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# The Chemical Age

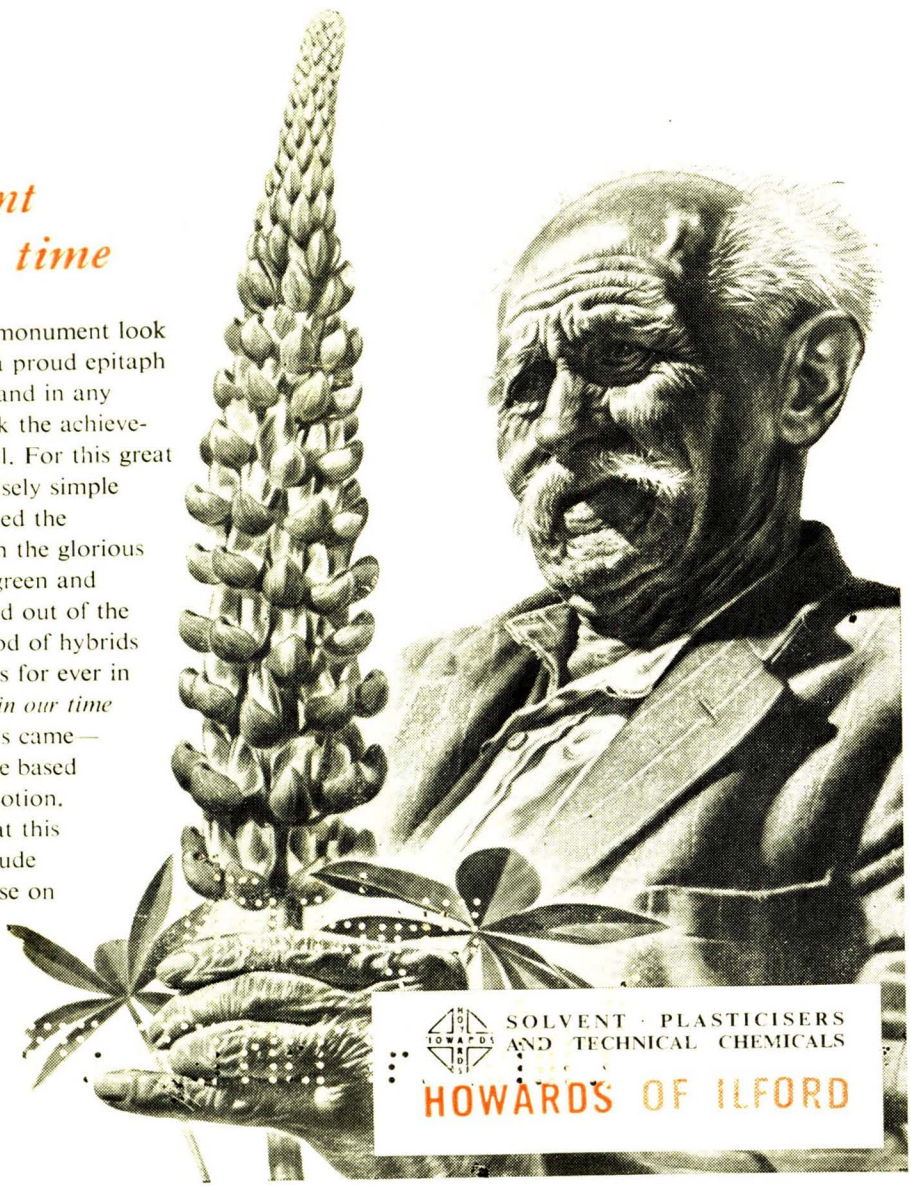
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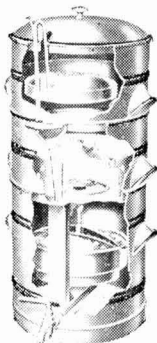
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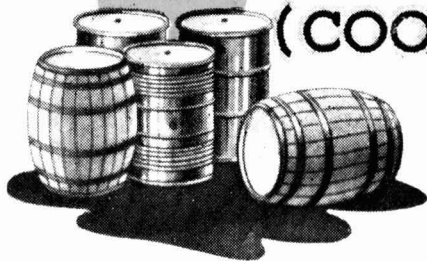
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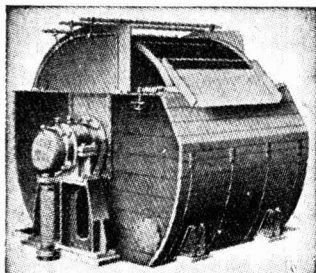
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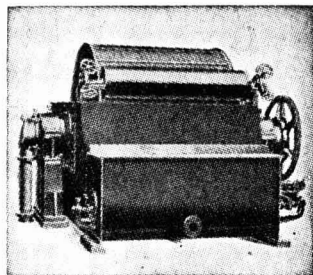
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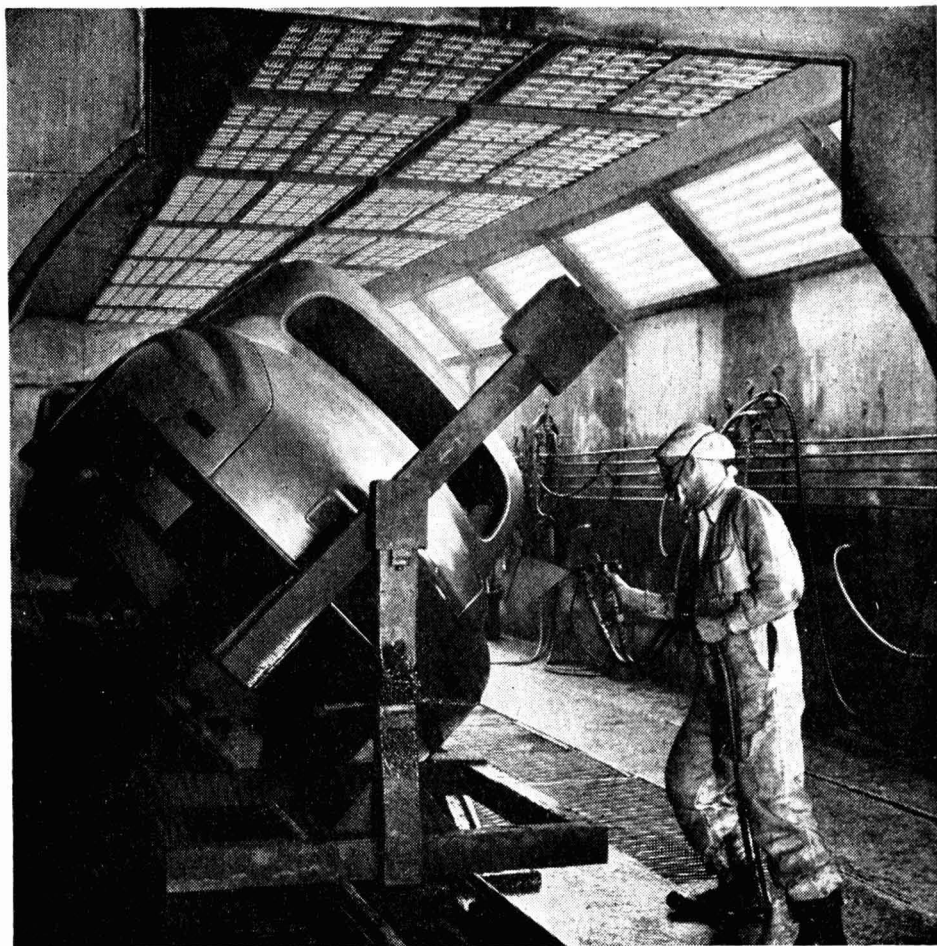


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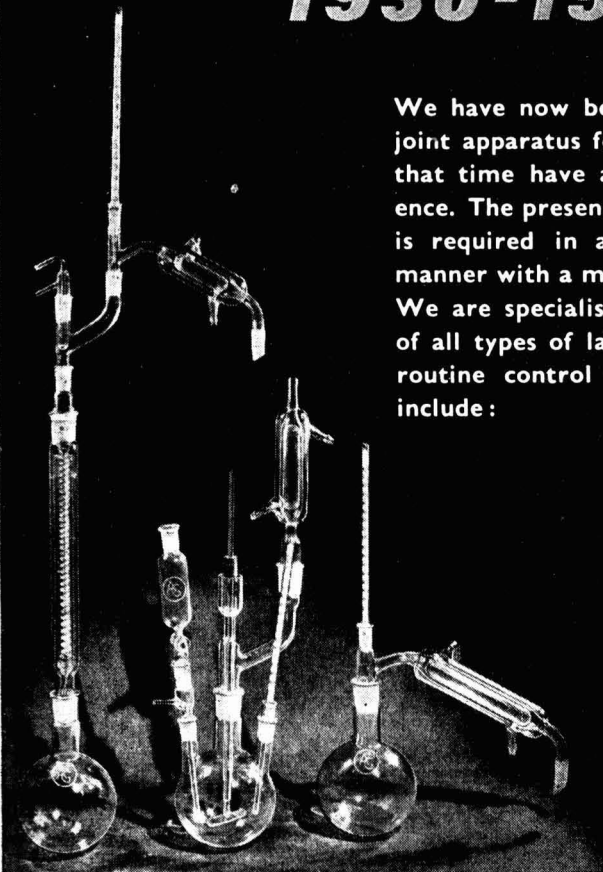
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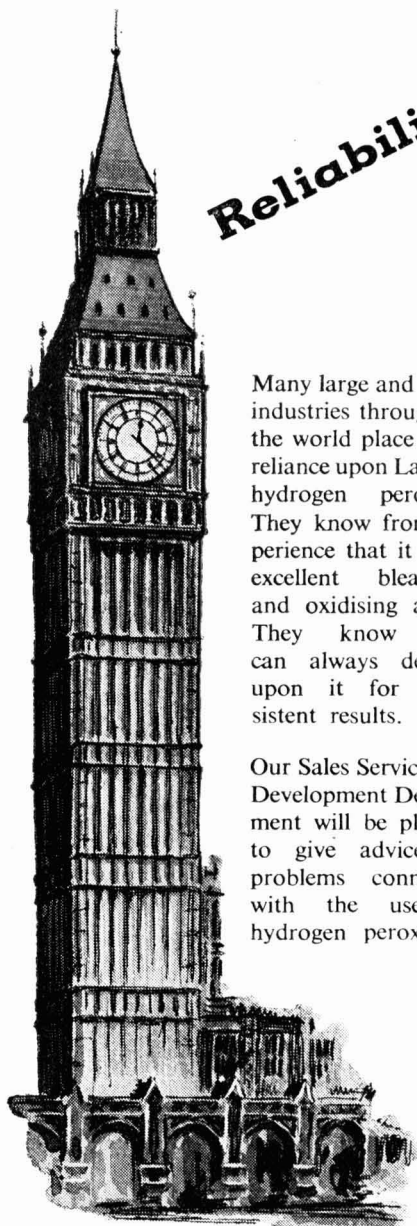


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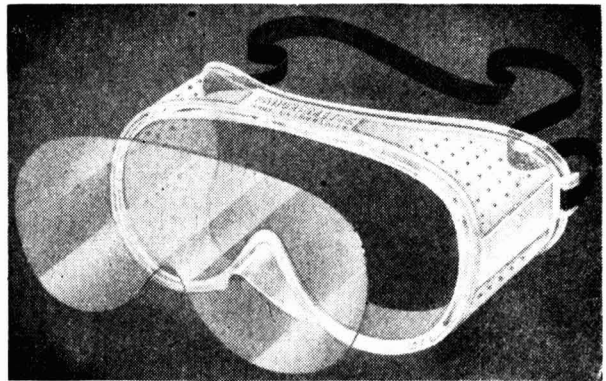


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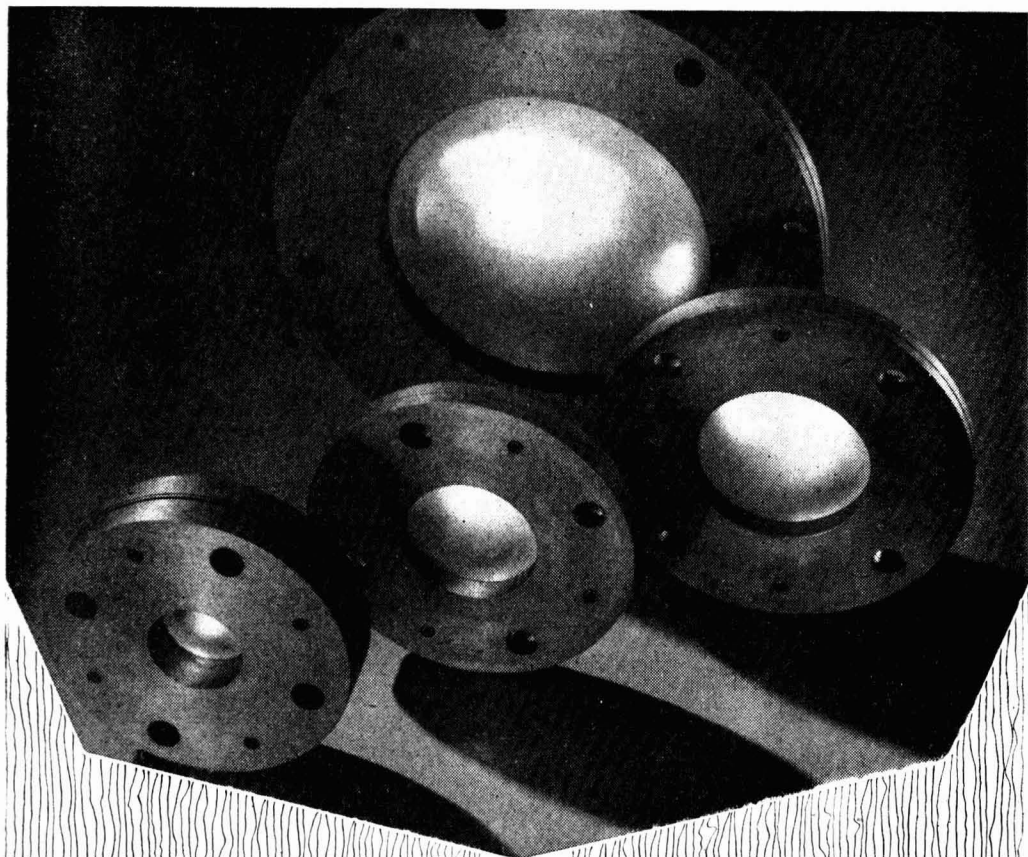
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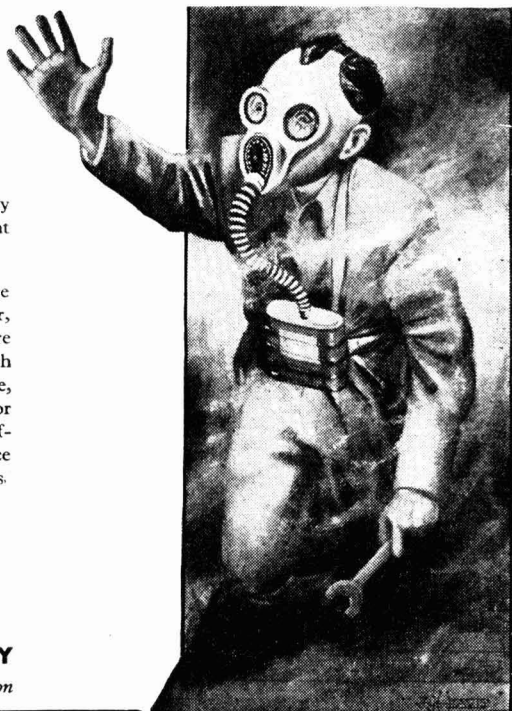
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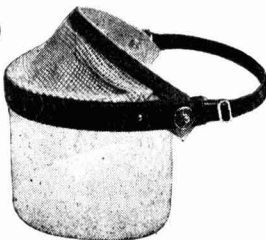


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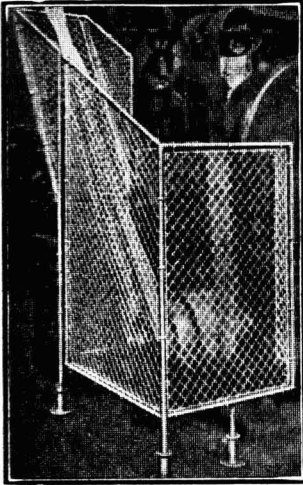
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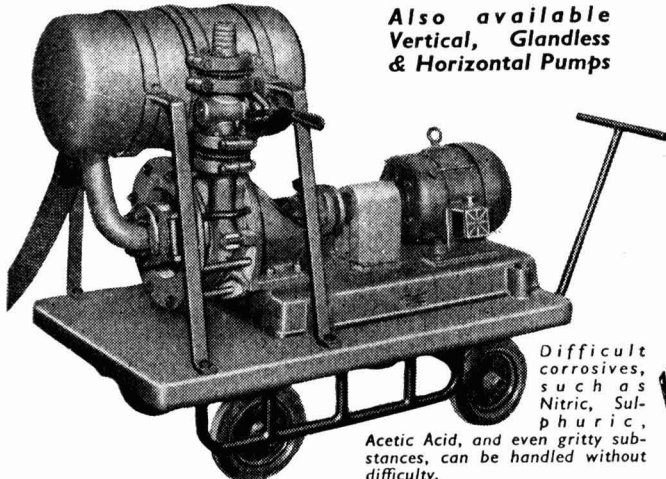
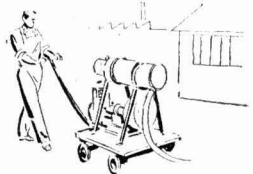
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*Established 1919*

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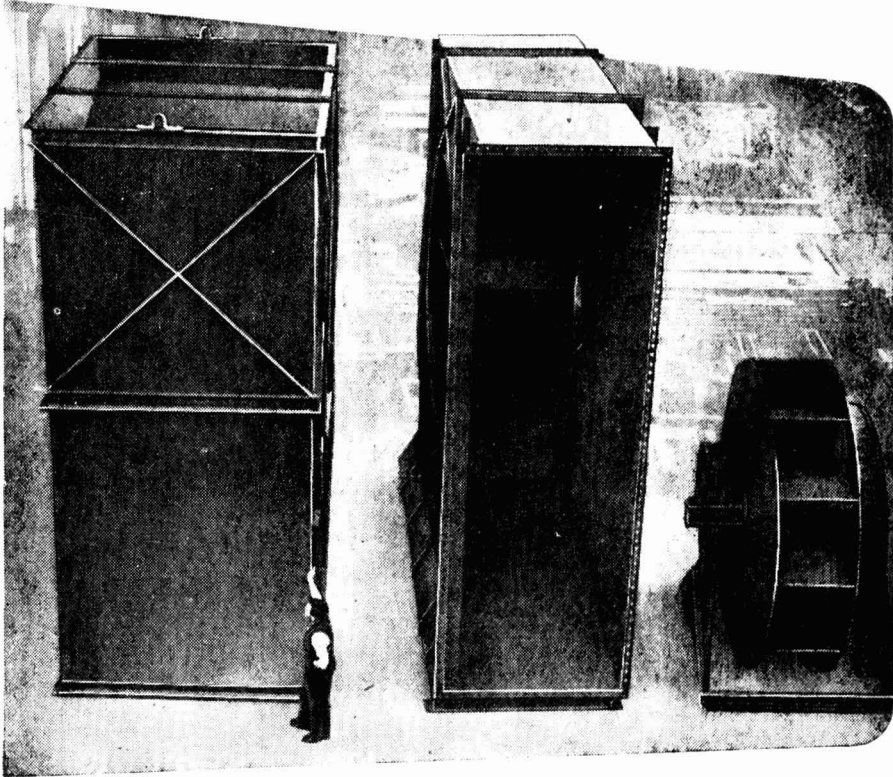
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# Chemicals from Nature

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SUCH words as 'nature' and 'natural' are dangerous for the unwary, for it can be argued with unquestionable soundness that a growing field of wheat is far from 'natural,' and there are purists of thought and terminology who would go so far as to contend that there is no such person as 'Nature.' What, indeed, is a chemical of natural origin? We can hardly doubt that chlorophyll extracted from grass or lucerne is thus describable; but what of sulphate of ammonia produced as a by-product of coke or gas manufacture? The sulphate radical may be an intruder but the ammonia has come from the fossil, coal, and is surely a naturally originating chemical, differing from the chlorophyll won from a current crop in the matter of geological time only.

