

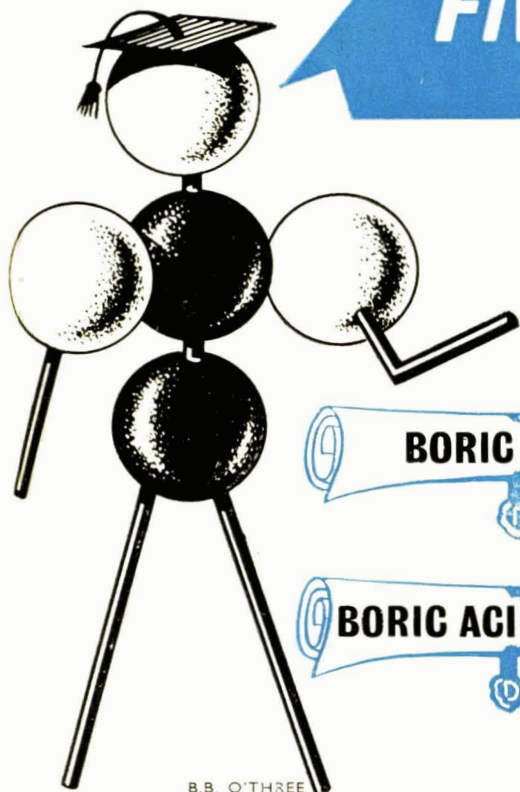
THE Chemical Age

VOL. LXXV

4 AUGUST 1956

No. 1934

Five firsts



B.B. O'THREE

BORAX (Decahydrate)

BORIC ACID

NEOBOR (Pentahydrate)

BORIC ACID "Glass"

DEHYBOR (Anhydrous)

You can depend on "20 Mule Team" products for the best possible results. We will help you choose the form of boric oxide (B_2O_3) best suited to your purpose. Please consult our Technical Department.

BORAX CONSOLIDATED LIMITED

Borax House, Carlisle Place, London, S.W.1

Telephone: VICTORIA 9070



20 Mule Team Regd. Trade Mark

TGA BX 65

CRUICKSHANK'S

SILICOFLUORIDES

OF

MAGNESIUM and ZINC

These Salts are obtaining a wide use in the treatment of concrete for protection against atmospheric action and subsequent disintegration.

The method used is a surface treatment and is the practical application of well-known chemical reactions designed to remove free lime from the concrete and replace it with insoluble fluorides and silica, thus leaving the surface impervious to water and resistant to the acid of the atmosphere.

The Silicofluorides are harmless and are applied with complete safety.

R. CRUICKSHANK LTD.

CAMDEN STREET · BIRMINGHAM, 1

Telephone: B'ham Central 8553 (6 lines)
Telegrams & Cables: Cruickshank Birmingham



The crank shaft is the heart of the engine; lubricating oil its heart's blood. Stream-Line filters enable first grade oil to be used over and over again, increasing efficiency and effecting a big saving in overhauls and maintenance.

Over 50,000 users prove the value of Stream-Line filters in the economical operation of i.c. engines.

STREAM-LINE FILTERS

MAKE OIL LUBRICATE LONGER

STREAM-LINE FILTERS LTD

INGATE PLACE, LONDON, S.W.1. TEL.: MACAULAY 1011



High above the others . . .
... for quality and consistency

<p>HYDROSULPHITES</p> <p>Hydros</p> <p>Formosul · Redusol Z</p> <p>Hydros I</p>	<p>DYESTUFFS</p> <p>Metachrome</p> <p>Afterchrome</p> <p>Acid</p>	<p>OTHER CHEMICALS</p> <p>Liquor Ammonia</p> <p>Ammonium Carbonate</p> <p>Ammonium Bicarbonate</p> <p>Bisulphite & Metabisulphite</p> <p>Sodium Sulphite</p> <p>Liquid SO₂ Hexamine</p>
---	---	--

A BIG NAME IN THE CHEMICAL WORLD

Brotherton

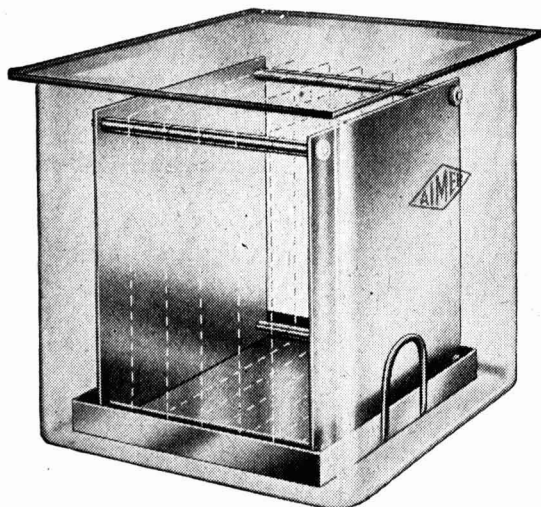
One of the world's largest manufacturers of hydrosulphites, liquid sulphur dioxide and hexamine. Makers of an extensive range of Metachrome dyes for dyeing wool in its forms.

★ Brotherton & Co., Ltd., City Chambers, Leeds 1. Also at Manchester, Glasgow and London. Works at Birmingham, Wakefield and Birkenhead

A UNIVERSAL OUTFIT FOR PAPER CHROMATOGRAPHY

for one- and two-way separations by ascending or descending solvent flow, or for circular chromatography.

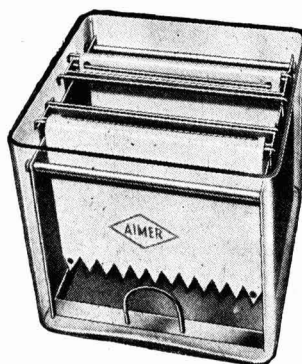
See CHEM. & IND., February 27th, 1954. Page 243



The apparatus is based on an all-glass tank, 12" cube, with a Chromatographic Frame, modified in size from that used by Datta, Dent & Harris (*Science*, 1950, 112, 621) to allow overnight runs on paper 10" square. The frame will accommodate 5 two-way chromatograms, or up to 50 one-way chromatograms, with ascending solvent flow in each case.

The frame method with ascending solvent is recommended for all routine or exploratory work. Its advantages are—the ease of handling, spotting, and drying the papers, especially for two-way separations; the very small amounts of material required; the excellent separations achieved with short, overnight runs; the very large number of separations which can be conducted simultaneously under identical conditions; and an unbreakable apparatus, economical in bench space solvents and paper.

For the separation of materials with low R_f values, requiring a longer solvent run than is the case with the Frame, the apparatus is readily converted to a conventional descending-flow apparatus. It will then accommodate up to 8 of the same 10" square papers, serrated at the lower edge to allow solvent to drip off into a tray. The tank will hold 6 of the trays in which 8" diam. circular chromatograms can be run.



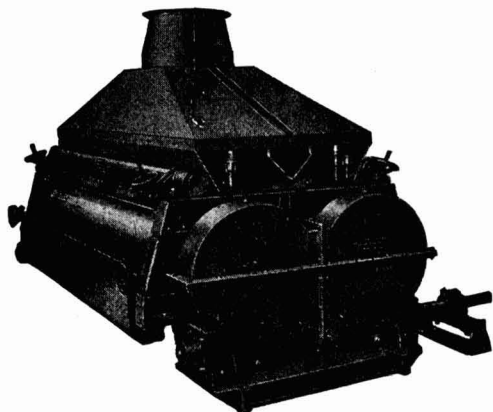
Other chromatography equipment, including All Glass Outfits, Fraction Collectors, and Desalting Apparatus, supplied. Prices and details on application.

AIMER PRODUCTS LIMITED

56-58 ROCHESTER PLACE,
CAMDEN TOWN, LONDON, N.W.1, ENG.

GULLIVER 3618, 6466.

MULTITUBULAR DRIERS ROLLER FILM DRIERS FLAKERS AND COOLERS



We offer accumulated experience of 50 years' specialization.

OUR WORKS, the largest in the United Kingdom devoted especially to DRYING MACHINERY, are laid out and equipped with the latest plant for this particular purpose.

MANY STANDARD SIZES including LABORATORY MODELS.

We have test plants always available

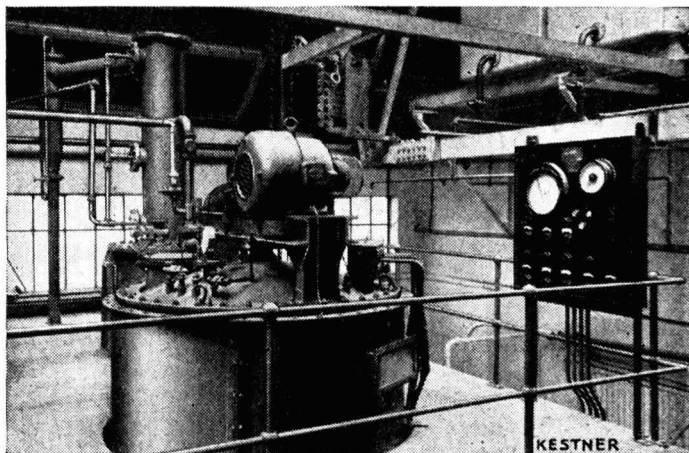
RICHARD SIMON & SONS, LTD.

PHENIX WORKS, BASFORD, NOTTINGHAM

CHEMICAL PLANT & PROCESSES

The Kestner organisation serves many industries. In fact, wherever chemicals are manufactured or used it is more than likely that you will find some Kestner plant—it may be a stirrer or other small item—it may be a large spray drier or the entire process plant. Whatever it be, large or small, you will find it doing "a good job."

If you are needing new plant, Kestners can help you on any of the following subjects :—



Isoelectric Plant for the manufacture of Alkyd Resins

ACID HANDLING · ACID RECOVERY PLANT · DRYING PLANT · EVAPORATION PLANT
FLUID HEAT TRANSMISSION SYSTEMS · GAS ABSORPTION & REACTION SYSTEMS · ISOELECTRIC
SYSTEM FOR PROCESS HEATING · KEEBUSH · LABORATORY & PILOT PLANTS · STIRRERS & MIXERS

Kestner's CHEMICAL ENGINEERS

KESTNER EVAPORATOR & ENGINEERING CO., LTD. 5 GROSVENOR GARDENS, LONDON, S.W.1

IPBE

A low-boiling ether of low water solubility

for extraction and other industrial purposes.



Shell Chemical Company Limited

Norman House, 105-109 Strand, London, W.C.2. Telephone: Temple Bar 4455

Sales Offices :
| **LONDON** : Walter House, Bedford Street, W.C.2. Tel: Temple Bar 4455.
| **MANCHESTER** : 144-146 Deansgate. Tel: Deansgate 6451.
| **BIRMINGHAM** : 14-20 Corporation St., 2. Tel: Midland 6954-8
| **GLASGOW** : 124 St. Vincent Street, C.2. Tel: Glasgow Central 9561.
| **BELFAST** : 35-37 Boyne Square. Tel: Belfast 20081.
| **DUBLIN** : 53 Middle Abbey Street. Tel: Dublin 45775.


★ Overseas enquiries should be directed to local Shell Companies.


INDUSTRIAL SAFETY • Fire and Accident Prevention and Protection

NON-SPARKING ←PUSH

DRAW →

SCRAPERS

14 ozs: 

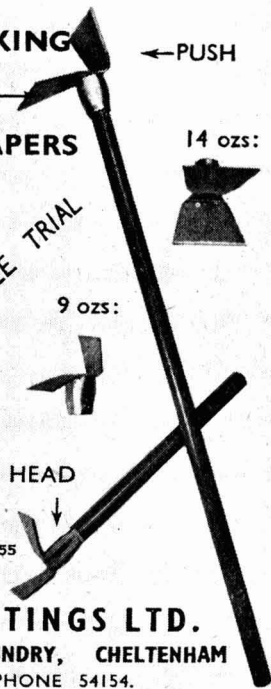
9 ozs: 

ONE MONTH FREE TRIAL

SELF LOCKING HEAD
WET OR DRY

PATENT. PEN. 13993/55

MEIGH CASTINGS LTD.
UCKINGTON FOUNDRY, CHELTENHAM
TELEPHONE 54154.



SAFETY FIRST

THE "OLDBURY" PATENT CARBOY DISCHARGER will empty and elevate up to 50 feet the contents of any carboy, bottle or vessel, and complies with all the conditions of the Factory Act of 1937.

