

# Chemical Age

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**PETROCHEMICALS and POLYMERS**

VOL. 86 No. 2207

28 OCTOBER 1961

## APV for the A<sub>2</sub>Z of Heat Exchange with chemicals

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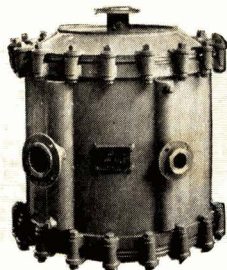
PVA

MIBK

MEA

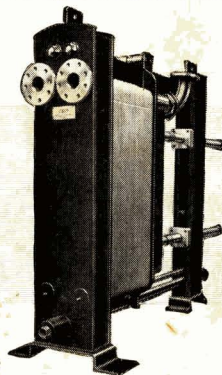
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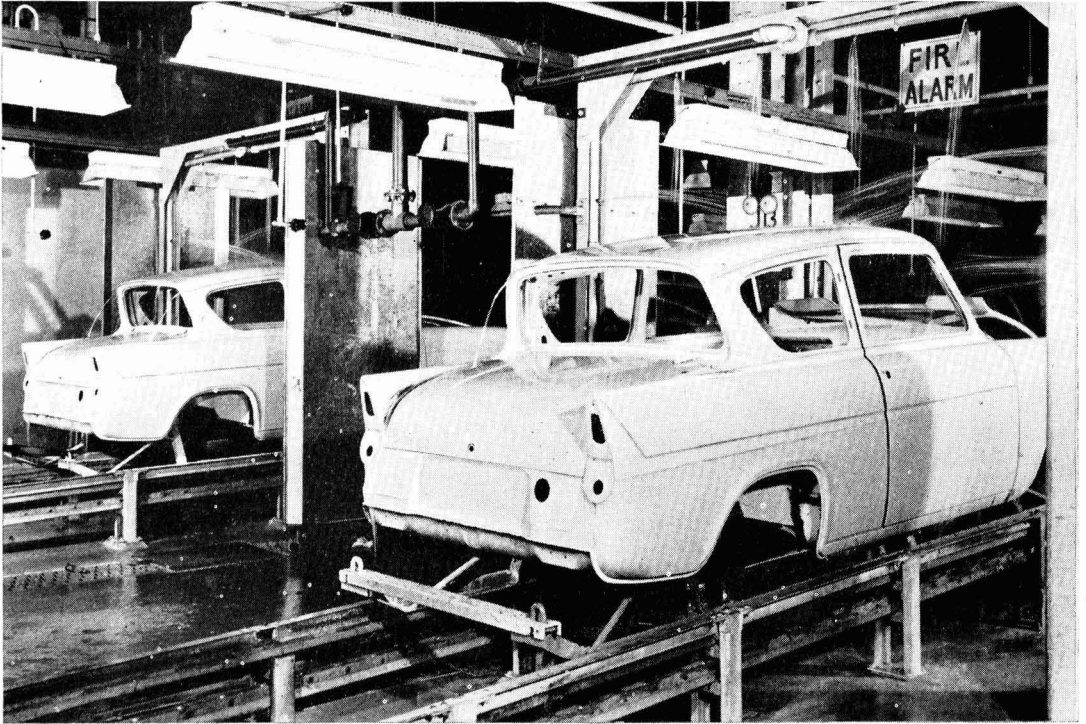
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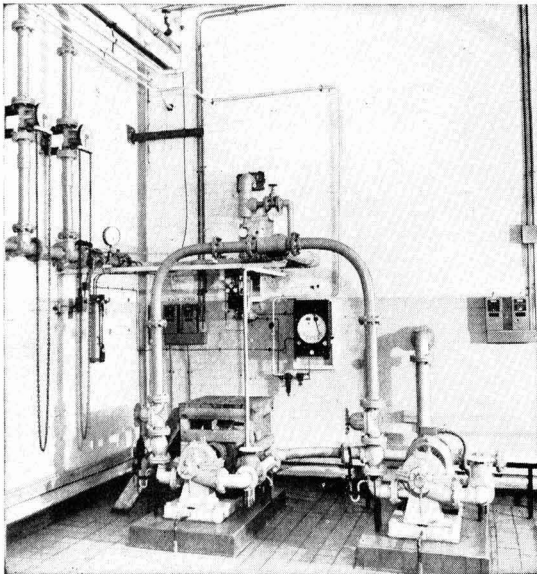


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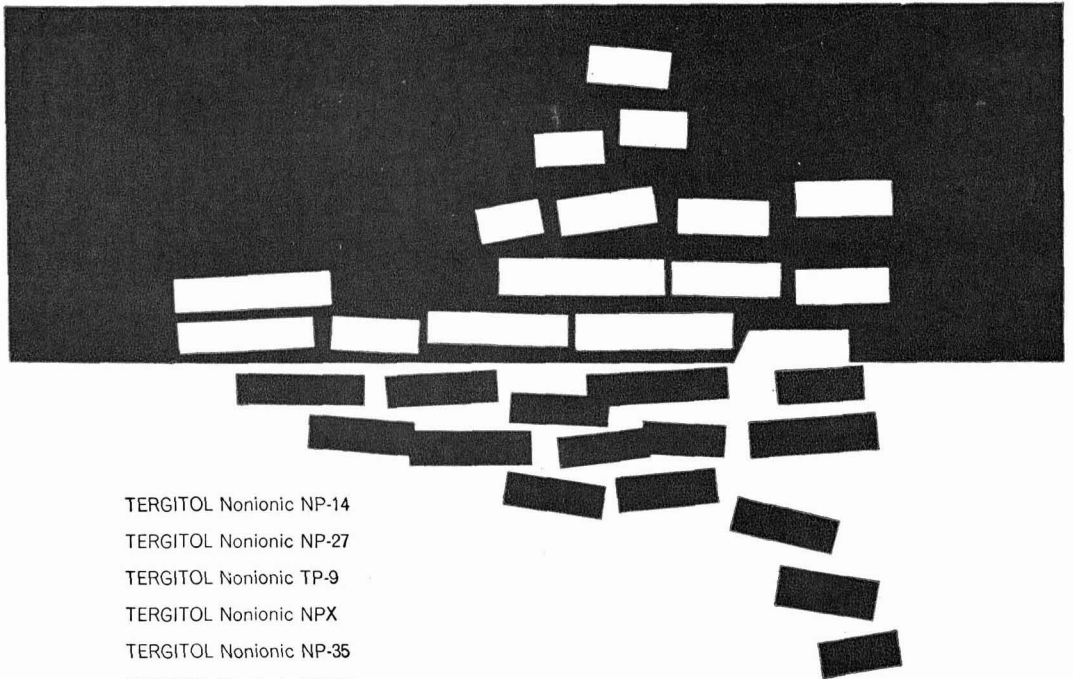






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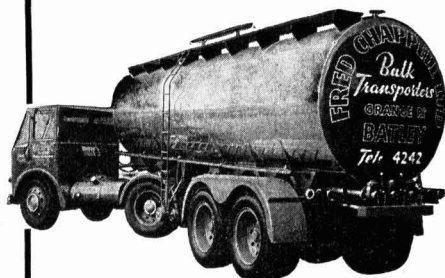
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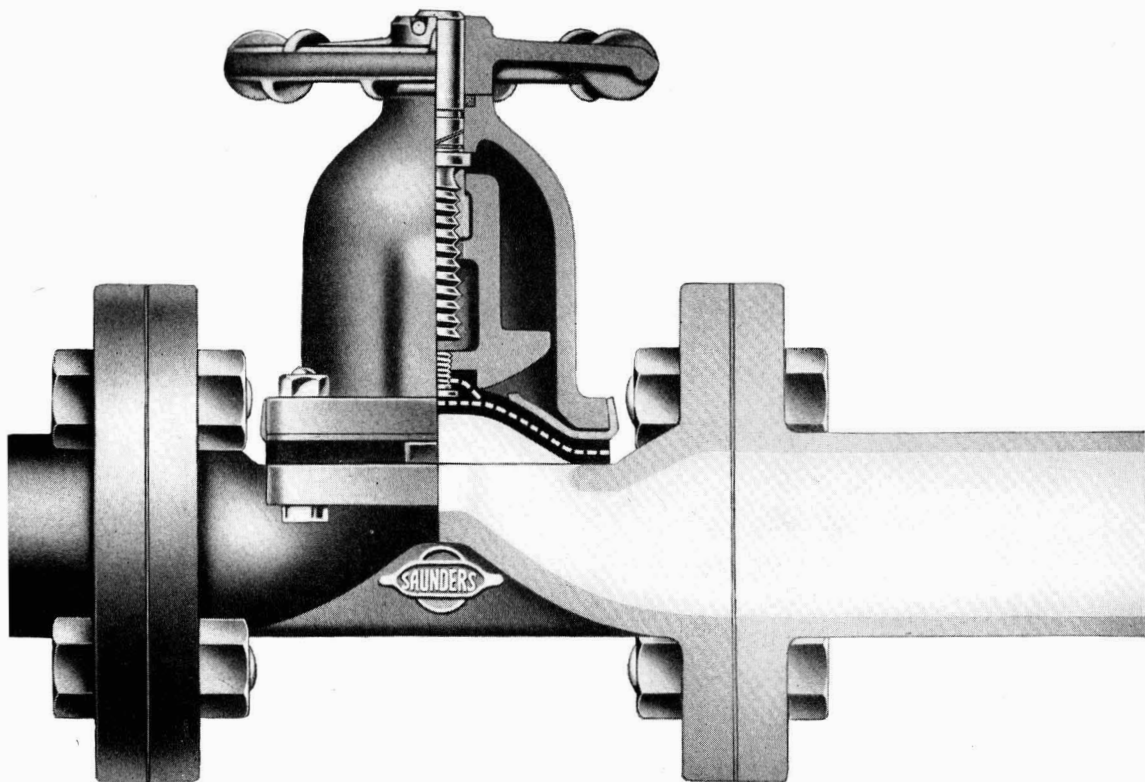
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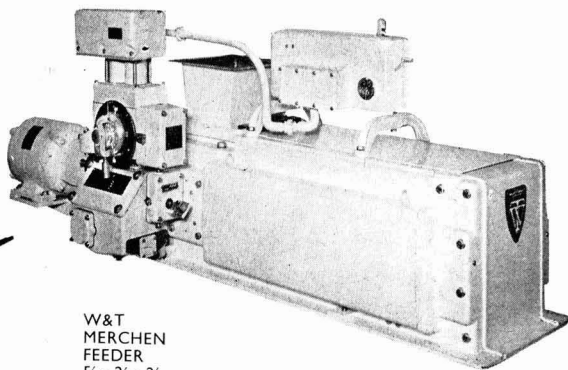
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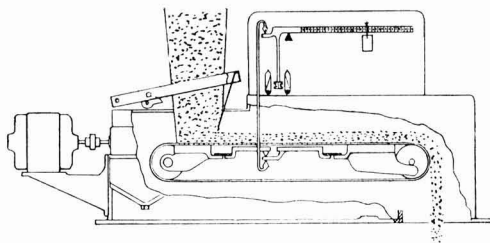
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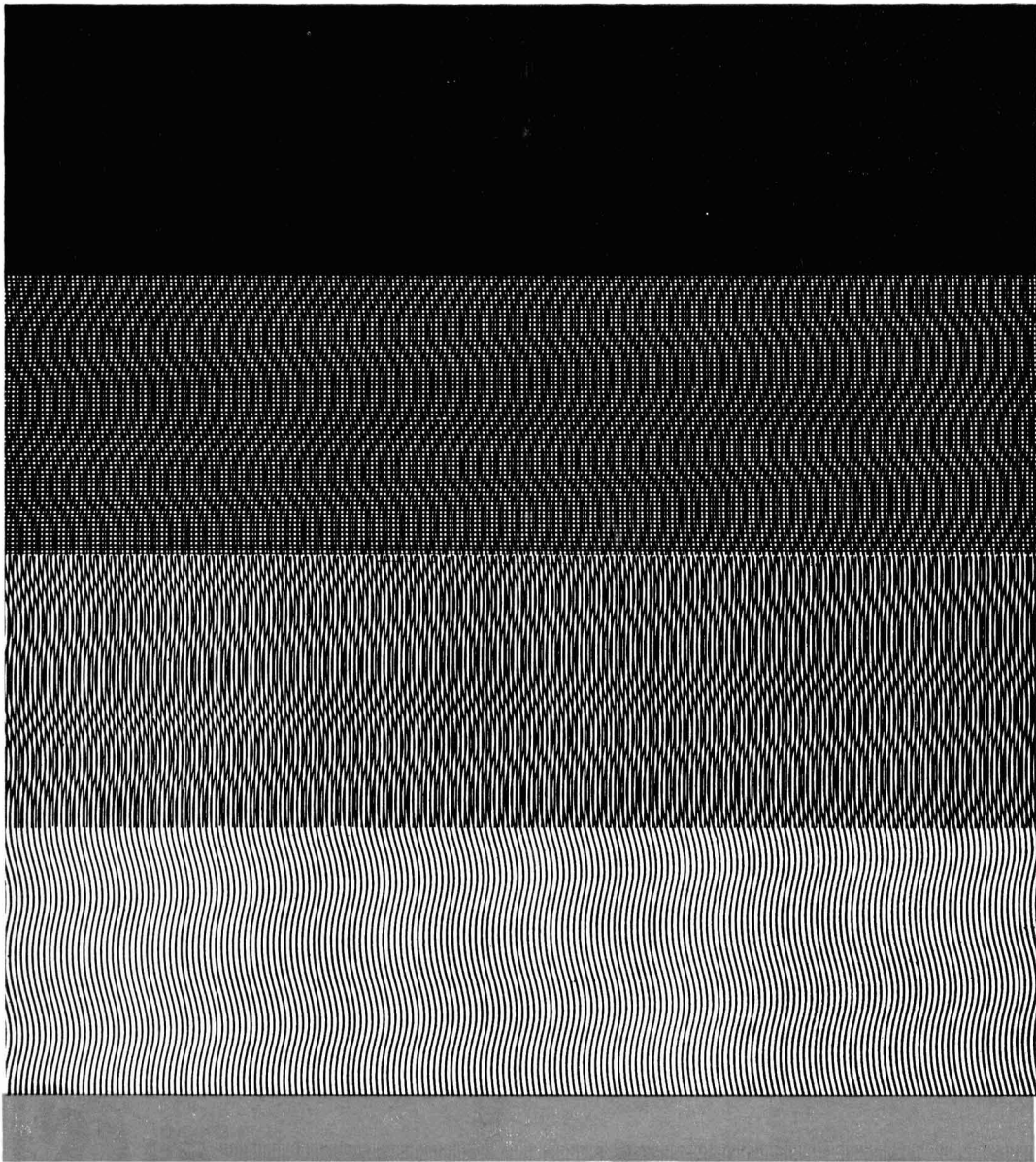
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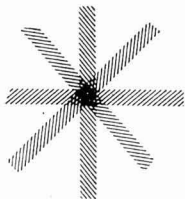
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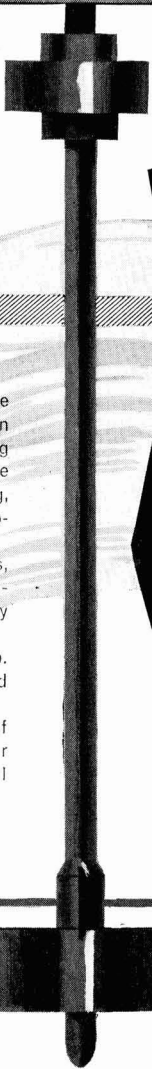
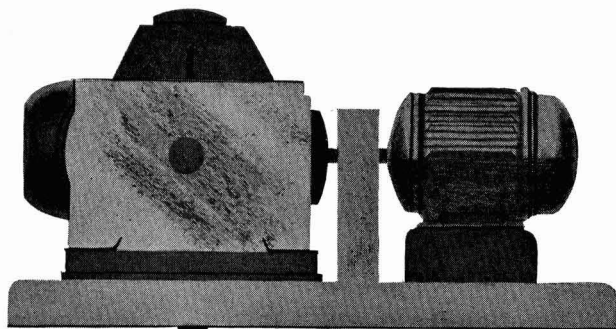
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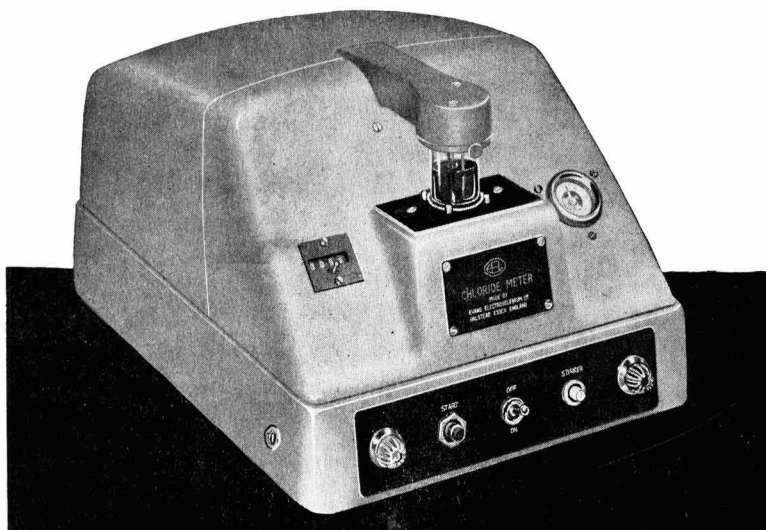
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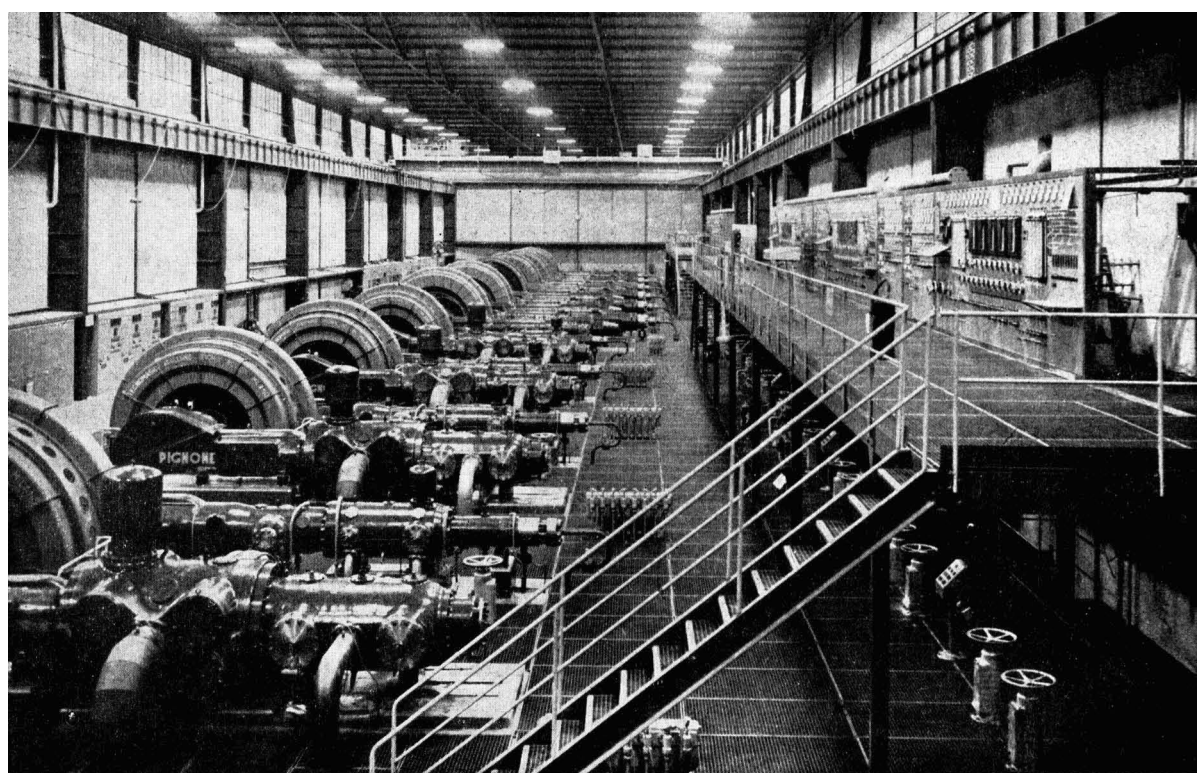
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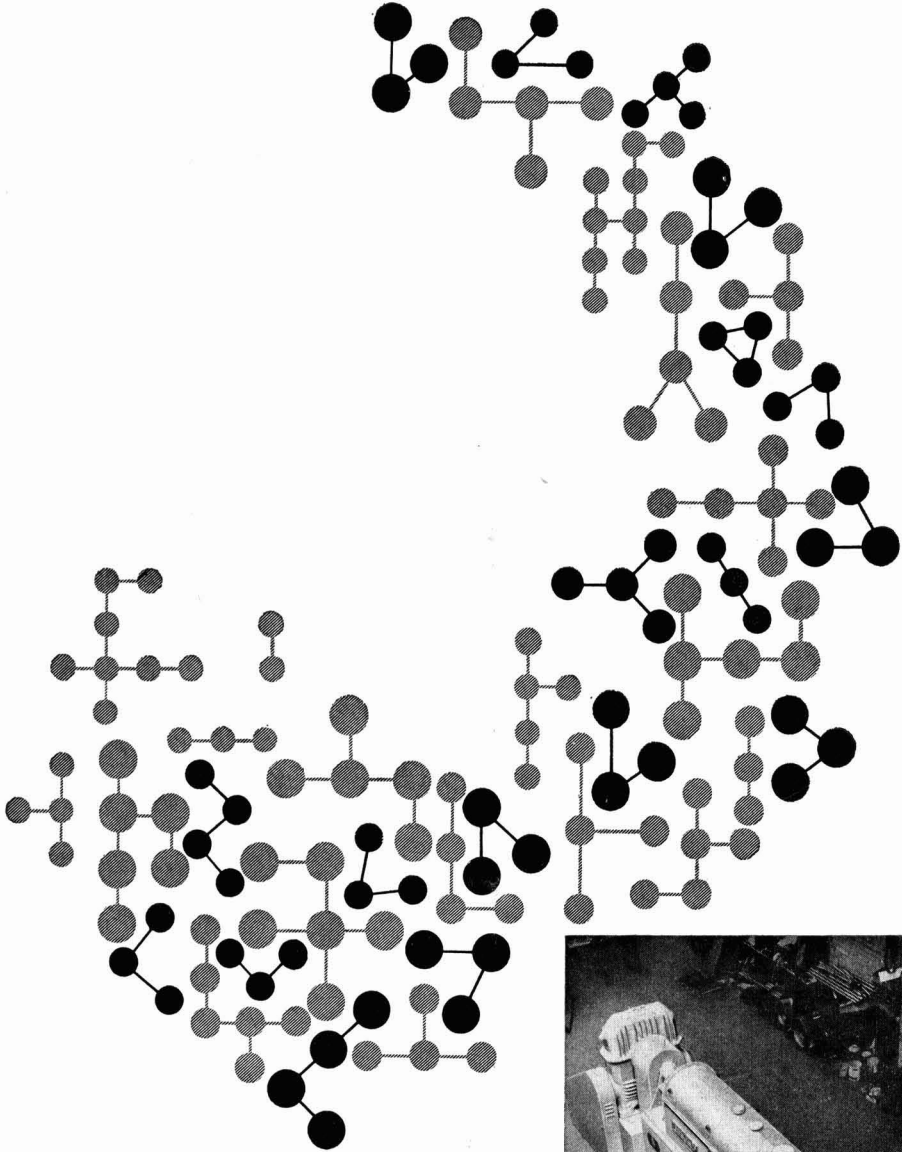
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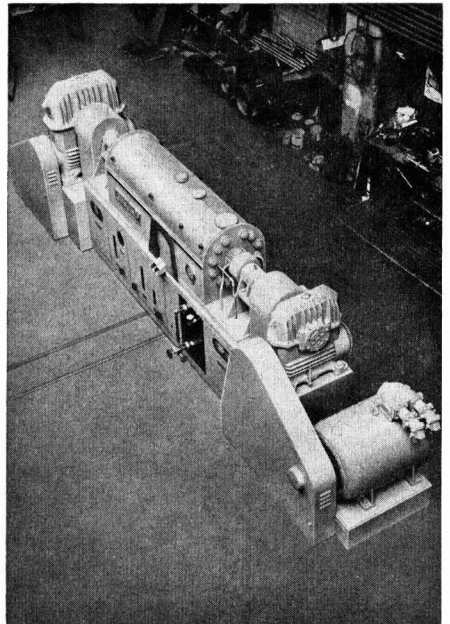
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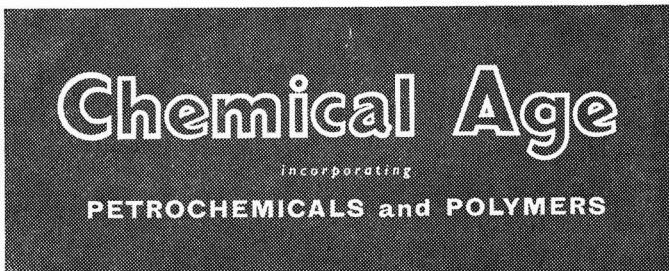
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**VINYL ACETATE**

ONE of the fastest growing monomers of the early 1960's is vinyl acetate. Showing a growth rate of 10% per annum in the U.K., and with an estimated consumption of between 18,000 and 19,000 tons in 1961, U.K. demand can be expected to rise to approximately 22,000 tons in 1963 and between 26,000 and 27,000 tons in 1965. Indications in the U.S. are that consumption will rise from 140,000 tons in 1960 to 160,000 tons in 1963 and 210,000 tons in 1965.