Perhaps these queries of definition are merely wasteful, the idle quibblings of futile thought, but there is still a sizeable amount of nature-worship in our technological world, particularly in agricultural and medical chemistry. There are numerous crop growers who contend that nitrogen in the form of dried blood or powdered hoof and horn is far superior as a fertiliser to the same quantity of nitrogen in the form of sulphate of ammonia, and they are prepared to back those beliefs by paying three or four times as much for this 'natural nitrogen' even in times of depression. It is true enough that there are distinctions in solubility and rate of availability between the two kinds of fertiliser nitrogen, but the support for the natural kinds is rarely based upon these logical arguments; far more often it rests upon mysticism, upon the faith that Nature, like mother, knows best and endows her products with additional but inexplicable virtues. When a traditionally plant-derived drug is at long last synthesised in the research laboratory,

achievement is recognised among scientists but it may take much longer for the synthetically produced product to be acceptable to the consumer.

Broadly speaking, the triumphs of synthesis are loudly acclaimed by scientists themselves, but outside the realm of laboratories and journals suspicion still lurks in the shadows. A recently published paper on the isolation of fine chemicals from natural sources (Wm. Mitchell, *Chemistry & Industry*, **43**, 1132-7) made a vigorous plea for much greater emphasis on research into naturally-occurring substances; by contrast, much of the far greater research effort devoted to synthetic drugs was described as blind groping. With a public audience or readership, this plea would not have required such powerful presentation; but in scientific circles today few can truthfully deny that synthesis occupies the altar.

Indeed, the very fact that some useful chemical, drug or insecticide, is still produced from an animal or vegetable source is by itself a challenge. Synthesis must be achieved—preferably, of course, with a lower-cost production process in the offing. But even without this economic blessing, full honour will be won by the molecule-architect for filling one more gap in the records. We should not disparage the great triumphs of synthesis, and few surely will agree with Mitchell's scathing piece of faint praise, 'True, there have been a few notable successes, of which one or two were achieved more or less accidentally . . .'

But this excessively zealous piece of pleading by counter-attack in no way diminishes the merits and force of Mitchell's case. Naturally-occurring substances, chemical and complex compounds organised in plant and animal growth, are paid scanty attention today.

Immediately one natural complexity has been synthesised, or even something closely akin (e.g., allethrin, synthetic imitator of the pyrethrins), the experts in synthesis run through the permutations of analogues and homologues with all the assiduity of the football pools specialists. Improvement upon nature may yield the winner!

Mitchell is far from alone in stressing the risks that may be run in using unusual molecules in chemotherapy. The worship of synthesis can be just as blind as the worship of nature. However, no one should seriously admit the prejudice that molecules built by nature will be safer chemotherapeutic agents than molecules fashioned by man. Some of the most toxic substances which can be introduced into the body are of plant origin, and the basic truth is that poisons and palliatives alike are not dependent upon their mode of production for their properties. We should assess a new chemical drug upon its own clinical merits, and allow plenty of time for this judging, irrespective of whether it is a natural extract or a synthetic 'miracle.'

The tendency to ignore naturally-originating chemicals is no doubt one of those fashion swings which not uncommonly influence chemical research. It is a little surprising, to say the least, that the huge success of antibiotics has not corrected this tendency of our times. (Indeed, an American biochemist could argue that there has never been more research upon natural complexities than in the past decade, for he would only have to cite the almost immeasurable volume of antibiotics research which has been conducted by just two or three US companies.) The British Government's single venture in the search for new antibiotics exists in a converted house, valiantly staffed by a far too small team of scientists, and the number of new micro-organic products that can be screened per year is sadly low.

On a wider scale the economic utilisation of products and wastes from farming, forestry, and fishing has been sadly neglected. The Development Commission's Report ('Survey of Agricultural, Forestry, and Fishery Products in the United Kingdom and their Utilisation,'

HMSO, 1953, pp. 141, 7s. 6d.) revealed some weaknesses that are quite extraordinary in a country so dependent upon abundances of raw materials. 'Although there are 300 primary and secondary products of biological origin arising in bulk in the United Kingdom, detailed chemical analyses for less than 5 per cent of these appear to be available . . .'

The disposal of bulky wastes is a long way removed from Mitchell's theme of fine chemicals from natural sources, and the discovery, for instance, that vanillin could be obtained from lignin made an insignificant contribution to the problem of utilising the huge tonnage of lignin produced in the making of wood-pulp. Nevertheless, if a marketable chemical substance can be extracted from a waste material, it is not unworthy of development merely because only a minute fraction of the total wastes will be affected. Yet 'not one of the 100 or so Government-aided research stations in the United Kingdom concerned with raw material utilisation, etc., has as its primary aim the development of new uses for animal and vegetable materials, by-products and wastes. In general, their attention is confined to single or limited groups of industries and their main objective is to improve the quality, application, methods of production, etc., of the established products of these industries.'

A notable example of both a waste disposal problem and neglected opportunity exists in the fisheries of this country. 'Many pharmaceutical substances of therapeutic value are to be found in fish tissues and are not at present appreciably utilised . . .' e.g., hormones, the anti-pernicious anaemia factor, bile acids, insulin, guanine, etc. And as another example: 20,000 tons of wool wax—a prolific and flexible source of sterols, wax alcohols, and fatty acids—are annually run to waste.

Chemicals, fine or crude, raw starting materials or highly purified final products, could and should be based far more upon plant and animal sources, upon renewable assets. 'Waste not, want not' is an old adage but it must increasingly apply to a country whose population/acreage ratio makes it as vulnerable as ours.

# Notes & Comments

## Canada's Sulphur Effort

**A**LTHOUGH her steadily expanding chemical industry will inevitably require more and more sulphuric acid, Canada will produce 60 per cent of her own sulphur needs by 1955. The present proportion is about 35 per cent. This estimate excludes the sulphur obtainable from sour natural gases in western Canada, a source that might well provide all the Canadian needs. Some of the gas fields in Alberta contain as much as 8 per cent of hydrogen sulphide, and 1,000,000 cu. ft. would yield some 40 tons of elementary sulphur. At present, however, the production from natural gas is small, only about 7 per cent of the amount obtained from pyrites roasting. In 1951 Canada produced 384,000 tons of sulphur or sulphur in equivalent form; the probable tonnage for 1953 is 570,000. This increase is largely due to rises in pyrites treatment and smelter gas recovery. Production of sulphur from Alberta's natural gases is so far confined to two new oil company plants which have a combined capacity of 20,000 tons of sulphur per year. Over half the sulphur used in Canada is required by the pulp and paper industry; the second largest use is the manufacture of sulphuric acid, mainly for further use in fertiliser production. Most users of sulphite for pulping or acid for fertilisers seem to have met the recent restrictions on US sulphur supplies by backing the alternative pyrites process. The huge potential reserves of the sour gases in the West are unlikely to be developed unless the world price for sulphur increases; the transport costs from west to east are too high.

## The Resistant Fly

**I**F there is one field in which DDT must eventually admit defeat after apparent success, it is in the control of houseflies. We read from time to time that certain housefly populations develop resistance to DDT, and we know that entomologists can produce resistant flies by allowing successive surviving generations to breed. And if the control

by insecticides is well-organised over a wide area, practically the total fly population in a few years achieves natural resistance. This is the case in Denmark. The most thorough use of DDT and other chlorinated hydrocarbon insecticides has taken place on Danish farms, and the result now is that the flies are immune. (*Nature*, **172**, 758-9). If such marked development of resistance has not yet occurred in other countries, it is because there has not been comparable exposure. The situation is ironic, for slackness or inconsistency in applying control measures lengthens the time-period during which control, when and where applied, can be effective!

## Certain and Safe

**T**HE Danish Government's Pest Infestation Laboratory at Springforbi seems to have surmounted the difficulty in devising a method by which Parathion can be safely used. No amount of inbred resistance to DDT and its kin could protect an insect from Parathion, but this organo-phosphorus insecticide brings other and more serious problems with it. It has a dangerous animal and human toxicity; and even if it could be sprayed in farm buildings, it would quickly be degraded to useless products through hydrolysis by lime-wash on walls, ceilings, etc. Strips of gauze of the bandage type, impregnated with Parathion solution and hung in buildings, have given most effective and lasting control over flies in farm buildings. Strips used for six months at 20° still gave 100 per cent kills when flies were exposed to them for one minute. The gauze strips have been manufactured in lengths of 10 or 100 mm. and with breadths of 2.5 or 5 cm. In 1952 they were used on 20,000 Danish farms; this summer they have been used on up to 100,000 farms. Failures to give complete control have been very few. In some countries there would undoubtedly have been considerable official reluctance to permit the use of Parathion in this way, but the Danish Health Department took this risk. No accidents have been reported.

## Liebig—150 Years

WE recently, and not without a little shame, realised that stamp designers and philatelists had honoured the third jubilee of Justus von Liebig's birth though the event had largely been ignored by chemists and the chemical Press. Germany this year issued a 30 pfennig stamp carrying an engraved portrait of this truly great nineteenth century chemist, 1803-1873; and *Stamp Collecting*, the well-known British philatelic weekly journal, recently contained an excellent article on Liebig's work. Before he was 40 Liebig had put forward the mineral theory of plant nutrition. In Sir John Russell's words, this 'came like a thunderbolt on the world of science.' Yet he had little knowledge of, or connection with, farming. Later he invented the famous extract of beef, and many people to whom the name of Liebig still means nothing will nevertheless have noticed on labels of well-known meat preparations the words 'Liebig Extract of Meat Company.' Liebig discovered chloral and chloroform. He invented the silver-backed mirror. He proved that the warmth needed by living bodies was derived from food combustion. He founded the first public chemical laboratory in his own country, when he was professor at Giessen. And as we recently noted (*THE CHEMICAL AGE*, 69, 589), it was in 1837 at the British Association's first Liverpool meeting that Liebig, then still a young man, made a vigorous plea for British interest in the 'new organic chemistry,' and as a direct result a new college was founded here eight years later, the first 'school' of British organic chemistry, and led by one of Liebig's own students.

## Self Taught

FOR all his achievements, Liebig was virtually a self-taught scientist; indeed, he was expelled from school for conducting unofficial experiments. It can be doubted whether any chemist enjoyed as brilliant and diverse a career. Fertilisers, meat extracts, infant foods, chloroform—the impact of his work was beneficial to all nations and totally humane in direction. That he could be dogmatic and bombastic and

an ungracious opponent in argument can be forgiven in the light of history, though in his own time it damaged his influence, especially in the later phases of his career. Liebig has never been honoured as much as he deserved. He must rank as one of the greatest 'applicators' of chemistry of all time, and we fail to recognise the full brilliance of his contributions unless we remember that he was half-way through his life when Victoria came to the throne. The 1953 postage stamp in his honour would have pleased him greatly; though he was 37 and had already published his greatest work, the mineral theory of nutrition, when the world's first postage stamp was issued.

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## Defeating Smog

PENNSYLVANIA Department of Health is setting up a service to prevent 'smog.' Mobile laboratory vans from the Bureau of Industrial Hygiene have been gathering data about prevailing winds and other meteorological conditions throughout the state. When this investigation is complete, the division, using official weather reports, will be able to forecast the occurrence of conditions likely to lead to the accumulation of fumes and fog in any vicinity. If necessary chemical and other industrial plants in the locality will be ordered to close down or curtail their operations until the dangerous weather conditions have passed. It is reported that Pennsylvania manufacturers, anxious to co-operate and hoping to avoid any sudden shut-downs, are making good progress in the installation of air pollution control equipment.

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## Fullers' Earth in India

ON being activated and tested for bleaching properties at the Scientific and Industrial Research central laboratories, Hyderabad (Dn), two samples of fullers' earth found in Hyderabad State are reported from India to have been found comparable to imported products. Production of fullers' earth in India in 1928 was about 3,000 tons, valued at Rs.21,700, and the quantity imported was worth Rs.80,355. There has been no substantial increase in its production since then.



# The Bursting Disc – A Modern Safety Device

by J. M. PIRIE, A.R.C.S., Ph.D., A.M.I.Chem.E.  
(Johnson, Matthey & Co., Ltd.)

FOR the protection of closed vessels and pipe systems against the effect of excessive pressure, the bursting disc provides a greater measure of safety than any other device. A correctly designed disc made of tested material can never withstand a higher pressure than that at which it is intended to burst; abnormal working conditions or incorrect assembly will always result in failure of the disc at a pressure lower than the intended bursting pressure. It is a device which always 'fails safe.'

When the bursting pressure is reached, a disc responds immediately; very little energy is required to open it fully and provided the discharge opening is of sufficient size, the excess pressure in the system is released at once. Discs can be mounted in openings of ample size without special difficulty, and large discs are neither unduly cumbersome nor expensive. A 20-in. orifice size bursting disc assembly is quite practicable even on

comparatively small vessels, whereas a safety valve of equivalent relieving capacity would be exceedingly heavy and very expensive.

Discs can be made of metals which will resist almost any corrosive conditions, and which can be used at elevated temperatures. They are simple to install and maintain and they can be stored indefinitely without deterioration.

## SOME LIMITATIONS

In past experience, the use of bursting discs has been accompanied by two serious disadvantages which have limited the general use of this device. The first of these is the problem of obtaining consistent behaviour from successive discs fitted to the same holder, since discs made from foil of the same thickness but purchased from different sources would vary quite considerably in the pressure at which they burst. Plant engineers often found it necessary to hold com-

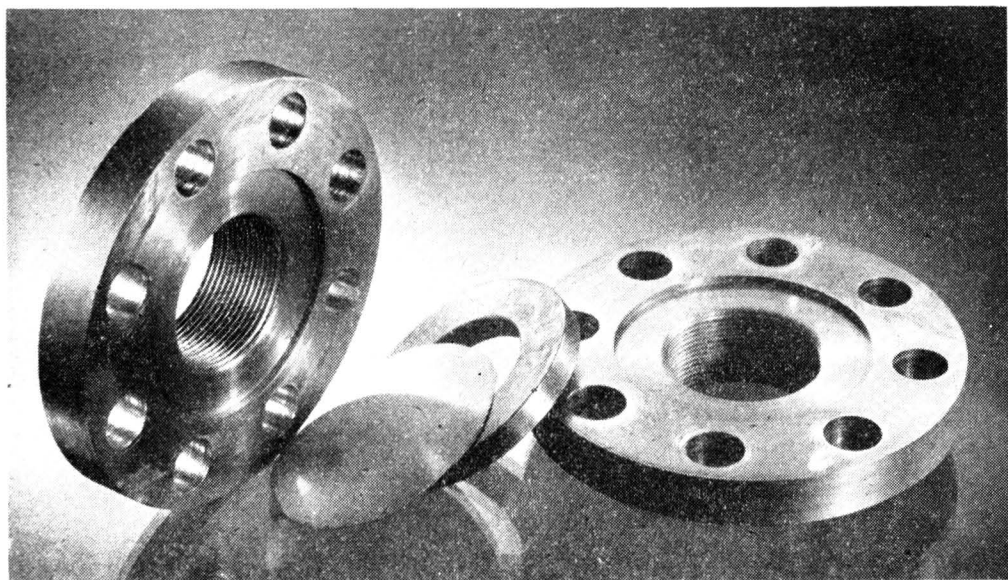


Fig 1. Component parts of orifice-type holder; flat nickel disc and stainless steel orifice ring

[Courtesy: Johnson, Matthey & Co., Ltd.]

paratively large stocks of particular foils which happened to be suitable in order to safeguard themselves against the difficulties of replacement.

The present availability of certified discs made from closely controlled pretested foils has entirely removed this particular problem, since replacement discs with known and repeatable characteristics can be obtained at short notice in whatever quantity is required.

The second disadvantage is the necessity to allow a margin, usually at the very least 25 per cent, between the normal working pressure and the intended disc bursting pressure, in a vessel protected in this way. This difficulty still remains and since the disc is normally set to burst at the safe working pressure of a vessel, it is usually not possible to operate at as high a pressure in a disc-protected vessel as it would be in the same vessel fitted with a safety valve.

A better understanding of the creep characteristics of the various available materials is however being acquired, and the safe margin between operating and bursting pressure is becoming more narrowly defined. When there is need to work equipment at the highest possible pressure, it is sometimes practicable to operate at over the normal limit and to avoid premature failures by changing discs fairly frequently.

### THE DESIGN OF ASSEMBLIES

A bursting disc cannot be considered alone; it is essentially part of a complete assembly and for accurate performance it

must be fitted into a correctly designed holder. Except for a limited range of special conditions, it is now the general practice to design the assembly so that the disc assumes a spheroidal form before it bursts, and the rupture occurs by tensile failure at the thinnest part of the crown. For many services the disc is predomed by applying a hydraulic pressure up to about 70 per cent of the required bursting pressure. This hydraulic predoming process quickly reveals any surface imperfections in the foil and is also of advantage in that it leads to more careful handling of discs by plant operatives.