KESTNER'S

5, Grosvenor Gardens, Westminster, London, S.W.

ARTIFICIAL RESPIRATION

The Electrical Journal Shock Card shows, by means of new illustrations with clear and concise instructions, how artificial respiration by the Schafer method should be applied. Supplied varnished and with cord.

(13½ × 22") 3s. 6d.

(Including postage in U.K. 3s. 9d.)

Ernest Benn Limited
Bouverie House, Fleet Street, E.C.4.

Metafilters secure the complete removal of suspended matter from any liquid at any temperature and pressure, giving an

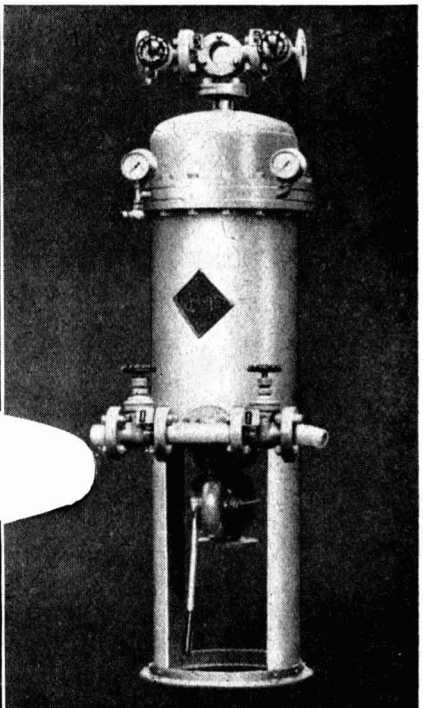
OPTICALLY CLEAR FILTRATE

without oxidation, loss of solvent, or escape of fumes. Can be completely cleaned in a few minutes without opening up. Constructed without soldering, brazing, or welding.

A TYPICAL METAFILTER INSTALLATION

Sizes from 10 gallons to 10,000 gallons per hour in any metal.

THE METAFILTRATION COMPANY LIMITED
BELGRAVE ROAD HOUNSLOW MIDDLESEX
Phone: Hounslow 1121-2-3 Grams: Metafilter Hounslow



INDUSTRIAL SAFETY • Fire and Accident Prevention and Protection**• NEPRO •****LIQUID NEOPRENE PROTECTIVE COATINGS**

★ anti-corrosive ★ weatherproof ★ anti-abrasive ★ flexible ★

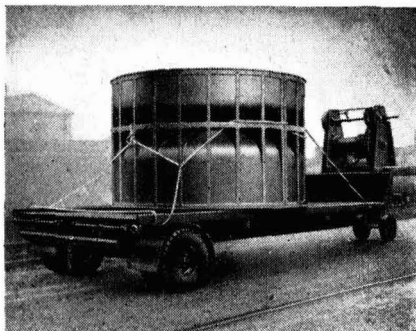
N-200

A RESILIENT HEAVY DUTY LINING FOR APPLICATION TO METALS, CONCRETE, AND WOOD FOR THE PROTECTION OF FANS, DUCTING, PIPES, TANKS, CHEMICAL AND MARINE PLANT.

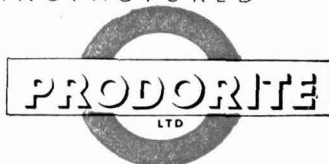


HEAD OFFICE
EAGLE WORKS
WEDNESBURY

TEL.: WED 0284 5 LINES



MANUFACTURED BY

**N-700**

A PERMANENTLY FLEXIBLE COATING FOR SIMPLE APPLICATION TO METAL CONCRETE, AND WOOD STRUCTURES FOR CORROSIIVE FUME AND SPLASH PROTECTION.



LONDON OFFICE
ARTILLERY HOUSE
ARTILLERY ROW · SW1
TEL.: ABBEY 3816 5 LINES

Sole Licencees in the U.K. for GATES ENGINEERING CO. U.S.A. GACO PROCESSES

WALLACH
BROS LTDEVERTRUSTY
INDUSTRIAL
SAFETY
EQUIPMENT49 TABERNACLE STREET
LONDON E.C.2**—FOR SAFETY**

A NEW and revised edition of our famous "Blue Book of Safety Equipment"—loose leaf for your added convenience—illustrating and describing our complete range of Industrial Protection—will be sent on request.

Write for *your* copy to-day.**WALLACH BROS., LTD.**

49, TABERNACLE STREET,
LONDON, E.C.2

Phone: CLerkenwell 1448/9

SPECIALISTS IN INDUSTRIAL SAFETY FOR 70 YEARS, AND MEMBERS OF THE ROYAL SOCIETY FOR THE PREVENTION OF ACCIDENTS



with

TELCON BERYLLIUM COPPER TOOLS

Beryllium Copper Safety Tools, by reason of their comparatively high thermal conductivity, have little tendency to spark and can be employed with confidence in dangerous atmospheres. The great strength and hardness of these tools gives them a performance and length of life assuring their superiority in this field, and their best recommendation is their widespread use by major industrial concerns handling inflammable materials.

Distributors for Great Britain

BERYLLIUM & COPPER ALLOYS LTD

47, VICTORIA STREET, LONDON, S.W.1 ABBey 6421/2

Manufactured by

TELEGRAPH CONSTRUCTION & MAINTENANCE

TELCON WORKS • MANOR ROYAL • CRAWLEY • SUSSEX

The Chemical Age

Volume LXXV
Number 1934

Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE · 154 FLEET STREET · LONDON EC4

Telephone : FLEET STREET 3212 (26 lines) Telegrams ALLANGAS · FLEET · LONDON

CONTENTS · 4 AUGUST 1956

News Briefs	203
Note & Comment	205
Uranium—No Longer Priceless	207
People in the News	208
Germany's Chemical Exports	209
British Association Meeting Programme	210
Development of New Drugs	211
Indian Newsletter	213
From all Quarters	214
Estimation of Gallium & Germanium—Part II	215
Austrian Chemical Industry	217
Industry's 'Booby Traps'	218
The Chemist's Bookshelf	219
Safety Notebook	221
Commercial Intelligence	224
Market Reports	226

Editor : Geoffrey F. D. Pratt

Manager : H. A. Willmott

Director : N. B. Livingstone Wallace

MIDLANDS OFFICE :
Daimler House, Paradise
Street, Birmingham

Phone : Midland 0784/5

SCOTTISH OFFICE :
116, Hope Street,
Glasgow C2

Phone : Central 3954/5

LEEDS OFFICE :
Martins Bank Chambers
Park Row, Leeds 1

Phone : Leeds 22601

SINGLE COPY 1/3 (BY POST 1/6)

ANNUAL SUBSCRIPTION 52/6

BRITISH TAR PRODUCTS

LIMITED

MAKERS OF

PYRIDINE
 PHENOL
 CRESYLIC ACIDS
 META-CRESOL
 NAPHTHALENE
 TOLUOLE
 ANTHRACENE OIL
 SOLVENT NAPHTHA
 XYLOLE
 ORTHO CRESOL
 METHYL CYCLOHEXANOLS
 CYCLOHEXANOL
 CYCLOHEXANONE

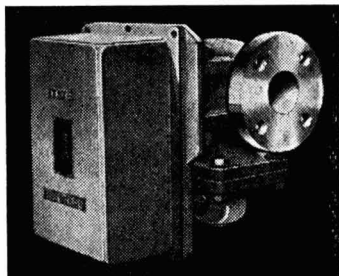
SALES OFFICE :

418^A GLOSSOP ROAD, SHEFFIELD, 10

Telephone: 60078-9

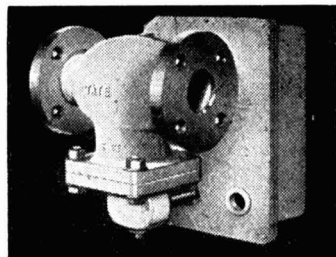
Telegrams : "CRESOL, SHEFFIELD 10"

TATE SOLENOID-OPERATED SEMI-BALANCED VALVES



RANGE:
 $\frac{1}{2}$ " to 4" bore
 5lbs. to 200 lbs./sq.
 PRESSURE
 TOTALLY-ENCLOSED

Also available:
 WEATHERPROOF &
 FLAMEPROOF



For use on:

STEAM, WATER, AIR, SPIRITS, OIL,
AND CHEMICALS.

TELEPHONE:
 BRADFORD 28348/9

TELEGRAMS:
 VALVE, BRADFORD

JONES, TATE & Co., Ltd.
 VICTORY WORKS, BRADFORD.

Some Questions of Cost

IN PLACE of the usual article, we deal this week with a letter written by Mr. Lawrence D. Hills of Bocking, Essex. Mr. Hills visits farms to report, as he states in his letter, 'news for a periodical' which is interested in organic farming. Mr. Hills' letter was written after he had read the article on this page of the issue published on 14 July, in which we considered letters that have appeared in a number of newspapers.

We concluded the article of 14 July thus: With more than 50 million mouths to feed and a good deal less than two acres of agricultural land per head to use, the most critical item in our imports/exports accounts is the bill for imported food. To hold this within practical range we need high output per acre at home, and reasonable costs per hundredweight or ton or gallon of produce. Full efficiency in these directions has yet to be reached, but it has so far been approached only in the period of expanded fertiliser use. It is surely irresponsible to advocate a return to farming methods which failed economically when we had a much smaller population to feed and virtually no balance-of-payments problems.

Mr. Hills' letter reads: My letter was necessarily brief. My purpose was partly to point out the 'Queerness' of reducing the cost of living by increasing the price of a loaf to a shilling, and making milk more expensive, while spending £19½ million on reducing the cost of chemicals to the farmer.

If it is possible for the best organic farmers to harvest two tons of wheat an acre and cut their winter milk costs to 1s 3d a gallon without using artificial fertilisers, then these chemicals should sell at their full cost. Where a soil or subsoil is deficient then chemicals are justified,

for the very small fraction that can be used by the plant gives results that pay.

Work at Harwell with radio-active tracers establishes the fact that compost, or farmyard manure contains only this absorbable fraction. This is why 0.01 per cent of phosphoric acid in good muck, selected by plant roots, is worth more than anything out of a bag.

The work of Dr. C. H. Duddington on the fungi that destroy eelworm and are destroyed by replacing FYM and NPK deserves the serious attention of those stockless farmers growing cereals, sugar beet and potatoes whom your correspondent considers so efficient.

Evidence of the organic movement in all countries, not of its 'lunatic fringe', but the men and women who have used these methods for long periods, has led your correspondent into protesting too much, like the attack on the cancer of the lung scare in a trade paper. If the chemical industry had the courage of, for example, the cigarette manufacturers (whose product is not subsidised but heavily taxed) its members would donate sums for a full scientific investigation of the position. These sums, like the subsidies to Rothamsted and other research stations, would come off super tax, like luxury motor cars.

My letter merely expressed what is an increasing opinion, and no agricultural chemical manufacturer should be unaware of the evidence on which it is founded.

I would be glad to supply a reading list for those who are interested. Those who doubt what your correspondent calls 'claims' I can refer to a quarterly publication containing accounts of my visits to organic farms. I do not claim to visit a farm, I report the news for a periodical

that can print it without deletions to suit chemical advertisers. Those who do not read the opposition case have no right to doubt the good faith of those who support it.

Our observations are as follows: When Mr. Hills says his letter was necessarily brief, he presumably refers to the fact that letters to newspapers should be short if they are to have a good chance of publication. He seems to think it is, nevertheless, reasonable to indict the products of a substantial industry, although he has no opportunity to provide supporting evidence. Our comments in the issue of 14 July have at least enabled Mr. Hills to state his case more fully.

In that statement he says: 'Where a soil or subsoil is deficient, then chemicals are justified, for the very small fraction that can be used by the plant produces results that pay . . .' There is little more that need be said. Deficiencies of plant-foods (in *available* forms) are rife. The purpose of chemical fertilisers is to supplement such natural or otherwise-derived plantfood supplies as may be in soils.

Fertiliser responses are measures of need, i.e., they occur when the ordinary supply is insufficient for good cropping and when the fertiliser addition makes that supply more adequate. It has long been known that the law of limiting returns applies to the relationship between fertiliser rates and crop yields, i.e., as an increasing rate of application reduces the state of deficiency, so the yield response falls off. Excessive applications for various reasons can actually reduce yields.