Biggest single factor behind the growth of polyvinyl acetate is its use in paints which accounts for roughly 45% of the consumption figure in the U.K. Use of vinyl acetate for latex coatings in the U.S. is expected to rise from 25,000 in 1960 to around 45,000 tons in 1965. In this field the monomer is competing with styrene-butadiene based latex paints, sale of which is levelling off, and with those incorporating acrylate resins. In the U.K. copolymers of various types account for 15% of vinyl acetate used, adhesives 10 to 12% and the rest in a variety of end uses. The picture is similar in the U.S.; consumption for adhesives is expected to rise from 30,000 tons in 1961 to 37,000 tons in 1965.

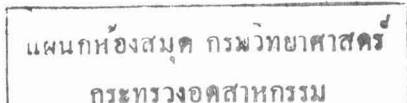
In anticipation of the rising demand, companies are increasing their production capacity. The two major vinyl acetate producers in the U.K., British Celanese Ltd. and Hedon Chemicals Ltd., are both currently involved in expansion programmes. British Celanese who originally had 3,300 tons a year capacity have now doubled it and are planning a further expansion at Spondon. Hedon Chemicals, jointly owned by Distillers Co. Chemical Division and Shawinigan of Canada, completed an extension to their plant at Salt End giving them a 60% increase in capacity and have a further expansion in the planning stage.

Projects now under construction in the U.S. will raise capacity from 165,000 tons a year in early 1961 to 250,000 tons a year at the beginning of 1963. Capacity in Canada, where the only producers are Shawinigan Chemicals will remain constant at 30,000 tons a year but may be expanded in the face of rising demand. Combined Western Europe and Japanese capacity is estimated at 230,000 tons a year (about two thirds West Europe and one third in Japan).

Towards the end of 1960, U.K. vinyl acetate producers were showing concern at the large amounts of the monomer being imported into the U.K. from the Continent, and application was made to the Board of Trade in October for the imposition of an antidumping duty. The 1960 import total at the time was running at the rate of 7,800 tons compared to an actual total of 5,375 tons in 1959, and the value of imports rose from £274,637 in the first quarter of 1959 to £333,977 in the first quarter of 1960. Italy and Switzerland were said to be the worst offenders; it was claimed that they were selling vinyl acetate in the U.K. at prices well below those in their domestic markets. The application, however, was withdrawn in January of this year.

In February of this year British Celanese announced a price reduction in their vinyl acetate of £2 10s per ton and this reduction tendency is continuing. The present cost of the monomer is around £145 to £150 per ton.

With demands the world over increasing in many fields, the future for vinyl acetate producers looks promising.



## New Canadian tariff scheme proposed by Du Pont

A SET of proposals designed to stimulate Canada's domestic chemicals production—and particularly high productivity segments of the economy by 'constructive use of tariffs,' has been presented to the Canadian Tariff Board by Mr. Herbert H. Lank, president of Du Pont of Canada Ltd. Mr. Lank said his proposals, advanced against the background of a nation striving for an overall increase in productivity, if accepted, would lead to quite widespread tariff revisions, both upwards and downwards, and help to improve Canada's adverse balance of payments situation.

He urged that tariffs be used to encourage the most effective use of Canada's productive resources by concentrating the national effort on those products where costs in real terms were the lowest. By real costs he did not mean simply dollar costs but rather something closer to the economist's term 'opportunity costs.' As an example, Canada's requirements of nylon polymer could be met either by domestic production, as it was, or by imports with, say the export of wheat in payment. In terms of man-hours, the cost of imported

nylon in the latter case would be three times the cost of making it in Canada.

"If payment for the imported polymer were made by the export of aluminium, newsprint, or any other product I know of, except crude oil, its real cost would exceed that of the Canadian-made polymer. And I have included in costs an allowance for capital equipment employed."

Although exchange depreciation had helped Canadian industry, sole reliance on this course had two serious disadvantages: it restricted imports across the board, and it added to costs and prices. Tariffs on the other hand, were a much more flexible and precise instrument of policy. Duty rates could be applied selectively. The resulting increased protection did not necessarily add to costs and prices.

In fact, tariffs could be used as an effective means of expanding markets and lowering costs rather than enhancing prices. In determining tariffs on particular products, Mr. Lank said, the first decision to be made was whether it should be produced domestically or imported.

## Midlands S.A.C. to mark Feigl's 70th birthday with symposium

MIDLANDS Section of the Society for Analytical Chemistry is holding an international symposium on analytical chemistry in honour of Professor F. Feigl's 70th birthday, at Birmingham University from 9 to 13 April 1962. The programme will consist of: Contributions on original scientific work; reviews of recent advances in selected branches of analytical chemistry; exhibition of new scientific equipment.

Following the symposium there will be a half-day conference, on the morning of Friday, 13 April, dealing with the 'Teaching of analytical chemistry'.

The social programme will include a civic reception to the delegates and their ladies, a symposium dinner, informal luncheons and dinners and a special programme arranged for lady visitors.

Plenary lectures will be given by Professor R. Belcher (U.K.), Professor Dr. Ing. F. Feigl (Brazil) and Professor P. W. West (U.S.).

The following lecturers have so far agreed to contribute: E. Berg (U.S.), J. Berger (Denmark), T. S. Burkhalter (U.S.), J. K. Carlton (U.S.), F. Clanet (France), C. Duval (France), G. V. M. Duyckaerts (Belgium), H. Freiser (U.S.), H. Gordon (U.S.), J. B. Headridge (U.K.), I. M. Kolthoff (U.S.), H. A. Laitinen (U.S.), R. J. Magee (U.K.), H. Malissa (Austria), A. C. Menzies (U.K.), G. W. C. Milner (U.K.), F. L. Moore (U.S.),

G. H. Morrison (U.S.), L. Ottendorfer (Austria), J. W. Robinson (U.S.), E. Sewicki (U.S.), A. A. Smales (U.K.), S. Veibel (Denmark), A. Walsh (Australia), H. F. Walton (U.S.), H. Weisz (Germany), F. Welcher (U.S.), C. L. Wilson (U.K.), P. Zuman (Czechoslovakia), J. Zyka (Czechoslovakia).

Application forms and further information can be obtained from Mr. M. L. Richardson, hon. symposium secretary, John and E. Sturge Ltd., Lifford Chemical Works, Lifford Lane, Kings Norton, Birmingham 30.

## Obituary

Mr. W. C. Wiggins, who died on 13 October at his Surrey home, aged 62, after a long illness, was a director of Bush, Beach and Segner Bayley Ltd. He joined Bush, Beach and Gent Ltd. in 1929 as a sales representative in the north-west and three years later opened a sales office in Birmingham. He became sales manager in London in the early 1930's and joined the board in October 1951. He continued in this position on the formation in 1959 of Bush, Beach and Segner Bayley Ltd.

Mr. Hugh Reynolds, aged 65, technical director of Cowan Brothers (Stratford) Ltd., a subsidiary of Johnson Matthey, died on 13 October.

## I.C.I. may take part in Spanish petrochemical project

INTERNATIONAL oil and chemical groups currently discussing the possibilities of establishing a petrochemical complex at Puertollano, Spain, including, it is understood, I.C.I., Montecatini, Phillips and Royal Dutch/Shell. The total project cost is expected to be about \$120 million. Negotiations are still in a very early stage and it is unlikely that any decisions will be taken this year.

The Spanish Government has recently authorised construction of a refinery at Puertollano by Empresa Nacional Calvo Sotelo de Combustibles Líquidos y Lubrificantes (wholly owned by the Instituto Nacional Al Industria. The company will benefit from a cut in Customs duties and taxes for 15 years. A 1.2 million ton capacity pipeline will carry crude oil from Malaga, 140 miles away.

## In Parliament

### Drug firm about to sue Health Minister?

Following the Minister's answers to questions on his new drug import policy in the House on Monday, Mr. K. Robinson (Lab., St. Pancras N.) said he appreciated that Mr. E. Powell could not be as forthcoming as he might be as he was about to be sued by one of the drug producing companies. He asked if the Minister was satisfied with the scheme so far.

Mr. Powell said it had been found possible to place those contracts and there was no question about the quality of the articles which were being obtained at advantageous prices. In due course royalties would either be negotiated or adjudicated.

Earlier, Mr. Powell had said that the industry had been asked for further information on sales promotion costs. Enquiries into costs and profits of a number of firms were being made under the revised voluntary price regulation scheme.

The Minister's plan to buy drugs from overseas (see CHEMICAL AGE, 7 October 1961, p. 546) will result in an estimated total saving of £500,000 in a full year. The question of royalties will be negotiated in due course.

## 20% Drop in Fison's trading profits

GROUP trading profits of Fisons showed a decrease of 20%, falling from £4,509,169 to £3,606,811, for the year ended 30 June 1961 (see also 'Commercial News'). These results, however, were in accordance with the forecast given by the Chairman, Sir Clavering Fison, at last year's meeting (see CHEMICAL AGE, 5 November 1961, p. 756).

Last year's profits were the result of unprecedented and unpredicted fertiliser sales in 1959-60. It is unlikely that fertilisers this year have reached even their usual growth rate of 4% per annum.

## Project News

# Kellogg to build I.C.I.'s million tons/year crude oil plant

CONTRACT for the design, engineering, construction and procurement of the 1 million tons/year crude oil distillation unit of I.C.I. Heavy Chemicals Division has been awarded to Kellogg International Corporation Ltd., London. Construction work will start next spring on a new 250-acre site on the north bank of the Tees.

Crude feedstock for this multi-million project will be supplied by Shell-Mex and B.P. and processed oil will be sent to Wilton Works. The plant will be used to provide some of the light distillate naphtha for the Wilton olefin plants. This arrangement will give I.C.I. a greater control over the raw materials used for the production of olefins. It is hoped that the plant will be fully operational by 1963.

Only part of the new site will be taken up with the crude oil distillation project, leaving room for storage and future developments. The pipeline system that links I.C.I.'s Wilton and Billingham works runs alongside the new site.

As stated in 'Project News', 14 October, Kellogg have also recently been awarded contracts for the Caltex Frankfurt refinery and Gulf Oil's Danish refinery. Currently, they are working on expansion of the refinery at Dinslaken, W. Germany.

## Glaxo to build milk-drying plant

● A NEW milk-drying factory is to be opened next year in Westmorland by Glaxo Laboratories Ltd. Costing approximately £550,000, it will be Glaxo's seventh milk-drying plant in operation at home and overseas. Production is expected to begin about the middle of next summer.

## New Hickson and Welch nitration plant commissioned

● A CONTINUOUS nitration and distillation plant has been successfully commissioned by Hickson and Welch Ltd., at Castleford. The stainless steel nitration unit is a German plant of Messner design. The engineering on the Castleford site was carried out by Hickson and Welch themselves. The distillation section of the plant uses an A.P.V. process and was designed by them (see CHEMICAL AGE, 30 September, p. 501).

The new plant increases the Hickson and Welch capacity by over 6,000 tons a year of mono-nitrotoluene, approximately 60% of which is the ortho isomer. Commissioning of the plant began last month and it is now in full production. The toluene used is coal tar based and

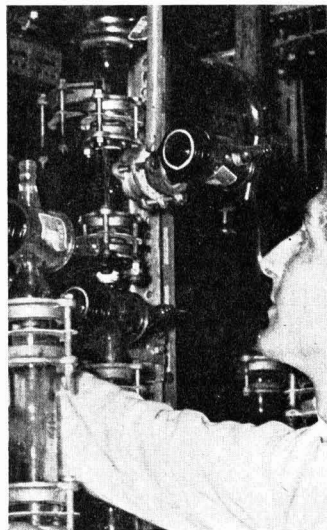
is obtained from several sources all in the U.K.

The commissioning of this plant has resulted in the concentration of the nitration facilities at Castleford. As a result the small plant at Milnsbridge has been closed.

The process of closing down at Milnsbridge has been going on for some time and the staff of the subsidiary, which used to be John W. Leitch and Co. Ltd., was absorbed by Hickson and Welch some years ago.

## LPG pipeline from Fawley to Southall gas works

● It has recently been reported in the Press that an 8 in. pipeline to carry liquefied petroleum gas would be laid alongside the 12 in. fuel supply connection to be constructed between Esso's refinery at Fawley and London Airport. An extension of this line would be carried from the terminal at Bedford to the Southall works of the North Thames Gas Board, where LPG will, it is suggested, be used for town gas.



Adjusting the flow through a filter bed during pilot scale development work on the improved sorbitol process at Howards of Ilford Ltd. It was announced in 'Project News', 21 October, that the new plant has now come into operation, with an annual capacity of 4,000 tons of 70% syrup. Hitherto, sorbitol has been imported, but the increased output by Howards will, it is said, fully meet U.K. needs and the anticipated increase in demand in the next few years

## Investment at Wilton Works now totals around £125 million

SINCE mid-1959, new construction investment at I.C.I.'s Wilton Works has been at a level of about £10 million a year, making a capital investment total at Wilton of around £125 million. Further construction based on sanctioned expansion will bring the total to more than £140 million.

Coupled with this pattern of a strong, continuing process of development is the Severnside programme in which sanctions now total some £18 million, of which about £3.5 million has already been spent.

This was stated by Mr. J. C. H. McEntee, chairman, at a recent meeting of Wilton Site Council, when he called on Wilton's 12,000 employees to help in meeting the renewed challenge to raise efficiency and reduce costs. Whatever the outcome of Britain's planned entry in the Common Market, he was certain that competition would intensify—and world trade in chemicals was one of the most fiercely intensive.

Mr. McEntee spoke of some variation in the level of production of individual plants in recent months, some of it due to increased competition, some due to the present position of the country's economy. A fall-off in the ordering rate

for Perspex had meant some redeployment of labour, but because of arrangements made for employment in other fields on Wilton site no one had become redundant.

Competition in polythene markets had been increasing and the search for new outlets had been stepped-up; start-up of nylon plant extensions had been smooth; recent outputs from the phthalic anhydride plant—once a source of acute difficulties—had been a record.

Addressing the same meeting, Mr. G. F. Whitby, chairman of I.C.I. Fibres Division, said that a large proportion of the division's research expenditure went towards improving product quality, machinery output and employee performance.

There were two other important research aims. First there must be a flow of new products to supersede the old; secondly, important changes were taking place in the textile industry which greatly affected the division's business. These included simplification of processes, the making of non-wovens, increasing use of plastics in textiles and the use of urethane backing to add warmth and bulk to fabrics.





★ THE petrochemical company set up in Brunsbüttelkoog, West Germany, by the Continental Oil Co., Houston, U.S., and Deutsche Erdöl-AG, Hamburg, whose formation was announced earlier this year in CHEMICAL AGE, has stated that part of its future production programme will comprise synthetic detergents that disintegrate easily in liquid waste.

This news follows by a fortnight the statement in Switzerland of a chemist of Chemische Werks Hüls AG, Marl, West Germany, that his company had developed a straight-chain olefin designated BW 1043, with disintegration potential in normal sewage processes of from 85 to 90%. He also mentioned a newly-invented detergent—a secondary dodecyl benzene sulphionate—with disintegration potential of from 95 to 97% and a new process tested on laboratory scale resulting in 80% disintegration; both, however, were stated to be too expensive at present for use.

★ 'ATOMIC dustbins' are the subject of a new Federal German patent (Number 1,053,686) registered by a chemist of the Bad Lauterberg barytes mines in Lower Saxony. These are in the form of a barytes container in which liquid atomic waste is poured—capacity is of 15 litres—to form a solid block with cement and barytes in the hollow centre of the 800-kilogramme container.

Barytes is one of the most effective protection media against X-rays and gamma-rays, as well as being available in greater quantities than lead and not being poisonous. The walls of the barytes container, which is shaped like a vacuum flask, themselves consume all radiations given off by the solidified atomic waste present inside it.

I understand that the Federal German Ministry for Atomic Affairs is to introduce a standardised atomic waste disposal system with these barytes containers and special vehicles, now being designed, for their transportation.

★ EARLY this week it was obvious that brokers had been caught off balance over I.C.I. shares. After the half-year results, a number of brokers were casting doubts about the wisdom of continuing to hold the company's ordinary stock; as a result share prices tumbled.

It was widely felt on the Exchange that when some 63,000 employees received 2.6 million shares last week under the profit-sharing scheme, many would quickly sell them. In fact, a surprisingly

small number came on the market, and by the end of the week the price had risen 3s a share to 60s 3d.

Probably more of these shares will be sold, but at the moment it seems that I.C.I.'s employees have a greater faith in the company's ability to overcome difficulties than does the Stock Exchange.

★ UNTIL now no economic process for the desalting of sea-water has been developed. This was stated categorically in Basle this month when the two U.S. experts Dr. M. J. Deutch, of Washington, and Mr. G. Oliven, of Los Angeles, presented a paper there on technical developments in fresh water production. Of the 18 distillation units and ten membrane electro dialysis plants currently in operation in the U.S. and elsewhere, all with the exception of four were small-scale and more suitable for brackish water treatment than for sea-water desalting. The desalting unit at Freeport, U.S., distilling some 3,785 cu. m. daily had a production price of about 1s 11d per cu. m. of fresh water.

The paper drew a gloomy picture of the world water supply situation. By 1980 U.S. water consumption will be such that it will be hardly possible to get along with current water reserves. In Europe a noticeable fall in the water level has been recorded of late. Under-developed areas of Latin America and Asia must be guaranteed water supplies. The use of sea-water or other salty water can no longer be avoided.

So serious did the two authors consider the position that they recommended the setting-up of an international study commission to control further technical development and planning. Problems are today manifold and knowledge modest; and new lines of thought must be followed.

★ THIS is the story of the disappearing chink; the chink of milk bottles that wakes me up so regularly every morning at 6.30 a.m., that I no longer need an alarm clock. According to Monsanto Chemicals Ltd. the days of the chinks made by millions of bottles each morning are numbered. Maybe not tomorrow, but much, much sooner than you think!

One of the reasons are the 250 million bottles (costing between 4d and 5d each) that are lost, stolen or strayed every year. Although well over £1 million is spent each year on urging us to drink a pinta milka day, the cost of replacing those missing bottles is more than £4 million. Good reason why the milk industry

should take a long hard look at the carton.

But the bottle, with its average life of 40 or 50 journeys, costs about one-tenth of a penny per pint delivered, compared with ½d or 1d/pint in cartons. A recent survey carried out by Monsanto Development and Market Research Department showed that many housewives had precious little to say in favour of the chinking bottle. Monsanto's interest in the economics of milk distribution stems from the new wax additive, EVA, which they are now busily developing. A material based on ethylene and vinyl acetate, it is added to refined paraffin wax, giving a greatly improved coating for all cartons and containers for beverages and foodstuffs.

★ THE first monograph to be issued by the Society of Analytical Chemistry is called 'Methods for the analysis of non-soapy detergent (NSD) products' and is by G. F. Longman, F.R.I.C., and J. Hilton, A.R.I.C., of the Unilever Research Laboratory.

Although formulations used in the manufacture of commercial non-soapy detergent products have varied considerably in the last 25 years, the trend has been reasonably static for the last two or three years and the authors have now found it possible to present a scheme of examination applicable to most types of products at present on the market. It does not include the examination of pure soap products or soap powders. The scheme of analysis covers the detergent active components most commonly used at the present time and also the quantitative estimation of all organic and inorganic components, including many whose presence may be accidental but unavoidable.

★ IT is five years since Calder Hall, the world's first nuclear power station, was opened. Since 17 October 1956, Calder Hall has supplied 3,729 million kwh. of electricity to the national grid.

The experience gained from operating the Calder Hall reactors and the similar Chapel Cross reactors has been of major importance in the development of nuclear power. Operating experience has been encouraging and there is no reason to doubt that the reactors will achieve their 20 years' design life.

The general conclusions that can be drawn from operating experience so far are: heat and electricity outputs have considerably exceeded design expectations; reliability in continuous operation and reduction in fuel changing and maintenance shut-down periods have been such as to achieve loads factors of over 85%; the magnox-canned uranium fuel elements have successfully withstood periods of irradiation in the reactors far longer than they were designed to achieve, without significant increase in fuel element failure rates.