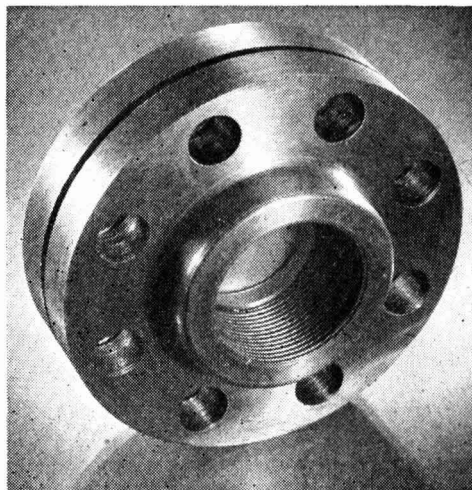
Disc assemblies with orifices from about 1 in. upward are generally of the flanged type. In their simplest form they consist of a base flange which is mounted on the vessel or pipe line with a recess to receive the disc, and a retaining flange with a corresponding spigot. This design is improved upon in the orifice ring holder (Figs. 1 and 2) which has a replaceable spigot, generally of a hard alloy. The capsule type holder (Fig. 3) is designed for quick and easy replacement, and is easily mounted between a pair of gasketed standard flanges. In small-bore assemblies, usually fitted to autoclaves, a screwed holder is employed. The cone-ring type (Fig. 4), in which the retaining pressure is transmitted through the apex of a conical ring, is undoubtedly the best of these.

In every type of holder, the retaining flange is given a smooth radius on the shoulder so that it cannot cut the rim of the disc. The size of this radius is varied according to the diameter of the orifice, but, within reasonable limits, it is not critical.

Discs for low pressure services are comparatively thin—say 0.002 in. to 0.01 in. in thickness—and when predomed would collapse inward if the system were subjected to vacuum. A perforated domed vacuum support is therefore provided, accurately fitted to the underside of the disc in order to avert the risk of collapse.

### SOME NECESSARY PRECAUTIONS

No safety device is completely tamper-proof, and because of their apparent simplicity bursting discs are sometimes the subject of abuse. Their use must be governed by a careful system of issue and record; nominated individuals who are to handle them should clearly understand their properties and function. It is particularly necessary, of course, to avoid any circumstances in which



*Courtesy: Johnson, Matthey & Co., Ltd.]*

**Fig. 2. Assembled orifice type holder**

the wrong disc could be fitted to a particular holder. Discs can be visibly tagged with their bursting pressure and orifice size, or a mechanical interlock can be incorporated so that it is possible to insert only the correct disc in a particular holder. Sealed holders, replaced as a unit and reloaded only under supervision, are preferred for some purposes.

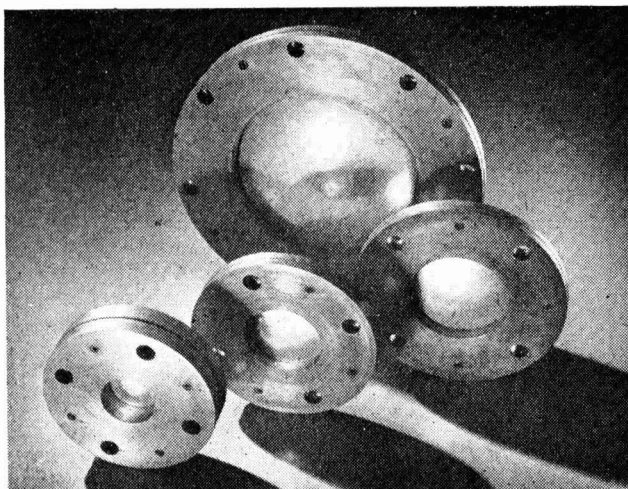
When a disc is placed in series with another disc, or with a safety valve, it is essential to avoid an undetected pressure rise in the interspace. If a system of high potential energy is to be protected by a large disc, it may be necessary to take precautions against the effect of recoil when the disc bursts. It is obviously necessary in most cases to provide a suitable vent pipe for the discharged vapours.

### TYPICAL APPLICATIONS

Discs may be used either as primary protection for a pressure system, or as secondary protection in conjunction with another safety device. Generally speaking, they are used for primary protection only in circumstances where it is impracticable to fit a safety valve. These circumstances arise when the conditions are highly corrosive or when a valve is likely to become blocked or stuck, or where leakage into or out of the system must be prevented, or where rapid pressure rise and large gas volume make a safety valve impracticable. These circumstances arise mainly in the chemical industry and it is here that the greatest number of directly protected vessels are found.

When a disc is used as primary protection

*Courtesy: Johnson, Matthey & Co., Ltd.*



**Fig. 3. Certified domed discs in capsule type holders**



*[Courtesy: Johnson, Matthey & Co., Ltd.]*

**Fig. 4. Exploded view of cone-ring holder**

it is a general requirement that the disc shall burst at a pressure not higher than the safe working pressure in the vessel. If the vessel is to be operated at temperatures other than atmospheric, the temperature at which the bursting pressure of the disc is the maximum is to be taken as the basis for calculation. The practice of using discs as secondary protection is comparatively recent, but is very

well worth consideration in a great many industries using pressure equipment. If a vessel is fitted with a safety valve, the disc can be arranged to burst at the pressure equal to the hydraulic test pressure of the vessel and is thus set at a very considerable margin above the normal working pressure. Generally speaking, the disc will never be required to function and will require replacement only at very infrequent intervals. On the other hand, should an unexpectedly rapid pressure rise occur or should the valve for any reason fail to open, the presence of the disc will completely eliminate the risk of a disastrous explosion.

The availability of precision-made certified discs in this country has already proved a rapid stimulus to their greater use and there is no doubt that the bursting disc will become in the near future a widely used and well recognised safety device.

## **New Glass Sales Company Quickfit & Quartz & Joblings Agreement**

AT the annual general meeting of the Triplex Safety Glass Company, Ltd., in London on 28 October, Sir Graham Cunningham announced that Quickfit & Quartz, Ltd., of Stone, Staffordshire, manufacturers of 'Quickfit' chemical plant in glass, and James A. Jobling & Co., Ltd., manufacturers of the well-known 'Pyrex' glassware, are jointly forming a new company for the development and sale of glass chemical plant and pipeline.

The new company will be called Q.V.F. Ltd. (the name is a contraction of 'Quickfit' and 'Visible Flow') and will have its offices at Mill Street, Stone, Staffordshire. The directors will be:—

Chairman: Sir Graham Cunningham (chairman of the Triplex Group of Companies, who control Quickfit & Quartz, Ltd.).

Managing director: Brian H. Turpin (director of Quickfit & Quartz, Ltd.).

J. A. Falconer, C.A. (managing director of Thomas Tilling, Ltd., who control Joblings, of which he is chairman).

C. J. P. Hope, B.Sc. (managing director of Joblings).

J. M. Bruce (chief chemical engineer, Quickfit & Quartz, Ltd.).

J. Window (chief salesman, Joblings).

A joint statement issued by the two firms said: 'We must realise that there is a big future for glass chemical plant and glass

pipeline, and consider that by amalgamating our resources we can more quickly and economically develop this comparatively new field both at home and abroad.'

Sir Graham Cunningham added: 'I should like to take this opportunity of paying tribute to the most friendly and co-operative way in which the directors of Tillings and Joblings made it possible to complete these arrangements, which should prove satisfactory both for our own company and for Joblings.'

## **Crystalline Solids**

### **Forthcoming Conference on Defects**

THE H. H. Wills Physical Laboratory of the University of Bristol, in co-operation with the International Union of Pure and Applied Physics (particularly its Commission for the Physics of the Solid State) and with The Institute of Physics, is organising a conference on 'Defects in Crystalline Solids' to be held from 13-17 July, 1954, in Bristol.

While not excluding other subjects in the field, the organisers propose to give particular attention to defects such as dissolved atoms, vacancies and F-centres, to microwave resonance methods of investigating their properties, and to the way in which they react with dislocations. Thus dislocations will be discussed in their chemical aspects, as influencing diffusion and precipitation in the solid state, rather than in relation to plastic flow.

It is hoped that a number of authors from overseas will personally present their papers, and with this in mind the conference has been arranged to follow immediately after the General Assembly of the International Union of Pure and Applied Physics.

Board and lodging will be provided in Wills Hall, a student hall of residence, on special terms, or at hotels. The conference is open to any scientist interested in this field, subject to the limitations of seating accommodation.

Further particulars may be obtained from the Secretary, H. H. Wills Physical Laboratory, Royal Fort, Bristol, 8, or from the Secretary, The Institute of Physics, 47 Belgrave Square, London, S.W.1. Those wishing to attend the conference are asked to apply to the former, marking the envelope '1954 Conference,' stating whether they wish to be accommodated at Wills Hall or at an hotel.



# Chemical Works Fire Fighters

## *Albright & Wilson's Brigade Have Specialised Knowledge*

**P**HOSPHORUS, phosphoric products, diphenyl and carbon di-sulphide, although chemicals which suggest a high fire risk, are all in a day's work for the 27 members of the works fire brigade of Albright & Wilson, Widnes. An article in the current issue of our sister journal, *Fire Protection Review*, points out that all the members of the brigade are part-timers, and, being engaged in various phases of the manufacture of phosphorus and its by-products, are well-versed in the idiosyncrasies and the dangers, and with the fire precautions statutorily laid down for these products.

Thus, in 1946, when Chief Officer W. G. Parkinson, then a phosphorus foreman, was asked to form a fire brigade, he was able to recruit from men fully aware of the hazards and fire danger points in the works. Twenty men were recruited from all sections of the works: from the phosphorus plant, where phosphorus is extracted from the rock in three-phase electric furnaces reaching a temperature of 1,500°; from the carbon tetrachloride plant, where carbon di-sulphide is used in manufacture; from the phosphoric acid plant (where diphenyl constitutes a serious fire risk); from the sodium phosphates shed; the electric sub-station housing four transformers; and other sheds and stores. The works cover an area of 12 acres, criss-crossed with railway sidings and, away from the main entrance, by roadways, covered with chemical dust and powdered rock, which are difficult for vehicular traffic.

### **Five Five-Man Teams**

The brigade started with four teams of five men—No. 1 made up of day workers; Nos. 2, 3 and 4 from shift workers (6 a.m. to 2 p.m., 2 p.m. to 10 p.m., and 10 p.m. to 6 a.m.). Later, a fifth team, composed of day shift men, was added so that two crews were available during normal day working hours. Mr. T. Shanahan was appointed deputy Chief Officer, a post he still occupies.

All training was undertaken outside normal working hours, each man spending an hour each week on fire service instruction. It was based at first on book instruction and theory. Progress was slow but

certain. Towards the end of 1946 Chief Officer Parkinson took a leading part in the formation of the Widnes Works Fire Brigade Organisation, and Albright & Wilson, Ltd., presented a silver challenge cup for the major trailer pump drill.

### **Training Intensified**

Training became more consecutive and sustained, the war-time decontamination centre being converted into a main station, including lecture room for use by the firemen when weather conditions made outside drilling impossible. A hose cart and light trailer pump were added to the equipment and determined training, practice in turnout and continued drilling turned groups of heavy chemical workers into five efficient fire fighting teams.

Nine klaxon fire alarms are strategically placed, and of course all sections are on the telephone. Should an outbreak occur, members of the brigade are called by a siren. First turn-out appliance is always the hose cart, equipped with stand pipes, branches and five sets of breathing apparatus. Each man has his own helmet, overalls and boots, all of which are stored in the main station. Here, also, is a floodlight, 4,000 ft. of hose, foam apparatus, foam replacement canisters, branches and compounds and eight oxy-acetylene sets. Based on the main station are three 500 gpm. major trailer pumps. To prevent confusion, and to make maintenance and refuelling easy, petrol and water tanks and other major parts are plainly marked in fluorescent paint—an idea of Mr. Parkinson's.

There are three sub-stations—an auxiliary station housing a 150-gpm. light trailer pump, and two on the banks of the canal which flows alongside the works. These latter are equipped with 500-gpm. fixed pumps, linked by fixed pipe lines to points inside the main works site. Another fixed pump can be operated from a well bore in the works, and there are 12 hydrants.

Throughout the offices and works are 112 fire extinguishers. All are thoroughly examined and checked every 12 weeks.

The air-conditioned electric sub-station, where there are four transformers, and a

series of high-tension switchgear, is covered by a fixed CO<sub>2</sub> installation. Should this battery go into operation, electric fans are automatically switched off, and the principal danger points are immediately covered by CO<sub>2</sub> jets. In the event of failure, this equipment can be operated manually from a break-glass compartment outside. At the entrance to the sub-station a sliding indicator board shows the position of major switches.

With a substance like phosphorus, the most diligent precautions must be taken to prevent minor burns which could result if phosphorus alighted on worker's boots or gloves. Should phosphorus in such cases cause an outbreak of fire, light sprays are immediately used to tackle the blaze in the first instance. Jets would scatter the substance, extend the blaze, and make it less easy to control. This applies also to sulphur, which is a by-product of several of the processes.

Fire prevention is the chief aim and Chief Officer Parkinson says that a fire in the works is a rare event. This is due to fire consciousness of all workers. Employees are quick to point out any sources of danger and have given valuable aid to the brigade.

In seven years 138 awards have been gained by the brigade in competitions.

The brigade works in full conjunction with a fully-equipped ambulance room, in charge of Sister E. Davidson. Here, every man is thoroughly examined by a doctor once a year, and some, on more dangerous work from the health point of view, twice a year. There is a dental clinic, equipped with X-ray apparatus, well-appointed treatment room, etc.

### Protective Clothing

'FURNO' Industrial Gloves are obtainable in over 400 patterns, specially designed for particular purposes. An illustrated brochure of gloves and protective clothing, newly issued by G. Waddington & Son, Ltd., Newland, Hull, lists some of these many types, which are supplied to the engineering, ship-building, colliery, iron, steel, gas and all heavy industries. Included are a range of gloves and mitts made to BSI specifications. Copies of the brochure, and any further information regarding products or specialised services, will gladly be supplied by the makers.

## Widow Sues Council

### Dermatitis Caused Man's Death?

**L**ORD HILL WATSON reserved judgment in the Court of Session last week after hearing a legal debate concerning an action brought by the widow of a Dundee man said to have died from a condition resulting from dermatitis.

Mrs. Betsy Gibson Mackie is claiming £4,000 damages from Angus County Council, who employed her husband, Robert Mackie, for about 26 years until June, 1951, as a motor driver, his duties for some years before that date consisting of loading and driving materials from Longhaugh Quarry, Angus, to roads near-by.

The loads, she alleged, frequently consisted of tarred road metal, and he often came into close contact with this and with tar fumes. About March, 1951, he contracted dermatitis as a result, and by 30 June his condition was so serious he had to cease work. He was admitted to Maryfield Hospital, Dundee, on 2 July and was under treatment there and in other hospitals until his death on 17 April, 1952.

Mrs. Gibson Mackie alleges that the cause of death was exfoliative dermatitis tipomelanitic reticulosis, which arose as a result of his initial dermatitis. He was 54 and earned about £7 a week. She was wholly dependent upon him.

She alleges that the defenders were negligent in failing to provide him with proper and adequate equipment for his work—in particular, suitable protective clothing—and that they did not provide a safe system of working. Tar and its products, she claimed, are recognised causes of dermatitis.

The defenders, who deny liability, make no admission as to the cause of Mackie's death or how he contracted dermatitis. They say that the road materials carried by him in his lorry during June, 1951, and the year up to that date, did not include any tar products.

They deny that the condition from which he died resulted from contacts during his work, and say it is not the normal practice to supply protectives against dermatitis to workmen who have occasion to handle materials such as Mackie carried in his lorry.

A new laboratory opened by the Royal Dutch-Shell Oil Company in Amsterdam on 2 November is stated to be the largest oil laboratory in Europe.

# Ionising Radiations in Industry

## Health & Safety Precautions in their Use

**D**ESPITE the great variety of uses in factories to which ionising radiations are being put, experience has amply indicated that with proper forethought and care to cover the risks, they are practicable without impairing the health of the workpeople. This information is contained in a pamphlet\* on health and safety precautions in the use of ionising radiations in industry just issued by the Factory Department of the Ministry of Labour and National Service.

The need for printed official guidance on this subject, drawn up specifically from the industrial angle, has arisen because of the tremendous growth in recent years of the industrial use of X-rays and the radiations from radioactive substances, more particularly of the latter as a result of the ready availability of a wide variety of artificial radioisotopes now produced at Harwell and elsewhere.

The pamphlet serves as a companion to two other official publications—the 'Recommendations of the British X-ray and Radium Protection Committee' and the Medical Research Council's 'Introductory Manual on the Control of Health Hazards from Radioactive Materials'—dealing with precautions necessary in hospitals and in university and research laboratories.

### Powerful Allies to the Industrialist

In an introduction, the pamphlet deals with the many different uses now made by industry of ionising radiations, which more and more are becoming powerful allies to the industrialist in helping him to examine and improve the quality of his products and to increase the speed and efficiency of, and gain greater insight into, the mechanism of his chemical and engineering processes.

Fixed or mobile X-ray sets are in use by many firms, mainly for the radiographic examination for faults, flaws, blowholes, cracks and the like, of castings, forgings, and fabricated or welded metal articles. Another considerable use is for the fluoroscopic examination of manufactured articles

such as spark plugs, cables, golf balls and tinned or packet foods, the purpose usually being to check the correct assembly or alignment of components, or the presence of foreign matter.

Radioactive substances find a much wider field of application on account of the different types of radiation they emit, the wide range of radiation energies available from a suitable choice of source, their relative cheapness, and for other reasons.

### Natural Radioelements

Among the natural radioelements, radium or mesothorium have for many years now been employed, mixed with zinc sulphide, as a self-luminous paint for the luminising of instrument dial markings and pointers; while radium and radon have become similarly well established as sources for the gamma radiography of castings, etc., in place of, or as a supplement to, X-rays. Their function for this latter purpose has now been almost entirely usurped by the gamma ray emitting artificial radioisotopes such as  $^{60}\text{Co}$ .

A considerable use of radioactive material is now made for eliminating or combating the static electrification troubles dangerous or inconvenient in so many industrial processes which handle highly insulating materials. The same and certain other radioisotopes are employed extensively for measuring and controlling the thickness of many manufactured materials such as plastic and rubber sheeting, linoleum, thin sheet steel and paper—the principle employed being simply that the beta rays emitted by these isotopes are stopped by interposed materials to an extent depending on the mass of material traversed.

There are also important industrial uses of radioactive materials as 'tracers' in which, by labelling, with appropriate radioactive materials, suitable chemical components of the system under study and following these through their subsequent transformations, valuable information can be gained concerning the mechanism of the chemical, physical, engineering or biological processes concerned. There are still further industrial uses of radioactive materials as, for example, in the

\* Precautions in the Use of Ionising Radiations in Industry (Factory Form 342) obtainable from HM Stationery Office or through any bookseller, price 2s. net (2s. 1½d. post paid).

impregnation of gas mantles, and it is anticipated that many more applications will be found.