Mr. Hills' single statement, as quoted above, justifies all the use of fertilisers so far made and certainly more than justifies the fertiliser subsidy. The fertiliser industry in this country has never yet produced a tonnage adequate to deal with all the deficiencies of nitrogen, phosphate, and potash that occur each year in the total farmed acreage; nor yet has the demand for fertilisers by farmers reached this level of target.

As to other evidence now put forward by Mr. Hills, his statement that Harwell work shows that compost or FYM contains only absorbable phosphoric acid and that this is worth 'more than anything out of a bag' may sound impres-

sive, but the deductions he and his friends in the organic-farming movement have drawn from Harwell radio-tracer work merely show how much out of their depth they are when interpreting experimental results. Radio-tracer work has also shown that phosphatic fertilisers contain phosphate that is quickly taken up by plants.

The suggestion that the industry should devote sums to a 'full scientific investigation of the position', as the tobacco industry has done with cancer of the lung research, ignores the fact that large sums have been spent, and are continually being spent, by the industry on research.

Incidentally, Rothamsted was founded by the pioneer of the British fertiliser industry, Lawes, and it is only in modern times that it has been more heavily funded by the State. Committee after committee—and here bodies of independent, reputable composition are referred to—have considered these claims (or contentions, for Mr. Hills has an objection to the useful word, 'claim') from the humus school or the organic-farming school, and always the verdict has been the same—special investigations do not seem justified because present research on fertility is comprehensive enough, or because evidence for the beneficial and unarmful use of fertilisers is overwhelming.

Finally, the outlook behind this attack upon fertilisers is surely well revealed in Mr. Hills' letter by the references to (1) luxury motor cars (irrelevant), (2) the publicity value of the tobacco industry's support for cancer research, (3) his ability to have news reported 'for a periodical that can print it without deletions to suit chemical advertisers (which is nonsense anyway).

Here, too, it seems most useful that our comments have enabled Mr. Hills to state his case at greater length. As for the statement that 'those who do not read the opposition case have no right to doubt the good faith of those who support it', Mr. Hills might as well be informed that we have studied the humus school's case very thoroughly for many years, particularly its presentation in book form, where at least adequate space for full argument and presentation has been possible.

NEWS BRIEFS

Chemical Employees

The number of people employed in the chemical industry at the end of May this year was 525,300. The corresponding figure last year was 516,200. It is estimated that the total working population at the end of May was 23,975,000, almost the same as at the end of April.

Export Office

Westwood House, Swallow Street, London W1, is the new home of Baker Perkins (Exports) Ltd., the organisation which handles the overseas trading of Baker Perkins Ltd., Westwood Works, Peterborough. The company is to move in on 7 August. The parent company's offices at Kingsway House will be maintained.

ILO Amendments

Certain amendments to the *Model Code of Safety Regulations for the Guidance of Governments and Industry* are to be published by the governing body of the International Labour Office. The amendments to be published originate from proposals of the permanent international committee for acetylene, fusion welding and allied industries and from the proposals of the textiles committee.

Styrene Products Ltd. Acquired

Negotiations have now been completed whereby Petrochemicals Ltd., a wholly owned Shell Chemical subsidiary since July 1955, acquires Erinoid's 40 per cent holding in Styrene Products Ltd. which thereby becomes a wholly owned subsidiary of Petrochemicals. Mr. L. H. Williams will remain as chairman and Mr. P. C. Chaumeton as managing director of Styrene Products Ltd. Erinoid Ltd. will continue to sell polystyrene and polystyrene derivatives manufactured by Styrene Products Ltd., under the existing trade name of Erinoid.

SCI Essay Competition

Commenting on the essay competition organised by the Corrosion Group of the SCI (see p. 204) the judges said that they found the task of selecting the winning entry from the total of 15 received was one of great difficulty. They were impressed by the generally good level of literary quality and found the most common weaknesses in the

omission of, or inadequate attention to, objections that might be raised to the views advanced and in the presentation of the conclusions. Several entries merited publication and the judges felt that the competition had been of service.

Increased Coke Production

Coke production increased by three per cent over the 12 months ended March 1956, according to the Gas Council. In the fourth quarter of the year coke production was approximately at the same level as in the fourth quarter of 1954/55. Sales of coke during the period remained about the same as in the previous year. Production of coke breeze fell by two per cent, whereas the production of crude tar and crude benzole increased by two per cent and one per cent respectively.

Deep Seal Coating

An oleoresinous deep seal coating, said to form a durable, protective, semi-gloss surface without losing the fine grain of wood, has been developed by British Bitumen Emulsions Ltd. Known as Isoseal, the coating is claimed to be relatively non-slip and heat-resisting.

Cement Production Costs

Rising costs of production have been mentioned by the chairman of The Tunnel Portland Cement Co. (Mr. N. M. Jensen) in his review of activities which has been circulated with the report and accounts. Referring to last year's cost at the company's West Thurrock works, the review states that compared with 1938, coal had increased by 346 per cent, power by 187 per cent, whereas the delivered price for packed cement to the nearest town had increased by only 129 per cent. In the same period, wage rates had increased by about 200 per cent, but actual wages were higher owing to overtime.

Margam Oxygen Plant Opened

Britain's first tonnage oxygen plant, which has been constructed by British Oxygen Co. Ltd. at Margam, Port Talbot, South Wales, at a cost of £1 million, was inaugurated on Wednesday (1 August) by the Home Secretary and Minister for Welsh Affairs, Major the Rt. Hon. Gwilym Lloyd-George, MP. The plant will service the nearby works of the Steel Company of Wales through direct pipeline. Capacity is 100 tons per day. A second plant of 200 tons per day capacity is planned for the near future on the same site.

Foxboro-Yoxall Move

FOXBORO-YOXALL'S new factory at Redhill should be ready for occupation by October, it is stated by Chamberlain Industries Ltd., who are carrying out the development of the site.

At present Foxboro-Yoxall has factories at Merton, Kidbrooke and Wandsworth, but it is hoped eventually to centralise all operations at Redhill. 'It is not yet possible to give a firm date for the completion of this move,' said a representative of the company.

The site is 56 acres in area and contains 80,000 sq. ft. of factory space together with about 23,000 sq. ft. of office space. It is anticipated that by the end of the next five or six years the floor space will extend to 240,000 sq. ft.

Switching-on Ceremony

On Wednesday 1 August Sir John Cockcroft, Director of the Atomic Energy Research Station, switched-on the new Van de Graaff accelerator at the Enfield works of Standard Telecommunication Laboratories Ltd., a wholly owned subsidiary of Standard Telephones & Cables Ltd. The accelerator was built by the High Voltage Engineering Corp. of America and will be used to investigate the effects of radiation on various materials used in electrical engineering and electronics.

New Offices

Bradley Pulverizer Co. announces that its offices are now at 6 Lambeth Road, St. George's Circus, London SE1 (WATERloo 4346-8); cables, Equestrian London.

Professor's Death

THE DEATH occurred on Monday 23 July, of PROFESSOR E. A. BRAUDE, Professor of Organic Chemistry at the Imperial College of Science and Technology, London. Professor Braude was 34. A German by birth, he came to England when he was 15. He was Rockefeller Research Assistant at the Imperial College from 1942 to 1945, becoming a lecturer in 1947. He was appointed reader in organic chemistry in 1952 and Professor in October 1955. Professor Braude's fields of study included the application of physical methods to problems of structure and reaction mechanisms, together with synthetic organic chemistry. He was one of the leading young chemists of the country and in 1950 he was awarded the Meldola Medal. An inquest was held at Kingston-on-Thames on 27 July, at which it was decided that Professor Braude took his own life. It was stated that he had an early disease of the spine.

SCI Competition Results

MR. J. F. LIGHT, of Bexleyheath, Kent, has been awarded a prize of 20 guineas in the Society of Chemical Industry's Corrosion Group essay competition for his entry, 'The Problems of Corrosion Interference Associated with the Application of Cathodic Protection to Buried Surfaces'. Prizes of seven guineas each have been awarded to MR. R. TATE, of Montreal, Canada, for his entry, 'Corrosion: Its Implications to Aircraft' and MR. M. A. PEARSON, of Birmingham, for his entry, 'Hydrazine as a Corrosion Inhibitor'. MR. G. M. W. MANN, of London, received the judges' commendation.



AIR ATTACK ON PESTS

Helicopter sprays pine forest in Western Germany with anti-pest solution made up of 25 per cent DDT and 75 per cent BP Diesel fuel. Caterpillars had threatened to strip the tops of the trees. The spraying was successful

NOTE & COMMENT

SIR MILES THOMAS'S remarks about the river Dee, briefly reported in our last issue (see page 164), seem to us to present a new and dangerous attitude towards pollution. If an industrial process is causing pollution, whether of the air or of a river into which wastes are passed, a balance sheet for the virtues of production and the losses of pollution cannot be soundly drawn up, either in financial or moral terms. When Sir Miles says that the prosperity of 2,000 workers at the Cefn Mawr works of Monsanto should be contrasted with 'a few sporting fish', surely he dismisses a sizeable social and biological problem far too easily. Generally with river pollution, the losses of fish are only one symptom of deterioration. Local experts are claiming that where there would normally be about five thousand salmon in the river there are now hardly one hundred. Dying salmon are frequently reported to have been seen. Even if a possible 98 per cent loss of salmon population can be regarded as minor, the toxicity that causes this cannot. Its other and general effects upon life in the river may be accumulative, leading to most undesirable conditions.

Not only the Fish

THIS is not to suggest that Sir Miles indicated any lack of willingness to face, and reduce, the problem of pollution by effluents. He also pointed out that Monsanto had spent £1 million already on it, and were still spending £75,000 a year. He hoped this effort was appreciated by those concerned, and gave an assurance that the problem would ultimately be solved. This is obviously a much happier approach to the clash between local and industrial interests, and one far more likely to encourage an attitude of patience. After all, processes which cannot apparently be operated

without the creation of harmful effluents must be looked upon as technically incomplete, and there has to be some limit to the principle that industrial pollution should be tolerated because of the economic importance of the processes involved. Nor is it desirable that old prejudices against the chemical industry should be fortified. New ventures need new sites and most of the existing industrial centres are overcrowded now. When a new chemical factory is proposed there is generally some local resistance, even though the factory will bring employment and prosperity to the area. Modern evidence that the prosperity can be accompanied by one or another form of pollution gives that resistance strength where it might otherwise be disposed of as prejudice inherited from the imperfect past. More than a few hundred, or thousand, fish is involved in any problem or river pollution by chemical factory effluents.

Towards Equality

NOT EVERYONE will take too seriously the latest policy statement of the Labour party, *Towards Equality*. The new leader's problems in reconciling some very different versions of socialism within the party's foremost ranks are not invisible. The almost ancient cries of the party are as dead as most of those who first attacked Westminster, and now a substantial proportion of the middle-class population looks enviously at the pay-checks of the 'exploited' working-class. Mr. Gaitskell has much the same task as that given to Mr. Butler towards the end of the war, to give an established political party new aims and a new policy when its old ones had either become obsolete or been achieved. Mr. Butler's problem was eased by the sudden access of the Labour party to high-majority power, for simple opposition became the major aim of the Conservative party. Mr. Gaitskell has not had the same help because, though in opposition, his party has not been steam-rollered into unity. *Towards Equality* has a ring about it though, in fact, it is a mere chirp of a call based upon minor economic differentials, most of which are to be expected in any industrial-com-

mercial community. 'All men are equal, but some are more equal than others.' However, there is always the possibility that a majority of Mr. Gaitskell's followers will themselves take the policy statement seriously, and in any swing of the political pendulum he might be obliged to put it into practice. The business executive, whether engaged in industry or commerce, will become the target of a series of new taxation measures, and the only incentive left to him will be to export himself to another country if he is young enough. Hard work, experience, skill, variable hours of work, these will have no special rewards left though it can well be presumed that simultaneously the trades unions will still fight bitter and periodic battles to maintain payment differentials between skilled and unskilled classifications of workers.