*Alembic*

# Pumps for chemical industry

## C.A.'s SPECIAL SURVEY & BUYER'S GUIDE

The growing complexity of chemical industry operations calls for an increasing variety of pumps for handling liquid chemicals, solvents and solutions as well as for effluent, water and other services. In the following pages we present

a selection of pumps, almost entirely of British manufacture, to cover an extensive range of industrial duties. It is hoped that this wealth of information will serve as a useful reference for users of pumps in the chemical and allied industries

### Co-operation is key to development of reliable chemical pumps

NOT so many years ago, the engineer who wanted a chemical pump had to search far and wide for one. Now, quite the opposite, he finds a bewildering array of pumps being offered to him as 'chemical pumps'. Not all of them justify the description; on the whole, however, pump manufacturers have made great strides towards achieving the main design features that are desirable in pumps for chemical process duties. Briefly, and in general, these are: simplicity of design; adaptability to continuous operation; suitable materials to meet corrosive, high-temperature and other conditions; adequate, but not complicated, sealing arrangements; and easy accessibility for cleaning and maintenance. Considering the large numbers of chemical pumps at present being called for, it seems anomalous that no one manufacturer appears to specialise exclusively in chemical pumps, until one reflects on the wide range of special duties to be catered for and the variety of materials—stainless steel, plastics, carbon and graphite, rubber and ebonite, ceramics and even glass—that the really conscientious chemical pump specialist would have to offer. It is not surprising that many makers of centrifugal pumps, for example, offer for chemical duties only variations of designs largely intended for water and general industrial liquids.

On the other hand, it often happens that the solution of a particular chemical process problem leads to the introduction of a range of pumps with applications elsewhere—one recent example being the development of a range of titanium-lined centrifugal pumps for nitric acid and other duties (CHEMICAL AGE, 27 May, p. 850).

Indeed, the most notable innovations in pumps for chemical process work in recent years have lain in the incorporation of new corrosion-resisting materials of construction, and improved sealing arrangements, rather than striking changes in basic design. Pumping is, of course, one of the oldest of industrial operations and all possible methods of moving liquids from one place to another have been fairly well explored over the

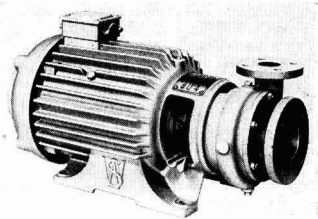
centuries; this does not leave much possibility of a pump being developed which differs fundamentally from established designs. The reliability of well-worn pumping principles can be seen, for instance, in the success of a modern version of the Archimedean screw type pump: this takes its place, in the range of currently available pumps, along with such unconventional ideas as the induced flow of liquids through a flexible tube subjected to alternate compression and relaxation, thus creating a glandless, valveless pump. There are now a number of variations on this idea, which for chemicals has the advantage of perfect sealing off of the liquid being pumped.

While, as indicated above, the majority of pumps available at present can be traced to a comparatively few basic designs, they vary enormously in the shapes and arrangement of particular components, in materials of construction, sealing arrangements, sizes and capacities. This makes it all the more important that their particular characteristics and capabilities should be precisely defined. At present, co-operation between pump makers and pump users from this aspect is far from ideal.

On the one hand, the terms in which

pump users specify their requirements are often very vague; a pump maker cannot be expected to meet requirements satisfactorily unless he is given full details of the duties to be performed, including the corrosive, physical, temperature and other properties of the liquid; the flow rate, head or pressure desired; type of drive and motive power available; whether the unit is for continuous or intermittent working; geographical and climatic features of the intended site, etc.

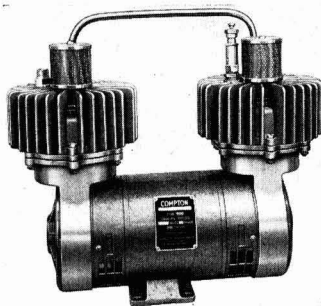
On the other hand, pump makers themselves are often guilty of giving only vague descriptions of the pumps they supply. The sales literature issued



**Type DMG Monobloc chemical pump with totally-enclosed fan-cooled motor, from Worthington-Simpson**

by pump makers reveals a general tendency to describe in glowing terms the corrosion-resisting, effective sealing, easy maintenance and other features of pumps without defining the type of pump being discussed; often some such word as "rotary", "centrifugal", "unchokable", is the sole clue as to the method of operation; such phrases as 'chemical pump', 'acid pump', 'slurry pump' often being substitutes for a true description. Some standardisation of pump descriptions would help both pump makers and pump users; thus, it would not seem to be asking too much for all sales data on pumps to be preceded by a fairly precise definition, e.g.: "Horizontal, motor driven, direct coupled, single stage, single entry centrifugal pump."

With further co-operation in such matters as this, as well as in the further development of basic pump designs for specific chemical applications, pump makers and chemical engineers will hasten the emergence of a satisfactory selection of pumps to meet the exacting requirements of future chemical plants.



**Compton 2D/245 compressor set by Dawson, McDonald and Dawson Ltd. Diafilter Engineering's diaphragm pump for chemical duties**

# KARBATE IMPERVIOUS GRAPHITE PUMPS

TRADE MARK

## ARE ROBUST, ECONOMICAL . . . AND UNSURPASSED IN CORROSION RESISTANCE!

### SEVEN REASONS WHY IT WILL PAY YOU TO STANDARDISE ON 'KARBATE' PUMPS

#### 1 ROBUST CONSTRUCTION

All component parts are designed structurally to withstand normal—and many abnormal—conditions which occur in pumping and maintenance operations. The armouring and compression type connections help to prevent damage from external shocks and stresses.

#### 2 UNSURPASSED CORROSION RESISTANCE

Few other pumps—regardless of price—can handle as wide a variety of corrosives as "Karbate" impervious graphite pumps. They are resistant to: mineral acids such as hydrochloric, sulphuric, phosphoric; acid combinations such as nitric-hydrofluoric, phosphoric-sulphuric; chlorinated hydrocarbons; alkalis; and organic and inorganic compounds of all types. In practically all these corrosives, changes in temperature and concentration will not affect the corrosion resistance of "Karbate" impervious graphite.

#### 3 WIDE RANGE OF MODELS AND SIZES

Twenty-one standard sizes of "Karbate" centrifugal pumps are available in both motor-mounted and frame-mounted types with capacities from 5 to 1000 g.p.m. and heads from 15 to 120 ft. Motor-mounted pumps can be supplied with 1 and 5 h.p. motors. Frame-mounted pumps can accommodate motors up to 60 h.p. and can be adapted to belt drives or direct coupled to steam turbines. Pumps can be operated at speeds up to 1760 r.p.m.

#### 4 READY AVAILABILITY

Standard sizes and models of pumps and a large inventory of replacement parts are carried in stock for prompt delivery.

#### 5 PARTS ARE INTERCHANGEABLE

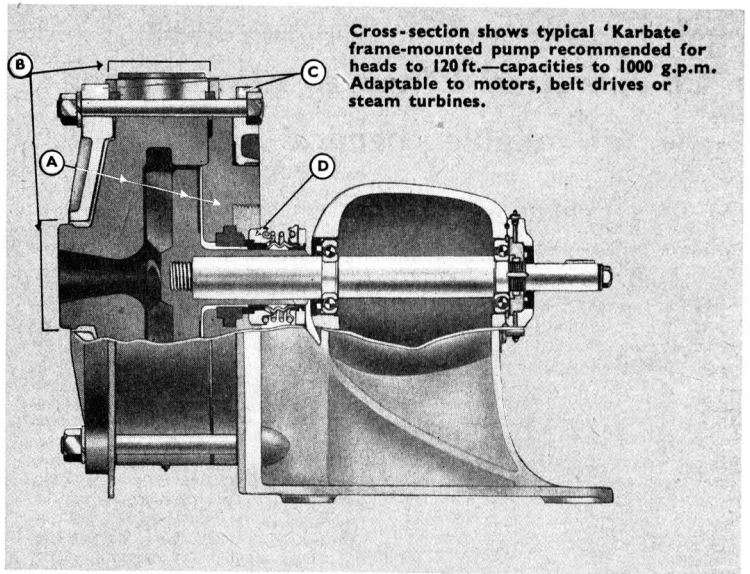
"Karbate" centrifugal pumps are designed for maximum interchange of parts. This keeps replacement parts stock at a minimum. All parts from the case cover back to the motor or frame are interchangeable within any model group. Impervious graphite is easy to machine. This makes it possible to turn down impellers on site to fit changed operating conditions.

#### 6 CHOICE OF SHAFT SEALING ARRANGEMENTS

Our rotary seal is standard on all "Karbate" centrifugal pumps. Pumps can also be supplied with "Crane" type 10 mechanical seal.

#### 7 LOW OVERALL COST

The corrosion resistance of impervious graphite and the robust construction of "Karbate" centrifugal pumps keep maintenance costs at a minimum. Furthermore, the initial cost of a "Karbate" pump is usually significantly less than a pump with equivalent corrosion resistance.

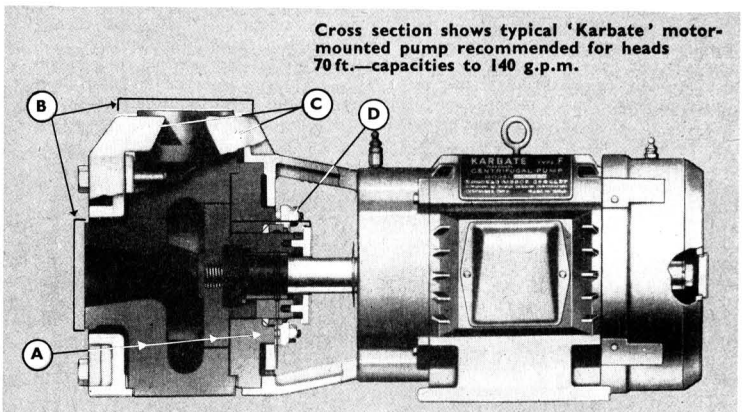


Cross-section shows typical 'Karbate' frame-mounted pump recommended for heads to 120 ft.—capacities to 1000 g.p.m. Adaptable to motors, belt drives or steam turbines.

TYPE 'C' Frame Mounted Centrifugal Pump with 'Crane' mechanical seal

A—Robust 'Karbate' impervious graphite wet-end parts

B—Compression type connections C—Cast iron armouring D—'Crane' mechanical seal



Cross section shows typical 'Karbate' motor-mounted pump recommended for heads 70 ft.—capacities to 140 g.p.m.

TYPE 'F' Motor-mounted Centrifugal Pump

A—Robust 'Karbate' impervious graphite wet-end parts

B—Compression type connections C—Cast iron armouring D—'Karbate' Rotary seal

**KARBATE**  
TRADE MARK  
IMPERVIOUS GRAPHITE

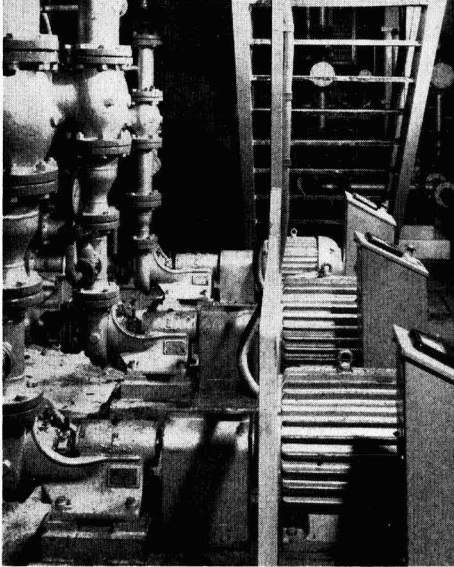
**BRITISH ACHESON ELECTRODES LIMITED**  
WINCOBANK, SHEFFIELD Telephone ROTHERHAM 4836

# Pumps and their suppliers

The following tables list pumps, mainly for liquids, supplied by British firms for chemical industry duties. These tables are intended only as a general guide; pumps listed do not necessarily represent the whole range of the manufacturer or supplier in question (a 'buyer's guide' appears on page 685).

MANUFACTURER OR SUPPLIER	DESIGNATION	DESCRIPTION	FLOW RATES (g.p.m.)	APPLICATIONS
Ames Crosta Mills and Co. Ltd., Moss Iron Works, Heywood, Lancs.	Pneu	Compressed air operated, only moving part being a ball valve.	5-60	Claimed to pump practically anything that will flow.
	Simplisic	Liquid being pumped is forced through a flexible tube by alternate pressure and suction impulses.	0-11	Corrosive and viscous liquids. Particularly suitable for liquids which may encrust and choke pipes.
Apex Construction Ltd., 15 Soho Square, London, W.1.	No. 192 chemical pump	Flow induced by mechanical compression of rubber or plastics tube.	0-2	Liquids, solutions and gases. Uses range from moisture analysis tests to metering of small quantities.
Appleton and Howard, Ltd., St. Helen's, Lancs.	Gush	Horizontal centrifugal, wetted parts in titanium, loaded p.t.f.e. bearings available.	2-1,000	Nitric acid and other corrosive liquids.
A.P.V. Co. Ltd., Manor Royal, Crawley, Sussex.	Puma	Centrifugal, all stainless steel, designed for easy cleaning and maintenance.	0-266	Primarily for potable liquids, has uses for chemicals.
Associated Electrical Industries Ltd., Crown House, Aldwych, London, W.C.2.	A.E.I. all-p.t.f.e. pump	Diaphragm type, self-priming.	0-0.5	Corrosive fluids, liquid foods.
Charles Austen Pumps Ltd., Petersham Works, High Road, Byfleet, Surrey.	C.16/300 Mk.III	Centrifugal, special nylon-filled Bakelite construction. Special corrosion-resistant materials used for components	0-6	Handling of corrosive fluids which attack stainless steel.
Henry Balfour and Co. Ltd., Durie Foundry, Leven, Fife.	Meader	Reciprocating ram operating inside cutting cylinder. Hydraulically operated.	( $\frac{1}{2}$ -20 cu. yd./hr.	Heavy solids, pastes, muds, etc.
	Scott-Wemco Torque-Flow	Centrifugal, with impeller located outside the flow pattern.	20-2,000+	Large solids in suspension, fibrous materials, crystalline slurries and other fragile materials.
Baskerville and Lindsay Ltd., 322c Barlow Moor Rd., Chorlton-cum-Hardy, Manchester.	Baskerville	Gas compressors, of various types and sizes.	—	Dry pumping of gases at low, medium and higher pressures up to 3,500 atm.
	Baskerville	Gas compressors with compression cylinder submerged in a water bath.	—	For use with CO and similar gases.
	Baskerville	Circulating pumps, max. pressure 500 atm.	—	For dry circulation of gases, can also be combined with a compressor for dual purpose operations.
	Baskerville	Proportioning pumps, specially designed to meet precise requirements.	(Adjustable over range 6-600 c.c./hr.)	Operating pressures up to 300 atm.
British Acheson Electrodes Ltd., Grange Mill Lane, Wincobank, Sheffield.	Karbate pumps Models C and F	Centrifugal, with wet-end parts in Karbate impervious graphite.	10-140 (Model F) 20-1,000 (Model C)	A wide range of corrosive chemicals to which Karbate is resistant.
British LaBour Pump Co. Ltd., Blundell Street, London, N.7.	Type UHL and UPL	Horizontal, impeller-type pumps, using hydraulic recirculation.	0-1,300	Especially useful for unloading vessels, such as tank vehicles, with no bottom outlet.
	Types SZ, SQ, MSZ, MSQ	As above.	0-1,000	Hot and cold process duties.
	Type DZT	As above. Easy to open up for cleaning.	0-500	General duties with corrosive liquids, solvents and slurries.
	Type UZ	As above. Lined with rubber or titanium for special duties.	0-350	

# Chemical and process pumping units



## LEFT:

Top: Sigmund A-N heavy duty chemical pumps on process duties in the SBR plant at Hythe of International Synthetic Rubber Co. Ltd.  
Middle: Mitchell-Craig centrifugal pump

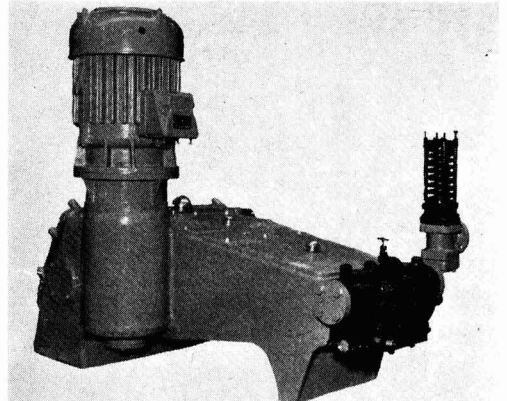
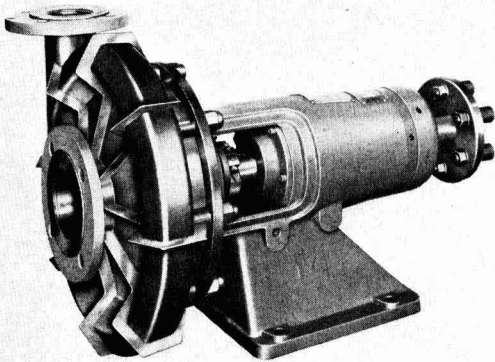
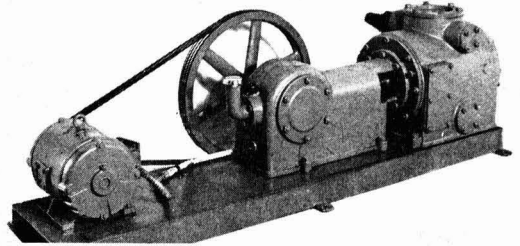
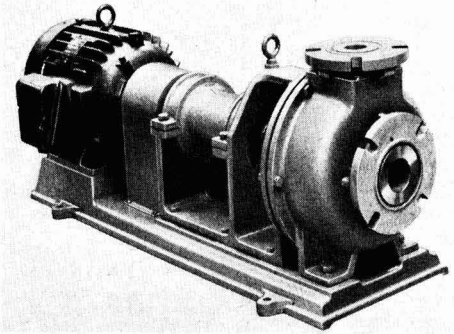
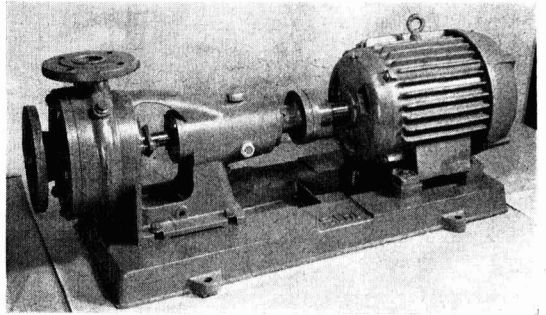
Bottom: One of two 350 W.I.R. pumps supplied by Appleton and Howard Ltd. to handle chlorinated brine for I.C.I. General Chemicals Division. Wetted ends are in titanium 130; mechanical seal is a Crane type 10 Fluoseal; capacity is 184 g.p.m. and head developed is 118 ft.

## BELOW:

Top: Glandless type ADKK self-priming centrifugal pump with electro-magnetic drive, by Siemen and Hinsch

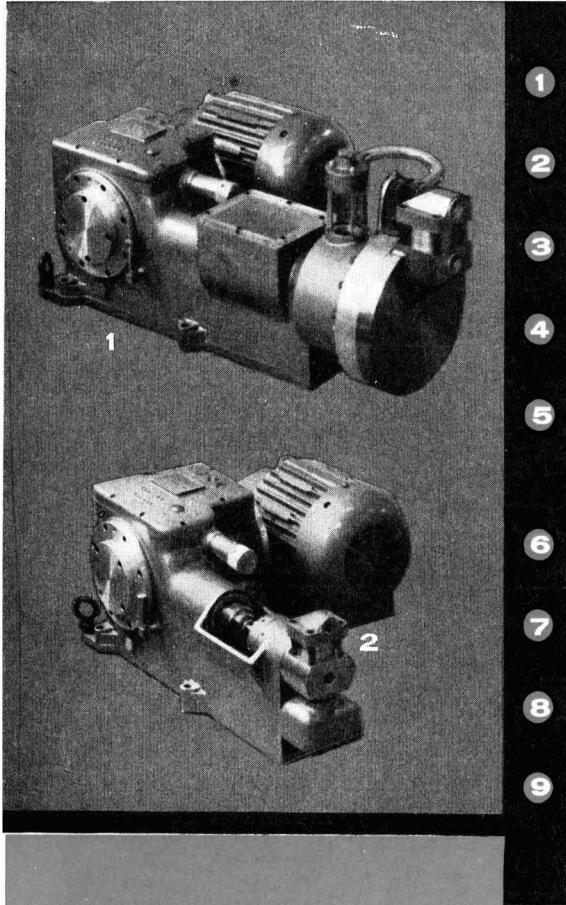
Middle: 2,000 litre/min. reciprocating pump of Calmic Engineering Co. Ltd.

Bottom: Weir horizontal 3-throw reciprocating electrically-driven pump for water, oil or chemicals





MANUFACTURER OR SUPPLIER	DESIGNATION	DESCRIPTION	FLOW RATES (g.p.m.)	APPLICATIONS
Calmic Engineering Co. Ltd., Crewe, Cheshire.	—	Reciprocating vacuum pump, available in standard (cast iron) or acid-resisting bronze version.	0-440	Manufactured for use with Calmic vacuum dryers.
	—	Water ring, also in standard or acid-resisting bronze version.	0-330	As above.
Comet Pump and Engineering Co. Ltd., Johnson Road, West Croydon, Surrey.	Comet	Rotary, positive-action, low-revving, vacuum suction. Various models, vertical and horizontal.	—	Viscous and sticky materials, heavy oils, pastes, etc.
	'Lab' Model	Miniature version.	—	Dosing and other laboratory applications.
Consolidated Pneumatic Tool Co. Ltd., 232 Dawes Road, London, S.W.6.	CP 77	Displacement type sludge pump. Two inlet valves connected to common inlet.	0-75	Water and sludge. Pump available in bronze and stainless steel.
C.P. Equipment Ltd., Mill Green Lane, Mitcham, Surrey.	Mark II	Centrifugal in 18/8/3 stainless steel. Easy cleaning features.	0-31.5 (water)	Chemicals, beverages, etc. Will handle most liquids up to medium viscosity.
Crane Packing Ltd., Slough, Bucks.	—	Bellows pump in p.t.f.e., designed mainly for laboratories or metering duties.	—	Highly corrosive liquids or gases.
C.T. (London) Ltd., 27 Ashley Place, Westminster, London, S.W.1.	Corblin	Diaphragm type, using a reciprocating piston and cylinder acting as a closed circuit hydraulic pump.	—	For handling liquids where normal methods unsuitable. Materials for corrosive conditions available.
Dawson, McDonald and Dawson Ltd., Compton Works, Ashbourne, Derbyshire.	Compton	Reciprocating diaphragm type compressors and pumps. Now available with contact parts in stainless steel.	(0-15 c.f.m. free air)	For handling gases of many different kinds
Dexine Rubber Co. Ltd., Rochdale, Lancs.	Dexonite	Centrifugal, single side suction type, constructed in Dexonite hard rubber and incorporating rotary seal.	0-200	Corrosive liquors, and liquors which must not become contaminated.
	Dexonite	Diaphragm pump.	0-7	Corrosive fluids.
Diafilter Engineering Co. Ltd., 902 Purley Way, Purley, Surrey.	Diachlor Series 361	Small chemical pump, operating through positive displacement diaphragm.	(2-24 gall./day)	Handles most moderate acids and alkalis; special head available for aggressive solutions.
The Distillers Co. Ltd., Great Burgh, Epsom, Surrey.	'M'	Accurate metering pumps, with or without diaphragm head. Duplex version also available.	(0-8.23 g.p.h.; Duplex, 0-16.46)	Metering duties, plant and laboratory. Claimed to be suitable for most liquids.
	DCL Micro pumps	With or without diaphragm heads.	(0-1,500 c.c./hr.)	Metering duties where glands prove troublesome.
The Bryan Donkin Co. Ltd., Chesterfield.	—	Centrifugal—single stage single suction, single stage double suction, or multistage types.	0-2,500	For liquids. Special purpose designs available for gritty water, sewage, sludge, etc.
	—	Reciprocating. Oil free designs available.	(0-8,500 c.f.m.)	For air and gases.
	—	Centrifugal air and gas pump.	(0-3m. cu.ft./day)	Applications include chlorine, sulphur dioxide, CO <sub>2</sub> , H <sub>2</sub> S.
Dorr-Oliver Co. Ltd., Norfolk House, Wellesley Road, Croydon, Surrey.	Wilfley type 'K'	Centrifugal sand pump, glandless.	10-4,000	Abrasive duties: sands, slurries, pulps etc.
	Wilfley type A.C.	Centrifugal, glandless acid pump.	5-1,600	Acids
	Oliver type O.D.S.	Air-operated diaphragm type slurry pump, with no mechanical linkage to diaphragm.	1-75	Pulps, slurries, sludges and acids.
	Dorrco type T.X.	Plunger pump, available in two sizes, with single or double plungers	25-100	Sewage sludges, effluent and water/oil sludges
	Dorrco types R and W	Suction pump.	5-465	For handling underflows from thickeners, clarifiers, etc., and for pulps, sludges, slurries



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'U' pump with diaphragm head  
Max. capacity 100 g.p.h.

