard Facing and Reclamation of Worn Parts.'

Wolverhampton: Victoria Hotel, Victoria Square, 7.30 p.m. Dr. A. A. Wells: 'A Review of Technical Works at the BWRA.'

#### Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 2.30 p.m. H. A. R. Binney (director and secretary, British Standards Institution): 'Fifty Years' Work on Industrial Standards.'

#### The Textile Institute

Leek: Nicholson Institute, 8 p.m. T. Flanagan (British Enka, Ltd.): 'Package Dyeing.'

### THURSDAY 19 MARCH

#### The Chemical Society

Edinburgh: North British Station Hotel, 7.30 p.m. Joint meeting with the RIC and SCI. Professor F. S. Dainton: 'Radiation Chemistry.'

London: Burlington House, Piccadilly, W.1, 7.30 p.m. Nernst Memorial Lecture by Professor J. R. Partington.

#### Society of Chemical Industry

London: 11 Chandos Street, Cavendish Square, W.1, 6 p.m. Microbiology Group.

[continued on page 438]





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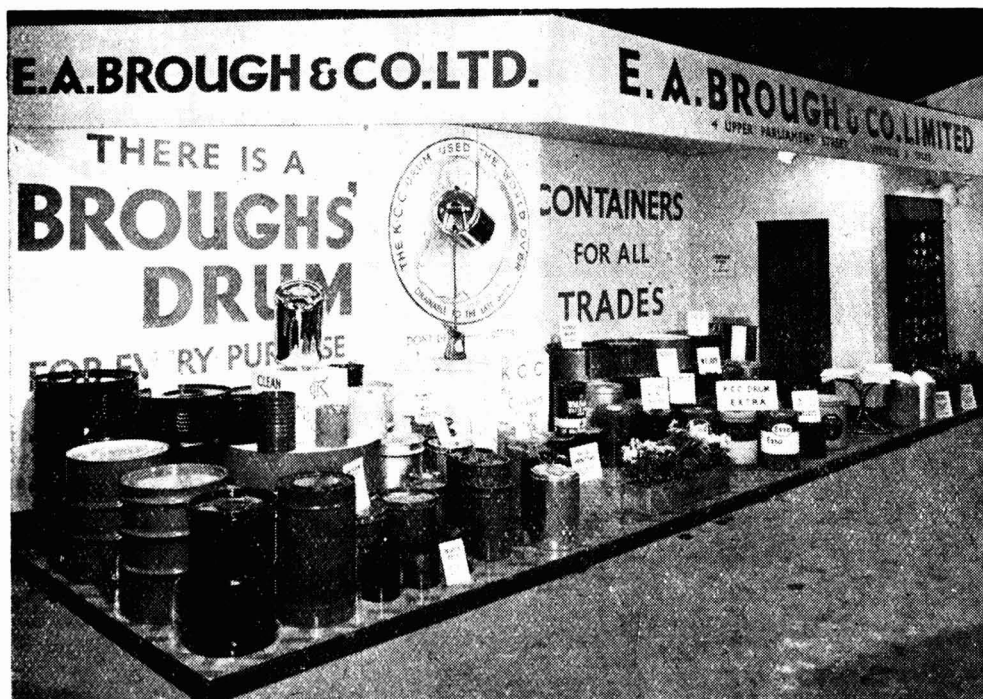
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## Next Week's Events

*continued from page 436*

annual general meeting. Dr. H. S. Holden: 'Microbiology and Crime.'

### **Oil & Colour Chemists' Association**

London: 26 Portland Place, W.1, 7 p.m. W. A. Caldwell and J. Creasy: 'The Effect of Some Physical Properties of Nitrocellulose on Lacquer Performance.'

### **Institute of Metal Finishing**

London: Charing Cross Hotel. Inaugural meeting of the Organic Finishing Group. 1 p.m. Luncheon, guest of honour: J. W. Cole, president, National Paint Federation; 2.30 p.m. business meeting; 3 p.m. technical session, A. A. B. Harvey: 'Problems of Paint Application'; 4.20 p.m. Tea interval; 4.30 p.m. technical session, D. H. Lloyd: 'Problems of Dip and Spray Painting.'

## **FRIDAY 20 MARCH**

### **Society of Chemical Industry**

London: University College, Gower Street, W.C.1. Fine Chemicals Group. 6.15 p.m. Informal buffet tea; 7 p.m. Three scientific films.

### **Institute of Metal Finishing**

Birmingham: White Horse Hotel, Congreve Street. Midland Branch. annual smoking concert.

### **Institute of Physics**

Manchester: The University, 6.45 p.m. Professor W. A. Mair (Cambridge University): 'Supersonic Flow.'

### **Society of Dyers & Colourists**

Manchester: Midland Hotel. Joint meeting with the British Association of Managers of Textile Works. Lecture by Dr. Fargher (Shirley Institute).

### **North East Metallurgical Society**

Norton: William Newton School, 7.15 p.m. Dr. H. M. Finniston: 'The Role of Metallurgy in Atomic Energy.'