Capital Gains Tax

OTHERS besides socialists have argued for a capital gains tax. Most verdicts on this proposal have found the cons outnumbering the pros. But such an introduction could well recoil upon any Labour administration of the future, whose other activities might bring a period of capital losses. Presumably if gains are to be taxable, losses would rank as rebates! A proposed change that could affect the chemical industry is for the Treasury to be permitted to collect death duties in property as well as in cash. By this means the Government would gradually acquire substantial share-holdings in industry, but this trend would probably be most marked in the sector of private companies. The future of private companies is already bedevilled by death duty tolls, though perhaps no one could seriously argue that owners of shares in private companies should be treated differently from owners of shares in public companies. Despite the necessarily large-scale operation of certain chemical processes, many chemical companies are still private companies. This means that a form of semi-nationalisation would tend to invade the industry in its smaller units, an odd inversion of the older left-wing doctrine that nationalisation must be introduced whenever massive production units are operated. A secondary consequence is almost amusing to contemplate. A new class of official

would be created—the Government-representing director! Frankly, we do not think it is required of any political party that it should usher us 'towards equality' for the ultimate goal must also mean stagnation. If a tip is taken from chemical reaction dynamics, what this country badly needs is not more equality but more equilibrium. Most interventions by Government in economics and industry in recent years have disturbed trends that would otherwise have reached states of near-equilibrium and thus resulted in stable conditions. No one of the left should know this better than Mr. Gaitskell.

Chemical Prices Pegged

ICI LTD. announced this week that it has decided to make no further increase in the home trade prices of the company's chemicals, dyestuffs, explosives, fertilisers, fibres, paints, pharmaceuticals, and plastics, at least until 30 June 1957.

This decision, said the company, is subject to the proviso that 'no unexpected or exceptional factors intervene, and provided the company does not incur any major increase in the cost of freight or fuel before that date.'

The statement added that 'The production costs of certain of the company's products, particularly those involving non-ferrous metals, depend markedly on imported raw materials which fluctuate widely in price, and for these the board can do no more than continue their policy of price restraint.'

On Wednesday ICI stated that they had decided on a reduction in the price of Alkathene (polythene) by 3d per lb. The selling price is now 2s 11d per lb.

The Distillers Co. Ltd. announces that it fully subscribes to the policy advocated by the Chancellor of the Exchequer of price restraint on a national scale as a contribution by industry to the attack on inflation. The company and its subsidiaries undertake to hold their present prices firm in the home market, at least to the end of 1956, subject only to circumstances beyond their control, such as increases in the cost of raw materials, fuel and carriage.

In recent months some increase appears to have taken place in a number of chemical prices. This is clear from a comparison between the prices published in THE CHEMICAL AGE last week and those included in the issue of 26 May.

Uranium—No Longer Priceless

Report of UK Atomic Energy Authority

DANGER of a world-wide shortage of uranium, from which stems both military and civil atomic energy programmes, has now been eliminated due to a spate of new discoveries—mainly on the North American Continent.

These important developments are recorded in the second annual report (1955-56) of the United Kingdom Atomic Energy Authority, laid before Parliament recently.

The report points out that the forecast made in September, 1954, by the director of the raw materials division of the United States Atomic Energy Commission, that the acceptable price for uranium contained in a high-grade concentrate might become \$10 (71s sterling) per lb., has already received some confirmation.

Turning to the chemical methods of extraction, the Authority relates that once uranium has been found and mined, the ore, which contains probably only a fraction of one per cent of uranium, has to be treated in order to provide a chemical concentrate with a minimum of 50 per cent uranium as the feed material for the Authority's chemical and metallurgical plant at Springfields.

Slag Treatment

In addition to virgin material brought into the uranium production plant at Springfields, during the year, the report continues, a large accumulation of slags and other materials produced in the uranium purification process has been treated for the recovery of its uranium content. Uranium depleted in the 235 isotope through irradiation has, following treatment in the Windscale chemical separation plant, been converted to the hexafluoride for re-enrichment in the gaseous diffusion plant at Capenhurst. The recovery processes for the DIDO and PLUTO fuel elements at the Dounreay chemical plants have been determined and construction, both of these plants and of the fuel element fabrication plants, has started.

Chemical processes have been developed at Harwell for the complete separation of the fissile uranium 233, fertile thorium and the radioactive fission products from neutron-irradiated thorium. The processes have been operated on a small pilot plant

scale, thus confirming the plant flowsheets. Sufficient uranium 233 has been produced for many of the nuclear characteristics of this material to be investigated.

Regarding chemical work on the effects of irradiation on the stability and corrosiveness of uranium solutions at high temperatures and pressure, the Authority records that this is now well advanced. Furthermore, chemical engineering studies have been made into methods for the continuous removal of fission products from these solutions.

Pilot Plant

Both beryllium and beryllia are now being made in Britain on a pilot plant scale. A new and simple technique has been evolved to produce beryllium powder from the raw products; the powder can then be used for fabrication of the necessary shapes required in reactor work by powder metallurgical techniques.

Under the Authority's isotopes and irradiation programme, chemical reactions initiated by radiation have been shown to proceed under a much wider range of conditions than hitherto considered possible. In many cases, it is revealed, the products are increased in value, as, for example, rubbers and plastics which can be treated by radiation to withstand higher temperatures. The programme has also embraced work on the sterilisation of drugs and this has shown that antibiotics which are normally destroyed by heat sterilisation can be completely freed from bacteriological contamination by simple irradiation. The potency of the drug is not affected.

Sewage pollution of beaches has been investigated by the introduction of ammonium phosphate containing radioactive phosphorus into a sewage pit before discharge into the sea off the south coast. The dispersion of the sewage was followed by immersed beta counters and the results compared with those obtained by adding harmless bacteria to the water at the same time as the phosphate and growing cultures from sea water samples. It was shown that a joint application of the two techniques was far more satisfactory than more orthodox methods used at present.

PEOPLE in the NEWS

● **MR. THOMAS BENSON GYLES** has been appointed by the UK Atomic Energy Authority to act as a liaison officer with industry to advise on the applications of the inventions that have arisen out of the work of the Authority's research and industrial groups and on the terms (on a non-exclusive basis) under which they can be used. The Authority states that it now has a substantial holding of patents and patent applications which may be useful not only in the development of nuclear power but also for more general purposes in the chemical, engineering, metallurgical and electronic instrument fields.

● At the annual general meeting of the Scientific Instrument Manufacturers' Association on 12 July, the retiring president, **MR. C. E. T. CRIDLAND**, installed his successor, **MR. G. A. WHIPPLE, M.A., M.I.E.E., F.Inst.P.**, in the chair for the year 1956-57. Mr. Whipple has been vice-president for the last two years and was honorary secretary of the association during the important years just after the war. Mr. Whipple is the chairman and managing director of Hilger & Watts Ltd.

● Two new representatives, **MR. D. J. DEWAR** and **MR. R. REDGATE**, have just been appointed by Compofox Co. Ltd., bringing the total outside sales staff to ten. Both will operate mainly from the company's Northern Flexibles Centre at Huddersfield Road, Oldham.

● The wedding took place at St. Phillip's Church, Girlington, Bradford, on 25 July, of **MR. MARTIN HOWARD LAY**, only son of Mr. and Mrs. H. D. Lay, of Leafield, Crosby, Isle of Man, and **MISS JEAN MARGARET ROSS**, younger daughter of the late Mr. J. B. Ross and Mrs. M. A. Ross, of Halifax Road, Buttershaw, Bradford. The bridegroom is employed in the fibres division of Imperial Chemical Industries Ltd., at Harrogate.

● The first vice-presidents of the Manchester College of Science and Technology are to be **SIR JOHN COCKCROFT**, director of the Atomic Energy Research Establishment, and **ALDERMAN WRIGHT ROBINSON**, who for 26 years has been chairman of the College of Technology sub-committee of Manchester

Education Committee. **LORD CHANDOS** has already accepted an invitation to be president of the College.

● After 31 years as a director of the United Indigo & Chemical Co. Ltd., the Manchester chemicals, dyes and animal foods group, **MR. JAMES BRUNDRET** has had to retire through ill health. He has been chairman for the last two years. **MR. WILLIAM S. HEYWOOD** has been appointed chairman.

● **MR. G. G. RIDDICK** has been appointed to the board of Thomas De La Rue & Co.

● **MR. FREDERIC S. HAGGERSON**, of the US, has resigned from the board of Bakelite Ltd. for reasons of ill health. **MR. GEORGE C. WELLS**, also of the US, has been appointed a director to fill the casual vacancy on the board.

● The appointment of **MR. A. M. ROSS** as sales manager is announced by Lederle Laboratories Division, Cyanamid Products Ltd. Mr. Ross was formerly assistant sales manager to **MR. C. GORDON KILLPACK** who now heads a new division formed to handle the company's animal feed supplements, veterinary products and food preservative materials. Under **MR. O. N. WILLIAMS**, director of Lederle in the UK, Mr. Ross will be concerned with the sale in this country of Lederle's ethical medical and pharmaceutical products.

● **MR. G. A. DUMMETT, M.A., A.M.I.Chem.E.**, was elected to the board of directors of The APV Co. Ltd. at the annual general meeting on 25 July. Mr. Dummett joined the company in 1935 and has successively been laboratory manager and scientific manager responsible for the research and development organisation.



Left, Mr. G. A. Dummett (APV); right, Mr. A. M. Ross (Lederle)

Germany's Chemical Exports

IF THE challenge of German competition is to be successfully met, British industry must pay special attention to improving its sales promotion abroad. It must invest more in the modernisation and expansion of industrial capacity in this country. This is stated in an article published in *The Board of Trade Journal* for 28 July, which considers West Germany's rising competition with British exports.

Between 1951 and 1953 West Germany increased her share of world trade in chemicals by one-fifth. Over the same period the UK share fell by 1 per cent. From 1953 to 1955 Germany's share of world trade in chemicals continued to increase, although at a slower rate than in the previous period, while the UK share continued to fall.

Table 1 (below) shows the expansion of certain commodity groups.

Percentage shares of world trade in manufacture of chemicals is shown in Table 2.

Table 1

				Value \$ Millions				German Exports	UK Exports
				1950	1953	1954	1955	1953-55	1953-55
				Percentage change					
Oils and fats	..	..	..	5	14	20	27	+93	+58
Chemicals	..	..	..	221	447	605	680	+43	+31

Table 3

Imports				Exports			
1st half	2nd half	1st qtr.	2nd qtr.	1st half	2nd half	1st qtr.	2nd qtr.
1955	1955	1956	1956	1955	1955	1956	1956
£'000	£'000	£'000	£'000	£'000	£'000	£'000	£'000
9,525	9,188	9,603	9,445	18,481	20,274	20,232	20,409

Fire Detecting Systems

DETECTING SYSTEMS which are said to react instantly to sudden rise in temperature and to give visible and audible fire alarms are described in a booklet recently issued by The Pyrene Co. Ltd., 9 Grosvenor Gardens, London SW1. The systems have been approved by the GPO for use in association with post office lines.

According to the booklet, Pyrene fire detecting systems work through the medium of detector heads suitably placed throughout a building or industrial site. Each group of up to 16 heads is connected to a control unit equipped with signal lamps indicating normal operation as well as warning of fire or faults in the circuit.

Detector heads are entirely electrical in operation, obviating the use of mechanical moving components which may become out of adjustment in service.

Table 2

	1951	1953	1955
	(provisional)		
Germany	13.5	16.4	17.4
UK	17.3	17.1	16.7
US	30.8	28.2	28.3

In the *Board of Trade Journal* article it is pointed out that, in general, wages have risen at roughly the same rate in both countries, but productivity has risen much faster in Germany than in the UK. The increase must owe a great deal to the rising rate of expenditure on industrial re-equipment. German exporters gain little, if anything, from more favourable treatment than that accorded to exporters in this country.

Imports and UK exports of chemicals are as set out in Table 3 (below).

According to the *Trade & Navigation Accounts of the UK*, total value of chemical exports for June was £20,677,569 compared with £20,974,146 for May. In June last year the figure was £11,840,098 (dock strike played havoc with chemical exports) and in May £21,094,905. The figure for June 1954 was £17,328,830.

Bradford Service Centre

EXPANDING sales in the North of England, coupled with the increasing number of industrial installations, have led Electronic Instruments Ltd. to open a new service centre in Bradford at 8 Duke Street. This centre, under the direction of Mr. A. C. Stewart, A.M.I.E.E., has been equipped with instruments and spares to provide full repair facilities and to act as a showroom and demonstration centre for the firm's products.

One of the company's principal activities is the manufacture of industrial pH equipment. The complex nature of some of these installations and the high intrinsic value of the processes being controlled, has prompted the company to introduce a fleet of pH mobile service units. This pH service, which is claimed to be unique, enables every customer to be regularly visited by a skilled engineer.