'U' pump with plunger head  
Max. capacity 100 g.p.h.

'M' pump with plunger head  
Max. capacity 8 g.p.h.

Duplex 'M' pump  
Max. capacity 16 g.p.h.

'M' pump with diaphragm head  
Max. capacity 8 g.p.h.

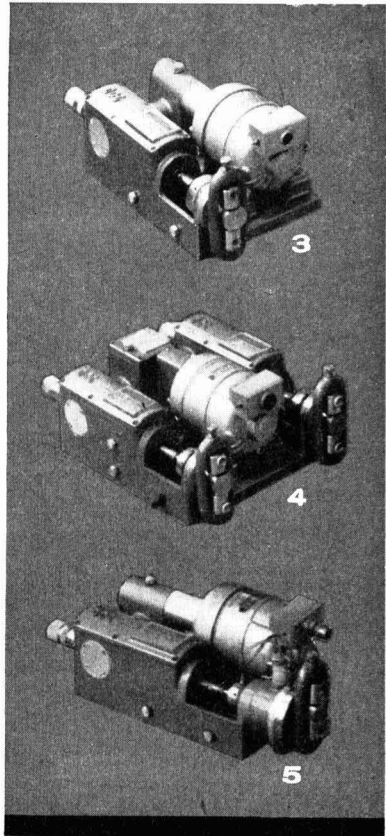
MICRO PUMPS TYPE 'S'

Duplex model with plunger heads  
Max. capacity 2,000 c.c. p.h.

With single plunger head—left hand  
Max. capacity 1,000 c.c. p.h.

With sterilisable diaphragm head  
Max. capacity 1,000 c.c. p.h.

With plunger head—right hand  
Max. capacity 1,000 c.c. p.h.

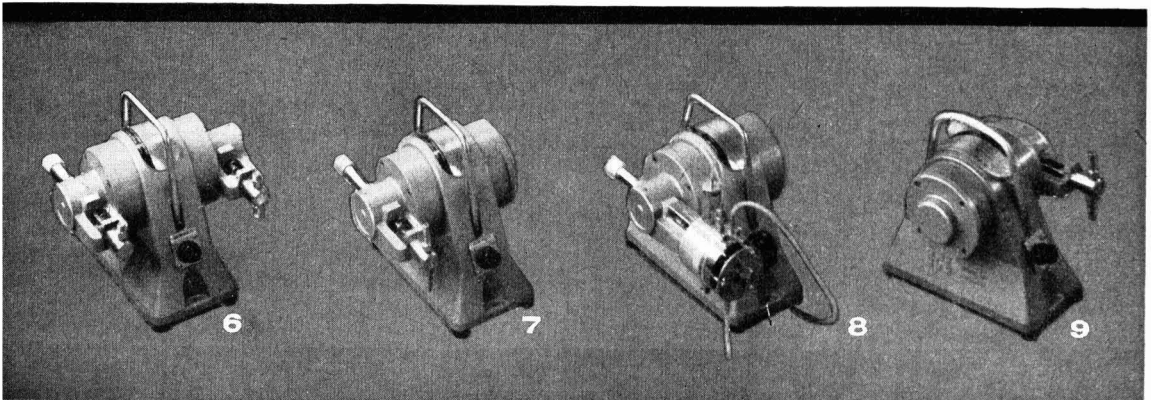


# DCL metering pumps

Full information is available on request

THE DISTILLERS COMPANY LIMITED

Great Burgh, Epsom, Surrey. Telephone: Burgh Heath 3470

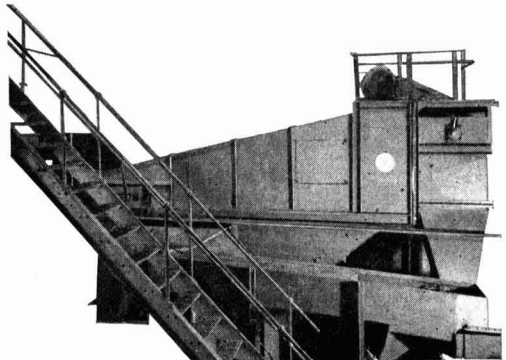
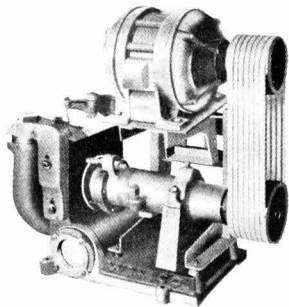


MANUFACTURER OR SUPPLIER	DESIGNATION	DESCRIPTION	FLOW RATES (g.p.m.)	APPLICATIONS
E.C.D. Ltd., Tonbridge, Kent.	—	Heavy-duty metering pumps of the reciprocating piston-diaphragm, diaphragm, and plunger types. Fluid operated diaphragm pumps for up to 3,000 p.s.i.	0-15	Metering of fluids and gases. Variety of multiple pump sets available.
	—	Diaphragm gas compressor.	(50-12,000 s.c.f.h.)	Proportioning of gases.
	—	Solenoid pump.	(0-4.8 ml./stroke)	Proportioning of liquids.
	G/50	Diaphragm and plunger pumps, including duplex version.	0-2.7	Proportioning of liquids.
George Fletcher and Co. Ltd., Masson Works, Litchurch Lane, Derby.	Amarilla	Rotary displacement pump, newly redesigned for wider application.	0-100	Handles viscous fluids, pastes, oils and fluids containing large percentage of solids.
Glen Creston Ltd., 37 The Broadway, Stanmore, Middx.	Inerton	Centrifugal, rigid p.v.c. or p.t.f.e. construction. Self-lubricated, no stuffing boxes.	0-50	Used for acids, alkalis, alcohols and many other liquids.
	Inerton	Portable electric immersion pump, p.v.c. construction.	1.25	Discharge of acids, alkalis, oils, alcohols, etc., from carboys, drums, etc.
Girdlestone Pumps Ltd., Woodbridge, Suffolk.	DMF100 and DMF Duplex	Glandless, diaphragm type.	0-10	Highly abrasive and corrosive liquids.
	NRF and UFR	Centrifugal type. The UFR has shaft sealing assembly enabling any mechanical seal or stuffing box arrangement to be easily fitted.	10-1,100	Handles wide range of fluids.
	IAS51	Self-priming centrifugal with open type impeller.	2-26	Highly volatile and corrosive liquids and also liquids containing suspended solids and abrasives.
	VSP	Vertical centrifugal sump drainage pump.	2-17	General industrial use.
	Seal Motorpump	Centrifugal, mounted on end flange of electric motor. Mechanical seals.	2-800	Handles liquids where weight and space occupied by pump must be kept to minimum.
	NR and Seal	Centrifugal pumps with mechanical seals.	1-41	Wide range of fluids.
Globe Pneumatic Engineering Co. Ltd., Ashton Road, Harold Hill, Romford, Essex.	—	Pneumatic sump and suction lift pumps, with radial type air motors driving on to a centrifugal pump.	0-4,800	Water pumping. Type B sump pump is submersible.
Sir George Godfrey and Partners (Industrial) Ltd., Hampton Road West, Hanworth, Middx.	Godfrey/Waterous, Series HJ	Positive-displacement rotary pumps, with two 3-lobed rotors mounted on stainless steel shaft. Lightweight.	0-250	Handles variety of liquids of low or high viscosity, or liquid/gas mixtures.
Goodenough Pumps Ltd., 112 Jermyn Street, London, S.W.1.	—	Portable, single-acting, diaphragm type pumps, in heavy-duty and lightweight versions.	0-85	Claimed to handle thickest mud, sludge and sewage.
	—	Automatic self-priming centrifugal pumps, various models.	0-1,250	Drainage, sewage pumping, etc.
Goodyear Pumps Ltd., Walmgate Road, Perivale, Middx.	Goodyear	Positive-displacement, Archimedean screw, axial flow type. Various alternative materials of construction.	1-150	According to specification, can handle vegetable and mineral oils, syrups, certain solvents, cosmetic creams, paints and chemicals.
Hathernware Ltd., Loughborough, Leics.	—	Centrifugal pumps in iron-armoured chemical stoneware, various types.	10-1,000	Corrosive liquids, except hydrofluoric.
	—	Stoneware 1/2-in. single-block type centrifugal acid pump.	0-25	For handling corrosive liquids at moderate lifting heights.
	—	Stoneware, diaphragm type.	—	For small pumping duties; can deal with liquids containing certain amount of sludge.
Holden and Brooke Ltd., Sirius Works, Manchester 12.	Type JTV	Horizontal centrifugal, contact parts in FMB quality stainless steel. Either sleeved packed glands or mechanical seals.	10-1,500	General chemical duties.
Howard Pneumatic Engineering Co. Ltd., Fort Road, Eastbourne, Sussex.	—	Proportionmeter pumps in variety of materials. Automatic controls available for operating from pneumatic air signal from 3-15 p.s.i.	(0.02 g.p.h. to 40 g.p.m.)	Metering duties. Multiple units available for blending four or more liquids into common container.

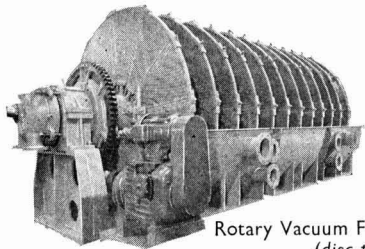
# PLANT FOR

ACID NEUTRALIZATION · CONTINUOUS & BATCH  
CAUSTICIZING · SEPARATION OF SOLIDS FROM LIQUIDS  
WATER FILTRATION · WATER CLARIFICATION

"WEMCO"  
SAND &  
SLURRY  
PUMP  
IN  
"N.I. HARD"



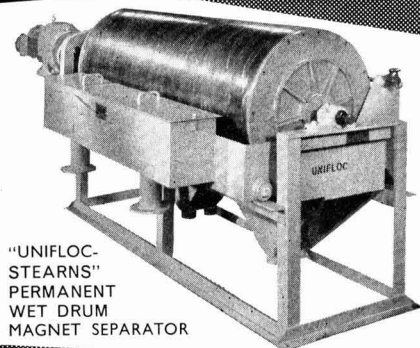
D.M.5 Dense Media Separator



Rotary Vacuum Filter  
(disc type)

*Equipment includes:*

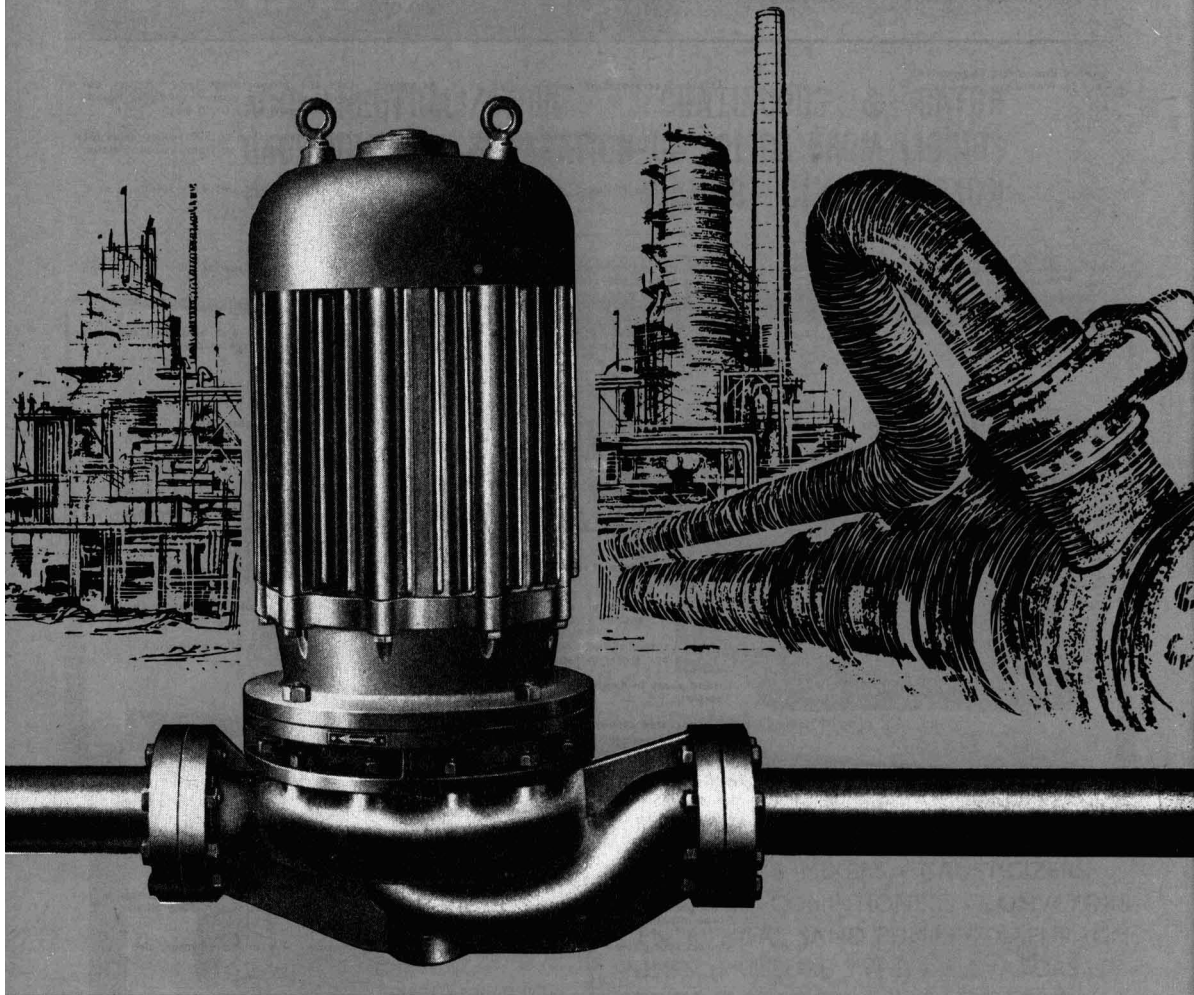
AGITATORS & MIXERS · CAUSTICIZERS  
CLARIFIERS · CONDITIONERS · CONVEYORS  
CENTRIFUGAL SAND PUMPS · DIAPHRAGM  
PUMPS (PRESSURE TYPE) · ELEVATORS  
FROTH FLOTATION CELLS · ROTARY  
VACUUM FILTERS · PADDLE MIXERS  
SLUDGE PUMPS · THICKENERS · STRING  
DISCHARGE FILTERS · VIBRATING SCREENS  
MAGNETIC SEPARATORS



"UNIFLOC-  
STEARNS"  
PERMANENT  
WET DRUM  
MAGNET SEPARATOR

**unifloc**

MANUFACTURER OR SUPPLIER	DESIGNATION	DESCRIPTION	FLOW RATES (g.p.m.)	APPLICATIONS
Howard Pneumatic Engineering Co. Ltd. (contd.)	—	Triplex (reciprocating) pumps.	As above	Like the proportioner type (above), designed to handle normal solid-free liquids with viscosities up to 15 poise.
	—	Rotary pumps generally in stainless steel, with easy-clean features, made in six sizes.	8-350	Viscous liquids up to 500 poises; used for pumping resins, polymers, semi-plastics, etc.
	—	Single-stage centrifugal, made mainly in stainless steel.	1-300	Corrosive liquids including sulphuric acid, etc.
International Combustion Products Ltd., 19 Woburn Place, London, W.C.1.	Vacseal	Horizontal and vertical spindle centrifugal pumps with gland sealed by suction or partial vacuum produced by impeller. Not self-priming.	5-3,500	All kinds of industrial slurries including abrasives.
	Vacseal	New glandless version developed specially for chemical industry. Size range 1-10 in.	—	Viscous slurries, also acids and mixtures where drip leakage inadmissible.
Jones and Stevens Ltd., P.O. Box 35, Eastern By-Pass, Littlemore, Oxford.	Concordia	Submersible small laboratory pump with impeller connected directly to small electric motor.	0-0.625	Everyday laboratory uses.
Kestner Evaporator and Engineering Co. Ltd., 5 Grosvenor Gardens, Westminster, London, S.W.1.	—	Submerged pump in Keebush and Kee-glas, with p.t.f.e. bearings in the form of bushes.	—	Suitable for HCl all concentrations, and sulphuric acid up to 50%.
	—	Centrifugal pumps of vertical glandless or gland type.	0-600	Very wide range of corrosives. Special units available for acidic slurries.
	—	Axial flow propeller type in Regulus metal and Tantiron construction.	0-3,000	Mainly for circulating large quantities of acidic liquors.
	—	Positive rotary sliding vane type in two sizes— $\frac{1}{2}$ and $\frac{1}{4}$ in.—in Tantiron.	0-5	General lab. and pilot scale work.
	—	Hand pump in Keebush, of semi-rotary pattern.	0-2	—
	Oldbury	Air operated carboy discharger and acid elevators.	—	—
Lee, Howl and Co. Ltd., Tipton, Staffs.	Hypersilid	End suction 2-2 $\frac{1}{2}$ in. centrifugal. No wear rings, generous impeller running clearance. Contact parts in silicon iron.	0-225	Corrosive liquors, e.g. sulphuric, nitric, acetic, formic, phosphoric acids, etc.
	Non-Clogg	Rubber lined centrifugal pump. Glass lined types also available.	—	Acids, oils, chemical trade liquors.
	—	Glass lined acid pump of horizontal, end suction, centrifugal type, with semi-open type impeller having back vanes.	0-182	Stated to have very high resistance to practically all acids and many alkalis.
	Tipton	Direct acting steam pumps.	—	Handle clean or dirty water, also viscous liquids.
Mather and Platt Ltd., Park Works, Manchester 10.	Univane	End suction, single-stage centrifugal.	0-1,000	Corrosive liquids water containing impurities, etc.
	—	Liquor pumps of many types, for horizontal or vertical-spindle operation.	—	Chemical and other liquors.
Megator Pumps and Compressors Ltd., 43 Berkeley Square, London, W.1.	—	Positive displacement pumps on sliding-shoe principle. Special synthetic materials avoid metal-to-metal contact.	5-370	Standard cast iron versions for alkalis, etc.; bronze and stainless steel for selected applications. Will also deal with high viscosity liquids.
Merrill Pumps Ltd., Dronfield, Nr. Sheffield.	—	Reciprocating tube diaphragm type, contact parts available in variety of ferrous, non-ferrous, plastics and other materials. Horizontal, vertical, suction lift and mobile versions.	0-55	Sulphuric, nitric, hydrochloric and other acids; acid and alkaline liquors and slurries, etc.
Mitchell Craig Pumps Ltd. (in association with L. A. Mitchell Ltd.), 37 Peter Street, Manchester, 2.	—	Ceramic lined centrifugal.	0-400	All corrosive liquors except hydrofluoric acid or strong caustic alkalis.
	J. 2.	Short stroke, high speed diaphragm pump, with diaphragm and valves in Hypalon (or Viton by special arrangement).	0-8.5	Corrosive and abrasive liquors.
	J. 1.	Portable hand-operated model.	—	As above.



**New**  
**all-round flexibility**  
**at new low**  
**operating costs**

The compact simplicity of the WP-N cuts initial cost by up to 25%, and maintenance charges by up to 20%.

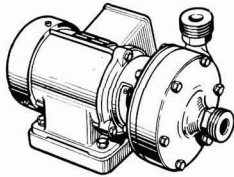
Write for literature giving full details.

Specially developed for the Chemical and Process Industries, the Sigmund WP-N pump embodies the latest design-principles. Every practical feature is incorporated to ensure best possible all-round efficiency plus new ease of maintenance. The pump is highly accessible, and its vertical close-coupled 'in-line' mounting cuts out the need for concrete foundations or baseplates. Close-coupling also reduces the number of component parts: it improves ease of dismantling and re-assembling by eliminating pump shaft and shaft coupling, pump bearings and bearing brackets, and all alignment problems.