### **The Royal Society**

London: Burlington House, Piccadilly, W.1, 4.15 p.m. Meeting for the election of Fellows; 4.30 p.m. P. J. Hillson and Sir Eric Rideal: 'The Becquerel Effect in the Presence of Dyestuffs and the Action of Light on Dyes'; A. B. Pippard: 'An Experimental and Theoretical Study of the Relation between Magnetic Field and Current in a Superconductor.'

### **The Royal Institution**

London: 21 Albemarle Street, W.1, 8 p.m. H. W. Melville (Mason Professor of Chemistry, University of Birmingham): 'The Size and Shape of Big Molecules.'

## Market Reports

LONDON.—There has been little change in conditions during the past week, although buying interest has been wider. Most sections of the industrial chemicals market report a steady inquiry for new business and delivery against contracts continue to cover good quantities. Prices have remained fairly steady at recent rates with the exception of the chemical compounds of lead which are again lower. The basis price for dry red lead and litharge is £123 10s. per ton and for dry white lead £138 per ton. A good demand for pitch has been maintained and there is also a steady inquiry for creosote oil and phenol crystals. Elsewhere in the coal tar products market, business has been quiet.

MANCHESTER.—Reasonably satisfactory trading conditions have been reported on the Manchester market for heavy chemical products during the past week. For the most part values have been well maintained, though there has been fresh easiness on balance in the lead products and some of the other non-ferrous metal compounds. The demand for general chemicals from home users, including the cotton, woollen and rayon trades, has been on fairly steady lines, and there has been fresh inquiry for export. The seasonal demand for fertilisers seems to be developing reasonably well.

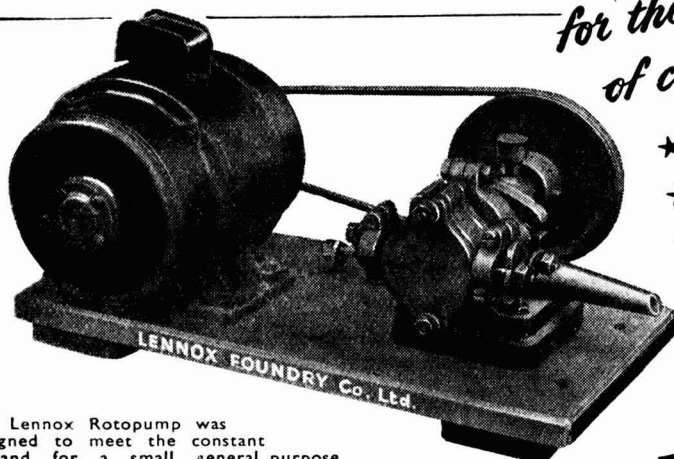
### **Pesticide Awarded Patent**

Farbenfabrik Bayer (Leverkusen) has been awarded a British patent (673,117) for a new synergistic pesticidal mixture of dimethyl and diethyl-*p*-nitrophenyl thionophosphates. The activity of the combination is said to be greater than the sum of the activities of the components.

### **Technical & Scientific Register**

The total number of persons enrolled on the Technical and Scientific Register at 12 January, 1953, was 5,107. This included 3,712 registrants already in work, but who desired a change of employment, and 1,395 registrants who were unemployed. Vacancies notified during the period 9 December, 1952, to 12 January, 1953 (five weeks) totalled 556, of which 127 were filled and 392 were cancelled or withdrawn.

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*for the handling  
of corrosive liquids*

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THE Council of King's College invite applications for a **LECTURESHIP IN CHEMICAL ENGINEERING**. Candidates must be competent to teach postgraduate students who are following a two year full-time course in Chemical Engineering. The Department offers ample facilities for research.

Salary on the scale £600 × £50 to £1,100 with family allowance and F.S.S.U.

Twelve copies of application, together with the names of three persons to whom reference may be made, should be submitted not later than 18th April, 1953, to the undersigned, from whom further particulars may be obtained.

**G. R. HANSON,**  
Registrar of King's College.

**EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS** in various Government Departments. The Civil Service Commissioners invite applications for pensionable posts. Applications may be accepted up to December 31st, 1953, but an earlier closing date may be announced either for the competition as a whole or in one or more subjects. Interviews will generally be held shortly after the receipt of the completed application form and successful candidates may expect early appointments.

The posts are divided between following main groups and subjects: (a) Mathematical and Physical Sciences; (b) Chemistry and Metallurgy; (c) Biological Sciences; (d) Engineering subjects; and (e) Miscellaneous (including e.g. Geology, Library and Technical Information Services).

**AGE LIMITS:** For Experimental Officers, at least 26 and under 31 on December 31st, 1953; for Assistant Experimental Officers, at least 18 and under 28 on December 31st, 1953. Extension for regular service in H.M. Forces.

Candidates must have obtained, or be taking examinations during 1953 with a view to obtaining the Higher School Certificate with Mathematics or a Science subject as a principal subject; or the General Certificate of Education in appropriate subjects; or the Higher National Certificate or other specified qualifications. Candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. Candidates over 22 will generally be expected to have higher qualifications.