Complete immunity from harmful effects depends on an intelligent appreciation of the properties of the various radiations and of their potential damaging effects on the human body, and on vigilant attention being paid to the necessary precautions.

### Absorption by Atoms

Fundamentally, it is the radiation energy absorption by atoms constituting the body tissues and cells when they are ionised which leads to damage. It must never be forgotten that ionising radiations give no immediately visible indication of their presence, that their absorption, even in large doses, produces no sensation and that their harmful effects are delayed ones. The harmful effects of radioactive materials are due much more to their physical than to their chemical properties. The pamphlet deals with properties of the various radiations emitted and goes on to show what effects each type has on the bodily tissues and blood cells if received in excessive amounts.

The greatest danger is from the inhalation or ingestion of active material from unsealed sources as a dust or gas, or from contaminated hands in smoking, nail biting and the use of cosmetics, etc. To this danger the absorption of radiation from external sources is secondary, though still most important, since adverse blood effects, skin burns and genetic effects are all possibilities to be guarded against.

Fortunately, there is wide international agreement on the maximum permissible dosage rates for the various classes of radiations and on the maximum permissible amounts of the various radioisotopes in common use which may be taken into, or retained in, the body, and this data is referred to in a separate section of the pamphlet.

The main body of the document is taken up with the precautions which should be adopted by all industrial workers liable to be exposed to ionising radiations—the aim being to suggest, in effect, a code of good practice.

Certain general precautions which apply to all such workers are dealt with under the headings of—Planning and Equipment, Inhalation and Ingestion Precautions, Super-

vision, Training and Monitoring, Film or Dosimeter Tests of Workers' Radiation Exposures, and Medical Supervision.

Though blood changes usually give the earliest detectable indication of damage to health from radiation absorption, nevertheless the emphasis in planning the protective measures should be much more on the instrumental, film badge, and dosimeter monitoring of radiation exposures than on blood counts.

Detailed suggested special precautions are outlined for the main categories of use of the radiations under the headings—X-radiography of Castings and Other Articles and of Welds, X-ray Fluoroscopy, X-ray Crystallography, Gamma Radiography of Castings and Other Articles and of Welds, the Use of Radioactive Static Eliminators, the Use of Beta (and Gamma) ray Thickness Gauges and Radioactive Tracer work and the Handling of Unsealed Radioactive Materials.

The pamphlet concludes with a selective list of references dealing with radiological hazards and protection for those seeking fuller details and factual data on individual aspects of protection problems.

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### Drummond Research Fellowship

MOST readers will doubtless be aware of the formation of a committee, under the chairmanship of Lord Woolton, to establish a Research Fellowship in the subject of nutrition to commemorate the name and work of the late Sir Jack Drummond. It has now been announced that for this purpose about £25,000 will be required. A circular letter sent out on behalf of the Fine Chemicals Group of the Society of Chemical Industry by Mr. W. Mitchell (chairman) and Mr. J. D. Kendall (hon. secretary), points out that Sir Jack Drummond was virtually the founder of the group and as its first chairman was instrumental in steering it through the difficult initial stages. The group committee feels that group members will wish to make a special contribution to the fund in recognition of the late Sir Jack Drummond's invaluable services. Members are therefore invited to send contributions to the Honorary Secretary, Fine Chemicals Group, c/o Society of Chemical Industry, 56 Victoria Street, London, S.W.1. Remittances should be made payable to the Treasurer, Drummond Fund (FCG).

# New Sulphuric Acid Plant

## Economics of a Small-Scale Unit

EXPERIMENTS were carried out before the war, at the Institute of Chemistry, Toulouse University, on the production of  $\text{SO}_3$  from stoichiometric mixtures of oxygen and  $\text{SO}_2$  at atmospheric pressure. The reaction mixture was conducted over a catalyst heated to  $450^\circ$ , when the heat of reaction raised the temperature to  $750^\circ$ ; on cooling to  $20\text{--}25^\circ$ , the greater part of the  $\text{SO}_3$  was condensed.

The residual gases contained  $\text{SO}_3$  to a partial pressure of 0.25-0.3 atmospheres, and this was removed by scrubbing with concentrated sulphuric acid. The gases were then recirculated, being replenished with  $\text{O}_2$  and  $\text{SO}_2$  at this stage.

After the war, workers at the Institute conceived the idea of employing the reciprocal solubilities of  $\text{SO}_2$  and  $\text{SO}_3$ , which had been reported by Rose more than 100 years before, for a complete extraction of the  $\text{SO}_3$ . A mixture of equal parts of  $\text{SO}_2$  and  $\text{SO}_3$  will remain completely liquid at  $0^\circ$ , and there is therefore no fear that cooling under  $20^\circ$  will cause blocking of pipes and cooler. Some results of their work are described in an article by Professor J. Cathala, *Chimie Ingenieur Technik*, 5, 285-91 (1953).

The problems of catalysis are completely different from those arising with the older technique, since, in order to obtain the highest possible transformation of  $\text{SO}_2$  to  $\text{SO}_3$  by the older method, the temperature of the catalyst must be controlled exactly and held as low as possible. Moreover, large quantities of catalyst are necessary, since, according to the data, one ton of catalyst will yield a maximum of 3.5 tons of acid daily.

### $\text{SO}_2$ Enriched Gases

Using the new technique with  $\text{SO}_2$  enriched gases, it is not necessary to maintain the catalyst at the temperature necessary for a complete conversion, and the reaction speed can be considerably increased since the reaction is carried out well away from the balance point. Instead of a stoichiometric mixture of  $\text{SO}_2$  and  $\text{O}_2$  there is an excess of  $\text{SO}_2$ , so that the reaction proceeds to the stage where, effectively, all the oxygen has been consumed, while at the same time there is enough excess of  $\text{SO}_2$  for a complete ex-

traction of the  $\text{SO}_3$  produced. In the investigations, compressed air was employed in place of pure oxygen.

A pilot plant was constructed working at a pressure of 10 atmospheres and with a calculated production capacity of 500 kg. per 24 hours. Sulphur was burnt by conducting dry air at 80-90 cu.m. per hr. over the surface of the melted substance at a temperature of  $136^\circ$ , the further amount of air necessary for the catalysis being introduced before the gases entered the contact oven.

The catalyst employed was barium vanadate precipitated on silica gel, which was pressed into tablets 10 mm. in diameter and 2 mm. thick; this catalyst was effective at about  $450^\circ$  for pressures from 1 to 10 atmospheres.

### Vertical Tube Condensers

The  $\text{SO}_2\text{--SO}_3$  mixtures were condensed fractionally in vertical tube condensers, which were cooled, first by cold water and then by liquid ammonia. This gave two different fractions which were led to appropriate points in a normal distillation column with heater and condenser; pure  $\text{SO}_2$  was recovered here and was partly used for cooling and partly led back into the reaction oven. Before exhausting to the atmosphere, the diluent gases were led through a silica gel absorption column, and then scrubbed with water.

Burning sulphur in air at 10 atmospheres. Cathala recovered 85-90 per cent of the sulphur as  $\text{SO}_2$  or  $\text{SO}_3$ :—

#### Analysis of input gases:

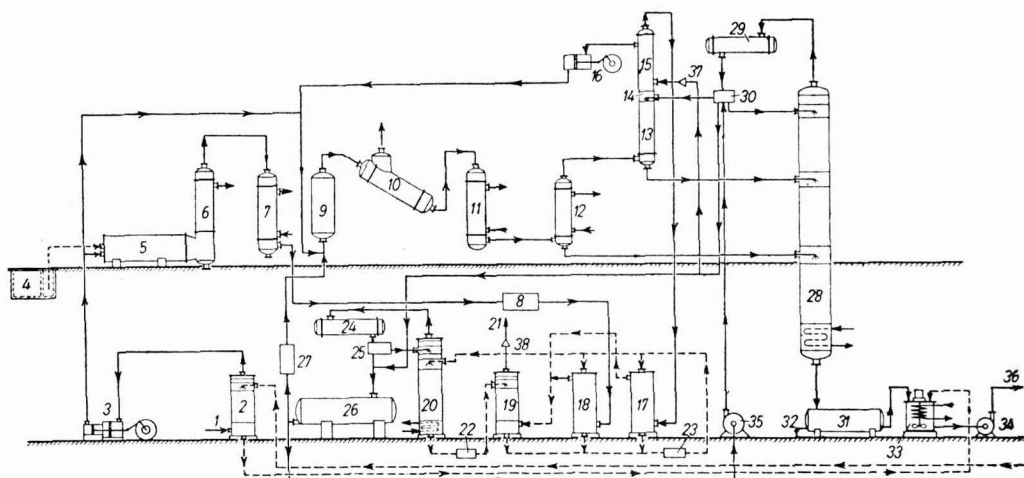
$\text{SO}_2$ ...	15 per cent	... 13 cu.m. per hr.
$\text{O}_2$ ...	6	... 5.2
$\text{N}_2$ ...	79	... 68.4
		86.6

#### Analysis of output gases:

$\text{SO}_2$ .....	8.6 cu.m. per hr.
$\text{SO}_3$ .....	4.4
$\text{O}_2$ .....	3.0
$\text{N}_2$ .....	68.4
	84.4

The efficiency of the catalyst in the pilot plant was 3 tons  $\text{H}_2\text{SO}_4$  per ton of catalyst per hour, which is 20 times as great as





**Schematic representation of a pilot-scale plant for the production of 5 to 10 tons of sulphuric anhydride per day**

1—Air supply ; 2—Sulphuric acid-drying tower ; 3—Piston compressor ; 4—Sulphur storage tank ; 5—Sulphur burning oven ; 6—Heat exchanger ; 7—Water cooler ; 8—Sulphuric acid scrubber ; 9—Contact oven ; 10—Heat exchanger ; 11—Water cooler ; 12—Water-cooled condenser ; 13—Liquid SO<sub>2</sub> washing tower ; 14—SO<sub>2</sub> reflux ; 15—SO<sub>2</sub> cooled condenser (−10°) ; 16—Piston compressor ; 17, 18, 19, 20—Towers for the recovery of SO<sub>2</sub> ; 21—Exhaust ; 22, 23—Circulation pumps ; 24—SO<sub>2</sub> condenser ; 25—Flow divider ; 26—SO<sub>2</sub> reservoir ; 27—SO<sub>2</sub> vaporiser ; 28—Distillation column ; 29—SO<sub>2</sub> condenser ; 30—Flow divider ; 31—SO<sub>3</sub> reservoir ; 32—SO<sub>3</sub> take-off ; 33—Mixer, stirred and cooled ; 34, 35—Rotary pumps ; 36—H<sub>2</sub>SO<sub>4</sub> take-off ; 37, 38—Pressure relief valves.

for former catalytic processes. Cathala believes that with a properly designed plant the figures might well be 300 to 350 tons of sulphuric acid daily per ton of catalyst, and that 98 per cent of the sulphur could be recovered in the form of SO<sub>2</sub> or SO<sub>3</sub>.

The paper under review contains a discussion of a possible design for a plant to produce 5 to 10 tons of sulphuric anhydride daily, the estimated installation cost of which would be £8,000. (See illustration). There is a similar calculation for a plant working at 5 atmospheres to produce 50 to 200 tons per day, and the following comparative costs are given:—

*Conventional contact catalyst method:*

Plant .....	£112,000
Building .....	40,000

£152,000

*Cathala method:*

Plant .....	£73,000
Building .....	5,000

£78,000

With pyrites or sulphide as the starting material, and modern ovens using the vortex layer principle, the price of an installation working at 6 atmospheres is estimated at a total of no more than £83,000.

## Sulphur from Indian Coal

ACCORDING to a series of investigations conducted by the Fuel Research Institute at Jealgora, Bihar, a substantial contribution to India's sulphur requirements can be made by the recovery of pyrites from Vindhya Pradesh coals. It was found that the coal of the Nowrozabad colliery contained 0.8 to 1.3 per cent of pyritic sulphur and investigations on the washability characteristics of the coals showed that practically 80 per cent of the pyritic sulphur could be separated from the coal which becomes concentrated in the rejects. Normally, the entire quantity of sulphur in the rejects is thrown away.

"E-MILTEK" (registration pending) is the new trade mark for the new "E-MIL" economy range of volumetric laboratory glassware and chemical thermometers manufactured by H. J. Elliott Ltd., E-MIL Works, Treforest, Glam. The two proprietary brand ranges described as "E-MIL" 'TEK-A' and "E-MIL" 'TEK-B' will now be sold under the brand name of "E-MILTEK" 'A' "E-MILTEK" 'B.'

# Natural Gas in Britain

## Extensive Survey Likely to be Spread Over Next Five Years

THE possibility of finding natural gas in Great Britain in quantities sufficient to be of commercial value is to be the subject of an extensive investigation organised by the Gas Council. This was disclosed last week in the Council's Fourth Report, which is for the year ended 31 March.

For many years, states the report, natural gas in very small quantities has been produced at Heathfield in Sussex; it has also been obtained at Cousland, Midlothian, and in the North Riding of Yorkshire near Whitby. But, although a great deal is known of the geological formations of the country, the object of explorations hitherto has been to discover oil and the explorers have not been so much concerned to ascertain the existence or non-existence of structures favourable to the accumulation of gas.

At the request of the Gas Council the Anglo-Iranian Oil Company, Ltd., allowed its chief geologist, Dr. G. M. Lees, F.R.S., to prepare a report on the prospects of finding gas in this country, and, while only actual exploration can answer the question, the report was sufficiently encouraging for the Council to decide to carry out an extensive field investigation, in association with the Anglo-Iranian Oil Company and its subsidiary, the D'Arcy Exploration Company, Ltd. The explorations are likely to be spread over a period of five years. It is hoped that these investigations will also provide information about the possibility of the underground storage of gas.

### Natural Gas in USA

Speaking at a Press conference, Sir Harold Smith, chairman of the Gas Council, pointed out that 92 per cent of the gas used in the USA was natural gas. A friend of his who had just returned from Vancouver had told him that that town was about to take natural gas supplied from Alaska, 1,000 miles away. Later Sir Harold said that the natural gas supplied would cost the people of Vancouver 50 per cent less than the gas now being manufactured there.

The extension of gas 'grids' and the transmission of gas at higher pressures than those hitherto adopted, states the report,

have stimulated the study of the long-distance transmission of gas, and the Council, with the assistance of the Institution of Gas Engineers, has instituted an inquiry into the physical and other problems involved. It is believed that much useful information may be obtained from the experience of other countries, particularly the USA, which has been visited recently by a mission, including two representatives of the Gas Council, sent under the auspices of the Organisation for European Economic Cooperation with the special object of studying long-distance transmission at high pressures. The subject would have added importance if natural gas in commercial quantities were found in Great Britain.

### Purchases from Coke Ovens

During the year under review in the report, gas was purchased from coke ovens to the total quantity of 68,104,000,000 cu. ft., or 341,600,000 therms, which was more by 3.6 per cent compared with the total for 1951-52. It included a full year's supply to the Wales Board of gas from the Nantgarw coke ovens of the National Coal Board which came into operation in September, 1951. Of the total gas which the Wales Board had available in 1952-53, 61.8 per cent came from coke ovens. Two other Boards—the Northern and East Midlands—purchased nearly half the gas they supplied.

Discussions continued between some of the Boards and the oil companies operating refineries within their areas, but the only Board which purchased gas from any oil refinery during the past year was again the North Western. The quantity purchased was 6,100,000 therms, compared with 7,500,000 therms in 1951-52.

The butane/air installation which the Wales Board brought into production at Whitland, Carmarthenshire, in 1951-52, had worked satisfactorily throughout the year, and a thorough examination of the distribution system after 12 months' service disclosed no effect on mains, meters or appliances. There was an increase of 7 per cent in the gas sold from the installation.

Further plants which the Wales Board proposes to install at Fishguard and Llanid-

loes for the use of liquefied petroleum gases have not yet been erected. These new plants will use propane, as the oil refineries have intimated that, as soon as transport can be arranged, supplies of propane will be more readily available than butane. Advantage of this cannot be taken until the special equipment necessary for transporting and storing the more volatile liquid is available. The butane/air plants erected by the Eastern Board at Bungay and Framlingham came into operation during the year.

### Progress with Methane

Progress has been made in the consideration of possible uses of methane drained from coal mines (primarily as a safety measure) and experimental supplies of this gas are to be taken from two pits, one in North Wales and the other in Cumberland. The National Coal Board and the Wales Gas Board have agreed in principle to a scheme which provides for an initial quantity of 60,000 cu. ft. a day to be supplied from the Point of Ayr Colliery, the calorific value being 980 B.Th.U. per cu. ft. This quantity, when reformed, will yield 1,100,000 cu. ft. of ordinary town gas. An economy of about 25,000 tons a year in the consumption of coal will be effected by this means. The Northern Board has reached agreement with the Northumberland and Cumberland Division of the National Coal Board for an experimental supply of methane from the Haig Pit at Whitehaven.

On general questions of coal supplies, points out the report, there is a standing Joint Commercial and Technical Coal Committee of the Gas Council and the National Coal Board, which has met regularly throughout the year. Joint committees have also been appointed for special lines of inquiry, such as the blending of coal, the use of methane from mines and the gasification of low-grade coals at Bogside, Fife.

Dealing with financial results of the year under review, the report states that the industry had a net surplus of £2,272,631. This surplus was after Area Boards had contributed £500,000 towards the Central Guarantee Fund which the Gas Council is required to establish. The total sum in the fund, including interest, is now £1,620,603.

Area Boards had also provided £12,097,246 for interest charges (including £9,497,274 for interest on British Gas Stock), £14,430,628 for depreciation and

£2,538,000 for taxation. Eleven of the twelve Area Boards had a surplus on the year's working, after making provision for tax.

There was neither surplus nor deficit on the Gas Council's revenue account, contributions from Area Boards being fixed at an amount exactly to balance the Council's expenditure. The gross revenue of the industry was £281,500,000 (£261,000,000)\* of which £164,000,000 (£147,600,000) came from sales of gas, £79,900,000 (£74,200,000) from disposal of by-products, £23,400,000 (£24,400,000) from sales and hire purchase of appliances, and £14,200,000 (£14,800,000) from other sources. No further issue of British Gas Stock was made during the year under review, but since then, on 7 August last, the Council issued £80,000,000 British Gas 4 per cent Guaranteed Stock 1969-72 at a discount of £1 per cent, the final call of which is due on 4 November. This brings the total amount issued to £384,075,805, of which £189,075,805 is compensation stock.