Chemistry at Sheffield

British Association Annual Meeting

THE 118th annual meeting of the British Association for the Advancement of Science will be held in Sheffield from 29 August to 5 September. The President of the Association, Sir Raymond Priestley, MC, former Vice-Chancellor of the Universities of Birmingham and Melbourne and a member of the Scott and Shackleton Antarctic Expeditions, will deliver his presidential address, 'Twentieth Century Man against Antarctica', on 29 August.

At a congregation for the conferment of honorary degrees by the University of Sheffield on 29 August, Sir Raymond Priestley will receive the degree of Doctor of Laws, *honoris causa*, and Sir George Paget Thompson, F.R.S., president of Section A—Mathematics and Physics, and Sir Charles Goodeve, O.B.E., F.R.S., president of Section B—Chemistry, will receive the degree of Doctor of Science, *honoris causa*.

The programme of the meeting has been given an industrial slant, where appropriate, partly because the meeting is being held in Sheffield and partly because 1956 is the centenary of Bessemer's announcement at the meeting of the Association in Cheltenham in 1856 of his revolutionary steel-making process, for which shortly afterwards he set up his own works in Sheffield.

Evening Discourse

An evening discourse will be delivered in the City (Oval) Hall on 31 August by Professor F. G. Young, F.R.S., on 'The Growth of Biochemistry'. Sir John Cockcroft, K.C.B., C.B.E., F.R.S., director AERE, Harwell, will give a public lecture on 4 September on 'The Future Development of Atomic Energy'.

Sir Charles Goodeve will deliver his presidential address to the chemistry section on 30 August. His address, 'Steelmaking since Bessemer' will introduce the following two papers on chemistry at high temperatures: 'The Manufacture of Titanium' by Dr. James Taylor, and 'Very High Temperature Reactions' by Professor George Porter.

Professor C. E. H. Bawn, F.R.S., will introduce the following papers on anti-oxidants on 31 August: 'Anti-oxidants in the Food Industry' by Dr. C. H. Lea, 'Anti-oxidants in the Oil Industry' by Mr. C. N. Thompson,

Citric Acid Production

IN 1923 Chas. Pfizer & Co. Inc., the New York chemical and pharmaceutical manufacturers, became the first firm in the world to produce citric acid by fermentation of molasses with the aid of selected micro-organism cultures.

Chemicals derived from citric acid are used in making food wrappings and other plastics products. The acid can also be used to increase the flow of oil in secondary oil recovery. Pfizer use citric acid at the Terramycin fermentation plant at Sandwich, Kent.

Molasses for the Pfizer plant at New York are now being discharged from tankers direct, via the company's newly extended pier. Previously delivery has been by barge after unloading from tankers in deeper water.

Portugal Seeks Export Markets

Capacity of cement factories in Portugal is reported to be greater than the domestic demand, with the result that, unless export markets can be found, full capacity cannot be maintained.

and 'Anti-oxidants in the Rubber Industry' by Mr. J. T. Watts.

A symposium on 'Glass—Recent Research and Development' will be introduced by Professor W. E. S. Turner, O.B.E., F.R.S. on 4 September. Professor R. W. Douglas will speak on 'Some Aspects of the Vitreous State', Mr. W. J. R. Merren will speak on 'Special Glasses', Mr. A. De Dani will speak on 'Glass Fibre Forming', and Dr. J. H. Partridge will speak on 'New Glasses Demanded by the Electronics Industry'.

A symposium on the physical properties of metals will be held by the mathematics and physics section on 3 September, when the following papers will be delivered:— 'The Physical Approach to Metallurgy' by Professor A. G. Quarrell, 'The Microstructure of Metals and Alloys' by Professor C. S. Smith, 'Brittle Fracture' by Dr. N. J. Petch, and 'The Metallurgy of Atomic Energy' by Mr. L. Rotherham.

A number of special exhibitions, including a schools science exhibition and a demonstration display of laboratory glassware are being arranged. Programmes of scientific films will also be screened each day.

LEGAL STUDIES

by Peter Pain MA

DEVELOPMENT OF NEW DRUGS

DEVELOPMENT of new drugs is a matter of intense public interest. The law takes account of this and seeks to encourage the exploitation of new inventions by the provision of section 41 of the Patents Act, 1949. This enables the Comptroller of Patents to compel patentees of inventions relating to food and medicine to grant licences to other persons who wish to manufacture them.

It lays down that where a patent is in force in respect of a substance capable of being used as food or medicine, or in the production of food or medicine, or in respect of a process for producing food or medicine, the Comptroller shall, on the application of any person interested, order the grant of a licence under the patent on such terms as he thinks fit, unless it appears to him that there are good reasons for refusing such an application.

The section makes it clear that it is the duty of the Comptroller to grant a licence, unless there is good reason to the contrary. The burden of persuading the Comptroller is thus cast upon the patentee and not the would-be licensee. The protection of the patent lies in the terms which the Comptroller may impose; it is he who must make the contract between the parties if they cannot come to terms on their own.

Comptroller's Judgment

The sort of considerations which actuate the Comptroller's mind were considered in the recent case *Re British Drug Houses (Reports of Patent Cases, Vol. 72, p2)*. The judgment rested largely upon a decision made under an earlier statute in respect of an application relating to a food patent *Re Glaxo Laboratories Ltd. (Reports of Patents Cases, Vol. 58, p12)*.

First of these decisions dealt with applications by British Drug Houses for licences to manufacture chloramphenicol, a substance in respect of which Parke Davis & Co. held six patents. Parke Davis & Co. had already granted a licence by agreement to Allen & Hanbury who joined with them in opposing the applications. Chloramphenicol, an antibiotic, was described in the evidence as an advance on penicillin and streptomycin, in

that the latter is administered by injection, while chloramphenicol can be taken orally.

Voluminous evidence was filed and the desirability of refusing a licence was considered in great detail. As a result of the judgment in this case, coupled with the earlier *Glaxo* judgment, it is possible to lay down certain general principles:

General Principles

(1) It was argued by those opposing the grant of a licence that it would be contrary to the public interest to grant a licence in view of the heavy expenditure which had been incurred in the course of making the discovery, especially as there was no evidence that the patentee had abused his monopoly. It was said that if a licence were granted it might lead to research into medicinal inventions ceasing altogether because the persons undertaking research would fear that compulsory licensees would 'suck the blood out of such research without themselves carrying out any research at all.'

This argument was rejected. The Assistan Comptroller pointed out that British law was a compromise between the laws of some countries which would not permit any patents at all in relation to food and medicine, and other countries which granted such patents without condition. The patentee was in fact protected by the power of the Comptroller to impose terms which would give him a fair return for his labour. Further he pointed out that some scientific research is carried out without any hope of financial advantage and referred to the work of Sir Alexander Fleming in relation to penicillin. It was therefore not to be expected that the grant of compulsory licences would lead to a complete cessation of research.

(2) The argument was advanced that the patentees and their licensees would be able to supply all the United Kingdom demand. There was also a rather inconclusive dispute as to who would be able to sell at the lower price. It was decided that a second source of so important a drug was desirable.

(3) In the *Glaxo* case it was objected that the applicants would not be able to manufacture commercially for a considerable time.

[turn to next page

Foods, Drugs & Water

A COURSE on the chemistry and microscopy of food, drugs and water, consisting of lectures and practical work based on the syllabus for the examinations leading to the diploma of the Royal Institute of Chemistry, will be held in the Department of Chemistry, Chelsea Polytechnic, Manresa Road, London SW3. The course will extend over two complete sessions. The first year (Tuesdays and Thursdays, 6 to 9 p.m.) will commence on 25 September.

Enrolment for first year students will take place on 19 September, from 6 to 8 p.m. The course fee for each session is £4 4s, plus a laboratory fee of 5s and a registration fee of 3s.

Legal Studies—New Drugs

from previous page

This objection was unsuccessful.

(4) It was also objected in the Glaxo case, with a like lack of success, that it was undesirable to divert labour and materials to the erection of a new plant in wartime.

(5) A further objection in both cases was that the applicants had not shown that they were competent to exploit the invention. Developing this, Parke Davis & Co. said that they had a large store of unpublished information, which they were prepared to reveal to the medical profession, but not to compulsory licensees. Chloramphenicol was a potentially dangerous drug and it would not be safe to allow BDH to manufacture and distribute it without this information.

The Assistant Comptroller said that the answer to this point lay in the Penicillin Act. Chloramphenicol was covered by this Act and could not be obtained without a doctor's prescription. Were a doctor in doubt as to whether he should prescribe, he would consult the information which Parke Davis were prepared to make available to him before prescribing and there would thus be no danger.

(6) In the Glaxo case it was also objected that the applicants could not exploit the licence without infringing other patents, but this objection too was overruled.

In both these cases compulsory licences were ordered. It is probably no exaggeration to say that in all such cases licences will now be ordered, unless there are some very special reasons to the contrary.

US Uranium Developments

THE Texas Company and the New Jersey Zinc Company have announced the joint purchase of the Happy Jack Mine in Utah from the Bronson and Cooper Mining Company of Montecello, Utah. Substantial tonnages of uranium ore have already been blocked out in this mine. The companies have also announced the signing of a contract with the US Atomic Energy Commission for the construction and operation of a uranium processing mill. This is to be built by the Texas Zinc Minerals Corporation at Mexican Hat, Utah, near the San Juan River, on land leased from the Navajo Indian tribe. Under the contract, the uranium concentrate produced at the mill will be sold to the Atomic Energy Commission on a per unit price basis. Construction of the processing mill is scheduled to be completed in September 1957. Texas Zinc Minerals has been licensed by the Atomic Energy Commission as a buyer of uranium ore from other sources.

Turbo-Drill Tests

TESTS with a turbo-drilling system, in which the bit is rotated by a turbine, will be carried out in the Netherlands this month in an exploration well at the western boundary of the Schoonebeek oilfield in the province of Drenthe. The operating company is NAM in which Shell and Standard Oil of New Jersey participate equally. Drilling operations with conventional equipment were started recently and are expected to have reached a depth of 1,300 metres by the end of July. The turbo-drill will be used for penetrating the hard formation below this depth, a bunter sandstone series, 1,000 metres thick. Drilling progress largely depends on the correct combination of the rate at which the mud is pumped downwards and the force with which the apparatus presses on the bottom of the well. It is expected that in hard layers progress with the turbo-drilling system will be very much more rapid than with the normal drilling system. This may result in considerable economies. Moreover, directional drilling, deflecting from the vertical, is much easier with the turbo-drill than with a conventional rig.

MR. SYDNEY SHAW, of 10 The Crescent, Hipperholme, a director of Bradford Dyers' Association, left £24,157 (net £23,845, duty £3,580).

Indian Newsletter

by Our Own Correspondent

THE Government of India has already received a preliminary project report on the Neiveli lignite project prepared by the UK consultants and it is currently being examined. It is learnt that if considered necessary a detailed report will be called for in the light of the work on the project.

The Union Minister for Production, Government of India, said that the investigation of the Neiveli lignite project was nearing the final phase. With 19 or 20 pumps working, they had been able to bring down the water level to about 205 feet. They had to bring down the level to about 250 or 260 feet, in order to make large-scale mining safe. The project administration would add nine more pumps. In all, there would be 30 pumps working very soon. All the pumps would go into action by the middle or end of next month. There was every reason to expect that the water level could be brought down to about 230 feet. The Government of India proposed to spend about Rs700 million (£52.5 million) initially during the Second Five-Year Plan for this project. This included a thermal station with 2,110,000 kW capacity, a fertiliser plant and carbonising unit. They hoped to start actual mining of lignite by the end of 1959.

New Plant for Aluminium

The Government of India is at present investigating the possibilities of establishing a Rs100 million (£7.5 million) aluminium plant in the public sector in Salem district, Madras State. The Union Minister for Industries and Commerce conferred with the Chief Minister of the Madras Government regarding this proposal. The proposed plant would be in the public sector and its annual output was expected to be of the order of about 10,000 tons. Two American experts had seen the site and had selected a particular area in Mettur. These experts had asked for samples of 500 lb. of bauxite taken from five different places and these samples are to be sent to America for the necessary test.

It has been decided to locate the Nangal fertiliser-cum-heavy water factory on the right or western bank of the river Sutlej, opposite to the Nangal township. Formal

acquisition proceedings in respect of 1,360 acres of land required for the factory have been started. The selected area has already been demarcated.