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Further particulars and application forms from the **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1**, quoting No. S94-95/53. Completed application forms should be returned as soon as possible. 20182/260/HE.

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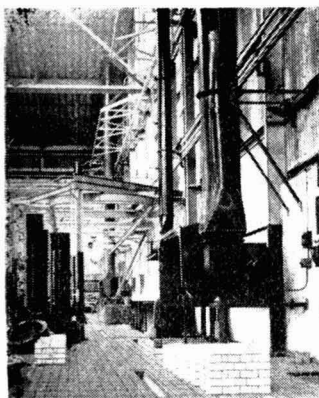
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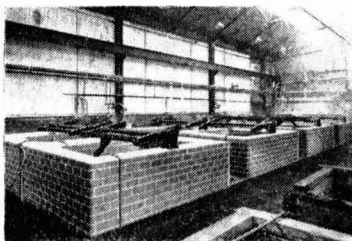
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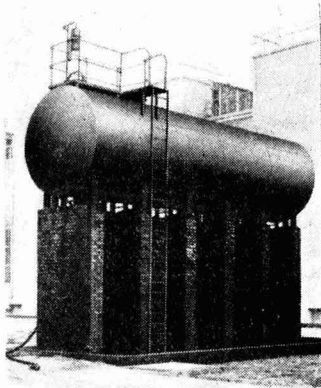
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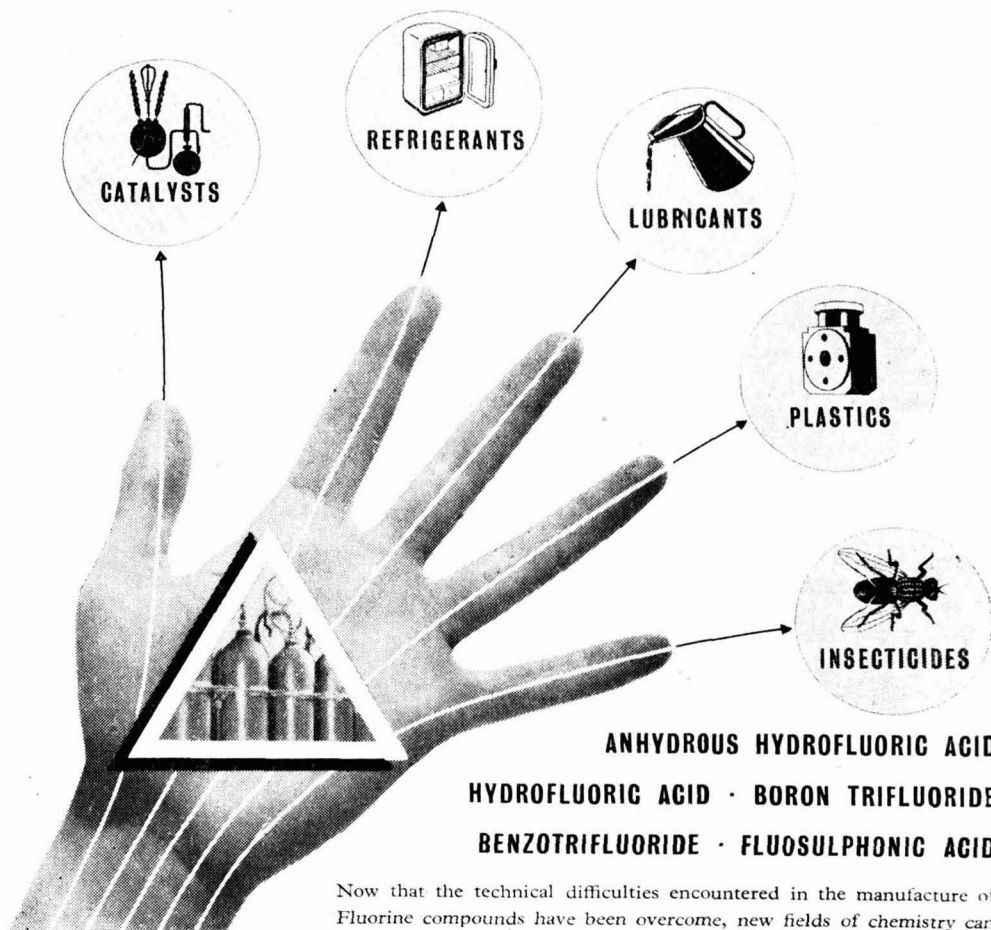


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# FLUORINE COMPOUNDS—

## INCREASING USE IN INDUSTRY



**ANHYDROUS HYDROFLUORIC ACID**  
**HYDROFLUORIC ACID · BORON TRIFLUORIDE**  
**BENZOTRIFLUORIDE · FLUOSULPHONIC ACID**

Now that the technical difficulties encountered in the manufacture of Fluorine compounds have been overcome, new fields of chemistry can be explored. Fluorine-containing refrigerants, plastics, insecticides and intermediates all show great industrial promise. The above-mentioned compounds are of value in the manufacture of such fluorinated materials, and are available in commercial quantities. Our research department would be pleased to advise on any technical queries regarding the use of Fluorine compounds.



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