The limited supplies of coal, steel and cast-iron available to the gas industry, and the increasing cost of coal, have been among the major problems with which the Gas Council has had to deal. It is estimated that increases in the pithead prices of coal since vesting date, amounting to approximately 17s. 9d. a ton, will cost the gas industry at the current rate of consumption £25,000,000 a year more than it would have had to pay at prices ruling at that date. Meanwhile the availability of good gas-making coals is decreasing. That is why the industry is not merely striving for increased efficiency, but looking for new processes and new sources of gas supply.

### Improved Efficiency

By improved methods of working, replacement of obsolete plant, closing down small, uneconomic works and concentrating production in larger units, a substantial increase in the efficiency of gas production has been obtained. Gas output per ton of coal carbonised in 1950-1 was 71.62 therms, in 1951-2 72.77 therms and in 1952-3 73.65 therms, this representing a reduction in terms of coal carbonised of 440,000 tons in 1951-2 and 330,000 tons more in 1952-3. The yield of coke and breeze per ton has been maintained. The improvement in the

\* Figures in brackets are those for the previous year.

yield of gas has not been due to any improvement in the quality of coal.

The shortage of steel was still a cause of delays in replacements and extensions to manufacturing plant. All such delays inevitably affect costs at times when the costs of construction are rising. The effects of the withdrawal of the Ministry's allocation scheme in May, 1953, cannot yet be judged.

Gasmaking capacity was increased by a net 75,000,000 cu. ft. a day (3.2 per cent), bringing the total capacity to 2,385,000,000 cu. ft. During the year 34 small, uneconomical works were closed, bringing the total closed since vesting date to 140. Economies have also been effected in the use of fuel and power at works. For example, savings by the East Midlands Board, amounting to £100,000 during the year, were obtained by the use of breeze instead of large coke in steam-boiler installations.

The shortage of steel has also hampered the repair of existing gas holders and the provision of additional storage. With the ending of control, it is hoped that supplies will be more plentiful and progress more satisfactory. The interlinking of works and the extension of high pressure mains are reducing the amount of new storage necessary, and giving consumers better supplies at better and more constant pressures.

## Synthetic Fibres

### Symposium on Their Properties

THE provisional programme has now been issued for the symposium on 'The Chemistry & Physics of Synthetic Fibres' which is to be held under the auspices of the Plastics & Polymer Group of the Society of Chemical Industry at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, from Wednesday to Friday, 24-26 March, 1954.

Mr. J. R. Whinfield will be the chairman on the opening day, when papers will be presented as follows:—'Chemical Aspects of Fibres,' Dr. R. Hill (I.C.I. 'Terylene' Council); 'Aminotriazoles as Fibre-forming Materials,' J. W. Fisher (British Celanese); and 'The Chemical Denaturation of Groundnut Protein & Fibre Formation,' W. E. Naismith (I.C.I. Nobel Division).

In the evening a formal dinner will be held at the Connaught Rooms, Great Queen Street, W.C.2, at 7.45 p.m., preceded by a

cocktail party given by British Celanese, British Nylon Spinners, BX Plastics, Courtaulds and I.C.I.

On the Thursday Professor J. B. Speakman (Leeds University) will be the chairman and papers will be presented as follows: 'Some Aspects of Crystallisation,' Dr. L. B. Morgan (I.C.I. Dyestuffs Division); 'Production of Fibres from 66, 610 and 6 Polyamides,' G. Meacock (British Nylon Spinners); and 'The Drawing of "Terylene" & Nylon,' I. Marshall and A. B. Thompson (I.C.I. 'Terylene' Council).

The chairman on the Friday will be Mr. J. Wilson (British Rayon Research Association) and these four papers will be presented: 'Some Relations Between Fine Structure & Mechanical Properties of Viscose Rayon,' L. Cotton and Dr. N. S. Wooding (Courtaulds); 'Infra-red Spectroscopy & the Molecular Structure of Cellulose Filaments,' Dr. J. Mann and Dr. H. J. Marrinan (British Rayon Research Association); 'Cellulose Acetate as a Raw Material for Fibre Formation,' A. R. Urquhart (Shirley Institute); and 'The Extrusion & Properties of "Saran" Filaments,' R. A. Horsley and J. Jack (BX Plastics).

Members of the Society of Chemical Industry may attend the symposium by paying a registration fee of £1. The registration fee for non-members who attend is £3. Payment of the fee entitles the participant to a set of preprints, morning coffee and afternoon tea. Registration forms are obtainable from the Assistant Secretary, Society of Chemical Industry (Plastics & Polymer Group), 56 Victoria Street, London, S.W.1.

## Peruvian Subsidiary

C. TENNANT, Sons & Co., of New York, one of New York's oldest merchant firms engaged in international trade, has announced the establishment of a Peruvian subsidiary company, Tennant (Peru) SA, at 390 Ave. Nicolas de Pierola, Dpto. 602, Lima. Like the parent company, Tennant (Peru) SA will devote its main activities to the export and import of ores and concentrates, metals, industrial chemicals, and other raw materials for industry. Mr. Aubrey Fletcher has been named resident managing director of the new company, and it is anticipated that the establishment of this company will further the expansion of Tennant's activities in South America and improve the facilities available to its clients.

# Prices of Unrefined & Refined Oils

## Increases Announced by Minister of Food

CHANGES—mostly increases—in the prices of both unrefined and refined oils allocated to primary wholesalers and large trade users during the current allocation periods have been announced by the Minister of Food, as follows:—

PRICES OF UNREFINED OILS TO PRIMARY WHOLESALERS AND LARGE TRADE USERS DURING THE FOUR WEEKS WHICH BEGAN 1 NOVEMBER				
		from	to	
Coconut oil ..	Crude and crude oleine ..	£118	£126	} Per ton naked ex-works
Palm kernel oil ..	Crude and crude oleine ..	£116	£124	
Cottonseed oil ..	Crude ..	£128	£137	
	Washed ..	£136	£145	
Groundnut oil ..	Crude ..	£139	£148	
Sunflower oil ..	} Crude ..	£136	£145	
Sesame/Beniseed oil ..				
Maize oil ..				
Soya bean oil ..				
Palm oil ..		£67/10	£68/10	
" ..		£67	£68	Per ton c.i.f. in loan drums
" ..		£66	£67	Per ton c.i.f. in bulk
Herring oil ..	Crude ..	£69	£70	} Per ton naked ex-store
Seal oil ..	Crude ..	£69	£70	
Whale oil ..	Crude No. 1 ..	£74	£75	
	Crude No. 2 ..	£69	£70	
Whale/herring/seal oil ..	Crude hardened up to 42° ..	£85	£86	
	46°/48° ..	£86	£87	
	50°/52° ..	£87	£88	
	54° ..	£87/10	£88/10	
	Iodine value 3/5 ..	£87/10	£88/10	
Cotton—Black grease ..		£25	£20	
Palm oil acid oil ..		£54	£ 2	

PRICES OF REFINED OILS TO PRIMARY WHOLESALERS AND LARGE TRADE USERS DURING THE EIGHT WEEKS WHICH BEGAN 1 NOVEMBER						
		from	to			
Coconut oil ..	Refined deodorised ..	£128	£137	} Per ton naked ex-works		
	Refined hardened deodorised ..	£135	£144			
Palm kernel oil ..	Refined deodorised ..	£125	£134			
	Refined hardened deodorised ..	£132	£141			
Cottonseed oil ..	} Refined deodorised ..	£152	£163			
Sunflower/Beniseed oil ..						
Soya bean oil ..						
Maize oil ..	} Refined deodorised ..	£157	£168			
Groundnut oil ..						
					Refined hardened deodorised to 40° ..	£169
				Refined hardened deodorised 50°/52° ..	£170	£181
Palm oil ..	Refined deodorised ..	£83	£90			
	Refined hardened deodorised ..	£95	£101			

### DSIR's Welsh Liaison Officer

THE Department of Scientific & Industrial Research has decided to appoint DR. R. O. JONES to be the first resident liaison officer of the Department in Wales. His task will be to study the industrial position in Wales with a view to assisting in the identification of industrial problems amenable to research and in the application of existing knowledge and research facilities to meet Welsh needs. To this end, he will work in close collaboration with other Government Departments in Wales and with Welsh industrial and regional organisations. It is hoped to provide a link between Welsh firms and the research laboratories of the DSIR, the Research Associations and others, and to

make more readily accessible in Wales the scientific information already available within the DSIR organisation.

Dr. Jones has already spent more than a year in a preliminary examination of Welsh problems in these fields. A graduate of University College, Swansea, and of King's College, London, he has in recent years been a member of the Headquarters staff of DSIR. Before that he was concerned in the development and utilisation of non-ferrous minerals, after having served for some years in the Geological Survey and Museum.

Dr. Jones took up his new duties on 1 November, and his office is in the Welsh Board of Health Building at Cathays Park, Cardiff. Telephone: Cardiff 5120.



# The Analysis of Cobalt

## Part VI—Miscellaneous Methods

FOR the rapid determination of cobalt Korenman and PUNCHIK<sup>1</sup> precipitated it as dipotassium sodium cobaltinitrite and measured the volume of the precipitate. The method is as follows:—To 1-2 ml. of the cobalt solution add 0.25 ml. of 30 per cent acetic acid, and 4 ml. of a mixture of one volume of 1N potassium nitrate and two volumes of 3N sodium nitrite. Measure the height of the precipitate in a calibrated tube and compare with standards prepared from known amounts of cobalt. The method is useful for control work but does not compare in accuracy with gravimetric methods. Cobalt has also been determined by measuring the volume of cobalt oxinate precipitates<sup>2</sup> but many metals interfere in this procedure.

The following electrodeposition method for the estimation of cobalt was proposed by Fine<sup>3</sup>:—Weigh enough sample to give a deposit of 15-100 mg. and decompose with hydrochloric acid. After decomposition is complete, add 5 ml. of sulphuric acid and heat until sulphur trioxide fumes are evolved. Cool the residue, add 100 ml. of water, then heat to ensure solution of soluble salts. Precipitate the elements of the copper group with hydrogen sulphide, and add bromine water to the filtrate to destroy the excess hydrogen sulphide and to re-oxidise iron. Remove the excess bromine by boiling.

### Removal of Iron & Calcium

Precipitate iron with ammonium hydroxide and calcium with oxalate, dissolve in hydrochloric acid, and reprecipitate. Evaporate the combined filtrates to 100 ml., and add sufficient ammonium sulphate, or sulphuric acid and ammonium hydroxide, to give 25-30 gm. of the salt in solution. Add ammonium hydroxide in an excess of 56-60 ml. Add 2 gm. of ammonium bifluoride and dissolve in the solution; small amounts of precipitated fluorides do not interfere, but excessive amounts should be filtered off. Dilute the solution to 200 ml. and electrolyse overnight at a maximum current density of 0.5-0.8 amp. per sq. dm.

Electrolysis is complete when sodium sulphide does not cause a noticeable darkening or precipitation after standing for 15

minutes. The deposit may be removed with concentration nitric acid and analysed for co-deposition of nickel.

Guzman and Rial<sup>4</sup> have estimated cobalt in ammoniacal solutions of sulphate, formate, acetate, oxalate, borate and phosphate by electroanalysis. In all cases precipitation was preferable at a potential of 690 mV., corresponding to 0.017 milliamp. on the meter employed. A brass cathode and a passive iron anode were used. The circuit allows the electricity source used for the electrolysis to be used also for driving the motor. In all solutions, results were within 1-2 per cent of the true value. The ammonia-borate solution gives higher values than the other solutions.

### Mercury as Cathode

Böttger<sup>5</sup> used liquid mercury as cathode and obtained excellent deposits of cobalt. The solution of cobalt to be electrolysed should contain 0.5-1.0 ml. of 5N sulphuric acid and a little hydrazine sulphate. When cobalt is deposited from ammoniacal solutions on a gauze cathode the results are likely to be too high.

Cobalt in presence of nickel has been determined by a polarographic method. Lingane and Kerlinger<sup>6</sup> found that the half-wave potentials of the two metals differed by only 0.1 V in 1N potassium chloride, but are separated by 0.29 V in a mixture of 1N potassium chloride and 0.5M pyridine, and by 0.33 V in 1N potassium thiocyanate.

If the supporting electrolyte contains equal concentrations of pyridine and a pyridinium salt plus 0.01 per cent gelatin to suppress the maxima, the cobalt and nickel waves are well separated and easily measurable in a simultaneous determination. Such a solution has a pH of 5.4, so any iron present is precipitated. Chromium by itself does not precipitate, but if iron and chromium are present, chromium is coprecipitated with the iron. Small amounts of copper and manganese do not interfere with the determination.

Ethylenediamine tetraacetic acid strongly displaces the reduction potentials of numerous elements. Souchay and Faucherre<sup>7</sup> showed that when a solution of divalent cobalt is stirred with lead peroxide and ethy-

lenediamine tetraacetic acid in the presence of potassium carbonate or sodium acetate, an intensely coloured violet-rose complex of trivalent cobalt is formed, which can be reduced polarographically at a very much lower negative potential (about 0.2 V) than in the case of divalent cobalt (for which the half-wave potential is always above 1.0 V). The method has been applied to steel analysis.

#### Estimation with Ni & Zn

A polarographic method for the estimation of cobalt in nickel compounds or in cathode deposits containing cobalt, nickel and zinc has been evolved by Watters and Kolthoff.<sup>8</sup> To about 25 ml. of solution containing 1-120 mg. of divalent cobalt, add 10 ml. of 1N ammonium chloride, 40 ml. of 6.25N ammonium hydroxide and 1 gm. of sodium perborate. Boil gently under reflux to oxidise the cobalt to the trivalent state and remove excess perborate. Cool, transfer to a 100 ml. volumetric flask, add 2 ml. of 1 per cent gelatine solution, dilute to the mark and mix.

Transfer a suitable volume to a polarograph cell and obtain the polarogram, or measure the diffusion current at  $-0.85$  or  $0.90$  V against the calomel electrode. The iron and manganese contents should not exceed that of the cobalt. The wave which corresponds to the reduction of cupric to cuprous precedes the reduction of cobaltic to the cobaltous state and can be used for estimating the amount of copper present. Trivalent chromium interferes because dichromate is formed and is reduced polarographically at about the same potential as that of the trivalent cobalt. Vanadate and molybdate do not interfere.

The same authors<sup>9</sup> oxidised cobalt to trioxalatocobaltate by lead peroxide in 1M oxalate solution at a pH of about 5.2 with an acetate buffer. After filtration, a well-developed polarographic wave, which merges with the solution wave of mercury, is obtained for the reduction of the trivalent cobalt complex. The diffusion current is proportional to the concentration within 1 per cent over the concentration range 0.5-10 millimolar.

No interference was found from iron, copper, nickel, uranium, molybdenum, cadmium, tin or zinc. Calcium interferes because it precipitates the oxalate and the precipitate carries down cobalt. Interference from manganese, vanadium, cerium and

chromium can be avoided by introducing hydroxylamine hydrochloride after the oxidation with lead peroxide.

Kolthoff and Langer<sup>10</sup> showed that the amperometric titration of cobalt with 1-nitroso-2-naphthol could be carried out with accuracy and precision in the presence of acetate buffer. From 1-20 mg. can be determined with an accuracy of 0.5 per cent or better. The ratio of Co:R —R is  $C_{60}H_8O(NO)$  — in the precipitate at the end point is 1:4. The results obtained in the titration of ammoniacal cobalt solutions were variable probably owing to aerial oxidation.

A recent method for the determination of cobalt in nickel alloys involves irradiating the sample in a flux of neutrons and measuring the resulting radioactivity.<sup>11</sup> The samples were irradiated in a flux of  $6 \times 10^9$  neutrons per second per sq. cm. As little as 0.5  $\mu$ g. of cobalt could be determined satisfactorily.

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## Effluent Helps Plastics

NON-AVAILABILITY of a cheap and plentiful supply of indigenous phenols in the country is stated to have been hitherto responsible for restriction of the plastic industry in India. The industry at present consumes annually about 8,000 tons of moulding powders, most of which are imported. Recent investigations at the Shri Ram Institute for Industrial Research, Delhi, are reported to have shown that waste effluent from producer gas plants at fertiliser factories can be profitably used by the plastic industry as it contains 15-20 per cent phenols.

### The Fertiliser Society

The next meeting of the Society will at the kind invitation of Imperial Chemical Industries, Limited, consist of a visit to their works at Billingham, Co. Durham, on Friday next, 13 November. The programme will include a paper entitled 'Nitrophosphate' by Mr. W. d'Leny.

# The Wiggins Gasholder

## Unique Features Demonstrated by New Installation

**T**HE National Coal Board has just installed at the Point of Ayr Colliery, near Prestatyn, North Wales, a type of gasholder which is new to this country, and last week a small party of technical journalists travelled from London to inspect the holder, which is being used to store methane.

In the USA the Wiggins gasholder has been developed for the storage of hydrogen, nitrogen, town gas, carbon monoxide, carbon dioxide, oxygen, methane, tetrafluorethylene, etc., by the General American Transportation Corporation, and Ashmore, Benson, Pease & Co., of Stockton-on-Tees, were so impressed that they obtained a licence to construct these holders in Great Britain and certain overseas countries.

### Unique Features

The holder at Prestatyn is not the first Wiggins gasholder to be built in Britain, but thanks to the generous co-operation of the National Coal Board, Ashmore, Benson, Pease & Co. were able to connect it up with a blower and stage a most interesting working demonstration, before it was put into regular use. It was an opportunity not to be missed as the Wiggins holder has several unique features and they can be appreciated fully only by watching them in operation.

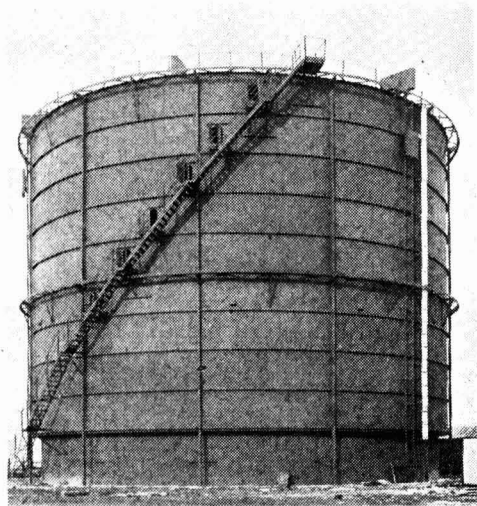
The Wiggins Dry Seal Gasholder is essentially a piston displacement type, as opposed to the bell or lift type water gasholder. A frictionless, movable piston floats on the confined gas, rising and falling with changes in volume. The seals which prevent the escape of gas through the annular space between piston and shell are cylinders made of asbestos cloth impregnated and coated with neoprene. The edges of these cylinders are joined by means of gastight closure to the piston telescoping fender and the shell wall.