The processes for manufacturing nitrogen and heavy water will be settled in consultation with the technical consultants, who are likely to be engaged by next autumn. The annual production capacity of the Nangal factory is expected to be a minimum of 70,000 tons of fixed nitrogen and 14 tons of heavy water. The factory is one of the three new fertiliser projects included in the Second Five Year Plan. The other two factories will be located at Rourkela in Orissa and at Neiveli.

Further Reports

A preliminary project report for the Nangal project has been received from one of the three firms who were asked some time ago to prepare such reports. Reports from the other two firms are awaited.

A private limited company, completely owned by the Government of India, was formed early this year to look after the execution of the Nangal project. A hostel for the project staff is to be built on about 3½ acres of land in the existing Nangal township transferred by the Bhakra authorities. It is expected to be ready for occupation by the end of September.

A new fertiliser factory, a British venture, to manufacture superphosphates will be established at Avadi near Madras. It is expected to go into production in December and will turn out 33,000 tons a year.

A new sugar factory is to be established by Cauvery Sugars & Chemicals Ltd. at Pettavayalai, Trichinopoly District, and will initially be equipped to crush 800 to 850 tons of cane per day and should be able to produce in a normal year 15,000 tons of sugar. Sufficient labour is available in the locality, and adequate power supply and transport facilities are also available. Steps are being taken to order the necessary machinery from The Mirrlees Watson Company Ltd. of Glasgow, who are arranging for sub-contractors to manufacture some items in India.



From all Quarters



Pharmaceutical Factory

The Argentine Ministry of Finance has announced that it has approved a proposal submitted by Eli Lilly International of Indiana to establish a modern factory to produce a complete line of pharmaceutical products. These were previously imported. Production is expected to begin in the near future.

Aden Refinery Output

The British Petroleum Co. reports that in the two years that the Aden refinery has been in operation it has refined 8.5 million tons of crude oil. The refinery's original housing scheme is almost completed and work is expected to start at the end of the year on a £1 million scheme to provide further accommodation.

BC Aluminium Sulphate Plant

Nichols Chemicals Ltd., a wholly-owned subsidiary of Allied Chemical & Dye Corp., of the US, has announced plans for construction of an aluminium sulphate plant in British Columbia, the first such unit in Western Canada. The plant, which will be located at the company's British Columbia works in Barnet, BC, is expected to be in operation late in 1956.

Norway to Export Cement

Until recently Norway had to import nearly 100,000 tons of cement a year. Now, she has increased production in this field so considerably that a surplus is available for export. The first consignment of 7,000 tons of cement was to be shipped to Canada this week. The cement industry in Norway aims to export a total of 50,000 tons by the end of 1956. Output now stands at almost one million tons a year, and consumption at about 900,000 tons.

Swedish Chemical Pulp

Sweden's production of chemical pulp in 1955 totalled three million metric tons, compared with 2.8 million in 1954. Exports, the highest since the war, reached 1.91 million tons (1.8 million in 1954). Twenty-nine per cent of these exports went to Britain, 12 per cent to France, and about 11½ per cent to West Germany.

Swiss Foreign Trade

Switzerland's imports of instruments and apparatus in 1955 amounted to Sfr 186 million, compared with Sfr 168 million in 1954. Imports of raw chemicals were Sfr 60 million, against Sfr 50 million the previous year. Exports of pharmaceuticals totalled Sfr 405 million, against Sfr 382 million in 1954; exports of aniline dyes were Sfr 270 million compared with Sfr 296 million, and exports of chemicals for industrial use totalled Sfr 152 million against Sfr 128 million.

Tanganyika Pyrethrum Production

The Tanganyika Farmers' Association announces that during May 61,845 lb. of pyrethrum flowers were delivered to the Association in the Northern Province compared with 106,139 lb. in April.

Kenya Pyrethrum Production Up

Kenya's pyrethrum production for the first five months of this year was 1,763 tons compared with 1,186 tons in the corresponding period of last year. Between 1 May and 21 June, 391 tons were produced, compared with 166 tons for the similar period last year. The planting of new acreages is well up to date and it is still expected that the acreage under pyrethrum will be 20 per cent up on last year's total.

Zytel Resin for Canada

Du Pont Co. of Canada Ltd. announces plans to manufacture Zytel nylon resin in Canada. Zytel is a moulding powder which is the plastic equivalent of nylon fibre and is used in the manufacture of mechanical parts such as gears and bearings. It can be produced in distinct grades with varying degrees of strength, rigidity, impact resistance and heat resistance. Installation will begin immediately at Du Pont of Canada's Kingston, Ontario, nylon yarn plant and initial production is expected early in 1957. The resin has previously been imported from the US. The plant will have adequate capacity to meet all Canadian requirements in the foreseeable future.

Estimation of Gallium & Germanium

Second of Two Papers Presented to Midlands SAC

BECAUSE of an interest at Harwell in the use of gallium as an alloying constituent with uranium, said Mr. Milner, there had developed a need for the determination of this metal in the presence of uranium. Important improvements had taken place subsequently in gravimetric and volumetric methods for the determination of milligram amounts of gallium. More recently, absorptiometric procedures for the determination of microgram quantities of this constituent had been reported. He proposed to consider these developments in some detail.

A prior requisite of methods for the analytical determination of gallium was a selective procedure for separating the metal from other constituents. Gallium readily formed stable complexes that were soluble in organic solvents. This fact had been used as the basis of separating gallium from many other elements. Attention was turned to the ready solubility of gallium chloride in diethyl ether. Difficulty was encountered immediately owing to possible losses of gallium by evaporation if the metal was attacked directly with hydrochloric acid. This was overcome by solution of the metal in sulphuric acid with a minimum of nitric acid followed by the addition of an excess of ammonium chloride.

Organic Solvents Investigated

Many organic solvents were investigated in developing a procedure for separation of the gallium, and the experiments were extended to include the extraction of gallium bromide and iodide in addition to gallium chloride. By means of a radioactive tracer technique, it was shown that gallium chloride was more readily extracted by organic solvents than either the bromide or iodide. Furthermore, it became clear that certain ketones were just as efficient as diethyl ether for the quantitative extraction of gallium chloride and that they were less affected by variations in the solution conditions, such as the final concentrations of sulphuric acid and ammonium chloride.

In the analysis of uranium-gallium mixtures, however, the ketone extractions proved to be less selective than the diethyl ether extraction. The gallium could be recovered from the combined diethyl ether extracts by

Last week the first article in this series dealt with the analytical chemistry of germanium. This week, Mr. G. W. C. Milner, M.Sc., F.R.I.C., A.Inst.P. (AERE, Harwell), considers some aspects of the analytical chemistry of gallium. The papers on which this series is based were read at the February meeting of the Midlands Section, Society for Analytical Chemistry, held in the University, Edmund Street, Birmingham.

evaporation or by re-extraction into water.

The Japanese worker Ato had used camphoric acid in the gravimetric determination of gallium. The metal was precipitated from solution as gallium camphorate, $\text{Ga}_2[\text{C}_8\text{H}_{14}(\text{CO}_2)_2]_3$, which was in turn ignited to the oxide. The main objection to this procedure was that gallium oxide appeared to be very hygroscopic unless the ignition was carried out at a temperature of 1200°C. Hence, Mr. Milner and his co-workers had attempted to complete the determination by weighing the gallium camphorate directly.

The incomplete precipitation of gallium in the preliminary investigations under Ato's conditions was traced to a lack of control of the pH. Further experiments showed the precipitation of camphorate to be complete only over the pH range 3.1-4.0 using ammonium acetate-acetic acid buffers. However, attempts to filter the precipitates produced under these conditions failed completely until a sodium formate-formic acid buffer was used instead. This resulted in the formation of a coarser type of precipitate. Contamination of the gallium camphorate with sodium salts was eliminated by precipitating from a buffer of pH 3.3, and interference from ferric iron was removed by a preliminary reduction with hydroxylamine hydrochloride.

On applying Ato's conversion factor of 0.189 to the camphorate precipitates, the gallium recoveries were consistently low. A detailed examination of the results revealed that the factor should be 0.213, and this value was confirmed subsequently from a thermolysis curve for the precipitate. Analysis of the gallium camphorate showed the empirical formula to be $\text{GaC}_{12}\text{H}_{18}\text{O}_6$, so that the previously proposed composition

Estimation of Gallium

must be incorrect. X-ray studies would probably be necessary before the exact structural formula of the precipitate was established.

The determination of amounts of extracted gallium less than three mg. was more satisfactorily completed by a potassium ferrocyanide titration with 3:3'-dimethylnaphthidine as indicator. Under the conditions outlined by Belcher for the determination of small amounts of gallium in organic compounds with this indicator, low recoveries were obtained owing to the difficulty of end-point detection. An investigation of the titration conditions showed that recoveries were good for concentrations of gallium from about 0.3 to 3.6 mg. if the pH of the aqueous solutions following the diethyl ether extraction was first adjusted to a value of 2.2-2.5

More Indeterminate

The end-point became progressively more indeterminate for amounts of gallium greater than two mg. owing to the rapid re-oxidation of the indicator. This effect was suppressed by the addition of a larger volume of absolute ethanol. No interference was encountered in the extraction-volumetric procedure from similar amounts of U, Fe, V, Cu, Zn, Cd, Pb, and Al to the gallium present.

During the development of volumetric procedures using ethylene-diaminetetraacetic (EDTA), it was observed that gallium formed a stable complex with EDTA, which could be employed for the volumetric determination of the gallium. A satisfactory procedure was formulated in which the coloured lake produced by gallium with galloxyanine was used to show the end-point of the titration. The discharge of the blue colour corresponding to the complete titration of gallium with EDTA could best be seen in solutions in the pH range 2.5-3.0.

The EDTA titration was much quicker than the gravimetric method in which camphoric acid was used, since it avoided the need for the preliminary separation of the gallium. The procedure could be applied, however, after the separation of the gallium by ether extraction. It was suitable at all concentrations of gallium from 0.25 to 50 mg.

Microgram amounts of gallium in the

range five to 50 μg . could be determined absorptiometrically by forming its complex with 8-hydroxyquinoline and extracting this complex into chloroform. The complex was best formed and extracted from solutions in the pH range 2.8-3.0, and a wavelength of 390 $m\mu$ was used for the absorbancy measurements. Unfortunately, this procedure was not very specific for gallium because several other elements including Fe, Cu, V, Al, Mo, Sn and Ge formed chloroform-soluble oxinates under the same pH conditions.

In applied analysis, however, the gallium could be separated first from some of these elements by an ether extraction from hydrochloric acid media under reducing conditions so as to prevent to a great extent any extraction of iron. Although the gallium could be back-extracted into water from the combined ether layers, a more useful method in this determination involved allowing the ether to evaporate off in the normal draught of an efficient fume cupboard.

Another absorptiometric method for the determination of microgram quantities of gallium, and one which could be extended to the determination of fractions of a microgram by using a fluorimeter, had been reported recently by Onishi and Sandell. This method was based on the reddish-violet complex formed by gallium in hydrochloric acid solutions with rhodamine B which was extracted into benzene. It was claimed that this reaction, in conjunction with the ether extraction of gallium for its initial separation from many other elements, provided a rapid, sensitive and specific method for the determination of traces of gallium.

Optimum Acid Concentration

The optimum hydrochloric acid concentration for the extraction of rhodamine B chlorogallate by benzene was close to 6.0 M. but unfortunately the extraction coefficient was not very high. Since approximately one half of the gallium remained in the aqueous phase, it was clear that the only way of using the method involved control of the volumes of the aqueous phase as well as of the organic phase and shaking up so that equilibrium conditions were established. Of the elements that were extracted with ether along with the gallium, none formed a complex with rhodamine B, and consequently this method would appear to be more specific than the oxine procedure.

Austrian Chemical Industry

DURING 1955 production of the Austrian chemical industry (700 enterprises) reached A.Sch. 5,860 million, 18 per cent above the preceding year. The rise was particularly noticeable in fertilisers (production of which increased from 568 thousand metric tons in 1954 to 635 thousand in 1955), staple fibre (from 36,700 to 39,600 metric tons) and plastics and plastic goods (from 9,800 to 14,600 metric tons).

Exports reached 436 thousand metric tons valued at A.Sch. 1,270 million, 10 per cent over 1954. Indirect exports, which are also important, are not included in these figures. Imports, mainly from West Germany, amounted to 587 thousand metric tons valued at A.Sch. 2,790 million a slight decrease in volume and increase in value.