**SIGMUND** PROCESS PUMP TYPE **WP-N**  
**SINGLE STAGE—SINGLE ENTRY CENTRIFUGAL PUMP**  
(Vertical close-coupled 3" in line)



MANUFACTURER OR SUPPLIER	DESIGNATION	DESCRIPTION	FLOW RATES (g.p.m.)	APPLICATIONS
Mono Pumps Ltd., Sekford Street, Clerkenwell Green, London, E.C.1.	Mono	Positive rotary pumps with cast iron, ebonite lined, stainless steel or gunmetal bodies; rotor in stainless steel or other corrosion resisting alloys.	0-135	Free-flowing, highly viscous, corrosive or abrasive fluids. Special units for handling powders.
Neumo Ltd., South Coast Road, Peacehaven, Sussex.	Neumo Supaversal	Positive displacement plunger type for drum or tank mounting (submersible). Various versions of different capacities. Corrosion resistant materials.	0-30	Claimed to handle anything that will flow and many products that will not.
Northey Rotary Compressors Ltd., Alder Road, Parkstone, Poole, Dorset.	—	'Oil-free' positive rotary compressors, single-stage, water cooled and air cooled versions.	—	Gas pumping in agitation, aeration and many other applications.
	—	Vacuum pumps, positive rotary; also available in 'oil-free' versions.	(7-750 c.f.m. displacement, swept volume)	Gas pumping in variety of applications.
The Permutit Co. Ltd., Permutit House, Gunnersbury Ave., London, W. 4.	Mark 7	High pressure chemical pump of horizontal, reciprocating, short stroke, double plunger pattern.	0-0.8	Injecting conditioning chemicals into drums or feed lines of very high pressure boilers.
	Mark 6	Positive displacement type, various materials.	0-0.8	For chemicals normally used in water treatment.
	Mark 5	High pressure, constant stroke, positive displacement.	0-1.2	For boiler feed water conditioning chemicals.
Plastic Constructions Ltd., Tyseley Industrial Estate, Seeleys Road, Greet, Birmingham, 11.	SV and LP	Horizontal centrifugal pumps in rigid p.v.c. Self priming.	0.125-16	Capable of handling extremely corrosive solutions.
	—	Portable motorised pump of p.v.c.	0-10	Carboy pump.
Q.V.F. Ltd., Duke Street, Fenton, Stoke-on-Trent.	—	Horizontal centrifugal of borosilicate glass construction, made in two sizes.	0-115	Unaffected by any chemicals except hydrofluoric acid, hot concentrated phosphoric acid and some caustic alkali solutions.
Reavell and Co. Ltd., Ranelagh Works, Ipswich.	—	Horizontal, double-acting dry vacuum pumps.	(162-4,300 c.f.m. piston displacement)	Various chemical industry applications.
	—	'Oil-free' rotary air compressors and exhausters.	(2-5 c.f.m.) free air	Supplying small quantities of oil-free air. May also be used as exhausters at up to 20 in. Hg.
Rediwell Ltd., 25-27 Kelvin Way, Crawley, Sussex.	RPu.1	Small horizontal centrifugal pump of polythene construction.	0-5	Light chemical duties.
	ANP. 350	Vertical submersible p.v.c. pump (portable).	0-7	Chemical solutions
Rhodes, Brydon and Youatt Ltd., Reddish Engineering Works, Stockport, Ches.	CP Mopump	Horizontal centrifugal, baseplate mounting. Casing arranged with centre line suspension.	10-350	Chemical process work.
	—	Vertical submerged glandless pumps, parts of the pumps steamjacketed.	1-100	For handling molten sulphur at approx. 275° F.
	—	Molten metal pumps.	10-100	For molten metals and fused salts such as sodium, sodium and potassium nitrates, caustic soda, etc.
Ryaland Pumps Ltd., Rusholme, Manchester, 14.	Types A, AE, ZAl	Self-priming centrifugal, vertical split-casing (lateral channel type). Stainless steel and conventional materials.	1-700	Process duties.
	ZLLE	End suction centrifugal, available in all iron construction with shaft in chrome steel.	10-500	Specifically designed for chemical industry.
	—	Liquid ring vacuum pumps.	(2-150 c.f.m.)	Various chemical processes.
	ADKK	Glandless self-priming centrifugal. Essentially similar to types A, AE, ZAl (see above).	—	Chemical processes.



## CORROSION-PROOF

**all-plastic pumps**  
**"INERTON"**

- Resistant to Acids, Alkalis, Oils, Alcohols . . .

"Inerton" pumps convey an extensive range of liquids, starting with distilled water, because it is not contaminated by the pumps, and ending with some of the most corrosive liquids, because the pumps remain completely unaffected by them. The standard types are made of hard PVC but they can now also be made of Tetrafluoroethylene, at roughly treble the cost. Apart from centrifugal pumps, immersion models are now also available.

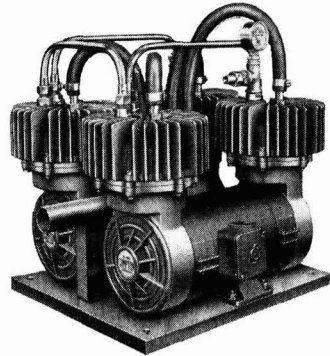
Complete absence of metal in the path of liquid ensures constant pH, high chemical resistance, no corrosion and no contamination of liquids by traces of metal. The pumps are self-lubricated and there is therefore no pollution by grease or oil. Their seal is self-adjusting. Output from  $\frac{1}{4}$ th to 45 gallons per minute. Leaflets with further details will be sent with pleasure.

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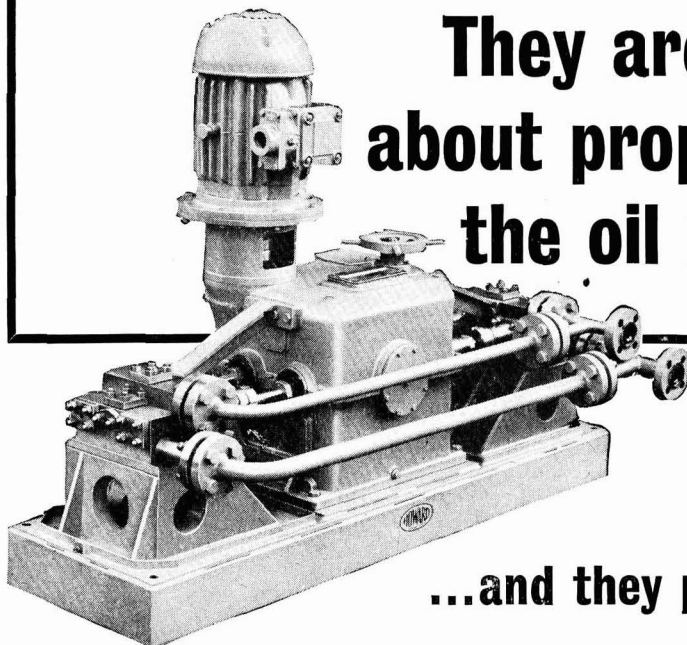
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# They are careful about proportions in the oil industry...

This illustration shows a 3HL double-ended proportioning pump working on a duty of 0-3.5 US g.p.m. with a discharge pressure of 1800-2250 p.s.i. It is one of several recently supplied to a well-known oil refinery where it is used to handle propylene/acetone/benzene/toluene.

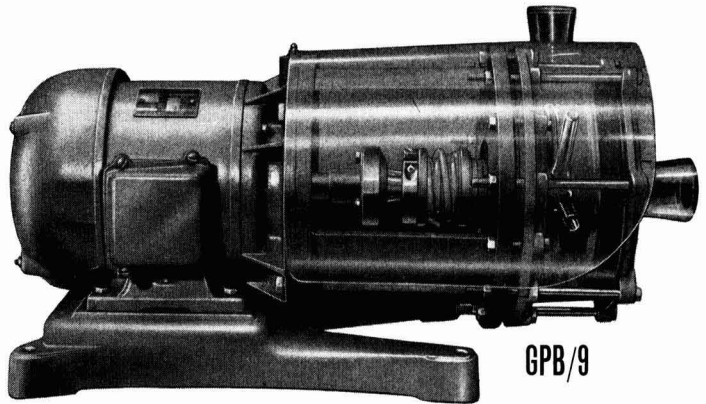
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Head Office & Works: FORT ROAD, EASTBOURNE, SUSSEX. Tel: Eastbourne 4804/5. Grams: Howmatic. London Office: TERMINAL HOUSE, GROSVENOR GARDENS, LONDON, S.W.1

MANUFACTURER OR SUPPLIER	DESIGNATION	DESCRIPTION	FLOW RATES (g.p.m.)	APPLICATIONS
Saunders Valve Co. Ltd.	—	Centrifugal with gunmetal impeller, mild steel shaft, cast iron casing; alternatively, all parts in cast iron, stainless steel, bronze or Monel.	0-1,000	Liquids compatible with specifications.
Sigmund Pumps Ltd., Team Valley, Gateshead, II.	WP-N	Single stage, single entry centrifugal type for close coupled in-line mounting. Easy accessibility, maximum interchangeability of components. Mechanical seal fitted as standard.	0-450	Specially developed for chemical and process industries.
	B-N, K-N, A-N, BMG, PBN	Chemical and process pumps (centrifugal) of various types, generally in stainless steel, cast iron, bronze, Ni-Resist, Lang-alloy, or to specification.	0-1,600	Wide range of uses.
	NZ	Non-clogging pumps.	0-1,500	
Stainless Steel Pumps Ltd., Myrtle Road, Eastbourne.	REC	Positive rotary pumps with 'easy-clean' features. Made in EN 5BJ 18/8/3 as standard but also available in Hastalloy, nickel cast iron, titanium, etc.	1-170	Chemical, dairy and food products. Particularly suitable for viscous products including heavy slurries, etc.
Stothert and Pitt Ltd., Bath, Somerset.	DCL and DCH	Horizontal centrifugal pumps, mechanical seals fitted as standard.	0-1,500	Various chemical and petroleum industry applications.
	—	Screw displacement pumps, able to displace gas and air as well as liquids. Self-priming.	—	Road and rail tanker loading and discharging, and other duties.
	—	Rotary gear displacement pumps.	—	Viscous fluids
Sulzer Bros. (London) Ltd., 31 Bedford Square, London, W.C.1.	UP, HPL and NCP	Centrifugal pumps for high and low lift.	—	Water and other liquid pumping duties.
Sutcliffe Hydraulics Ltd., Speedwell Works, Whitwell, Castleford, Yorks.	—	Multi-piston in line type, of fixed or variable capacity.	0.17-40	Various. Suitable for handling hydraulic and certain fuel oils.
Tangyes Ltd., Cornwall Works, Smethwick, Birmingham.	'C'	Centrifugal in 18/8/3 stainless steel. Interchangeability a feature. Stuffing box can accommodate either soft packing or mechanical seal.	2-300	Wide range of chemical process duties.
	—	Horizontally split centrifugal.	100-1,800	Water, oils, cyanide, etc.; with special materials can handle alkalis, acids and process liquids.
	—	Centrifugal acid pumps with wetted parts of hard lead or Monel.	50-1,800	Hot dilute sulphuric acid solutions and other corrosive liquids.
	—	Direct acting steam-driven pumps of single and double cylinder types.	—	Wide variety of liquids including chemicals.
The Thermal Syndicate Ltd., P.O. Box No. 6, Wallsend, Northumberland.	—	Vitreous mercury vapour pumps for high vacuum, constructed entirely of fused silica. Two standard types: two-stage and single-stage; along with 'fore pump'.	—	Laboratory high vacuum applications.
Thom, Lamont and Co. Ltd., Hawkhead Works, Paisley, Scotland.	—	Variety of steam or electrically driven, reciprocating type pumps.	3.3-200	For water, oil, acid, according to specification.
Transkem Pumps Ltd., West Arthurlie Works, Barrhead, Nr. Glasgow.	TK and TC	Centrifugal with easy dismantling features, lined and with all contact parts in Petrox C ceramic material.	5-450	Acids and corrosive liquors, except hydrofluoric acid and hot caustic solutions. Also resistant to abrasive slurries.
	TK/HODP	Portable, hand-operated, diaphragm acid pump with ceramic components.	0-450	As above.
Unifloc Ltd., Swansea	—	Pressure type diaphragm pumps.	—	Sludge pumping and other applications.
	—	Centrifugal pumps.	—	Sand and slurry.

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GPB/9

...with outstanding Chemical and Thermal shock resistance properties!

Q.V.F. Glass Pumps have been specially developed for use in the Chemical Industry for the conveyance of corrosive liquids.

Made in two sizes (types GPB/6 and GPB/9) they are of the centrifugal type and run at 1400 r.p.m. A glass impeller of simple design thrusts the liquid through the tangential outlet of the glass casing. A mechanical seal is used having a spring-loaded P.T.F.E. bellows rotating with the shaft.

The complete pump forms a compact and efficient unit and the motor is interchangeable.

Other outstanding advantages of this revolutionary pump are fully described in a new folder—free on request.



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Grams: Q.V.F. Stoke-on-Trent. Telex.

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pumps of self priming design with  
mechanical shaft seals

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Available with mechanical Seals and  
in all grades of stainless steels

## RYALAND PUMPS LTD.

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### Rusholme Manchester, 14

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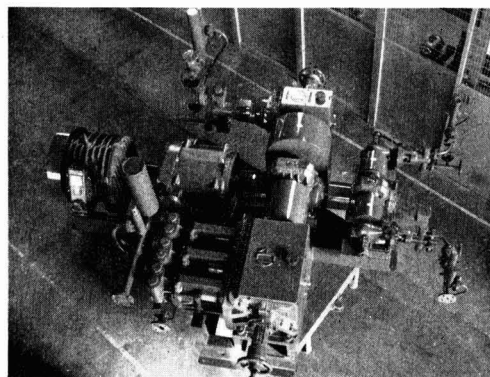
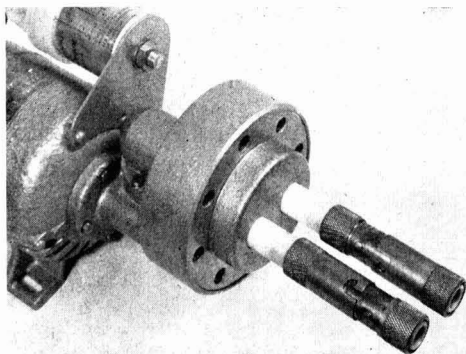
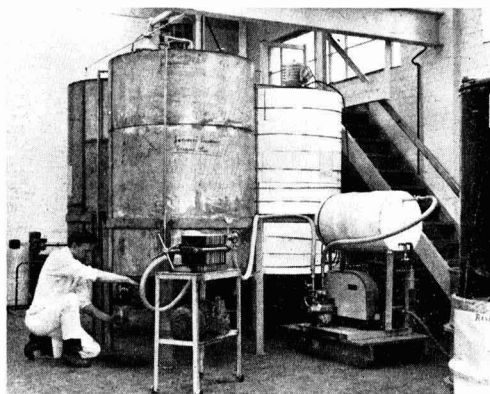
End suction type single stage centrifugal  
pumps (obtainable with water cooled  
bearings, mech. seals, etc.) maximum  
casing pressure 240 psig

MANUFACTURER OR SUPPLIER	DESIGNATION	DESCRIPTION	FLOW RATE (g.p.m.)	APPLICATIONS
Watson-Marlow Air Pump Co., Marlow, Bucks.	HR	Flow inducer, in which a flexible tube clipped to a multi-curved track is subjected to pressure by rollers, leading to suction action. Unit is therefore a glandless, valveless pump.	0-7	Laboratory and production models for handling liquids, emulsions, slurries, creams and gases.
G. and J. Weir Ltd., Cathcart, Glasgow S.4.	—	Horizontal, 3-throw reciprocating pumps.	5-60	Water, oils and chemicals.
	—	Steam driven, direct acting pumps, vertical or horizontal.	0.7-358	Water, oil, chemicals and tar.
	—	Vertical, 2-throw pumps of double acting, reciprocating type.	38-716	Variety of liquids.
Wilkinson Rubber Linatex Ltd., Camberley, Surrey.	—	Centrifugal, lined with Linatex natural rubber, size $\frac{7}{8}$ in.-12 in.	15-3,500	Specially designed for abrasive slurries, will handle chemicals within limits of natural rubber.
	—	Diaphragm pumps, Linatex lined and also available with butyl and Hycar rubber linings. Sizes 1, $1\frac{1}{2}$ and 2 in.	0-900	Slurries, chemicals, effluent sump drainage, etc. Accessories available include flexible suction and delivery pipes, dip pipes for emptying drums and carboys.
Worthington-Simpson Ltd., Lowfield Works, P.O. Box 17, Newark, Notts.	—	Centrifugal pumps of horizontal split casing and monobloc construction—materials include stainless steel, Worthite corrosion-resisting alloy steel, and conventional materials.	0-1,400	Wide range of acids, chemicals and solutions.
	—	Specially designed, close tolerance reciprocating pumps.	0-167	Claimed to give high volumetric efficiencies when handling volatile liquids.
	—	Range of pumps for sump service, various materials.	0-330	Acids, alkalis, slurries, liquids containing solids up to $\frac{1}{2}$ in diam., and viscous liquids.

**RIGHT:** Goodyear B7 pump with new Viton A elastomer hose shown in use on perfume processing duties at the Maesteg works of Revlon Overseas Corporation

**BELOW, LEFT:** Close-up of A.E.I. pump with working parts in p.t.f.e. Two  $\frac{3}{4}$  in. p.t.f.e. couplers are shown connected to the inlet and outlet ports of the pump

**BELOW, RIGHT:** Multi-pump set for the manufacture of man-made fibres, by E.C.D. Ltd.



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HIGH PRESSURE AUTOCLAVES  
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**All pressures up to 30,000 P.S.I.**

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dangerous

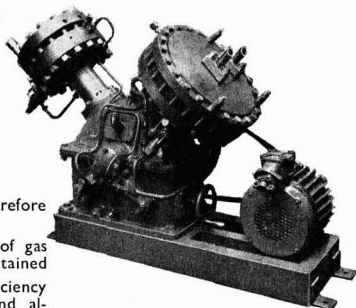
or corrosive

gases and

liquids

- No glands — therefore no losses.
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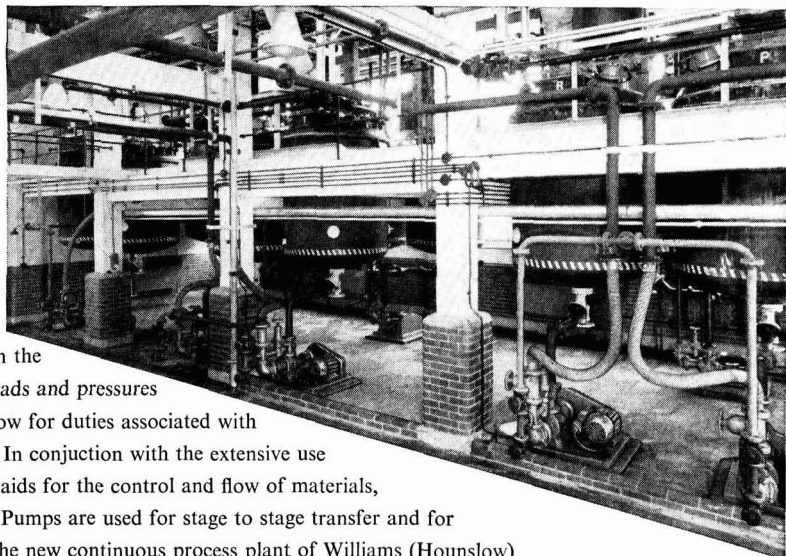


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The uniform delivery from the Mono Pump under varying heads and pressures ensures an uninterrupted flow for duties associated with continuous production plants. In conjunction with the extensive use of mechanical and electrical aids for the control and flow of materials, a batch of ten Mono Pumps are used for stage to stage transfer and for delivering to filter presses on the new continuous process plant of Williams (Hounslow) Limited, for the production of food colours of extreme physical and chemical fineness.

The  
**MONO**  
pump

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CLERKENWELL GREEN, LONDON, E.C1.  
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United Kingdom Branches: Belfast, Birmingham, Glasgow, Manchester,  
Newcastle and Wakefield. And Overseas: Dublin, Durban, Johannesburg,  
Melbourne and Sydney.



# Buyer's guide to chemical and process pumps

In this buyer's guide, pump manufacturers and suppliers listed in the foregoing tables are classified under the general description of pumps they more usually offer for chemical industry duties. The list is not intended to be exhaustive.

## AIR-OPERATED

Ames Crosta Mills and Co. Ltd.

## ARCHIMEDEAN SCREW

Goodyear Pumps Ltd.

## AXIAL FLOW (PROPELLER TYPE)

Kestner Evaporator and Engineering Co. Ltd.

## BELLOWS

Crane Packing Ltd.

## CARBOY PUMPS

Glen Creston Ltd.  
Kestner Evaporator and Engineering Co. Ltd.

## CENTRIFUGAL (STAINLESS STEEL)

A.P.V. Co. Ltd.  
C.P. Equipment Ltd.  
Dorr-Oliver Co. Ltd.  
Holden and Brooke Ltd.  
Glen Creston Ltd.  
Howard Pneumatic Engineering Co. Ltd.  
Rhodes, Brydon and Youatt Ltd.  
Ryaland Pumps Ltd.  
Saunders Valve Co. Ltd.  
Sigmund Pumps Ltd.  
Tangyes Ltd.  
Worthington-Simpson Ltd.

## CENTRIFUGAL (SPECIAL MATERIALS)

Appleton and Howard Ltd.  
Charles Austen Pumps Ltd.  
British Acheson Electrodes Ltd.  
Dexine Rubber Co. Ltd.  
Dorr-Oliver Co. Ltd.  
Hatherware Ltd.  
Kestner Evaporator and Engineering Co. Ltd.

## CENTRIFUGAL (SPECIAL MATERIALS)—(Contd.)

Lee, Howl and Co.  
Mather and Platt Ltd.  
Mitchell Craig Pumps Ltd.  
Q.V.F. Ltd.  
Rediwell Ltd.  
Rhodes, Brydon and Youatt Ltd.  
Tangyes Ltd.  
Franksem Pumps Ltd.  
Wilkinson Rubber Linatex Ltd.  
Worthington-Simpson Ltd.

## CENTRIFUGAL (CAST IRON, BRONZE, GUNMETAL, ETC.)

Henry Balfour and Co. Ltd.  
Bryan Donkin Co. Ltd.  
Dorr-Oliver Co. Ltd.  
Girdlestone  
Glen Creston Ltd.  
Goodyear Pumps Ltd.  
International Combustion Ltd.  
Mather and Platt Ltd.  
Rhodes, Brydon and Youatt Ltd.  
Ryaland Pumps Ltd.  
Saunders Valve Co. Ltd.  
Sigmund Pumps Ltd.  
Stoithert and Pitt Ltd.  
Sulzer Bros. (London) Ltd.  
Tangyes Ltd.  
Unifloc Ltd.  
Worthington-Simpson Ltd.

## DIAPHRAGM

Associated Electrical Industries Ltd.  
C.T. (London) Ltd.  
Dexine Rubber Co. Ltd.  
Dorr-Oliver Co. Ltd.  
E.C.D. Ltd.  
Girdlestone Pumps Ltd.  
Goodenough Pumps Ltd.  
Hatherware Ltd.  
Merrill Pumps Ltd.

## DIAPHRAGM (contd.)

Mitchell Craig Pumps Ltd.  
Franksem Pumps Ltd.  
Unifloc Ltd.  
Wilkinson Rubber Linatex Ltd.

## GAS COMPRESSORS

Baskerville and Lindsay Ltd.  
Dawson, McDonald and Dawson Ltd.  
Bryan Donkin Co. Ltd.  
E.C.D. Ltd.  
Northey Rotary Compressors Ltd.  
Reavell and Co. Ltd.

## HAND-OPERATED AND LABORATORY PUMPS

(See also 'Carboy Pumps,' 'Induced Flow,' 'Metering and Dosing,' etc.)  
Jones and Stevens Ltd.  
Kestner Evaporator and Engineering Co. Ltd.

## INDUCED FLOW (FLEXIBLE TUBE)

Ames Crosta Mills and Co. Ltd.  
Apex Construction Ltd.  
Watson-Marlow Air Pump Co.

## METERING AND DOSING

Baskerville and Lindsay Ltd.  
Comet Pump and Engineering Co. Ltd.  
Crane Packing Ltd.  
Diafilter Engineering Co. Ltd.  
The Distillers Co. Ltd.  
E.C.D. Ltd.  
Howard Pneumatic Engineering Co. Ltd.

## POSITIVE-DISPLACEMENT PLUNGER

Neumo Ltd.  
Permutit Co. Ltd.

## RECIPROCATING

Henry Balfour and Co. Ltd.  
Bryan Donkin Co. Ltd.  
Calmic Engineering Co. Ltd.  
E.C.D. Ltd.  
Sutcliffe Hydraulics Ltd.  
Thom, Lamont and Co. Ltd.  
G. and J. Weir Ltd.  
Worthington-Simpson Ltd.

## ROTARY DISPLACEMENT

George Fletcher and Co. Ltd.  
Sir George Godfrey and Partners (Industrial) Ltd.  
Stoithert and Pitt Ltd.