The piston is weighted with concrete blocks to meet the designed operating pressure. When the gasholder is in the empty position the piston rests on the shell bottom. The volume confined within the loops of the seal is said to represent less than  $\frac{1}{2}$  per cent of the storage capacity.

As gas enters the gasholder the seals are first inflated and assume an upward looped

position. This inflation requires approximately  $\frac{1}{4}$  in. water gauge pressure. When sufficient gas has been pumped so that its pressure reaches the pressure load of the piston the piston rises. Additional gas raises the piston to a point where its fender contacts the outer or telescoping fender. This is at about one third of the height of the shell. These fenders form an abutment surface for the seal fabric. As the piston rises, the seal rolls off the piston fender on to the telescoping fender. This movement of the seal is entirely frictionless and the same is true of the seal connecting the telescoping fender and shell wall. At the demonstration last week the piston was raised from the ground to the roof and then lowered again. Spectators were able to watch the seals operating and actually feel them at the same time. When the piston fender contacts the telescoping fender, both elements rise as a single unit until full storage capacity is reached.

Simplicity of design is characteristic of the Wiggins gasholder. Close tolerances have been eliminated and the few moving parts are always open for inspection. No roller



*The Wiggins gasholder at Point of Ayr showing stairway, doorways, capacity indicator and levelling device*

guides or centring mechanisms are required. Guiding of the piston is accomplished automatically by the seal, which maintains the piston centred within the holder shell and prevents the piston from rotating.

The advantages claimed for the Wiggins gasholder are: (1) no operating costs; (2) reduced maintenance costs; (3) freedom from weather hazards; (4) quick purging; (5) clean uncontaminated gas; (6) close control of gas pressure; (7) reduced atmospheric corrosion and (8) low cost foundations. No heating, recirculation or dehydrating of sealing liquid is required and the dry seal of the Wiggins gasholder does not freeze, does not evaporate and does not blow out. Purging can be accomplished in a matter of a few hours instead of days and no liquid is present to evaporate and adulterate the gas. The operating pressure gradient of the Wiggins gasholder is held within 1 in. of water. There are no wet surfaces exposed to corrosive elements and where atmospheric corrosion conditions are extreme, susceptible parts can be protected with anti-corrosion coatings. The only concrete foundation needed in most extreme cases is a concrete ring or piers, since it is only the shell weight of the Wiggins gasholder which has to be supported. It is said that these benefits and savings can be obtained by converting any gasholder, whether it be wet, grease or tar type.

The dischargeable capacity of the holder at Point of Ayr is 250,000 cu. ft. and the general dimensions are as follows:

Main shell—79 ft. 9 in. inside diameter.

Lower shell—76 ft. 5 in. inside diameter.

Height to top curb—63 ft.

Height of lower shell to offset—9 ft. 3 in.

Height of piston fender—7 ft. 8 in.

Height of telescoping fender—16 ft. 10 in.

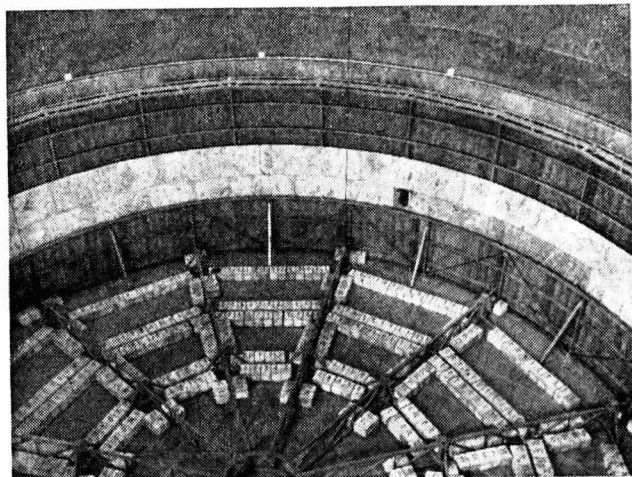
Height of gastight portion of shell—27 ft. 11 in.

Its total weight is only 204 tons, but because in this case the ground was unstable it was necessary to build upon a piled foundation. The piles are driven round the circumference of the shell, and at the piston support only, which is less expensive than the piling which would have been necessary to carry a water sealed holder.

The sealing fabric has an area of 7,000 sq. ft. Two seals are fitted, one from the shell to the telescoping fender and the other from the fender to the floating piston. Access to the piston is gained by means of an external stairway leading to doors at six different levels above the gastight portion of the shell, and by means of manholes in the crown.

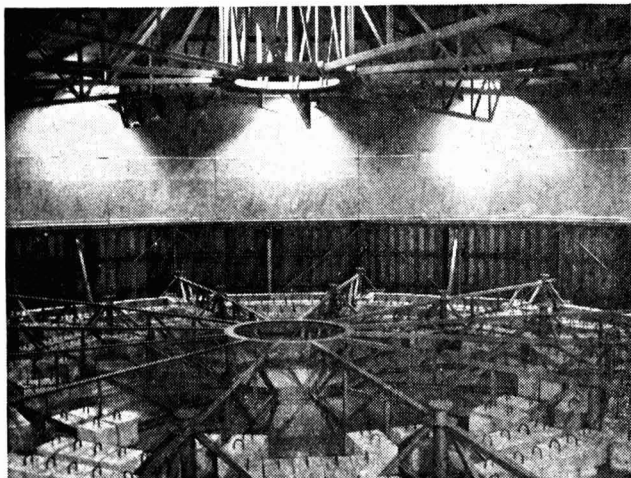
The piston itself rises nearly to the roof of the shell, giving maximum capacity where it automatically operates a relief valve when the holder is full. When the holder is empty, the outlet branch is automatically closed by the fabric seal. An automatic levelling device keeps the piston riding level and wide clearances prevent any friction. Above the gastight portion of the shell complete ventilation is afforded by  $\frac{1}{2}$  in. gaps between each tier of side plates and by additional weather guarded ventilators. The crown manhole covers are also of ventilating construction.

The gas pressure within the holder can be varied by means of adding or removing concrete weights distributed over the piston



*Piston at the bottom of the empty gasholder*

*The loaded piston and the telescoping fender nearing the crown of the holder*



surface. At Point of Ayr the gas will be stored at  $10\frac{1}{2}$  in. minimum to  $11\frac{1}{2}$  in. WG, the pressure being achieved by loading the piston with 864 concrete blocks weighing 86 tons. A vertical indicator is fitted to the outside of the holder, indicating the quantity of gas stored in 10,000 cu. ft. divisions.

The application of the Wiggins gasholder for storage of chemical process and industrial gases at higher pressures has met with unusual acceptance by the industry in the USA and today installations ranging up to

500,000 cu. ft. are being used for storing a wide number of gases. Ashmore, Benson, Pease & Co. are at present constructing a holder of 450,000 cu. ft. capacity and two holders of 1,000,000 cu. ft. capacity are being built by other companies in other parts of the world. Gasholders of up to 7,000,000 cu. ft. capacity are now being considered by the chemical and industrial gas industries. Operating pressure can be designed to meet any particular specification up to 20 in. of water.

## Radioisotope Conference

A RADIOISOTOPE Conference arranged by the Atomic Energy Research Establishment, Harwell, is to be held in Oxford during the week 19 to 24 July, 1954.

This will be similar to a conference arranged by Harwell in 1951 in Oxford which was also on the peaceful uses of atomic energy and was attended by over 500 delegates from Britain and many countries overseas. Great progress has been made since then in the use of radioactive isotopes and the forthcoming conference will deal solely with developments in recent years. It will discuss methods and results obtained using radioisotopes in all fields of science.

On the first three days of the Conference papers presented will deal with applications in medicine, biology and agriculture. The remainder of the meetings will be concerned with chemical, physical, engineering and general industrial applications. In medicine it is intended to deal with experimental uses.

An exhibition of instruments and techniques of interest to radioisotope users will be held in Oxford during the Conference. The printed proceedings will be published, if possible before the end of 1954. Further details and application forms can be obtained from the Conference Secretary, AERE, Harwell, Didcot, Berks.

## Preventing Eye Accidents

PREVENTION of industrial eye accidents is a subject of wide interest as shown by the response to the special National Eye Safety Week recently held under the auspices of the Royal Society for the Prevention of Accidents. An attractive coloured poster, with the slogan 'Don't Lose Sight of Eye Safety,' has been produced by Fleming Safety Goggles (Division of J. & R. Fleming, Ltd.), 146 Clerkenwell Road, London, E.C.1, and they are distributing copies freely on request to any firms who may care to use it as part of their 'follow-up' of the Eye Safety Week.





20TH CENTURY CHEMISTRY. By Joseph I. Routh. W. B. Saunders Co., London and Philadelphia. 1953. Pp. 564. 29s.

It is always a little difficult to understand the American system of education and books like this do not help. At first glance it would appear as if the Americans delay until the university years the study of subjects which are normally taught in the fourth or fifth forms of British schools. On reading further, however, one comes across such things as a chapter on heterocyclic compounds which would never be included in an elementary text book in this country.

'20th Century Chemistry' is intended as a text-book for 'those students whose contact with chemistry is represented by a one-year course' and endeavours to teach the fundamentals of inorganic, organic and biological chemistry. As there are no students in Britain, to our knowledge, who are apt to be exposed to chemistry for only one year we are unable to see who could possibly benefit from Professor Routh's book. On the whole he appears too elementary for the British university student, but in some sections he suddenly plunges into more advanced fields without having first provided the basis for thorough understanding.

It may be argued that we in this country are too conservative in our attitude towards illustrations for text-books but, on the other hand, one can surely over-illustrate. In this case there are 288 illustrations and the reviewer found that his attention was being continually diverted from the subject matter. Their connection with the text is generally very tenuous. For instance, the text contains the following statement: 'Methyl alcohol . . . is used as a denaturant for ethyl alcohol, as a solvent of shellac . . . as an anti-freeze . . . and as the raw material for synthesis of other organic compounds (Fig. 187).' When one refers to the illustration quoted, however, one sees a young lady striking a match over a stove and the caption reads 'A solidified form of methyl alcohol is used in small portable stoves . . .' Most British teachers would regard with caution

a schoolbook containing pictures with such captions: 'Negligee made from Dacron polyester fibre,' or 'The sun-tan lotion which this girl is applying contains one of the glycols.'

The text is reliable and very comprehensive, but it is doubtful if the almost bare succession of facts is of great value. Teachers in this country might find it of interest, but it can hardly be of use to those studying chemistry at a university or to chemists working in industry.—A.B.R.I.

THE CHEMICAL INDUSTRY. By T. I. Williams. Penguin Books, Ltd., Harmondsworth. 1953. Pp. 192. 2s.

Although the operations of the chemical industry affect almost every phase of our life, its products are for the most part absorbed by other branches of industry and therefore are often quite unknown to the general public. When it is considered that the industry employs about 500,000 people, produces over 14,000,000 tons of products a year, and has an annual turnover of about £600,000,000, the importance of publicising its efforts, achievements and aims becomes even more apparent.

This little book describes, almost without recourse to technical terms (a remarkable feat in itself), the complete history of the chemical industry in Britain, together with those foreign developments which were of particular importance to its growth. The treatment is not strictly chronological, each chapter being concerned with the rise of a particular branch of the industry; from alkali and sulphuric acid in the beginning, to dyes and plastics, and the prospects for the future.

No publisher is more likely to succeed in selling the ordinary public such a book, than Penguin Books. Of a suitable length for a train journey, written in a scholarly but entertaining style, 'The Chemical Industry' may prove of value in the establishment and maintenance of better relations between the public and the manufacturers—and that is a matter of great importance.—B.I.

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# HOME

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## Royal College of Science

The value of penicillin in making the soil more productive, the properties of metals and alloys and numerous other aspects of modern scientific research were most interestingly demonstrated at a conversazione which the Royal College of Science held in London last week to mark Commemoration Day.

## Chemical Club Officers

At the annual general meeting of the Chemical Club held at 2 Whitehall Court, on 20 October, the following elections took place:—President, F. E. Warner; chairman, Dr. E. H. T. Hoblyn; hon. treasurer, Dr. T. A. Smith; new members of the committee, R. L. Stephens and Dr. V. E. Yarsley. Dr. J. Hoy Robertson was re-elected hon. secretary.

## Duty Exemptions

The Treasury have made an Order under Section 10(5) of the Finance Act, 1926, exempting dimethyl *iso*amylethylmalonate and *n*-valeraldehyde from Key Industry Duty, for the period from 6 November, 1953, to 18 February, 1954. The Order is the Safeguarding of Industries (Exemption) (No. 8) Order, 1953, and is published as Statutory Instruments 1953, No. 1574. Copies may be obtained (price 2d. net by post 3½d.) from HM Stationery Office, Kingsway, London, W.C.2, and branches, or through any bookseller.

## Utilisation of Coal

'We are still the champion coal wasters of Europe,' said Sir Ben Lockspeiser, secretary of DSIR, at the annual luncheon of the British Coal Utilisation Research Association, recently. He was of the opinion that we lack neither science nor technology to save 15-20,000,000 tons of coal a year, and the additional expense would be no more than the cost of importing the coal. Sir Charles Ellis, president of the Association, who also spoke, said that there was no easy solution to the problem of atmospheric pollution. If coal were burnt efficiently it burnt smokelessly.

## Synthetic Covered Ball

A tennis ball cover composed of wool and such synthetic fibres as Terylene and nylon has been developed at Dunlop Research Centre. It is said to give a substantially longer life.

## Institute of Fuel

Dr. W. Idris Jones (Director General of Research, National Coal Board), the newly elected president of the Institute of Fuel, presided at the Institute's annual dinner at the Connaught Rooms, London, last week. The principal guests and speakers were Viscount Hall, P.C., and Viscount Waverley, and also among the company were several leading figures in the fuel industries. A dance followed the dinner.

## Deliveries Not Affected

William Palfrey Ltd. (24 City Road, E.C.1), ask us to emphasise that the recent extensive fire at their Newport works will not interfere with production and deliveries of the Palfsacks-multi-wall paper sacks and mattress covers, of which they are manufacturers. The entire production of these, together with the polythene-coated bags, is concentrated at their Rochester works, from which the normal delivery services are made.

## New Monopolies Inquiry

The Monopolies Commission are now examining the arrangements in Semi-Manufacture of Copper and Copper-Based Alloys to see whether they operate or may be expected to operate against the public interest. Their terms of reference include copper, brass, bronze, and nickel silver in the common forms such as sheet, strip, wire, tubes, rods and sections. Copies of the full terms of reference may be obtained on application to the Commission. The Commission would welcome statements from manufacturers, merchants, importers and exporters who rely on a supply of these products for their business. Statements, which can be quite brief in the first place, should be sent to the Monopolies and Restrictive Practices Commission, 3 Cornwall Terrace, Regents Park, London, N.W.1.

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# OVERSEAS

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## Consulting Chemists' Meetings

Open meetings of the Association of Consulting Chemists & Chemical Engineers, Inc., New York, are scheduled for 1954 as follows:—27 April, New York, symposium and banquet (guest speaker); 26 October, annual symposium and banquet (guest speaker).

## Tannin Helps Drilling

Australian engineers are now using tannin extract from the white gum tree to keep drilling mud watery and to maintain the usefulness of bentonite in deep drilling operations when searching for oil. The chemical properties of the tannin extract make deeper drilling possible.

## Latin American Paint

A large Cleveland paint firm has announced new plant expansion programmes in Latin America. New facilities will double output in their Mexican factory, and a new plant is being built in Valencia, Venezuela. The latter is the Cleveland firm's first factory in South America.

## Pakistan-France Trade Pact

Under the terms of a trade agreement recently signed between Pakistan and France, the latter will supply the former *inter alia*, with iron and steel products, chemicals, dyes and machinery and millwork. Pakistan will send to France merchandise including 80,000 tons of raw jute, 15,000 tons of raw cotton, hides and skins, furs, tea, hand-made carpets, a variety of cottage industry products, also bulls for breeding purposes.

## Fewer Accidents at Work

There were 12 per cent fewer accidents in chemical plants of participating members of the Manufacturing Chemists' Association, USA, during the first eight months of this year as compared with the corresponding period of 1952. This, recently said Mr. A. J. Wurtz, secretary of the MCA's general safety committee, was due to: (1) alertness and personal participation of top management in safety programme, (2) assignment of better trained safety supervisors and (3) stepped-up safety education programmes.

## Higher Uranium Profits

Considerably higher profits from uranium production are indicated in the quarterly reports of the South African gold mining groups. The outstanding improvement is that of Daggafontein, in the Anglo-American group, with a profit of £228,000, compared with £120,000 in the previous quarter. The scale of operations at both the sulphuric acid and uranium extraction plants was enlarged during the quarter.

## Chilean Nitrate Output Doubts

Following a steady decline in the production of nitrate in Chile over the past few years, doubts are being expressed as to whether this year's production target of 1,650,000 metric tons will be achieved. A 57 days' strike recently caused a standstill at the largest producing group. First steps are now being taken in developing the solar evaporation system to make use of very low-grade ores and take advantage of washings left after processing of the ore.

## USA Manganese

Deposits of low-grade manganese in the State of Maine will be put through a pilot plant test with the hope that a commercially feasible product suitable for steelmaking will result. There are large quantities of ore in Aroostook County and if a satisfactory process for treating it can be developed the USA's dependence on foreign sources of supply can be substantially reduced. At present, 90 per cent of US manganese supplies come from abroad.

## Fertilisers in Canada

Consolidated Mining & Smelting Company of Canada, Ltd., recently began output of ammonium phosphate at its new \$9,000,000 plant at Kimberley, BC. It is expected that the plant's output of about 190 tons a day will all be marketed in Western Canada. The plant utilises iron sulphide, a by-product of the Sullivan Mine concentrator at Kimberley; phosphate rock from a Cominco subsidiary operation in Montana; and ammonia from the company's nitrogen plant near Calgary.

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## • PERSONAL •

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At the annual general meeting of the British Standards Institution held on Thursday, 29 October, at British Standards House, 2 Park Street, London, W.1, SIR ROGER DUNCALFE was elected president to succeed VISCOUNT WAVERLEY, P.C., G.C.B., G.C.S.I., G.C.I.E., F.R.S. Sir Roger's appointment was proposed by Lord Waverley, whose three-year term of office had ended in accordance with the BSI constitution.

Sir Roger Duncalfe, as chairman of British Glues & Chemicals, Ltd., is a leader of Britain's chemical industry, and has been closely identified with standards work and the BSI for more than twenty years. He has been successively chairman of Technical Committees engaged on standards projects, chairman of the Chemical Divisional Council and of the Institution's Finance Committee and General Council, and more recently its vice-president. He was knighted for his outstanding contributions to industrial standardisation at the time of the BSI Golden Jubilee in 1951.