Estimation of Gallium

from previous page

It was recommended by one of the audience that morin was a useful indicator for the direct titration of small amounts of gallium with EDTA, it giving a sharper end-point than that with galloxyanine. A slide depicting results for the direct titration of gallium with EDTA had shown the errors (positive) in the recovery of quantities of gallium less than one mg. to be quite appreciable. Dr. T. S. West wondered if this could be explained in terms of the strong competition under such conditions between the EDTA and the fairly large amount of galloxyanine indicator (5 drops) employed in the titration.

An enquiry from Dr. R. Belcher concerned the selectivity of the gravimetric procedure for gallium using camphoric acid. In his reply, Mr. Milner said that this had not been studied exhaustively, but certainly iron did not interfere under the conditions formulated. No answer could be given to the question as to why gallium chloride was more readily extracted in practice by organic solvents than either the bromide or iodide when from theoretical considerations one might expect the reverse to apply.

Atomic Research Facts

Representatives from India, Burma, Ceylon, Indonesia and Egypt met in Bombay on 23 July to evolve a common policy for closer co-operation in research and development on atomic energy. The conference has been sponsored by the India Government.

'Smaller Order Book'

A CHEMICAL engineering department order book 'somewhat smaller than that achieved in 1954' was reported by Dr. R. J. S. Seligman, chairman of the APV Co. Ltd. at the annual meeting on 25 July. The chemical engineering department had been reorganised and an industrial sales department formed. Dr. Seligman continued: 'The reorganisation makes it very different to form a reliable picture of what the current year offers. It can be said, however, that the bulked orders received to date are at a higher rate than those of 1955, though much below what it is hoped they will ultimately reach'.

Dr. Seligman pointed out that the company was faced with intensified competition in all its markets at home and abroad. Profit on trading was £577,932 compared with £519,107; profit-sharing bonus was £40,574 and the parent company's turnover in 1955 was £3,968,000 compared with £3,715,000.

The chairman referred to 'the unfortunate stoppage which has taken place during the current year and its very serious effect on the prosperity of the company and all who are connected with it. The loss of orders and the actual expenditure involved must affect the results of the current year.' Dividend of 10 per cent for the year was approved.

Test Rig for Micro-Filters

A special rig for the testing of micro-filters for use in the BP Aviation Fuelling Service has been commissioned at the company's research station at Sunbury-on-Thames. In recent years BP has carried out extensive research into the problem of micronic filtration, particularly in connection with the fuelling of aircraft, and laboratory tests have been made on many materials. The new rig, which can simulate flow rates experienced in practice, will facilitate these tests.

Loan Agreement Signed

The German Potash Loan agreement was signed on 1 August to become effective on 15 August it was announced recently in London by Sir Bernhard Binder, presiding at a meeting of the Potash Syndicate of Germany's 25-year Sinking Fund Gold Loan. The meeting approved the offer made on 11 February 1954 by the Syndicate and certain of the guarantors of the loan.

Industry's 'Booby Traps'

NATIONAL industrial safety week, organised by the Royal Society for the Prevention of Accidents, will be held from 5-10 November. The Society states that the need for constant effort on the part of those concerned with accident prevention is shown only too clearly by the latest available figures relating to industrial accidents:— Nearly 185,000 injured every year in factories and workplaces, and three persons killed every working day.

On the economic side, the loss to industry as a result of accidents amounts to no less than 20 million man-days a year.

Object of the industrial safety campaign is to encourage all workers to cultivate safe habits in working so that neither they nor their workmates are subjected to unnecessary hazards. During the launching week of the campaign, workers in every factory throughout the country will be invited by means of special posters and other propaganda to 'Look Out For Booby Traps'—the collective name adopted for hazards that range from defective tools to careless behaviour.

During the safety week—and after—managements are asked to keep the booby trap slogan before their workers and to do everything possible to encourage safe working.

In addition, the 50 or so local industrial accident prevention groups in the United Kingdom will be organising special functions in connection with the campaign.

Canadians at French Exhibition

The Canadian chemical industry is reported to be exploring the possibilities of the French market and, under the auspices of the Canadian Department of Trade & Commerce, is organising a joint display of chemicals, synthetic rubbers and chemical pulps at the IVth Chemical, Rubber & Plastics Exhibition to be held at the Parc des Expositions, Porte de Versailles, from 22 November to 3 December.

Bung Key

The 'Fit All' bung key, produced by G. W. Steele & Co., Fountain Road, Hull, is stated to fit any filler bung or tap plug in drums of British, American or Continental manufacture and to remove or tighten any bung without damage. Constructed as one tool in drop forged chrome molybdenum steel, it weighs 4½ lb. and is 18 in. long.

Profit from Plastics

'THE WHOLE of this year's profits are attributable to the security and plastics divisions', said Mr. B. C. Westall, chairman of Thomas De La Rue & Co. Ltd., at the company's 59th annual meeting on 25 July.

He continued: 'in the plastics division there has been a substantial increase in sales of Formica and Delaron laminated plastics. Last year I reported that the price of Formica products had been reduced by 10 per cent. The hopes I then expressed that the profits would be maintained by an expansion of turnover have not only been fulfilled but, by reducing waste and making strict economies, the factory has made a considerable contribution towards this increase in profits.

'Another encouraging sign is the increasing success of the plastics manufacturing units in France, Germany, Spain and Italy from which we may expect a reasonable contribution to the company's profits during the current year. Since the close of the year, arrangements have been made to erect a factory for the manufacture of our plastics products in Australia. It will be two or three years before this factory can operate. There is a considerable field for us in the general export market.

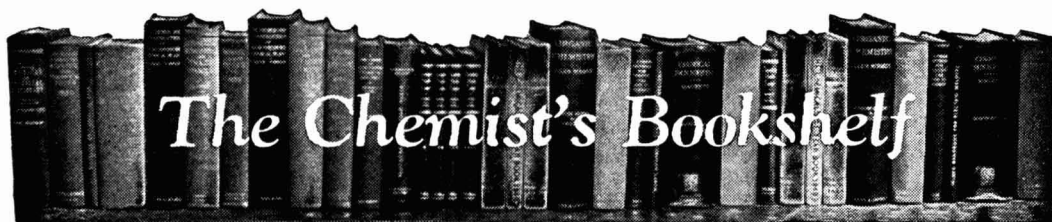
'During the year steady progress was made in the expansion of Delaron. We have successfully introduced a copperclad grade of Delaron laminate.

'A considerable sum has been spent on research and development covering all divisions. By divising new and more economical methods of production it is probable that some of our plant and machinery may be rendered obsolete or semi-obsolete more rapidly than provided for.'

A final dividend on the ordinary stock of 20 per cent, less tax, was approved. The meeting also approved a special resolution increasing the authorised capital of the company by £1 million. Trading profit was £899,807.

Dounreay Power Station

The third and final phase of the Dounreay atomic power station was scheduled to begin on 1 January, said Mr. T. A. Parry, works manager, on 23 July. On that date, he said, they were due to take over and start up large sections of the chemical group, as well as the main administration block and workshops.



ESSENTIALS OF QUANTITATIVE ANALYSIS:
AN INTRODUCTION TO THE BASIC UNIT
OPERATIONS. By A. A. Benedetti-Pichler:
The Ronald Press Company, New York.
1956. Pp. xiv+666. \$15.

Many years ago Lachmann's *Spirit of Organic Chemistry* was included among the recommended reading of students. The reviewer feels, although of course for quite unrelated reasons, that an appropriate title for this work by Professor Benedetti-Pichler would be *The Spirit of Analytical Chemistry*, and it is some time since he has met a general textbook on analytical chemistry which he could regard with the same whole-hearted approval.

Different Approach

This results from the fact that the author has, in many ways, cut completely loose from the accepted textbook treatment of analytical chemistry, in a way that has probably not been done since the publication of T. B. Smith's equally stimulating and fundamental work, *Analytical Processes*. Instead of dealing seriatim with all the many techniques now utilised by the analytical chemist, from the oldest to the newest, Benedetti-Pichler has broken down the various methods into a series of unit operations. These can then be treated under headings that bring together, in some cases for the first time, methods normally considered to be quite unrelated.

Broadly speaking, the first half (or rather more) of the book presents the whole field of analytical chemistry under three headings, measurement, preliminary operations, and analytical operations. The second part of the book gives an experimental course suitable for study according to the principles given in the first part. The unification of material can be well illustrated by instancing two of the sub-headings in the theoretical section. Under measurement we find determination of equivalence, which includes both electrical equivalence (coulometry) and

chemical equivalence (titrimetry). The latter, in turn, enables all the techniques of titration to be considered side by side, no matter what the indicating signal for the end-point may be. Again, under analytical procedures we find three sub-headings, (1) the sample for analysis, (2) establishment of separable phases, (3) mechanical separation of phases. A moment's thought will confirm that essentially these are all the analytical operations, and that a whole variety of procedures, filtration, extraction, sublimation etc., should be regarded as related operations.

Any reader familiar with the earlier work of Benedetti-Pichler will expect the treatment to be thorough, and firmly based on valuable practical detail, quite apart from its stimulating theoretical treatment. Such a reader will not be disappointed. On page after page even an experienced worker will find information with which he may be familiar through the hard school of experience, but which he will not have seen in print before.

The book, it should be remembered, is self-styled an introduction. It starts with the assumption that the reader may have no acquaintance with analytical chemistry as such. But it will take the newcomer further on the road to becoming a complete analytical chemist than any other work of comparable size known to the reviewer.

Conventional Avoided

The book is particularly impressive in the way in which it avoids the conventional segregation of physical chemistry. Benedetti-Pichler assumes that the reader has a solid chemical background. The physical chemistry which he introduces is the physicochemical treatment of analytical processes, rather than patches of physical chemistry which may be useful in analysis. In other words, he has everywhere successfully integrated the physicochemical treatment with the main theme; nowhere is there that undesirable

inducement to skip what appears to be an irrelevant interpolation.

It is greatly to be regretted that the rate of exchange will unfortunately place this book outside the financial reach of the average student. Every student of chemistry should be thoroughly familiar with it. And since it is fully documented with references and bibliographies, every practising analytical chemist will find it of continuing value.—CECIL L. WILSON.

CHEMICAL ENGINEERING PRACTICE. Edited by H. W. Cremer and T. Davies. Vol. I—GENERAL, Pp. xiv+494, and Vol. II—OPERATIONS AND PROCESS INVOLVING SOLID SYSTEMS (Part I), Pp. 632. Butterworths Scientific Publications, London; Academic Press Inc., New York, 1956. 95s per volume.

Occasionally a reviewer's lot is made even more pleasant than usual. Here is a notable example—the first two volumes of a 12-volume treatise on the theory, practice and scope of chemical engineering. A work of this nature has long been overdue. Perhaps it will help to answer that aggravating question 'What *is* chemical engineering?' As the editors point out, the subject, apart from being associated with applied chemistry, is concerned essentially with applied physics. It will be evident to readers of these volumes that the boundaries of chemical engineering lie far beyond the chemical industry. The subject matter of the whole work is to be classified on the physico-chemical principles underlying the various operations involved, and not on the familiar 'unit operations' basis.

Volume I deals with a number of introductory subjects such as the origin of chemical engineering, and the training and functions of the chemical engineer. Other topics include: investigation and development of industrial processes (the use of materials and energy balances), pilot plant design and operation, and preparation of flow diagrams.

Volume II deals with the physics, chemistry and metallurgy of solid systems, including the following subjects: metals and alloys, corrosion, plastics and glasses, powder metallurgy, porous masses and their industrial uses, and transpiration cooling.

One small criticism concerns the statement (Vol. I, p. 329) that the minimum effective liquid rate (m.e.l.r.) in a packed column refers to the minimum liquid load required

for *complete* wetting of the packing. There has been enough work published on this subject to show that a packing is rarely, if ever, completely wetted, even near its loading point; m.e.l.r. means, quite simply, the liquid rate below which a packing ceases to function efficiently. It is some consolation, however, that the authors use the term m.e.l.r. rather than that complete misnomer m.w.r. (minimum wetting rate).

A list of contents for the remaining 10 volumes is also included and it is strange, in view of the wide range of topics discussed (for example, a section on wave mechanics in Vol. I), that no reference is made to statistics. The editors, quite rightly, have refused to be bound to conventional limits regarding the choice of subject matter, so this omission is quite surprising. A chemical engineer does not have to be a statistician but he must, surely, be acquainted with the simpler methods and applications of statistical analysis.