## ROTARY, POSITIVE ACTION

Comet Pump and Engineering Co. Ltd.  
Howard Pneumatic Engineering Co. Ltd.  
Kestner Evaporator and Engineering Co. Ltd.  
Mono Pumps Ltd.  
Stainless Steel Pumps Ltd.

## SAND PUMPS

Dorr-Oliver Co. Ltd.  
Unifloc Ltd.

## SCREW DISPLACEMENT

Stoithert and Pitt Ltd.

## SLIDING SHOE

Megator Pumps and Compressors Ltd.

## SLUDGE PUMPS

Consolidated Pneumatic Tool Co. Ltd.  
The Bryan Donkin Co. Ltd.  
Dorr-Oliver Co. Ltd.  
Unifloc Ltd.

## STEAM PUMPS

Lee, Howl and Co. Ltd.  
Tangyes Ltd.  
Thom, Lamont and Co. Ltd.

## WATER PUMPS

Globe Pneumatic Engineering Co. Ltd.  
Lee, Howl and Co. Ltd.  
Sulzer Bros. (London) Ltd.  
Tangyes Ltd.

## WATER RING

Calmic Engineering Co. Ltd.

## VACUUM PUMPS

Northey Rotary Compressors Ltd.  
Reavell and Co. Ltd.  
Ryaland Pumps Ltd.  
Thermal Syndicate Ltd.

## Flexible containers solve problem of transporting chemicals, liquids

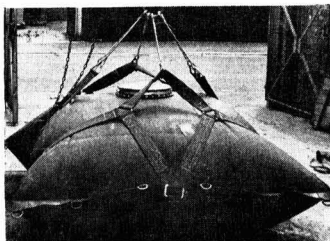
A NEW approach to the problem of transporting liquids by road or sea has been adopted by Fireproof Tanks Ltd., The Airport, Portsmouth, who have developed the manufacture of tough flexible containers of 100-500 gall. capacity which can be readily and easily slung from lorries, railway wagons or ships, by means of a reinforced flexible lifting harness. Other developments are as follows:

**Pallet Tanks.** Flexible containers of up to 250 gall. capacity, manufactured of ozone-resistant Hycatrol rubber, can be fitted in collapsible pallets for the carriage of storage of a wide range of liquids including all petroleum fuels, mineral and vegetable oils, alkaline fluids, latices, medium strength acids, calcium chloride solutions and many other chemical fluids. Special lined containers are made to contain consumable fluids including beer, fruit juices and drinking water.

**Tracon Liners.** Hycatrol liners are also manufactured to fit standard Tracon collapsible containers and are suitable for the carriage of the same wide range of liquids as for pallet tanks.

**High Impact Plastic Valves.** Poppet-type elbow valves have been developed

which are ideally suited for use on all types of rigid and flexible containers. Two models have been designed, both of high impact plastics, one operated by a small handwheel and the other by a quick-acting level operated cam. In both models, the valve is a shaped moulding of Hycatrol rubber designed so that the contents of the containers tends to force the valve on to its seating. A flat plate valve has also been developed for use on all types of rigid or flexible containers where it is essential that the attachments protrude as little as possible. Basically the valve consists of two circular high



One of Fireproof Tanks' flexible containers fitted with lifting harness

impact plastics plates bolted together with a circular plate recessed between them. The filling/discharge pipe is connected directly to the upper valve plate.

**Hy-Clad.** New developments in Hy-Clad reusable gaskets and seals include a metal/rubber/metal sandwich which can be produced in sheet in sheet or section form for damping the vibrations and extending the fatigue life of metal structures and component parts.

**Insulated Blankets.** An insulating quilting of fabric reinforced p.v.c. with a vinyl foam insert has been manufactured and has proved very successful in blanketing and insulating exposed petroleum containers. Can be manufactured in any required size or thickness.

## Petroleum analysis and testing services

FORMATION of Brett Yarsley Services, with laboratories at Chessington, Surrey, has been announced by Caleb Brett and Son Ltd., London, and Yarsley Testing Laboratories Ltd. The new organisation will carry out the analysis and testing of petroleum and related products, and will provide technical services to the petroleum chemical and shipping industries.

Caleb Brett have been in business as bulk oil surveyors and tank calibrators for about 40 years and Yarsley's experience of analytical and testing work covers about 30 years.

## I.C.I. LOOK FOR FERTILISER PLANTS IN "FOUR CORNERS OF U.K."

**N**ITROGEN deliveries in the U.K. have reached a new record every year since 1948. In 1948 nitrogen consumption was 180,000 tons; in 1960 it was just over 450,000 tons, and consumption will go up to 550,000 tons a year or even higher, predicted Mr. W. d'Leny, chairman of I.C.I.'s Billingham Division. Mr. d'Leny was speaking for the first time as chairman at the Billingham Division Council held on 4 October.

Mr. d'Leny said that although there had been dumping of fertilisers in the U.K. by Continental manufacturers, the Board of Trade had been able to prove that these fertilisers were dumped at prices below the home prices of the country of origin and suitable action was taken.

The chairman warned the division that there was a difficult time ahead for fertiliser exports in the next two years. With their present method of manufacture from coal they would lose money on exports and the situation is likely to continue until the modernised plant at Billingham comes into operation.

The Billingham Division has tried to stimulate consumption of methanol by several reductions in price.

"Liquid carbon dioxide sales are well ahead of last year's and another record seems likely," Mr. d'Leny said, "but Drikold sales have been rather disappointing, mainly due to the bad weather

in July and August."

The problem of over-capacity in the petrochemical field was touched on by Mr. d'Leny. He said that one of the factors that was making it difficult for the Heavy Chemicals Division at Billingham to maintain an upward trend in sales was that I.C.I. was entering a period when manufacturing capacity for petrochemicals in the U.K. and throughout the world will exceed demand. I.C.I. came into the field of petrochemicals very early and the result is that they did secure a substantial proportion of the U.K. market at an early stage, but now, all over the world, other companies and particularly the oil companies, were jumping on the band wagon in the hope of making a quick profit. "This is not in fact what has been achieved", he went on to say, "and for a time, until there has been an adjustment, there will be intense competition and a lowering of prices."

On transport costs from Billingham to the South of England, Mr. d'Leny said that they are getting in the region of £4 or £5 a ton and by building a plant at Severnside they will be able to cut down transport costs by something under a half.

The chairman expresses the hope that eventually I.C.I. will have fertiliser plants at the four corners of the U.K. so that the cost of transport is reduced to a minimum and eventually the price of the products to the farmer can be reduced.

## New plastisol adhesive replaces spot-welding in car production

**F**IRST of a new line of experimental plastisols developed as a metal-to-metal adhesive by B.B. Chemical Co. Ltd., Ulverscroft Road, Leicester, in co-operation with a leading car maker, is already ousting spot welding on the production models of two or three British car manufacturers.

It is being used for bonding reinforcing members of boot lids and bonnet tops. No extra time is taken for the process and the adhesive is cured in the normal paint drying process, representing a saving in production time.

No formulation details are available, but it is expected that this new adhesive, a heat-gelling compound, will find much wider application, not only in cars, but in other industrial processes. The bonding substance is a tough, flexible solvent-free adhesive with gap-filling properties and high peel strength, suitable for application to steel and aluminium.

The new product is designed for metal bonding where the assembly will subsequently be heat-treated, thus curing the substance to a tough rubbery consistency. Tolerant of oil contamination, it is readily extruded by virtue of its thixotropic nature, through lengths of ½-in. bore, high-pressure hose. Neither in the

cold state nor during cure will the compound flow; and the minimum cure-time is 30 min. at 270°F, though the bond is not impaired if the cure-time is exceeded. On test, a bond subjected to 360°F for 3½ hours survived without the slightest degradation.

As an alternative to spot-welding, this adhesive system has the virtue of creating an overall bond and seal. The compound itself is non-inflammable, non-drying, with good storage properties; and the curing cycle was planned around temperatures commonly used in the automobile industry's paint shops.

## Esso research centre extended

**S**ITE preparations have begun at the Esso Research Centre at Abingdon, Berks, for two additional buildings. One is a new laboratory block to house the expanding petrochemical and polymer application research department, and the second building is for the accommodation of the company's management staff at present located in the London office.

The main contractors are W. E. Chivers and Sons and the work is expected to take two years to complete.

## Adhesive overcomes problems of urethane-textile bonding

**A** NEW adhesive that "will revolutionise manufacturing trends in textiles" has been developed by the Industrial Adhesives Division of Evode Ltd., Stafford. Known as Evo-Stik Impact adhesive 6108, it is a one part rubber/resin formula and is recommended for bonding polyurethane foam to fabrics and for fabric combining in general.

This adhesive is not only resistant to water, oil and high temperatures, but also to all solvents used in dry-cleaning. Therefore all garments made from combined materials can effectively be cleaned by normal processes without fear of adhesive breakdown.

The formulation was developed to meet a number of textile needs, such as uneven tensions in the fabrics and foams being combined; too deep a penetration into the fabric; and adhesive clogging of the pores in the foam. Additional problems experienced in dry-cleaning and which the new adhesive overcomes, has been a tendency for the foam, in some solvents, to swell as much as 50% and lose most of its strength and for the polyurethane adhesive to weaken to the extent that delamination could take place.

## Chancellor talks on planning with employers

**S**TRUCTURE and functions of the new planning machinery which is proposed by the Chancellor of the Exchequer were the subject of discussions between the Chancellor and employers' organisations at the Treasury last week. Particular stress was laid on assessments of future growth.

General support for the proposals was re-affirmed on behalf of the Federation of British Industries, British Employers' Confederation, National Union of Manufacturers and the Association of British Chambers of Commerce.

## Duty drawback sought on fertiliser materials

**T**HE Board of Trade are considering an application for the allowance of duty drawback on certain imported materials when used for the production in the U.K. of compound fertilisers for export. The imported materials are: Leuna salt-petre (ammonium sulphate nitrate), diatomaceous earth, and di-ammonium hydrogen orthophosphate.

Representations by interested parties should be sent in writing to the B.o.T. Tariff and Import Policy Division, Horse Guards Avenue, London S.W.1, not later than 10 November.

## Import duty to stay on dicalcium phosphate

**A**pplication for removal of import duty charged on calcium hydrogen orthophosphate of mineral origin (also known as dicalcium mineral phosphate) has been rejected, the Board of Trade considering that a case had not been made out for removal of duty.

# CENSUS REPORT ON CHEMICALS PRODUCTION

## Sales in 1958 topped £520 m. rising 40% in four-year period

**S**ALES of the U.K. general chemicals industry in 1958 topped the £520 million-mark, a 40% rise on 1954. Net output in 1958 was worth more than £247 million, 56% up on 1954. These figures are given in the Census of Production report for chemicals on general chemicals for 1958—the last of the census reports to be published (3s net from H.M.S.O.). Of the total sales, which include the value of goods produced and work done, more than 60% was accounted for by 11 enterprises each with a labour force of 2,000 or more.

The 1958 census includes drugs and pharmaceutical preparations and the distilling of industrial alcohol, formerly included in different reports. Another change in the current report is that it deals only with firms employing 25 persons or more, as against the 1954 census which covered firms with 11 or more persons employed on productive work.

### TABLE 1—INDUSTRIAL SUMMARY

Estimates for all firms			
	1954	1958	
No. of enterprises	...	582	
No. of establishments	...	794	
	£'000	£'000	
Sales goods produced, work done	371,509	520,708	
Purchases of materials, fuel	205,173	296,806	
Stocks: Change during year	+1,970	+314	
At end of year	18,185	31,610	
Work in hand: Change during year	+1,564	-386	
At end of year	6,563	9,158	
Stocks of materials, fuel: Change during year	+3,567	-519	
At end of year	33,621	44,527	
Payment for transport	14,938	18,325	
Net output	157,975	247,018	
Average number employed:	'000	'000	
Operatives	75.9	87.9	
Other	34.4	43.8	
Total, inc. working proprietors	110.4	131.9	
Wages & salaries:	£'000	£'000	
Operatives	39,971	55,448	
Other	24,869	38,713	
Capital spending:			
New building work	12,186	19,896	
Plant & machinery:			
Acquisitions	38,328	80,929	
Disposals	484	532	
Vehicles:			
Acquisitions	1,219	2,109	
Disposals	448	441	

In an analysis of returns from firms employing 25 or more persons by chemical industry groups the census report gives sales totals (goods produced and work done) as follows (figures in brackets are 1954 sales):

Pigments, £27,342,000 (£20,253,000).  
Pharmaceutical chemicals, £31,299,000 (£19,949,000).

Inorganic chemicals, £162,972,000.

Organic chemicals, £141,613,000.

Compressed gases and miscellaneous chemicals, £140,869,000.

Net outputs in those fields were:

Pigments, £11,064,000 (£8,002,000).

Pharmaceuticals, £17,255,000

(£10,771,000).

Inorganics, £64,676,000.

Organics, £58,633,000.

Compressed gases, etc., £72,965,000.

Net output per employee person employed was:

Pigments, £1,756,000 (£1,502,000).

Pharmaceuticals, £1,589,000

(£1,286,000).

Inorganics, £1,521,000.

Organics, £2,321,000.

Compressed gases, etc., £2,049,000.

Spending on new building work was:

Pigments, £2,697,000 (£1,340,000).

Pharmaceuticals, £2,020,000 (£415,000).

Inorganics, £10,746,000.

Organics, £26,373,000.

Compressed gases, etc., £32,959,000.

In a table entitled "total make of in-

termediate products," the census report shows that a 1958 figure, returned in all industries, for hydrochloric acid (1.14 sp. gr.) of 220,000 tons. Sulphuric acid total make in the chemicals industry was 1,669,000 tons, produced by 31 enterprises. Chlorine total make returns in all industries was 368,000.

Other total makes, returned in all industries, were: acetylsalicylic acid, other than aspirin tablets, 8,183,000 lb.; morphine, codeine, ethyl morphine and other morphine derivatives, 67,600 lb.; caffeine and theobromine, 266,000 lb.; other alkaloids, 141,000 lb.; penicillin, 215,290,000 mega units.

Table 2 is an extract from the census list showing sales of principal products, by firms with 25 or more employees, including sales by establishments classified to other industries. It is pointed out that 1954 figures are not fully comparable.

TABLE 2—SALES BY LARGER FIRMS

	1954		1958	
	'000 tons	'000	'000 tons	'000
<b>Inorganics:</b>				
Hydrochloric acid	247	2,328	202	2,066
Sulphuric acid	1,252	12,966	1,242	13,217
Hydrofluoric acid	n.a.	6,139	3.8	527
Other inorganic acids	82.2	2,718	81	3,448
Ammonia liquor	n.a.	2,318	n.a.	2,638
Ammonium cpds., exc. phosphates & sulphate	n.a.	†	65.6	3,338
Carbon disulphide	n.a.	†	144	4,605
Chlorine	n.a.	48.7	32.6	1,950
Copper sulphate	n.a.	3,428	28.1	2,736
Lead compounds	30.2	2,142	n.a.	4,322
Magnesium cpds.	n.a.	2,146	n.a.	40,183
Sodium cpds., exc. sulphate & phosphates	n.a.	37,696	n.a.	398
Sulphur	32.4	618	73.6	454
Sulphur dioxide	n.a.	†	5.8	242
<b>Organics:</b>				
C. hydrocarbons	n.a.	*	91.2	9,154
C. & higher, inc. butadiene	n.a.	*	96.7	3,280
Acetic & citric acids	21.2	2,528	34.2	4,273
Salicylic acid	n.a.	2,251	1.8	454
Other org. acids	n.a.	†	n.a.	3,567
Ethyl alcohol	43,803	7,816	47,502	8,471
Propyl alcohols	n.a.	†	4,613	2,075
Butyl alcohols	14.7	1,783	14.9	1,528
Higher fatty alcohols	2.8	471	2.4	375
Other alcohols, not sulphated	n.a.	9,175	n.a.	8,739
Chlorocarbons	n.a.	†	83.2	6,014
Det. alkylates	n.a.	*	81.0	5,377
Esters, n.e.s.	n.a.	†	36.8	5,862
Formaldehyde & paraformaldehyde	n.a.	†	39.4	3,045
Glycols, etc.	n.a.	*	26.2	4,769
Acetone	43.6	2,947	50.7	3,267
Other ketones	n.a.	1,974	n.a.	2,748
Phenol, syn.	n.a.	†	17.8	2,479
Phthalic anh.	11.9	1,923	29.2	3,840
Rubber, syn., inc. nitriles & high styrene	n.a.	*	7.5	2,261
<b>Miscellaneous:</b>				
Pigment dyestuffs	4.4	4,127	4.0	5,438
Titanium dioxide	63.5	8,842	89.3	15,045
Acetylene	502	3,592	497	4,050
Carbon dioxide	51.4	1,154	n.a.	3,709
Hydrogen	859	325	n.a.	790
Nitrogen	454	288	2,491	790
Nitrous oxide	173	538	n.a.	589
Oxygen	5,644	5,488	9,102	9,189
Furnace black	n.a.	†	95.1	7,121
Other blacks, inc. thermal & lamp	71.2	5,269	8.8	480
Unclassified blacks	n.a.	2,638	n.a.	2,128
Lab. chems., not radioactive	939	1,486	1,185	1,538
Essential oils	n.a.	†	n.a.	7,260
Lube oil additives	n.a.	*	n.a.	1,990
Plasticisers, n.e.s.	17.9	4,563	22.7	4,339
Phthalates	10.1	2,356	14.5	3,263
Phosphates	8.1	835	5.6	1,591
Other	2.4	2,390	7.9	3,164
Rubber accelerators	2.1	2,079	4.8	2,745
Rubber antioxidants	5.4	1,871	n.a.	2,100
Textile auxiliaries	n.a.	1,871	n.a.	2,100

Symbols: n.a. not available \* not recorded separately † n.a. owing to risk of disclosure

# Italy switching to o-xylene for phthalic

ITALY'S phthalic anhydride capacity totals between 60,000 and 70,000 tonnes/year. Actual production in 1960 amounted to about 55,000 tonnes, while consumption was between 40,000 and 45,000 tonnes; demand, however, is growing steadily.

About 70% of Italy's total needs is accounted for by plasticisers, 15% by paints, 10% for dyestuffs and 5% for rubber and other industries. Exports and imports of phthalic anhydride in Italy are as follows:

	Imports	Exports
	1960 Tonnes	1960 Tonnes
Czechoslovakia ... ..	—	1,420
France ... ..	71	1,307
Soviet Union ... ..	360	—
United Kingdom ... ..	140	2,095
West Germany ... ..	233	374

The following companies produce phthalic in Italy: A.C.N.A. at Cengio, near Savona; Barbini, Venice; Bombrini Parodi Delfino, Colleferro; Carbochimital, Padua; C.L.E.D.C.A., Padua; Ftalital, Scanzosciate, near Bergamo; Industrie Chimiche Lodigiana, Crespiatica, near Milan; Prada, Trent; Silna, Padua; Soc. Italiana Resine, Luino, near Varese.

Until recently, naphthalene was the only raw material used for the production of phthalic anhydride. Now, however, A.C.N.A., B.P.D. Ftalital and Silna are utilising o-xylene, a cheaper starting material in Italy. Some Italian phthalic producers believe that unless there is a

cut in the price of naphthalene, its usage in the production of phthalic will steadily decline.

**Naphthalene.** Total production of hot-pressed naphthalene in Italy is between 6,000 to 7,000 tonnes/year. Producers are: C.L.E.D.C.A., Milan; Cokitalia, Milan; Distillerie Lombarde Catrame, Milan; Fornico, Vado Ligure; Prada, Trent; and Vetrocoke, Porto Marghera.

Montecatini are planning a petroleum-based naphthalene unit at Brindisi with capacity of up to 25,000 tonnes/year.

Italy's home consumption totals from 45,000 to 50,000 tonnes and a considerable proportion of the country's needs is therefore imported as can be seen from the following figures:

	1960	1961
	Jan.-May Tonnes	Jan.-May Tonnes
<b>Imports:</b>		
Raw naphthalene ... ..	43,046	9,499
Refined naphthalene ... ..	2,147	103
<b>Exports:</b>		
Raw naphthalene ... ..	181	101
Refined naphthalene ... ..	47	3

About 78% of naphthalene consumption is taken up for the production of phthalic anhydride, the balance being absorbed by producers of dyestuffs and other goods.

	Phthalic Anhydride	Naphthalene, Raw
	Tonnes	Tonnes
Capacity ... ..	60,000-70,000	—
Production ... ..	55,000	6,000-7,000
Consumption ... ..	40,000-45,000	45,000-50,000
Imports ... ..	594	43,046
Exports ... ..	12,267	2,147

## Expansion plans in East Germany

BY 1965, it is stated in East Berlin, the share of coal as base material in the production in the Soviet zone of Germany of benzene will fall to 74% (1959: 100%), that of xylene to 10% (1959: 100%) and that of butane to 24% (1959: 48%), the remainder being made up by petrochemical bases. Ethylene output, which in 1959 was based wholly on coal, will by 1965 also be produced petrochemically, as will propylene, production of which had not yet started in 1959. Naphthalene, acetylene and synthesis gas production will remain based completely on coal.

By the same year 1 volume-% of all East German mineral oil products will consist of phenol, 1 volume-% of aromatics, 6 volume-% of liquid gas, special products and losses, 2 volume-% of paraffin and 1 volume-% of petroleum coke.

Initial production of the oil refinery and petrochemical complex VEB Erdölverarbeitungs- und Chemiewerk Schwedt an der Oder in Schwedt is to begin in late 1963. The plant will produce gaseous hydrocarbons, benzene, xylene and various other hydrocarbon products, as well as petroleum fractions. Output will go particularly for the building up of production

of such East German synthetic fibres as Dederon, Lanon, Wolcrylon and Prelana, particular importance being attached to the capacity increase of the first two fibres mentioned.

It is stated that by 1965, East Germany will have increased plastics output to 120,000 tonnes of p.v.c., 20,000 tonnes of polystyrene (from Buna-Werke), 10,000 tonnes of acrylic fibre and 6,000 tonnes of polyvinyl acetate.

Aussenhandelsunternehmen Limex is the name of a new East German foreign trade organisation set up for the sale and purchase of licences, rights, technical documentation and technical aid.

### B.D.H. revise publication on molecular sieves

B.D.H. Laboratory Chemicals Division, Poole, Dorset, have produced a second edition of their publication on Union Carbide molecular sieves for selective adsorption. By arrangement with Union Carbide International and Union Carbide Ltd., B.D.H. offer Union Carbide molecular sieves types 4A, 5A and 13X for laboratory use. The booklet describes their properties and laboratory and industrial uses.

## Johnson Matthey acquire Belgian firm

MAJORITY of shares of the leading Belgian precious metals company, Pauwels Frères S.A. have been acquired by Johnson, Matthey and Co. Ltd. This Belgian firm have had friendly relations with Johnson Matthey and for some 30 years have acted as their principal agents in Belgium.

The future name of the Belgian company will be Johnson, Matthey et Pouwels S.A. Mr. H. Limbourg, hitherto general manager, becomes managing director and Mr. L. Mendel, the general manager, while Mr. R. Turner and Mr. P. G. Smyrk, directors of Johnson Matthey, join the board of the Belgian company.