Although he has devoted so much time and energy to this specialised activity, Sir Roger has also undertaken much work in other directions on behalf of industry. He is president of his own industry's organisation, the Federation of Gelatine & Glue Manufacturers; past chairman and vice-president of the Association of British Chemical Manufacturers; and his long service to the Federation of British Industries is marked by the fact that he holds the office of vice-president, and is also chairman of the Federation's Technical Legislation Committee.

The British Plastics Federation, founded in 1933, has elected its first president. He is MR. C. F. MERRIAM, chairman of the British Xylonite Company, which was founded in 1877, and was the first company in England to manufacture and make articles from the earliest of the organic plastics—celluloid. Mr. Merriam, who followed his father and grandfather as head of the business, joined the company in 1905, becoming joint managing director with his father in 1919 and chairman in 1933. He spent all

his working life in the British plastics industry and is a past-chairman of the British Plastics Federation and a vice-president of the Association of British Chemical Manufacturers. He retired from full-time work with his company last year.

MR. A. R. CREW, manager of advertising, Monsanto Chemicals, Ltd., and MR. R. MACDONALD WATSON, publicity manager, BX Plastics, Ltd., have been co-opted to the British Plastics Federation Publicity Committee. MR. W. JUDE has resigned from the committee on leaving British Industrial Plastics, Ltd. Other members of the committee are MR. W. M. YORK (E. K. Cole, Ltd.), (chairman), MR. D. H. BALFRY (Industrial Mouldings), MR. P. A. DELAFIELD (British Resin Products), MR. C. S. DINGLEY (British Industrial Plastics), MR. A. E. SKAN (Tufnol, Ltd.), and MR. P. I. SMITH (I.C.I.).

It has been announced that PROFESSOR H. A. KREBS, sharer of this year's Nobel Prize for medicine, and professor of biochemistry at Sheffield University, is to receive the American annual Lasker award for medical research.

MR. S. YATES-DUTTON has been appointed chemical sales manager of Joseph Crosfield & Sons, Limited, in succession to MR. A. C. H. CAIRNS who, as previously reported, has joined the board of that company.

Elections announced at the recent annual meeting of the Association of Consulting Chemists & Chemical Engineers, Incorporated, New York, were as follows: *President*, MR. FOSTER DEE SNELL; *vice-president*, MR. ABRAHAM TAUB; *secretary*, MR. THOMAS P. KEARNEY; *treasurer*, MR. PERCY E. LANDHOLT; *council*, MR. C. BUSOW, MR. C. DAVIDOFF, MR. H. W. DIPPEL, MR. H. L. SHULDENER, MR. P. STECKLER, MR. G. H. MORSE and MR. LEE.

MR. HARRY S. FERGUSON, vice-president of Allied Chemical & Dye Corporations, has been named chairman of the Public Relations Committee of the Manufacturing

Chemists' Association, Washington, D.C., to succeed MR. H. BRAYMAN, who has served since the committee's inception. New members of the committee are MR. D. C. CARMICHAEL, MR. M. R. BUDD, MR. R. L. TAYLOR, MR. T. MARVIN and MR. C. S. HOAGLAND.

The council of Leeds University have agreed to confer the title of Emeritus Professor upon PROFESSOR F. CHALLENGER, on his retirement from the Chair of Organic Chemistry, and upon PROFESSOR N. M. COMBER, on his retirement from the Chair of Agricultural Chemistry.

The RT. HON. THE EARL OF DUDLEY, M.C., T.D., D.L., J.P., has retired from the Board of British Iron & Steel Corporation Limited, of which he had been chairman since its inception in 1935, following the purchase of Round Oak Steel Works Limited by Tube Investments Limited. SIR CHARLES BRUCE-GARDNER, Bart., M.I.Mech.E., has been appointed chairman of the Board. Sir Charles is chairman of John Lysaght Limited, a director of Steel Company of Wales Limited, Guest, Keen & Nettlefolds Ltd., and of several other important industrial companies.

MR. MARTIN APLEY has left Catalin Ltd., Waltham Abbey, Essex, to join the Walker Extract and Chemical Co. Ltd., of Bolton, Lancs, as development manager and director. Mr. Apley has been chief chemist of Catalin Ltd., since its formation in 1937.

SIR LESLIE HOLLINGHURST has been nominated as chairman of the non-profit-earning company to provide increased fuel efficiency advisory services, the formation of which was announced in the Commons last week by the Minister of Fuel and Power, MR. G. LLOYD. The British Productivity Council, stating later that the proposed name of the company was the National Industrial Fuel Efficiency Service, stated that they had nominated the following as other members of the board of directors:—SIR PATRICK J. DOLLAN, chairman, Scottish Fuel Efficiency Advisory Committee; SIR JOHN HACKING, deputy chairman (Operations), British Electricity Authority; SIR EDWARD HERBERT, deputy chairman and managing director, William Hollins and Company, Ltd., Nottingham; MR. LESLIE A. W. JENKINS, joint managing director, John Wright & Sons

(Veneers), Ltd., London; MR. HENRY F. H. JONES, deputy chairman, the Gas Council; MR. E. JULIAN PODE, managing director, the Steel Company of Wales, Ltd.; and MR. JACK TANNER, chairman of the TUC General Council and a member of the British Productivity Council.

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## Obituary

We regret to announce the death of LT.-COL. W. A. VIGNOLES, D.S.O., M.I.E.E., a director of Evershed & Vignoles, Ltd., who died peacefully at his home on Saturday, 24 October.

Lt.-Col. Vignoles was born in 1874 and received his technical education at Finsbury Technical College, subsequently working in the shops of W. T. Goolden & Co., the predecessors of Evershed & Vignoles, Ltd. After distinguished service in the infantry dating from 1914, he retired from the army in 1919 with the rank of Lt.-Colonel, and returned to Grimsby, being elected president of the I.M.E.A. for the year 1922-23. In 1928 he was appointed director and secretary of the Electrical Development Association, from which appointment he resigned in 1931, to join the board of Evershed & Vignoles Ltd. as joint managing director with Mr. Adolph Vines. In 1951, owing to ill-health, he resigned the position of managing director, but still held a seat on the board of Evershed & Vignoles Ltd.

MR. RALPH HALKETT, pioneer of the gas grid system in Great Britain, has died at Winchcombe, Glos, aged 76. For 25 years he was manager of the former Sheffield Gas Company.

The death took place on 25 October of MR. I. NEWTON HUGHES, at his home, 65 Church Street, Flint, at the age of 96. Mr. Hughes was a native of Bagillt, and, after three years at Manchester University, became chief chemist at the chemical works of Messrs. Muspratt Bros. and Huntley, at Flint, and later works manager until the works closed down in 1921. He then went with the firm to St. Helens and retired in 1925. He entered Flint Council in 1911, and was Mayor in 1925. He was made a magistrate in 1927, and was on the supplementary list at the time of his death.



# Publications & Announcements

LATEST booklet in the 'Choice of Careers' series issued by the Central Youth Employment Executive is No. 42, 'The Copper-smith,' obtainable from HM Stationery Office or through any bookseller, 1s. 3d. net. Intended primarily for boys who are about to decide the kind of work to take up on leaving school, the booklet explains how the craft has been handed down from father to son, with little change, from early times. Some of the work has been made easier by the invention of machines, and the modern coppersmith may have to work also with aluminium, stainless steel and various alloys, but he must still be skilled in the basic handwork of his craft. Among the personal qualities required are constructive ability, a good eye and memory for shapes.

\* \* \*

AT Wesseling, between Cologne and Bonn, construction work will soon start on the first plant in Western Germany to produce polyethylene and ethyl benzene derived from oil. Refinery gases from the nearby oil refinery will provide feedstock. Production is planned to begin in 1955. Operators of this venture will be 'Rheinische Olefinwerke G.m.b.H.,' jointly owned by Badische Anilin and Soda-Fabrik A.G., and Deutsche Shell AG. Polyethylene, which is to be produced at Wesseling under the registered trade mark 'Lupolen,' is a plastic material with a variety of uses. It is said to have good electrical insulation properties, and to be moisture-proof, resistant to acid and alkali, and, because it retains its properties at low temperatures, to be unaffected by extreme cold. In addition to its important application as an insulator in the electrical industry, it is used in the manufacture of plastic ware, particularly tubes and bottles, and for making moisture-proof packages. Ethyl benzene is the base material for the production of polystyrene, which is used in the manufacture of plastic toys, combs and other toilet ware.

\* \* \*

THE proceedings of the National Bureau of Standards Semi-centennial Symposium on Electrochemical Constants, held in 1951, have now been published as NBS Circular 524, 'Electrochemical Constants.' The 30 papers in this volume present some of the

latest results, both experimental and theoretical, in the field of fundamental electrochemistry from many leading establishments in the United States and abroad. Research in electrochemistry was one of the Bureau's first functions. Among the outstanding scientists presenting papers at the symposium were:—J. O'M. Bockris, Imperial College of Science and Technology, London; Marion Eppley, The Eppley Laboratory, Inc.; A. R. Gordon, University of Toronto, Canada; Herbert S. Harned, Yale University; Charles A. Kraus, Brown University; Wendell M. Latimer, University of California; D. A. MacInnes, The Rockefeller Institute for Medical Research; J. Th. G. Overbeek, University of Utrecht, The Netherlands; Robert A. Robinson, University of Malaya, Singapore; A. J. Rutgers, University of Ghent, Belgium; George Scatchard, Massachusetts Institute of Technology; H. J. V. Tyrrell, Sheffield University, England; and W. F. K. Wynne-Jones, University of Durham, Newcastle-upon-Tyne, England. Copies of this publication, published at \$2, may be ordered from the Government Printing Office, Washington 25, D.C., but remittances must be in US exchange and should include an additional one-third of the publication price to cover mailing costs.

\* \* \*

PSYCHROMATICS is the study of the effects of colour and light in a building on the people who work there. Its application to colour and lighting schemes in industrial and commercial buildings, schools and hospitals, creates an environment in which greater mental and physical comfort is enjoyed and thus it stimulates productivity, efficiency and good industrial relations, according to a well-produced leaflet issued by Holland & Hannen and Cubitts, Ltd. 258 Gray's Inn Road, London, W.C.1, who have a Psychromatics Section dealing with this specialised subject. It is pointed out in the leaflet that the installation of planned colour and good lighting in a building need cost no more than the traditional and often inefficient type of treatment. While the company are equipped to carry out every phase of the work themselves, they are willing to co-operate in a consultative capacity on any problem concerning the functional use of colour and illumination.

ONE per cent better utilisation of vehicles in this country would reduce expenditure by £4,000,000 a year according to a report made by a Joint Research Committee formed by the Institute of Municipal Treasurers & Accountants and the Institute of Cost & Works Accountants. Total national expenditure on road haulage, excluding any shares of expenditure on the upkeep of roads, is estimated at £600,000,000 a year, and although the report arises from investigations into local and public authorities, it will be of concern to all who run road services. Often, states the report, about two-thirds of the cost of road haulage represents drivers' wages, licences, insurance, depreciation (or capital charges) and garaging; one-sixth covers repairs and renewals of parts, and the other sixth goes in fuel. The report—issued as a booklet entitled 'Transport Costing' and available from Gee & Co. (Publishers), Ltd., 27-28 Basinghall Street, London, E.C.2, at 2s. 6d. post paid—discusses methods found to be effective in keeping costs down and brings out certain factors, often overlooked, to which it is necessary to give attention if a transport service is to be run economically.

\* \* \*

INDUSTRIAL trucks and materials handling equipment manufactured by Wilmot Trucks Limited, Ivanhoe Works, Scotts Green, Dudley, are clearly illustrated in their latest leaflet, No. 137. There are about 60 illustrations in all, showing the wide and representative range of trucks, etc., supplied to many industrial users throughout the country. The firm has a Materials Handling Advisory Service which is at the disposal of those who are interested. The leaflet forms a section of the company's general catalogue. Price lists, special quotations and other sections of the catalogue are obtainable on application.

\* \* \*

SUCCESSOR to the Plant & Animal Products Department section of the Bulletin of the Imperial Institute, 'Colonial Plant and Animal Products' appears as the quarterly journal of the Colonial Products Advisory Bureau (Plant & Animal) and is obtainable from HM Stationery Office at 5s. net. The latest edition—No. 3 in Vol. III—contains reports of recent investigations at the Colonial Products Advisory Bureau as well as a couple of original articles.

ANNUAL consumption of common salt in and with food is given variously as 22 to 29 lb. per head of population per year. The particular aspect of the connection between chlorine and food discussed by Mr. E. A. Whitlock, chief chemist to Wallace & Tiernan, Power Road, London, W.4, in an article entitled 'Food & Chlorination,' which recently appeared in *Food*, is not, however, concerned with chlorine as chloride, but in the free available state, hypochlorous acid, and in other forms wherein it plays a valuable part as a disinfecting agent. The use of chlorination in the canning, frozen food, flour milling, fish processing and sugar industries is discussed, and the value of chlorination and relative merits of steam sterilisation in the dairy industry assessed. The article has been reprinted as the company's Technical Publication No. BRA-174.

\* \* \*

CLOSE investigation of the economics of power production and steam utilisation by all users of coal, steam and power or electricity is called for by the necessity to conserve the nation's coal reserves on the one hand and to reduce manufacturing costs on the other. This is pointed out in Publication E.53 of Ashworth & Parker Limited, Riverside Works, Bury, Lancs., and the claim is made that where the demand for low pressure steam for heating, drying or other process work approximately balances or is greater than the steam required to generate the power to drive the works, the most economical method of producing this power is to pass the steam through a back pressure engine before utilising it for process work. Many hundreds of installations of this description, it is stated, are in successful operation and among those illustrated in the publication is one in a Darlington chemical company's works.

\* \* \*

TWO brochures have recently been received from the Glyco Products Co. Inc., of New York. The first describes the physical and chemical properties, the very many uses for sequestration and chelation, and the analysis of the 'Tetrines,' the sodium salts of ethylenediamine tetra-acetic acid. The second, entitled 'Cosmetic and Drug Manual,' is concerned with formulations for creams, lotions, shampoos, lipsticks, mascara, and pharmaceuticals, involving the 14 polyhydric alcohol esters manufactured by Glyco.

# Law & Company News

## Commercial Intelligence

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

### Mortgages & Charges

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

ZEMS LTD., London, N., manufacturing chemists. 2 October, £1,750 debentures, to A. J. Norton, London; general charge. \*Nil. 1 September, 1952.

BELLROCK GYPSUM INDUSTRIES, LTD., Chertsey. 25 September, collateral security supplemental to a debenture dated 8 January, 1952, to Equity & Law Life Assurance Society; charged on land at Staunton (Notts.), comprised in a lease dated 5 November, 1952; also 25 September, £50,000 debenture, to Equity & Law Life Assurance Society; charged on mines or beds of gypsum under certain lands at Staunton, on other lands at Staunton and a general charge (subject to, etc.); also 25 September, collateral security supplemental to a Trust Deed dated 8 January, 1952; charged on land at Staunton, comprised in a lease dated 5 November, 1952. \*£275,000. Feb. 11, 1953.

COLONIAL GAS ASSOCIATION, LTD., Hove. 1 October, £482,000 (Australian currency), third debentures, part of a series already registered. \*£782,100 first series and £750,000 second series. 29 October, 1952.

D. DESMOND & Co., LTD., London, E., chemists. 28 September, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the bank; charged on 6 and 6a Albert Road, Silvertown, and fixtures. \*£8,000 (fluctuating). 5 March, 1953.

TELGOR LTD. [formerly ROGER & GALLET (LONDON), LTD.], London, N.W., chemists, perfumers, etc. 25 September, charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; charged on Beasley's Ait Works, Sunbury. \*Nil. 31 December, 1952.

WALLACE (CHEMISTS), LTD., Radcliffe. 21

September, £2,500 debentures; general charge.

### Satisfactions

H. BENNETT (PHARMACY), LTD. [now GORDON SMITH (CHEMISTS), LTD.], Hale. Satisfaction, 30 September, of debentures registered 10 September, 1952.

PHARMAX LTD., Chislehurst, chemists. Satisfaction, 3 October, of charge registered 5 August, 1947.

THERMO PLASTICS, LTD., Dunstable. Satisfaction, 30 September, of debentures registered 25 March, 1947.

FRASER-BETTS & SONS, LTD., Brighton, chemists, etc. Satisfactions, 9 October, of debentures registered 19 April, 1949.

SMITH & MAINPRIZE, LTD., Bradford, chemists, etc. Satisfactions, 9 October, of two charges registered 2 October, 1946.

## New Registrations

### Hemjay (London) Ltd.

Private company. (524,883.) Capital £1,000. Merchants, forwarding agents, bankers, manufacturing chemists, food processors, agents, etc. Directors: Wm. H. Jacobs and Wm. A. Hemmings (directors of Herbert's Food Products, Ltd., etc.). Reg. office: Cromwell House, 6/9 Surrey Street, Strand, W.C.2.

### F. R. Himsworth Ltd.

Private company. (525,117.) Capital £30,000. Objects: To undertake and experiment with any process in connection with the protective or decorative treatment of metal or metal alloys, etc. Directors: John G. Peckston and Francis R. Himsworth. Secretary: S. J. Tinkler. Reg. office: 22 Duke Street, Darlington, Co. Durham.

### J. W. Hutchinson (Chemist) Ltd.

Private company. (524,886.) Capital £6,000. Consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. First director: Mrs. Florence A. Hutchinson. Reg. office: 120/122 Sandy Lane, Skelmersdale, nr. Ormskirk.

### Valley Mill (Sprays & Chemicals) Ltd.

Private company. (524,828.) Capital £500. Manufacturers, importers, exporters

of and dealers in all kinds of chemicals, fertilisers, manures, fibres, fumigants, gases, liquids, etc. Directors: R. O. Thomas, R. Davies. Reg. office: The Valley Mill, Valley, Anglesey.

## Company News

### Fisons Ltd.

Preliminary accounts issued by Fisons Ltd. for the year ended 30 June last show that after providing for ordinary business expenses, including £651,479 for depreciation (as against £594,989 last year), the trading profits of the group, together with investment income, were £2,451,637, as compared with £1,645,352. Net profit after all charges is given as £701,429, an increase of £57,769. The final equity dividend is being raised from 7 per cent to 8 per cent, making 12½ per cent (10 per cent) for the year.

### Petrochemicals Ltd.

What he describes as 'a remarkable improvement in plant efficiencies' during the past financial year is referred to by Mr. Godfrey H. Owtram, chairman of Petrochemicals Limited, in a statement accompanying the company's accounts for the year ended 30 June last. The improvement, he says, is largely due to the work of the technical manager, Mr. W. E. Huggett, and his associates. By March, he adds, the efficiency of a number of their plants was surprising some of the sceptics who had doubted whether in fact the targets could be achieved. Improvements in financial results would have been greater because of this and the cutting of administration costs but for two factors—the recession which has affected many of the large British chemical companies and the reduction in production with the purpose of gradually lowering large stock accumulations. Trading operations of the parent concern showed a surplus of £8,750 before charging depreciation and interest, and the net loss was reduced to £866,803 from the previous year's £1,339,340. Subsidiary and associated companies are making progress.