Since 1956, Johnson Matthey have also acquired manufacturing and trading interests in France, Holland, Italy and Sweden.

## Ministry approves Sabin oral vaccine

THAT the Sabin vaccine is preferable to the Salk vaccine to ensure the immunity of a community as well as an individual to poliomyelitis is the finding of the Public Health Laboratory Service which it reported to the Polio Vaccines Committee of the Medical Research Council.

The Sabin vaccine consists of live virus attenuated, whereas the Salk vaccine consists of virus killed by formaldehyde. The Sabin vaccine also has the advantage of being given orally.

The Minister of Health has now approved use of the Sabin vaccine in the priority groups.

## Cationic chemicals versus corrosion

At the 25th Jubilee Congress of the German Society for Fat Research, held in Hamburg from 22-29 October, the only British paper was given by Mr. M. K. Schwitzer, a director of Armour Hess Chemicals Ltd. The paper, entitled 'New ways in preventing corrosion by means of cationic chemicals', dealt partly with theoretical aspects, partly with the application of these products in oil primers, as filming amines in steam condensate systems and in the control of corrosion, including that caused by micro-organisms, in oil wells.

## Alginate to make food products in former I.C.I. works

Alginate Industries Ltd., Girvan, seaweed processors for industrial purposes, are developing a Foods Division using the former I.C.I. factory at Grangeston, Girvan. Based on their own research work, the company is developing a new range of food products.

## Will

Mr. James Harold Griffiths, joint managing director of T. C. Clark and Co. Ltd., chemical plant makers, Wolverhampton, who died on 4 June intestate, left £14,305 net (duty paid £748).

## Overseas News

# U.S. co-operation for proposed Indian carbon black plant

THE Indian Government has approved plans for a carbon black plant near Bombay with annual capacity of 30 million lb. The scheme is sponsored by United Carbon Co., Texas, in co-operation with Mr. C. H. Bhabha, a banker, at an estimated cost of Rs.13.5 million, of which Rs.5 million would be provided by foreign exchange. The issued capital will total Rs.16.25 million and shares worth Rs.5 million are to be issued to United Carbon for U.S. dollars to cover the cost of plant and machinery.

United Carbon also plan an additional investment of Rs.20 million for the production of about 100 tons/day of ammonia from the waste gases of the carbon black plant.

Columbia Carbon also have plans for the production of carbon black in India, while Phillips Carbon Black and Duncan Brothers, Calcutta, are building a joint plant near Durgapur to produce 22 million lb./year.

## Japanese firm to make Eastman polypropylene

Subject to the approval of the Japanese Government, Showa Denko are to produce polypropylene in Japan using an Eastman process. Showa Denko have been licensed under one of the Eastman processes for the production of polypropylene. This process produces a highly crystalline propylene polymer, characterised by its stiffness, high melting point and tensile strength.

## Natural gas discovered in New Zealand

A natural gas field with a potential production of at least 100 million cu. ft. of gas a day has been discovered at Kapuni in the North Island of New Zealand. The Prime Minister has stated that light oil which could be separated from the gas would yield 50% motor spirit if refined at the new Whangarei, North Auckland oil refinery.

## Sasol get first shipment of A.E. & C.I. methanol

A rail tanker load of 8,000 gall. of methanol, the first to be received from African Explosives and Chemical Industries' Modderfontein works, was recently unloaded at Sasolburg. Although Sasol produce 50% of their methanol needs, the other half of their 40,000 gall./month usage has previously been imported.

Sasol use methanol in their Rectisol gas purification process. The company's production of hydrocarbons, alcohols and ketones all stem from three raw mate-

rials—oxygen, water and coal. Under high pressure, the Lurgi plant processes them into a synthesis gas containing carbon dioxide, sulphur and other impurities. Methanol is used for the selective washing of this gas at low temperatures.

The Modderfontein plant now produces some 10,000 tons of methanol a year, or enough to meet South Africa's needs for some years. A.E. and C.I. and others use methanol for the production of formaldehyde and formaldehyde resins.

## Australian imports of industrial urea

Urea for purposes other than fertilisers or animal feedstuffs and containing less than 20% by weight of common salt, can now be imported into Australia duty free under British preferential tariff.

## LPG from Greece

A liquid gas production unit is shortly to come on stream at the Greek State refinery of Aspropyrgos, with an annual capacity of 50,000 tonnes. This capacity level indicates that almost all hitherto unused hydrocarbons produced at the refinery will be utilised. Current liquid gas consumption in Greece is of some 12,000 annual tonnes, although attempts are to be made to increase this. The surplus resulting from the difference between Aspropyrgos output and local consumption will be exported.

## Union Carbide acquire rights to Price patent

Union Carbide Chemicals have bought the rights to the Price patent on urethane products from General Tire for a "relatively modest" sum. Union Carbide will be able to sub-license on a royalty-free basis. The Price patent relates to urethane products made from polyethers which are adducts of alkylene oxides with polyhydric alcohols having less than seven carbon atoms and three to six hydroxyl groups. General has exclusive rights to the Price patent.

## Nippon plan additional ethylene plant

Nippon Petrochemicals of Japan are expected to apply shortly for approval of the revision of a contract with Stone and Webster, U.S., in connection with their plan to install a 50,000 tonne a year ethylene plant at their Kawasaki factory. A new 40,000 tonne a year plant was completed in May of this year and is now in full production.

Completion of the additional plant will give the company an ethylene capacity of 100,000 tonne a year, the largest in

Japan. Nippon also have plans to complete a further 30,000 tonne a year plant by the end of 1962, and another 20,000 tonne a year plant by the end of 1963. The total investment required is estimated at about 480 million yen.

## Dialdehyde starch to be made in Italy?

Two firms, Miles Chemical and Ledoga S.p.A., plan to form a corporation, called Miles, S.p.A., to explore markets for dialdehyde starch in Italy and plan an Italian plant if results are favourable. Immediate market studies in the leather industry should be completed in six months.

## Commonwealth Oil Refining move into petrochemicals

A \$6.5 million plant to make naphthalene and other petrochemicals is to be built by Commonwealth Oil Refining adjacent to their refinery at Ponce, Puerto Rico. The plant, to have a capacity of 50 million lb. of naphthalene a year, will use the Hydeal process licensed from Universal Oil Products. Construction will begin in January and should be completed a year later.

## Fire at C.S.R. Sydney plant injures eight

At least eight men were injured, one of them critically, by an explosion and fire at a chemical plant in Sydney on 4 October. The explosion shattered a section of an acid recovery tower at the Commonwealth Sugar Refinery's works at Rhodes, a western suburb.

## Bayer to sell drugs in U.S.

Farbenfabriken Bayer AG plan to sell ethical drugs in the U.S. They have set up a company, FBA Pharmaceuticals Inc., which will handle research, manufacturing and sales in the U.S.

## Japan fibre contract with Swiss firm

A contract has officially been signed between Nippon Rayon and Inventa of Switzerland whereby the manufacturing technique of Inventa's polyester-polyether fibre Grilene will be introduced in Japan. The contract specifies that Sw.F. 2 million will be paid for engineering and know how together with a royalty of 1.75%. Lowering of the royalty will be discussed later as production increases.

Based on the contract, which is effective for 10 years, Nippon are to build a plant at the cost of 350 million yen with a capacity of 20 tonnes a day.

## Du Pont set up West German sales subsidiary

Du Pont are to set up a sales subsidiary in W. Germany for Orlon, nylon and other synthetic yarns. The new company, to be called Du Pont Chemie G.m.b.H., will be a subsidiary of the Swiss company, Du Pont de Nemours International, who market Du Pont's products in Europe, Africa, Australia and Asia.



● **Mr. J. S. Watkins**, fertiliser products sales manager of Billingham Division has been elected president of the Fertiliser Manufacturers' Association for the coming year. Mr. Watkins has worked at I.C.I. as a research chemist on formulation and granulation problems of fertilisers containing ammonium phosphate and ammonium nitrate. He joined the fertiliser section of Sales Control Department at Billingham in 1941, was appointed home sales manager in 1945 and fertiliser products sales manager (home and export) in 1955.

● **Mr. Thomas Williams**, new F.M.A. vice-chairman, is chairman and managing director of the Eaglescliffe Chemical Co. Ltd., with whom he has been for the whole of his career. This company is now part of the Associated Chemical Companies Group, of whose Fertiliser Division Mr. Williams is also a director. A member of the F.M.A. council for over 10 years and chairman of the North of England Section, he is also a member of council of the National Sulphuric Acid Association.

● **Mr. E. S. Hibbert** has been appointed to the staff of the Fullers' Earth Union Ltd., a member of the Laporte Industries Group, as civil engineering consultant. He will maintain an advisory service in connection with the use of the company's Fulbent bentonite in its



E. S. Hibbert

many applications in civil engineering for the benefit of consultants, engineers and contractors.

● **Professor Dr. C. Wurster**, chairman of Badische Anilin- und Soda-Fabrik AG, was elected president of the West German chemical industry association, Verband der Chemischen Industrie e.V., Frankfurt-on-Main, at the annual meeting in Bad Godesberg.

● **Mr. John G. Window**, sales director of Q.V.F. Ltd., Stoke-on-Trent, has been elected a director of Q.V.F. Glastechnik GmbH, of Schierstein, near Wiesbaden.

● **Mr. John Garnett**, who has been appointed director of the Industrial Welfare Society, is responsible for the communications section of I.C.I.'s Central Labour Department in London.

● **Mr. B. D. Baines** has been appointed technical sales manager of Nuclear Chemical Plant Ltd., 105-113 The Broadway, West Ealing, London W.13, and **Mr. T. V. Molesworth** senior chemical engineer. Mr. Baines was formerly with the Hawker Siddeley Nuclear Power Co. Ltd. and was sales manager of Nuclear

## PEOPLE in the news

Engineering Ltd. He joined Nuclear Chemical Plant this month. Mr. Molesworth was formerly with the U.K. Atomic Energy Authority and joined Nuclear Chemical Plant in 1960 after a period with the Rubber Research Institute of Malaya.

● **Herr Bruno H. Boettger** has resigned as chairman of the chemical-metallurgical company Metallgesellschaft AG, Frankfurt-on-Main, and gone into retirement.

Aged 70, he had been with Metallgesellschaft for 53 years. He is succeeded by **Dr. Hellmut Ley**, **Prince Casimir Wittgenstein** becoming vice-chairman and **Dr. Jakobus Greven** a director.

● **Mr. H. C. Baadsgard**, sales director of Nu-Swift Ltd., has retired and resigned his directorship of the company and its associated companies, owing to advancing years. **Mr. Frank Tompkins**, already a director of Nu-Swift Ltd., has been appointed home sales director in his place.

● **Mr. A. W. Wilson** has been appointed market development manager of Deeglas Fibres Ltd., a subsidiary of BTR Industries Ltd.

### Mali Health Minister visits Glaxo

The Minister of Health for Mali, Somine Dolo, recently visited Glaxo Laboratories Ltd., at Greenford, as part of an official visit to this country to study the National Health Service. Before a tour of Glaxo's production and research departments, M. Dolo met Mr. H. W. Palmer, managing director, and members of Glaxo's export staff.

## TRADE NOTES

### Process control

Literature on the C-scope, an instrument designed by the Electronics Division of Bruce Peebles and Co. Ltd., Edinburgh, as part of a programme to provide instrumentation and process-control schemes for the chemical and allied industries, is available. The instrument is suited to monitoring applications where it is required to sample an important stage of the process at short definite time intervals. Timing units can be preset.

### Efco vacuum furnaces

From 1 November the vacuum furnace activities of Efco Furnaces Ltd. will be handled by a new division with offices, design and manufacturing facilities at Sheerwater, near Woking, Surrey. Mr. M. J. Severs is technical manager of the new division and Mr. W. Kuysler is sales manager.

### Witamol plasticiser

Witamol 190 (di-isotridecyl phthalate), which can be used as a 105°C p.v.c. wire insulation plasticiser, is being marketed in the U.K. by Chemicals Trading Co. Ltd., 18-20 Creechurch Lane, London E.C.3. Manufacturers are Chemische Werke Witten GmbH.

### Hycar Polyblend latex

A new information sheet is available from British Geon Ltd., Devonshire House, Piccadilly, London W.1, on their Hycar Polyblend 552, a latex blended from p.v.c. and a butadiene/acrylonitrile

rubber. Hycar Polyblend latex 552 has been developed for general coating purposes, and has been used with success in the paper industry. Cured films from Polyblend 552 have high mechanical strength together with excellent grease resistance.

### Hoechst solvent catalogues

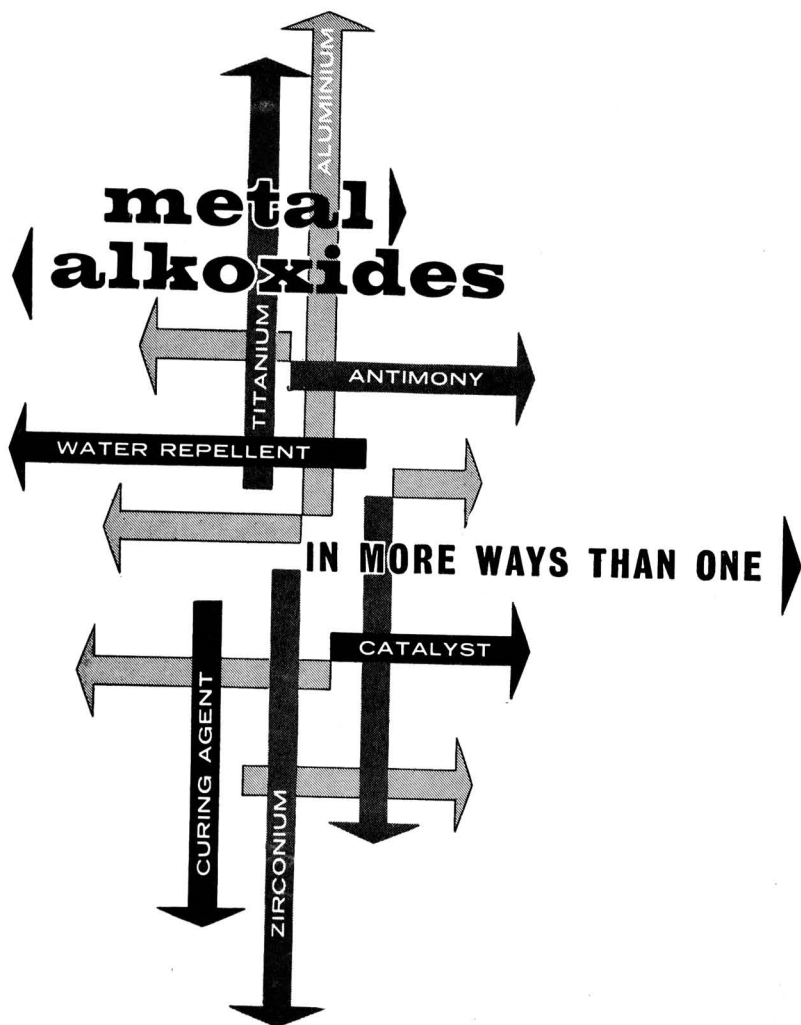
Farwerke Hoechst AG, Frankfurt-on-Main, have issued the third edition of their solvents catalogue 'Lösungsmittel Hoechst', in which full details are given of the company's ethers, ketones, alcohols, glycol ethers, esters, complex solvents, chloro-hydrocarbons and terpene solvents. Also presented in a new, fourth issue is the Hoechst brochure 'Spezialerzeugnisse für den Säureschutzbau' in which details are given of Hoechst special products for acid-proof constructions. Both publications are in German.

### Anti-bumping granules

Available from B.D.H. Laboratory Chemicals Division, Poole, Dorset, in 250 g. quantities are anti-bumping granules of fused aluminium oxide. They resume their tranquilising function after distillation has been interrupted, and very little is required for each experiment. The cost of 250 g. is 5s 6d.

### New Pfizer division

The Pfizer Group of companies has formed a new division, called Agricare Products, for the marketing of a range of sheep biologicals through agricultural chemists.



Industrial demand for Spence metal alkoxides continues to rise as existing uses expand and new uses are developed. Problems in such diverse fields as the modification of plastics, transesterification catalysis or the promotion of adhesion may yield to the use of metal alkoxides.

**For further details of these and other versatile organic metal compounds write to Product Development Department, Peter Spence & Sons Limited.**



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## Commercial News

### British Oxygen

Harris Calorific (Australia) Pty. Ltd., have become a wholly-owned subsidiary of Commonwealth Industrial Gases Ltd., a partly-owned subsidiary of British Oxygen Co. Ltd.

### Courtauld's

In last week's issue of CHEMICAL AGE, it was stated that Courtauld's stand to gain an interest in British Enkalon, the new company set up to make nylon-6 in Northern Ireland, in making a bid for British Enka. This is not so because British Enkalon shares will be offered to shareholders of British Enka as at 17 October in proportion to their holding at that date.

### Fisons

Group trading profits of Fisons for the year ended 30 June 1961 fell from £4,509,169 to £3,606,811 after depreciation of £1,741,103 (£1,902,482), (see also p. 666), but the dividend remains the same at 11% with an unchanged final of 7%. After tax of £1,740,020 (£2,484,485) and minority interests of £7,111 (£4,064), group net profit was £1,859,680 (£2,020,620).

The net current assets of the company were £12,974,938 (£15,606,202); future capital expenditure will be £13,508,000 (£22,225,000).

### Laporte

Approximately 97% of the 5,347,082 Ordinary shares offered to shareholders in Laporte Industries at 18s per share have been taken up.

The rest have been sold for the benefit of shareholders to whom the shares were provisionally allotted.

### Scottish Tar Distillers

The directors of Scottish Tar Distillers Ltd. propose to increase the authorised capital to £1,125,000 and to capitalise £80,262 in a 1-for-10 scrip issue to holders registered on 9 November. An extraordinary meeting has been called for 23 November.

### Air Products

According to trade reports Air Products, U.S., are negotiating to buy the 47% interest in Houdry Process owned by Sun Oil. Acquisition of an interest would be a further step in Air Products' plan to broaden their chemical interests. None of the firms involved have confirmed the report.

### Allied Chemicals

Allied Chemical and Dye Corporation, U.S., report for the third quarter of the current year a net profit of \$10,400,000, or 52 cents/share (\$10,700,000, or 53 cents/share). Total sales for the third quarter stood at some \$181,200,000 (\$187,500,000). For the first three-quarters of 1961 as compared with the first nine months of last year, the company recorded sales of \$561,100,000

- Fisons group trading profits down 20%
- Laporte holders accept 97% of issue
- S.D.T. to increase capital to £1,125,000
- Robeco reduced investment in I.C.I.

(\$588,600,000) and net profit of \$36 million (\$41.5 million), or \$1.80 (\$2.08) per share.

### American Cyanamid

Third quarter sales totalled \$146.6 million (\$136.85 million) report Cyanamid of America. Earnings for the first nine months of 1960 were worth 52 cents/share (40 cents).

### Chemische Werke Huls

Sales of the Marl, West Germany, chemical concern Chemische Werke Huls AG rose over the first five months of this year by 2.5% in quantity and 1.6% in value, the difference indicating the current price pressure. Chemische Werke Huls, who further state that they are to raise their capital during next year, also report that their part-subsiary, the Marl synthetic rubber producers Buna-werke Huls GmbH, increased their quantitative sales by as much as 18.3% during the first five months of 1961 over the corresponding period of last year, actual sales turnover rising by 10.5%.

### Hooker Chemical

Hooker Chemical Corporation, New York, and Parker Rust Proof Co. Detroit, Mich., are negotiating for a merger of Parker Rust Proof Co. into Hooker Chemical Corporation. Should the current negotiations result in an agreement, it is anticipated that the proposal will be submitted to the stock-

holders of both companies at meetings early next year.

### Robeco

An interim report from Robeco, the Dutch investment company, states that considerable changes took place in the composition of its portfolio during the summer.

Among industrials, the investment in the Beecham group has been increased to 35,000 shares valued at £84,219, in Davy Ashmore to 52,000 shares with a market value of £100,000 and in Glaxo Laboratories to 26,000 shares worth £70,200. The investment in Imperial Chemical Industries has been reduced to 30,000 shares with a market value of £91,875.

### NEW COMPANIES

PHILIP BAKSH AND CO. LTD. Cap. £100. Manufacturers of and dealers in chemical products, solders of high purity metals in discs, pellets, spheres and special fabrications for semi-conductor devices, etc. Directors: Robert Baksh, 58 Worpole Road, London S.W.19, and Philip Baksh.

P.F.T. (INVESTMENTS) LTD. Cap. £600. Subscribers: A. F. Hancock and R. M. Thomas, both of Imperial Chemical House, London S.W.1. Directors: G. Hopkins, J. H. F. Ratcliffe and G. W. Raybould, appointed by Taylor Woodrow Ltd., N. J. Freeman, F. Hill and R. A. Lyne.

## Market Reports

### STEADY CALL FOR COAL TAR PRODUCTS

**LONDON** Steady price conditions prevail in most sections of the chemicals market and no important changes have been reported. The movement to the home consuming industries has covered good volumes although this has been largely against contracts, with strictly new business limited to spot or nearby requirements. Export trade enquiry is keeping up to a good level with buyers seeking competitive quotations.

The call for agricultural chemicals continues on the quiet side, but rather more activity has been reported in tar products.

**MANCHESTER** Quotations have been steady to firm in most sections of the chemical market during the past week. Actual movements up or down have been few and of relatively little importance. Home trade demand for bleaching, dyeing and finishing products from the

cotton textile industries has been on a fair scale, with a steady movement of supplies to most other outlets while maintained. The shipping demand has continued at about the level of recent weeks.

In the market for the coal tar products most descriptions are finding a reasonably steady outlet. Feature of the fertiliser section is the call for basic slag and the compounds.

**SCOTLAND** As far as the home market is concerned, the past week has again been one of considerable activity. For the most part there has been little change in prices. Quantities have also shown little variation and have been well up to nominal requirements; this also applies to contract deliveries. Enquiries have featured well in the past week and these have been for a varied range. Considerable interest is still being shown in the overseas market.



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## Bookshelf

# World production and chemical industry usage of minerals

MINERALS FOR THE CHEMICAL AND ALLIED INDUSTRIES, 2nd Edition. By *S. J. Johnstone* and *M. G. Johnstone*. Chapman and Hall, London, 1961. Pp. xii + 788, 147s.

Few people concerned with raw materials for inorganic chemicals will be unfamiliar with the first edition of this book published in 1954. A brief description will therefore suffice. The minerals are considered under about 80 headings, more than half of which are the names of the elements which they yield. For a typical metal, the ores are first discussed, then the world production, the treatment of the ore, the figures for end uses and specifications for the material and its alloys. The references are full and very largely derived from U.S. literature.

The revision for the second edition has been incorporated in each section. New chapters have been added on *diamond, gold, helium, iron ores, hafnium, scandium and yttrium*, and the scope of the section on clays has been expanded. The authors note that they have been able to add much information recently released from "secret lists".

This compendium has been compiled with every care for the convenience of the reader. It is a most useful addition to the band of well-thumbed reference books.

## ► Organic peroxides

ORGANIC PEROXIDES. By *A. G. Davies*. Butterworths, London, 1961. Pp. x + 215, 50s.