### Thos. W. Ward Ltd.

Despite more competitive trading conditions, Thos. W. Ward Limited achieved the new record turnover figure of £33,000,000 for the year ended 30 June last. This is revealed by the chairman, Mr. Geo. Wood, in his statement accompanying the accounts.

He adds that of this total turnover, the parent company's figure of £22,500,000 shows an increase of £3,000,000 compared with the previous year and the combined turnover of subsidiary companies of £10,500,000 an increase of £1,000,000. The charge for UK and foreign taxation required £1,027,342, leaving profits of £946,868, and after adjusting for the amounts already dealt with by subsidiary companies in their own accounts, the parent company was left with a net profit available for allocation and appropriation of £590,835, an increase of £15,880 compared with the previous year. To mark the 75th anniversary of the founding of the business by Thomas William Ward and the 50th annual meeting of the company, £25,000 had been set aside for distribution among the employees in addition to the usual bonus. The board recommends a final ordinary dividend of 15 per cent less tax, making 20 per cent for the year.

### Savory and Moore Ltd.

Group trading profit of £156,486, compared with £166,817 for the previous year, is reported by Savory & Moore Limited for the year ended 31 March last. After allowing for taxation and the minority interests' proportion, the net profit was £63,380, as against £61,656. Profit retained in the subsidiary companies' accounts was £24,360, compared with £17,803, so that the net profit brought into the accounts of Savory & Moore Limited was £39,020 (£43,853). The dividend recommended is 10 per cent (same) on the ordinary shares and consequential participating dividend of 1 per cent (same) on 7½ per cent Cumulative Preference (Participating) Stock.

## No Charge on Pallets

NO conveyance charges are now made by British Railways on owners' pallets on which goods are loaded, or for the return of the pallets to the senders. (A pallet is a tray beneath which a fork—operated by power or by hand—can be inserted so that the tray and its load can be raised or lowered or carried along). Traffic can be loaded on pallets at the despatching-point and remain on them until finally unloaded. Traffic conveyed on pallets by goods or passenger train services is charged on the net weight of the goods and packing, but excluding the weights of the pallets, and returned empty pallets are carried free by rail.

# ION EXCHANGE MATERIALS

Ion Exchange today performs many tasks in industry, and Permutit manufactures a wide range of these materials. Their application in roles distinct from water treatment has resulted in the development of numerous new industrial processes giving improved results and lower running costs. Some of the materials now available, with their characteristics, are shown below.

<b>ZEO-KARB</b>	A sulphonated coal product containing both strong and weak acid groups.	<b>DE-ACIDITE E</b>	A medium basicity high capacity anion exchange material.
<b>ZEO-KARB 215</b>	A nuclear sulphonic acid resin containing also hydroxyl groups.	<b>DE-ACIDITE FF</b>	A very high basicity anion exchange material in bead form suitable for absorption of very weak acids.
<b>ZEO-KARB 216</b>	A resin containing weak acid groups of the carboxyl type.	<b>BIO-DEMINTROLIT</b>	A mixed cation and anion exchange resin of high stability for demineralisation in a single column.
<b>ZEO-KARB 315</b>	A sulphonic acid resin particularly stable up to 100°C.	<b>DECOLORITE</b>	A resin of high porosity for removing colour from solutions.
<b>ZEO-KARB 225</b>	A unifunctional, high capacity sulphonic resin in bead form.	<b>RESIN MEMBRANES</b>	For special purposes, many of these materials can be supplied as membranes in the form of rods, discs and thimbles.

With forty years' experience in the manufacture and operation of Ion Exchange materials, the Permutit organisation is continually developing new materials, and new methods of using them. Its Research Laboratory is ready always to co-operate in the solution of your problems.

## THE PERMUTIT COMPANY LIMITED

Dept. V.A. 150, Permutit House, Gunnersbury Ave., London, W.4. Tel.: CHiswick 6431



## Next Week's Events

### MONDAY 9 NOVEMBER

#### Society of Chemical Industry

Belfast: Queen's University, 7.45 p.m.  
H. J. Plenderleith: 'The British Museum Laboratory.'

#### Institute of Fuel

Newcastle-on-Tyne: King's College, 6.30 p.m.  
G. L. Duffett: 'Waste-heat Recovery by Turbines.'

#### Institute of Metals

Glasgow: 39 Elmbank Crescent, 6.30 p.m.  
C. E. Ransley: 'Gas Unsoundness.'

#### Purchasing Officers' Association

London: Royal Society of Arts, John Adam Street, W.C.2, 6.45 p.m. R. H. Smith: 'Flesh, Fowl or Good Red Herring.'

### TUESDAY 10 NOVEMBER

#### Society of Chemical Industry

London: Geological Society, Burlington House, W.1, 5.30 p.m. Chemical Engineering Group joint meeting with Oils & Fats Group. I. H. Chayen and D. R. Ashworth: 'The Application of Impulse Rendering to the Animal Fat Industry.'

Birmingham: Birmingham & Midland Institute, Paradise Street, 6.30 p.m. T. P. Hughes: 'Some Aspects of Rocket Fuels & Propellants.'

#### Society of Public Analysts & Other Analytical Chemists

Glasgow: Central Station Hotel, 7.15 p.m. Scottish Section. K. Sporek and A. F. Williams: 'Rapid Determination of Glycerol in Fermentation Solutions: A New Chromatographic Procedure'; I. A. Heald: 'Field Analysis in Connection with Water Treatment Problems.'

### WEDNESDAY 11 NOVEMBER

#### Royal Institute of Chemistry

London: Norwood Technical College, Knight's Hill, S.E.27, 7 p.m. Film display.

#### Institution of Chemical Engineers

Birmingham: The University, Edmund Street, 6.30 p.m. F. H. Garner, S. R. M. Ellis and D. W. Fosbury: 'Perforated Plates in Liquid-Liquid Extraction (Toluene-Diethylamine-Water System).'

Manchester: College of Technology, 3 p.m. J. S. Forsyth and N. L. Franklin: 'The Interpretation of Minimum Reflux Conditions in Multi-component Distillation.'

### THURSDAY 12 NOVEMBER

#### The Chemical Society

Bristol: The University, 7 p.m. Social evening and film show with RIC and SCI.

#### Society of Chemical Industry

Edinburgh: North British Station Hotel, 7.30 p.m. R. E. Davies: 'The Mechanism of Hydrochloric Acid Production by the Stomach.'

Preston: Town Hall, 7.30 p.m. Joint meeting with RIC. A. F. Wells: 'Three Dimensional Chemistry.'

#### Institution of Chemical Engineers

Manchester: College of Technology, Sackville Street, 6 p.m. Graduates & Students Section. W. Kenyon: 'Works Study as an Instrument of Control in Industry.'

#### Pharmaceutical Society of Great Britain

London: 17 Bloomsbury Square, W.C.1, 7.30 p.m. Professor W. H. Linnell: 'The British Pharmacopœia: Chemistry.'

#### Institute of Welding

London: 2 Savoy Hill, W.C.2, 6.30 p.m. Films.

### FRIDAY 13 NOVEMBER

#### Society of Chemical Industry

London: Wellcome Research Institution, 183 Euston Road, N.W.1, 6.30 p.m. Fine Chemicals Group. Conversazione.

London: Institution of Electrical Engineers, Savoy Place, W.C.2, 9.45 a.m. Corrosion Group. Symposium on 'Cathodic Protection.'

London: Borough Polytechnic, Borough Road, S.E.1, 6.30 p.m. Food & Agriculture Groups. Conversazione.

#### Institution of Chemical Engineers

London: Caxton Hall, Westminster, 6.30 p.m. Graduates & Students Section. Dr. L. H. Whynes: 'Some Aspects of the Absorption of Silicon Tetra-fluoride Gas in Water.'

#### Institute of Physics

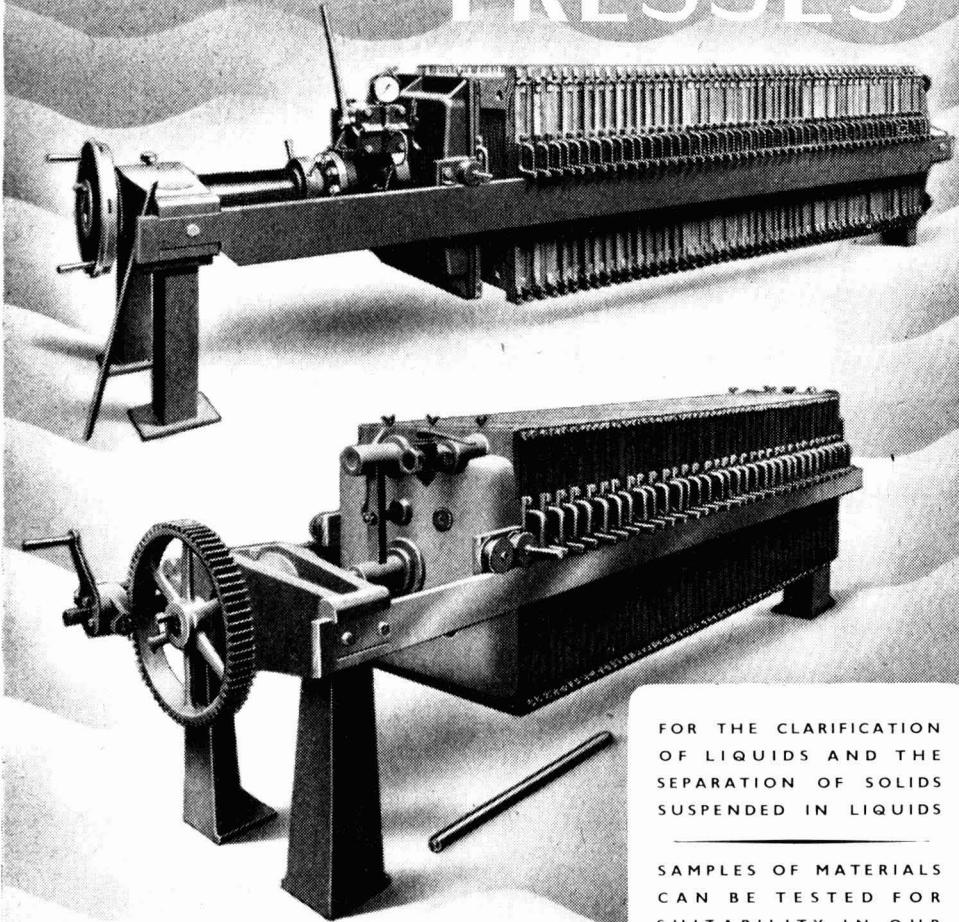
Cardiff: University College, 5.15 p.m. Professor M. W. Thring: 'The Similarity Condition for Some Industrial Models.'

#### Fertiliser Society

Billingham: I.C.I. Works, 11.30 a.m. W. d'Leny: 'Nitrophosphate.'

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## Market Reports

LONDON.—A steady market with a rather better inquiry on home account has been reported during the past week. The demand for the general run of soda products has been fully maintained, and prices are well held. Interest in the barium compounds is strong and elsewhere there is a good call for acetone, formic acid and hydrogen peroxide. Export business is reported as quiet with a lot of inquiry which has yet to find its way to the order books. Among the coal tar products pitch is receiving more active inquiry, and phenol and *meta*-cresol are both firm on export account.

MANCHESTER.—Fresh inquiry on the Manchester market during the past week for the alkalis and other leading heavy chemical products has been on a fair scale and little alteration in the general price position compared with recent weeks has occurred. The textile and allied trades are absorbing relatively good quantities of a wide range of chemicals against contracts and, with one or two exceptions, this is also the experience so far as the other principal consumers are concerned. In the fertiliser section there is a continued good demand for basic slag and the tendency in other directions is for business to improve gradually. Among the tar products, creosote oil, phenol, benzol, toluol and xylol are in steady request.

GLASGOW.—The demand from most sections of the trade has been good, with an increased turnover in textiles. The uncertainty of some of the metals has slowed down demand in some directions. However, on the whole, the past week has been a very satisfactory one.

### Brazilian Oil Refinery

According to a Brazilian Press report, The National Petroleum Council has given the 'Companhia Petrolífera da Amazonia' permission to install a refinery in Manáus, State of Amazonas, with a refining capacity of 5,000 barrels a day. The company will refine Peruvian petroleum and has already signed a contract with 'Ganso Azul' of Peru. It owns a fleet of oil tankers and is negotiating with French and US firms for the purchase of refining equipment.

## Water & Air Pollution

### Chemical Industry's Problems

THE Ruabon (North Wales) works of Monsanto Chemicals Limited was visited recently by an intra-European mission, arranged by the Organisation for European Economic Co-operation, for the purpose of studying water and air pollution problems. (See THE CHEMICAL AGE, 31 October, p. 921).

The mission, numbering some 20 representatives of research institutes, public health authorities, water authorities, industrial organisations and similar bodies drawn from all over Europe, was given a review of the problem solved by Monsanto in disposing of its effluent—that of an essential industrial undertaking of national importance located in an area of noted beauty in the valley of the River Dee.

Next, the mission was given a technical explanation of the steps the company had taken to deal with the preservation of public amenities, and was finally taken on a detailed tour of inspection of the recently constructed biological effluent purification plant. This purification plant, which was formally opened by Sir Ben Lockspeiser, Secretary of the Department of Scientific and Industrial Research in June, 1952, is of particular interest because it constitutes, so far as is known, the first large-scale application in this country of this method of treatment of chemical waste liquors of non-biological origin.

At the time of the formal opening Monsanto had, since the initiation of its protective measures, spent upwards of £600,000 on all aspects of its effluent purification programme. The work still continues and substantial extensions to the biological purification plant have been brought into operation during the past 12 months.

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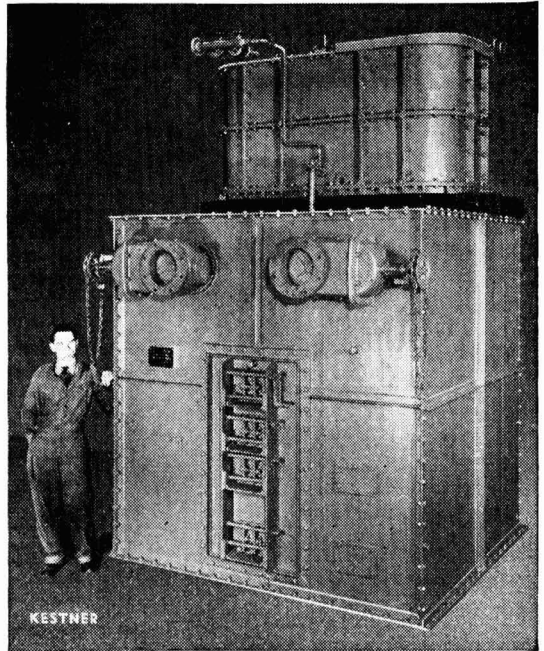
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# Chemical plant and processes

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# CLASSIFIED ADVERTISEMENTS

## SITUATIONS VACANT

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

### PYRETHRUM BOARD OF KENYA. CHEMIST

Required to take charge of chemical laboratories in NAKURU, dealing with the analysis of pyrethrum flowers and with chemical investigations in connection with the growing, preparation and marketing of the material. Applicants should have University Degree with First or Second-Class Honours, Chemistry as principal subject, or an equivalent qualification, or possess high professional attainments. They must also have had considerable experience in directing the investigation of raw materials of plant origin, for preference experience with pyrethrum. Commencing salary within the basic scale £1,000-£1,500, according to qualifications and experience. The post provides for a cost-of-living allowance, Provident Fund and free passages. Application forms can be obtained by writing to BOX "OC/176," c/o 95, BISHOPSGATE, E.C.2.

### SENIOR SCIENTIFIC OFFICERS; SCIENTIFIC OFFICERS; PATENT EXAMINER AND PATENT OFFICER CLASSES.

The Civil Service Commissioners invite applications for permanent and pensionable appointments to be filled by frequent competitive interviews. The Scientific posts are in various Government Departments and cover a wide range of Scientific research and development in most of the major fields of fundamental and applied science. In biological subjects the number of vacancies is small; individual vacancies exist at present for candidates who have specialised in Palaeobotany, Invertebrate Fossils and Foraminifera. The Patent posts are in the Patent Office (Board of Trade), Admiralty and Ministry of Supply.

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Further particulars from the **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1**, quoting No. S.53/53 for Senior Scientific Officers and S.52/53, S.128/53 for the other posts. Completed application forms to be returned on or before 31 December, 1953. 23429/80/JLH

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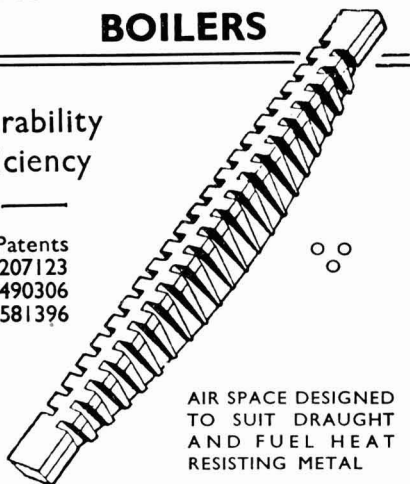
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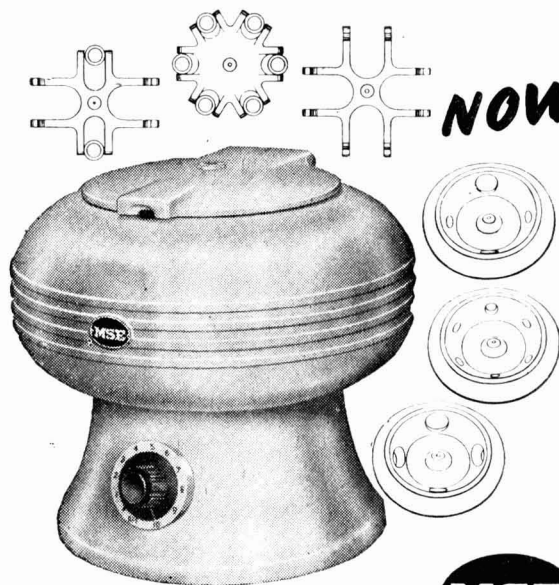
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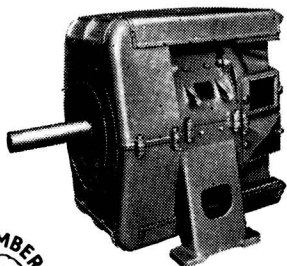
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