No book on organic peroxides has appeared since that of *Tobolsky and Mesrobian* (1954). *Davies* covers a wider field so that there is some justification in his claim that "no comprehensive account . . . has been available". The first eight of the 14 chapters are devoted to the main classes of peroxide. The treatment is formal and systematic. Most of the space is devoted to methods of preparation and physical properties. Very full references are given and the reader can confidently use these chapters as reliable compilations from the literature up to about October 1960.

Chapter 9 covers O—O heterolysis; intermolecular nucleophilic substitution at oxygen. This is followed by: O—O heterolysis; intermolecular nucleophilic rearrangement; Thermally induced O—O homolysis; Redox reactions with metal ions, and other redox reactions. Each chapter is a concise, fully documented account. The author applies himself strictly to the matter in hand and succeeds in imparting an immense amount of information. The last chapter concerns detection and analysis, and the very necessary hazards and safeguards. There

is a satisfactory subject index and a superfluous author index. The writer has, quite correctly for his purpose, adopted a style in which workers names are not mentioned. Consequently it is extremely rare that an author's name can be found on the page to which the index refers.

The book is certain of a welcome from many chemists. Peroxides are of increasing academic and industrial importance, but tend to receive scant attention in general organic texts.

## ► Reaction kinetics

PROGRESS IN REACTION KINETICS, VOL. 1. Edited by *G. Porter* and *B. Stevens*. Pergamon, Oxford, 1961. Pp. viii + 276, 70s.

This is the first of a new series which Pergamon Press hope to publish annually, though to judge by the fact that several of the reviews were well over a year old when published, they will not keep to their programme. It contains nine reviews on aspects of reaction kinetics which are of contemporary interest. Four of the articles relate to gas kinetics (Reactions of oxygen atoms, Rate constants for elementary steps in branched chain reactions, Kinetics of the reactions of ions with molecules, and Reactions of alkyl radicals), and five to liquid phase kinetics (Effects of diffusion rates on chemical kinetics, Salt effects in solution kinetics, Fast reactions of excited molecules, Nucleophilic substitution at a saturated carbon atom in non-hydroxylic solvents, and Physical chemical aspects of enzyme kinetics). The articles are written by leading authorities in their fields and provide quantitative data along with a critical assessment of their reliability on a wide variety of reaction rates. The volume contains an index of reactions, a subject index, and an author index. In future volumes it is proposed to publish cumulative indices of all reactions detailed in earlier volumes. This series should prove to be most useful to research workers in kinetics. At 70s. Volume 1 is expensive and although the printing is excellent the paper and binding are disappointing.

## ► Gas-liquid transfer

ABSORPTION, DISTILLATION AND COOLING TOWERS. By *W. S. Norman*. Longmans, London, 1961. Pp. x + 477, 70s.

Pure science is frequently claimed, with some reason, to be international. Largely for historical causes connected with its craft origins, engineering generally has a national bias. Chemical technology is in an intermediate position, but because of its engineering origins it is necessary that students in this country should be well supplied with texts by indigenous authors.

At present, this is not the case so all authoritative new books fill a need.

The present work covers the whole range of gas-liquid transfer operations. The treatment is exhaustive and fundamental. Undergraduates will probably find the whole book rather overwhelming and best studied piecemeal. The author is clearly aware that his subject is complex and makes every effort to help the reader. There are many good diagrams and worked examples. Five pages of problems are given in an appendix. Full references enable the reader to follow up any chosen topic.

## ► Ceramic chemistry

PROGRESS IN CERAMIC SCIENCE, VOL. 1. Edited by *J. E. Burke*. Pergamon, Oxford, 1961. Pp. viii + 232, 70s.

This first volume of a new series is produced with the aid of an advisory board of seven. Such a wealth of talent seems superfluous but the editors have failed to hit on a convenient system for references, so a little additional help would not have been misplaced.

There has recently been a great increase in interest in ceramics because of the importance of high temperatures in modern technology. Ceramics are wanted for missiles, jets, electronics and atomic energy, but none of these applications are specifically considered in these reviews. They are fundamental and because only five are printed their length is convenient. They are: 'A review of glass strength', *R. J. Charles*; 'Vaporisation of oxides', *R. J. Ackerman, R. J. Thom*; 'Chemistry of cement hydration', *H. F. W. Taylor*; 'Deformation and fracture of ionic crystals', *J. J. Gilman*; 'Chemical approach to problems of the glassy state', *R. W. Douglas*. There is much interesting material attractively presented. It would be a pity if the title caused physical chemists in general to overlook this series.

## ► Polymers for industry

POLYMERIC MATERIALS. By *C. C. Winding* and *G. D. Hiatt*. McGraw-Hill Book Co., New York, London, 1961. Pp. v + 406, 93s.

This very readable book provides a survey of the natural and synthetic polymeric materials currently in industrial service: their chemical origin, molecular structures, industrial production, methods of fabrication, and the physical properties, and chemical resistivity of the resulting materials. It is written at a general level and presupposes the minimum knowledge of chemistry, physics and engineering by the reader. Nevertheless it succeeds in giving a clear qualitative account of polymers and their various uses.

A major weakness is the absence of critical assessment—e.g. of the relative qualities of the various fibres, of the efficiencies of the adhesives, etc. The important X-ray and infra-red methods of examining polymers are not mentioned, neither are the various analytical techniques for identifying them: but within the scope of its presentation the volume is instructively written.

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# NEW PATENTS

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

## ACCEPTANCES

### Open to public inspection 29 November

Manufacture of ammonium sulphate. Chemical Construction (G.B.) Ltd. **883 313**  
 Manufacture of sodium carbonate. Roumania, Minister of Petroleum & Chemical Industry. **883 202**  
 Oxidation of aromatic hydrocarbons. Imperial Chemical Industries Ltd. **883 314**  
 Production of phosphonitrile polymers. Albright & Wilson (Mfg.) Ltd. **883 587**  
 Amines. Compagnie Francaise des Matieres Colorantes. **883 297**  
 Process for the cyclic production of hydrogen peroxide. Edogawa Kagaku Kogyo Kabushiki Kaisha. **883 226**  
 Process for dyeing fibres or foils or polyesters, polyacrylonitrile or cellulose acetate. Farbwerke Hoechst AG. **883 518**  
 Process for the manufacture of nitrogen-containing organic phosphorus compounds. Rottweiler Kunstseidefabrik AG. **883 299**  
 Piperazine-carboxylic acid esters and process of preparing them. Farbwerke Hoechst AG. **883 336**  
 Steroids and the synthesis thereof. Olin Mathieson Chemical Corporation. **883 317**  
 Dyestuffs of the peri-dicarboxylic acid imide series capable of being fixed on the fibre and process for their manufacture. Ciba Ltd. **883 337**  
 Process for the production of high polymers of ethylene in granular form. Montecatini. **883 520**  
 Coating process. Ciba Ltd. **883 521**  
 Thermoplastic compositions. B.X. Plastics Ltd. **883 275**  
 Resinous products. Pittsburgh Plate Glass Co. [Addition to 840 325.] **883 229**  
 Elastomers and the preparation. Montecatini. **883 524**  
 Catalysts. Imperial Chemical Industries Ltd. [Divided out of 883 314.] **883 315**  
 Processes for the production of organic hydroperoxides. Ruhrchemie AG. **883 277**  
 Method of producing an oxonide of an unsaturated fatty acid. Cudahy Packing Co. **883 531**  
 Analogues of vitamin B<sub>12</sub> and process for their biosynthesis. Soc. Farmaceutici Italia. [Addition to 794 151.] **883 230**  
 Polymer emulsions by radio chemical grafting. Nobel-Bozell S.A. **883 473**  
 Triazine disazo dyestuffs and their manufacture and use. Ciba Ltd. **883 550**  
 Production of cyanamides. Sugino, K., Odo, K., and Ichikawa, E. **883 319**  
 Water-insoluble heterocyclic monoazobenzene dyestuffs. Ciba Ltd. **883 342**  
 Cyclopentadienyl titanium trihalides and method of preparing same. American Cyanamid Co. **883 551**  
 Compounds of the phthalocyanine series. Monsanto Chemical Co. **883 552**  
 Process for the removal of the nitrosyl com-

pounds from sulphuric acid compounds. Farbenfabrik Wolfen Veb. **883 302**  
 Production of hard rubber compositions. General Tire & Rubber Co. **883 344**  
 Process for the manufacture of sorbic acid. Farbwerke Hoechst AG. [Addition to 854 383.] **883 492**  
 Steroids and the manufacture thereof. Upjohn Co. **883 212, 883 479**  
 Process for the manufacture of unsaturated halogen compounds and the conversion thereof. Roche Products Ltd. **883 480**  
 Method for the recovery of nitrogen values and acetic acid from mixtures containing nitric and acetic acids. Escambia Chemical Corporation. **883 493**  
 Acrylonitrile copolymers and fibres and other shaped articles produced therefrom. Stockholms Superfosfat Fabriks AB. **883 305**  
 Production of manganese pentacarbonyl hydride. Badische Anilin- & Soda-Fabrik AG. **883 280**  
 Interpolymers derived from N-substituted acrylamides. British Nylon Spinners Ltd. **883 494**  
 Preparation of phosphoryl triisothiocyanate. Imperial Chemical Industries Ltd. **883 488**  
 6 $\beta$ -nitrosteroids and methods for their production. Abildgaard, K. **883 495**  
 Guanidine compounds. Ciba Ltd. **883 282**  
 Vitamin compositions comprising cobalamine and ascorbic acid. Upjohn Co. **883 259**  
 Urazole derivatives and their preparation. Abbott Laboratories. **883 219**  
 Halopregnenrienes and process for preparation. American Cyanamid Co. **883 576**  
 Morpholine derivatives. Ravensberg GmbH. **883 220**  
 Herbicidal compositions. Upjohn Co. **883 234**  
 Complex copper compounds of mono azo-dye-stuffs containing quaternary ammonium groups and process for their manufacture. Ciba Ltd. **883 445**  
 Polypeptides. Ciba Ltd. **883 445**  
 Aerosols. Sorex (London) Ltd. **883 578**  
 Hormonal agents. Searle & Co., G. D. **883 310**  
 Hydrocarbon conversion process. Esso Research & Engineering Co. **883 579**  
 Production of alumina. Commonwealth Scientific & Industrial Research Organisation. **883 311**  
 Anthelmintic compositions containing piperazine or a derivative thereof. Boots Pure Drug Co. Ltd. **883 199**  
 Microbiological process for the preparation of steroids and ketones. Wisconsin Alumni Research Foundation. **883 500**  
 Production of mixtures of phosphoric and sulphuric acids. Canadian Industries Ltd. **883 242**  
 Ultra-violet light stabilised organic polymers. American Cyanamid Co. **883 370**  
 Production of 2,2-bis(4-hydroxyphenyl) propane. Union Carbide Corporation. **883 391**  
 Polymerisation. Monsanto Chemicals Ltd. [Addition to 858 077.] **883 392**  
 Thiophosphoric acid esters. Farbenfabriken Bayer AG. **883 566**  
 Guanidine compound. Ciba Ltd. [Divided out of 883 282.] **883 283**  
 Process for the production of carboxylic acids. Studiengesellschaft Kohle. [Addition to 798 065.] **883 243**  
 Process for the production of polyamides. Badische Anilin- & Soda-Fabrik AG. **883 323**  
 Unsaturated aliphatic chlorine compounds and process for the manufacture and conversion thereof. Hoffmann-La Roche & Co., AG, F. **883 481**  
 Synthetic resins from certain acid anhydrides and resinous ester of mono carboxylic aromatic acid with resinous diglycidyl ethers. American-Marietta Co. **883 244**  
 Benzoxazine derivatives, their preparation and pharmaceutical compositions containing them. Thomae GmbH, Karl. **883 324**

Polyepoxy esters. Union Carbide Corporation. [Addition to 863 446.] **883 260**  
 Polyurethane-ureas containing urea-linked N-(hydroxyalkyl) alkylene diamines. Wyandotte Chemicals Corporation. **883 568**  
 Phosphacyclohexanes and the preparation thereof. American Cyanamid Co. **883 262**  
 Process for synthesising urea. Chemical Construction Corporation. **883 509**  
 Method of polymerisation of vinyl esters. Kurashiki Rayon Kabushiki Kaisha. **883 263**  
 Amine. Ciba Ltd. [Divided out of 883 282.] **883 284**  
 Process of preparing primary alcohols. Continental Oil Co. **883 375**  
 Method of producing trichlorosilane. Brown, Boveri & Co. Ltd. **883 326**  
 Gasolines containing polymeric additive agents. Esso Research & Engineering Co. **883 427**  
 Curing oxidised hydrocarbon polymer films. Esso Research & Engineering Co. **883 569**  
 Production of acrylic acid and esters thereof. Union Carbide Corporation. **883 510**  
 Siloxane co-polymers. Dow Corning Corporation. **883 266**  
 Production of  $\beta$ -trichloroborazols. United States Borax & Chemical Corporation. [Addition to 860 378.] **883 327**  
 Recovery of acetylene. Phillips Petroleum Co. **883 200**  
 Process for the production of alkaloid derivatives of lysergic acid. Soc. Farmaceutici Italia. **883 329**  
 Hydrazine derivatives and a process for the manufacture thereof. Hoffmann-La Roche & Co. AG, F. **883 379**  
 Process for the production of organic perhydrates. Henkel & Cie GmbH. **883 268**  
 Process for the production of shaped articles from acrylonitrile polymers. Farbenfabriken Bayer AG. **883 269**  
 Process for the sulphochlorination of polymers containing chlorine. Solvay & Cie. **883 380**  
 Stable water-soluble acetylsalicylic acid derivative. Mead Johnson & Co. **883 331**  
 Lysergic acid alkaloids. Soc. Farmaceutici Italia. [Addition to 883 329.] **883 330**  
 Polyolefin compositions. Du Pont de Nemours & Co., E. I. **883 583**  
 Acetylenic dihalogen compound and a process for the manufacture thereof. Hoffmann-La Roche & Co. AG, F. [Divided out of 883 481.] **883 482**

## AMENDED SPECIFICATIONS

### On Sale 22 November

Polymerisation of vinyl alkyl ethers. Goodyear Tire & Rubber Co. **481 236**  
 New sulphonyl-ureas and preparations containing them. Farbwerke Hoechst AG. **863 451**

## DIARY DATES

**TUESDAY 31 OCTOBER**  
 S.C.I.—Portadown: Trinity College, 2 p.m. 'The Bramley and other apples.'

**THURSDAY 2 NOVEMBER**  
 R.I.C.—London: Brunel Coll. of Tech., Woodlands Rd., W.3, 7 p.m. 'Modern developments in coordination chemistry' by J. Lewis.  
 R.S.—London: Burlington House, Piccadilly, W.1, 10.30 a.m. 'Discussion on 'Mechanisms of virus infections' read by Prof. Wilson Smith.

**FRIDAY 3 NOVEMBER**  
 S.C.I.—London: 14, Belgrave Sq., S.W.1, 6.30 p.m. 'The Wittig reaction and its application in organic synthesis' by Prof. B. Lythgoe.

S.C.I.—Manchester: The Manchester Literary & Philosophical Society. One day Symposium 'Polyurethane foam'.

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**DUST RECOVERY PLANT** by Visco Beth, with 12 collector chambers, overall length 30 ft. 1 in. with 12 in. dia. flanged air entry, with dampers, expansion box and explosion doors. Left and right hand Screw Conveyor at base, Bag Shaking Gear, Gilled Tube Steam Heater, Multivane Fan. Mounted on fabricated bed on anti-vibration mountings with direct coupled 30 h.p. 400/440/3/50 cycles motor with starter.

**HORIZONTAL VACUUM DRYING PLANT** by Scott, comprising horizontal cylindrical agitated drier 23 ft. × 4 ft. with top centre feed inlet and bottom centre outlet with hand wheel control. Jacket and chamber pressure 10 p.s.i. Drive by 10 h.p. 400/3/50 cycles motor. With steel feed hopper with dust hood and worm conveyor in bottom, electric vibrating unit, vertical inclined belt and bucket elevator, overhead steel holding bin, rotary brush sifter, pump, vertical condenser.

**VACUUM OVEN** by Francis Shaw, cast iron construction, 6 ft. 3 in. × 7 ft. 10 in. back to front × 5 ft. 1 in. wide internally, 12 platens of welded construction and heavy swing door each end having four corner wheel operated swing clamps. Usual flanged connections to internal headers with swan neck connections to platens.

**HORIZONTAL RIBBON TYPE POWDER MIXER**, 3 ft. 4 in. × 3 ft. 8 in. × 7 ft. 7 in. long with bottom bagging-off outlet. Drive through worm reduction gearbox from 10 h.p. motor with starter and isolator.

**HORIZONTAL TOT. ENC. SOLUTION MIXER**, 12 ft. × 6 ft. 6 in. internally, 10,000 litres capacity, fabricated from welded mild steel plate with dished end, fitted heavy glanded spiral type agitator. Fabricated mild steel stand, top and bottom outlets and top air/steam connections. Suitable 70 p.s.i. w.p. 30 h.p. required to drive. **THREE AVAILABLE.**

**DOUBLE 'Z' MIXER** by Werner Pfeleiderer, cast iron construction, trough approx. 52½ in. × 43½ in. × 34½ in. deep, double geared, bare input shaft, designed for hydraulic tilting, tilting gear not available, trough is water jacketed.

**DOUBLE 'Z' MIXER** by Morton, inclined trough type in mild steel and cast iron, tin sprayed, 3 ft. × 30 in. × 34 in. full depth, welded on jacket suitable for water cooling/low pressure steam, non tilting trough with quick acting wheel operated bottom outlet, double geared with glanded shafts, chain driven from gearbox by 60 h.p. 400/440/3/50 cycles motor. **SEVERAL AVAILABLE.**

**BEKEN DUPLEX DOUBLE TROUGH MIXER**, size PT27B, mild steel fabricated trough 21 in. × 21½ in. × 20 in. deep, capacity 27 gallons brim, 21 gallons working. Usual agitators with glanded shafts running in plain bearings, hand tilting through bevel and worm gears, mild steel cover with interlock. Drive from 5 h.p. 400/440/3/50 cycles motor with starter and reversing switch. All mounted on cast iron combination bedplate.

**COMPLETE BALL MILL GRINDING PLANT** by International Combustion, comprising 8 ft. × 48 in. chrome steel lined Hardinge Ball Mill driven by 220 h.p. motor with vertical feed hopper, constant weight belt feeder, steel cyclone, double cone separator, motorised fan, etc.

**LINATEX RUBBER BALL MILL** by Wilkinson Rubber, 48 in. × 44½ in. long externally, mounted on ball or roller bearings and fitted with end driving spur gear, supported on fabricated steel end frames. Drive by 15 h.p. 400/440/3/50 cycles motor with reduction gear, starter and isolating switch.

**7 ft. EDGE RUNNER MILL** by Clayton Goodfellow, cast iron tapered pan 9 in. deep at sides, twin tapered rollers average 37 in. dia., fitted scrapers and ploughs, no outlet, pulley drive, aluminium canopy with side covers. **TWO AVAILABLE.**

**OLIVER CONTINUOUS FILTER** by Dorr Oliver, four rotating discs 6 ft. dia. with timber filter plates in copper trough, driven through worm gear by chain sprocket, with dry vacuum pump, centrifugal pump, and filtrate and wash water receivers.

**JACKETED FILTER PRESS**, serial KJi, by S. H. Johnson, 31½ in. sq. with 38 chambers giving total working area of 475 sq. ft., chambers max. 60 p.s.i. w.p. Plates arranged inside circulation of cooling brine. Plate and frames and gunmetal, frames 1½ in. thick, chamber 1½ in. deep. Fitted hand hydraulic tilting gear and with available filter cloths. **FIVE AVAILABLE.**

CONTINUED NEXT COLUMN

**PLATE AND FRAME FILTER PRESS**, 37 frames, chamber size 29 in. sq., ribbed surface plates, arranged manual closing. **THREE AVAILABLE.**

**JACKETED LEAD COATED CAST IRON PLATE AND FRAME FILTER PRESS** by Johnson, 12 chambers, 8 in. × 8 in. × 1 in. thick, ¾ in. top side feed inlet, individual outlets. Filter closed by centre ratchet, feed by hand operated vertical plunger pump.

**HYDRO EXTRACTOR** by Broadbent, 48 in. dia., direct electrically underdriven by 400/440/3/50 cycles motor with mild steel welded Monitor case, three-point suspension fitted galvanised covered spring balance mechanically and electrically interlocked, hand brake, electrically connected perforated galvanised basket with starter.

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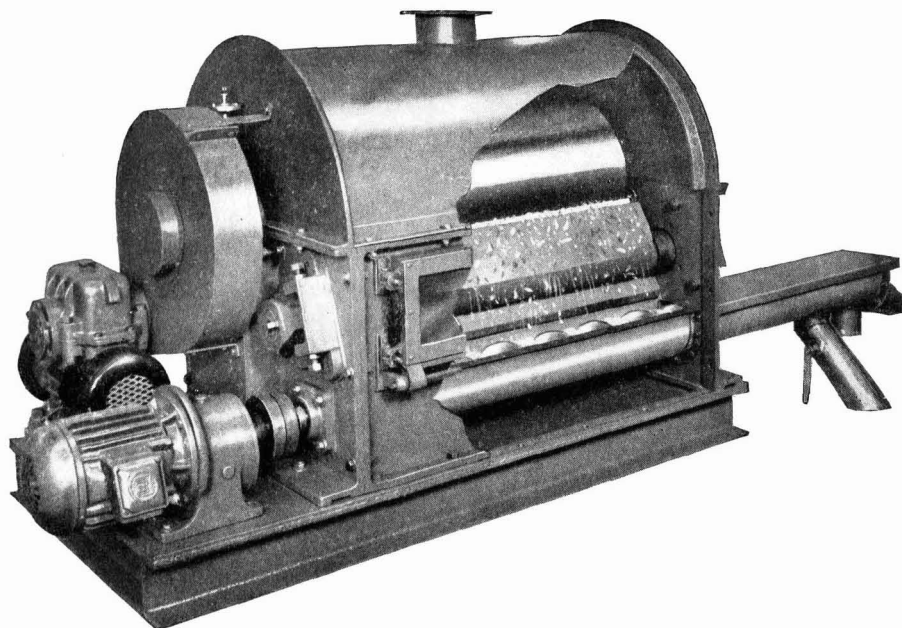
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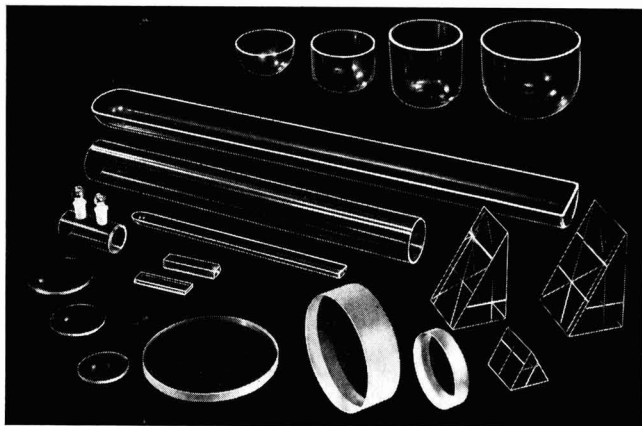
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