Attractive Binding

The volumes are attractively bound and add grace to any bookshelf. The printing is clear throughout, and only one typographical error was noted (Vol. 2, p. 616, eqn. (8)—the term in parentheses should read $G_{cc,t}/K$). The indexing is first class, and the continuity and blending of the various authors' styles bears evidence of meticulous editorship.

Considering the value of these two volumes, the price is moderate and the treatise should be a necessary acquisition for libraries, teaching establishments and industrial concerns. The editors and publishers are to be warmly congratulated on their foresight and diligence. Publication of the remaining 10 volumes will be eagerly awaited.—J. W. MULLIN.

Israeli Oil

Production tests at Heletz III, Israel, indicate that its output will be about the same as that of Heletz I. Some 6,000 tons of oil have so far come out of Heletz I at a rate of 260 barrels a day. This oil will be refined in Haifa when a quantity of 10,000 tons is available for processing. A second oil layer has been struck at Heletz V. It was discovered at a depth of 5,000 ft. and is similar to the layers found at Heletz I and II.

Safety Notebook

THE eight victims who perished in the disastrous mill fire at Keighley last February have not died in vain. It will be recalled that, at the subsequent inquest, the jury added to their verdict a recommendation that an adequate fire warning system should be installed in every factory and workshop.

This subject has been debated in Parliament; the Ministry of Labour and National Service is taking special and very active steps with the object of ensuring that occupiers whose premises are within the scope of the above-quoted section of the Factories Act, 1937 are complying with its requirements. (THE CHEMICAL AGE, 14 and 21 July).

As regards the chemical industry, while the managements of many works have wisely not waited until the Keighley tragedy made the need for effective fire alarm installations such a live issue, it is earnestly hoped that those who have not yet thus protected their staffs and establishments will take the earliest opportunity to do so. This irrespective of whether or not they are subject to statutory obligation to make these arrangements.

Fire Brigade Advice

When considering the introduction of fire warnings, the effectiveness of existing systems, or indeed any aspect of the wide range of works fire safety, escape, prevention or extinction, it cannot be stressed too strongly that the advice of the local fire brigade should be sought. This is one of its present-day functions and the courteous guidance of the specialist officers in its fire prevention department is invaluable. There is no need to emphasise here that some apparatus which would be certain to function in most factories could not be relied on in chemical works as atmospheric and other conditions might cause corrosion. The fire brigade would advise as to suitability, or whether certain parts of the system would require specially coated or plated protection from injurious vapours and so forth.

It should be noted that in premises where section 36 (7) of the Factories Act, 1937 applies, it is not sufficient to acquire an effective

'Where in any factory more than 20 persons are employed in the same building, or explosive or highly inflammable materials are stored or used in any building in which persons are employed, effective provision shall be made for giving warning in case of fire, which shall be clearly audible throughout the building. Factories Act, 1937, Section 36 (7).

fire-warning system, but it must be one 'which shall be clearly audible throughout the building'. This may present no easy task for the fire protection engineers in works crowded with noisy machinery or where there is the roar of crushing processes. The factory inspectorate, like the fire brigade, can be very helpful in these matters.

In deciding upon an automatic fire alarm system, there is a third direction to which the works management should turn—that is if it is desired to obtain the substantial discounts from the fire insurance premium possible because of such installations. To do so the latter must comply with the *Rules of the Fire Offices' Committee for Automatic Fire Alarm Installations*, the insured furnishing a certificate of installation in precise terms prescribed by the FOC. Among its many clauses there are details of the system, a declaration that the FOC's latest rules have been complied with, and of willingness to carry out any requirements of the Committee's insurance offices. Particulars of fire extinguishing appliances kept on the premises must be stated, and the installing engineers have to give a signed undertaking as to maintenance, tests, reports and certificates.

If a reduced insurance premium is to be the governing factor, early consultation with the appropriate fire insurance office is important. This is because, at the time of writing, there are, undoubtedly, some extremely effective automatic fire warning systems which have not received FOC recognition. The approved list of well-tried apparatus was compiled several years ago.

As the primary function of an insurance

company is, of course, to 'cover' the property of its insured against financial loss in case of fire, etc., it is to be expected that the provision of even the most effective automatic warning system will not alone secure premium discounts. These are governed by how the alarm will be delivered to a possible source of help, how it will be received and dealt with, and particularly what will be the nature of the response. The FOC grades installations into classes A, B, and C according to the type of fire-fighting service facilities normally on call.

The Fire Offices' Committee Fire Protection Association, 15 Queen Street, London EC4 has published a clearly written brief technical information sheet (TIS. 2002) entitled *Fire Alarm Systems in Buildings*. The subject is dealt with in considerably more detail in *British Standard Code of Practice CP 327.404.402.501 (1951) Electrical Fire Alarms*, published by the British Standards Institution, 2 Park Street, London W1 (price 5s).

Fire-warning systems are either manually-operated (non-electrical) or electrical (manually-operated or automatic).

There are four disadvantages with any manually-operated system. These are: (1) It can only function when the premises are occupied. (2) It depends on the fallible human element which may fail in an emergency through forgetfulness, panic or impossible approach to the point where the alarm must be sounded. (3) It will warn only a limited area, especially if the works are noisy. (4) It may not be heard at the position in, or near, the affected building from which the fire brigade would be summoned.

Distinct Method Needed

In the category of manually-operated warning systems may be placed gongs, 'triangles', whistles, bells rung by hand or rope, 'sounders' (metal devices to be struck by a hammer stowed alongside), and by hand-operated syrens. The last named are, however, out of the question if a syren is used for other purposes in the works, or if the local fire brigade unit is called by syren.

It is hazardous for any works to rely for its fire warning system on the public-address installation, the establishment's hooter, or the stopping of the engine. Some absolutely distinct method must be adopted. Moreover, its signal by sound and/or light must be clearly understood and acted upon by all concerned.

FIRE ALARMS

Electrical fire-warning systems are of two main types—those which have to be actuated by somebody, and the automatic.

In the first category may be placed simple alarm bell systems with the pushes wired in parallel. Comprehensive installations of this kind have glass-fronted alarms and an indicator board at some strategic point to which all the circuits terminate. Here, and maybe elsewhere, the alarm is sounded and the fall of a shutter or drop indicator shows where the fire is situated. This board is located in the watchman's office, the porter's lodge or in a works fire station, if continually manned.

Mention must also be made of the use of a works inter-communication system for fire alarm purposes; and, between some industrial and other premises where there are exceptional risks there are special 'fire telephones'.

Automatic Installations

Automatic fire alarm installations, and particularly those which transmit an alarm to a fire station as well as warning the occupants of a building or buildings, are ideal methods for notification of fire. Following is an authoritative pronouncement about them. It is an extract from *Post-War Building Studies No. 29, Fire Grading of Buildings, Part II, Fire Fighting Equipment* (HM Stationery Office, 1952):

'Automatic fire alarm systems have an obvious advantage because they do not depend on the presence of personnel to operate them. They are designed to give automatically a signal of the outbreak of a fire and then should transmit a signal, to a place whence help (that of a public fire service of a private fire brigade or other staff organisation) may be forthcoming.

'Buildings may be equipped with both automatic sprinklers and automatic fire alarms. A small outbreak of fire may sometimes be detected and notified by the fire alarm early enough to enable help to be brought to the scene and to extinguish the fire before it reaches the stage at which the sprinkler system comes into operation; in any case an automatic fire alarm system with a brigade connection provides a means of summoning personnel to control extinguishment by the sprinkler.

CONSIDERED

The foregoing reference to sprinklers is a reminder that although the uninitiated may regard them, and other types of automatic projector of water, carbon dioxide, foam etc., as systems for extinguishing fire when at a very early stage, or for limiting it until further apparatus can be got to work, they perform another vital function. This gives them a high place in any consideration of automatic fire alarm systems because, when a head or projector, begins to operate, prompt, loud and continuous warning is given.

Precautions Against Corrosion

In a chemical works where possibly corrosion could menace the struts of sprinkler-heads, it is practicable to counter this by means of plating, coating or enclosure—together with constant inspection; but by far the safest method is to fit quartzoid or silica bulbs. These are immune from corrosion. Essential metal parts can be specially treated.

In the BSI *Code of Practice* already referred to there are two important points to bear in mind when planning any electrical alarm system: Its power must be independent of the mains' supply; and wiring shall be enclosed in conduit, or protected to an equivalent standard. All electrical fire alarm systems should be tested daily and examined thoroughly by the installation engineers at least quarterly.

Automatic fire alarm systems in the heat-sensitive category and operating on the 'thermostat' principle are of three main types in Britain. Approved by the Fire Offices' Committee, they are the 'May-Oatway', 'National Tubular' and 'Pearson'. There are still some of a fourth type—the

'Aero'—in principle somewhat similar to the 'National Tubular', but under FOC rules, no allowance is made for them if erected after 13 May 1929.

Heat-sensitive detectors, fitted to the ceilings in every part of a building, are set to operate under fire conditions at predetermined temperatures. Ingenious features are incorporated to cope with atmospheric variations of a non-emergency nature.

There are several quite excellent automatic fire detection systems and at least two types of automatic smoke detector. One of these utilises the principle of interruption of a beam of light, or infra-red ray, which falls on a photo-electric cell. The other will give the alarm because of the effect of smoke upon the electrical conductivity of the atmosphere.

Lastly, for small places, there is an ingenious self-contained automatic fire alarm. Hung on a nail or hook, it operates at a temperature of 125°F when the circular bell will emit a piercing warning for 75 seconds.

Refinery Explosion

Twenty-five people were reported killed in an explosion at an oil refinery at Dumas, Texas, on 29 July. The explosion occurred when refinery firemen and members of an emergency squad were trying to repair a safety valve. The first explosion was followed by a second and intense heat was generated.

All goods for consignment to The Permit Co. Ltd. at either Gunnersbury Avenue, London W4, or Commerce Road, Brentford, Middlesex, or Mortlake Road, Kew, Surrey, must, from 20 August, be consigned to the new works at Brentham Halt Road, Hanger Lane, Ealing, London W5. Goods stations are Willesden (MR) and Park Royal (WR).

Manufacturers' Agents for:

Importers of Produce from:

CHINA

M. D. EWART AND CO. LTD.

15 DEVONSHIRE ROW, BISHOPSGATE, LONDON, E.C.2.

Telephone: Bishopsgate 4333 (10 lines) Telex: London 8466 Telegrams and Cables: "Jasmine London"

Commercial Intelligence

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

Mortgages & Charges

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

BARCLAY & SONS LTD, London EC, chemical manufacturers etc.—2 July, deb., to Barclays Bank Ltd. securing all moneys due or to become due to the Bank; general charge. *Floating charge up to £25,000 and mortgage £5,000. 11 November 1955.

PINNACLE PLASTICS LTD. Hereford.—3 July, £5,200 debts.; general charge. *Nil. 11 June 1956.

WEED CONTROL LTD. Nottingham.—28 June, £1,000 (not ex.) charge, to Lloyds Bank Ltd.; charged on land known as Marshy Bottom Close, Nottingham Road, Radcliffe-on-Trent. *Nil. 14 April 1955.

Satisfactions

NORCO LTD. Birkenhead, manufacturers of oils etc.—Satisfactions 10 July, of two charges registered 23 August 1954.

POULTEN, SELFE & LEE LTD. Wickford, scientific glassware manufacturers.—Satisfaction 5 July, that part of property comprised in a charge registered 2 June 1948 (land in Russell Gardens, Wickford, with factory and store thereon), has been released from the charge.

Increases of Capital

H. M. LANGTON & Co. LTD. (376,320), chemical manufacturers etc., 8 Bloomsbury Square, London WC1, increased by £4,500 in £1 5 per cent cumulative preference shares, beyond the registered capital of £500.

WRIGHT, LAYMAN & UMNEY LTD. (265,864), 46 Southwark Street, London SE1, increased by £30,000 in £1 ordinary shares, beyond the registered capital of £340,000.

New Registration

Uclaf Ltd.

Private company (568,723). Registered 9 July. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in chemical products of all kinds, etc. The directors are: Pierre Beytout, 122 rue Lauriston, Paris XVIe, director of Uclaf Societe Anonyme; Stanley F. Shuttleworth, 73 Southway, London NW11; Stanley J. Baker, 47 Hayes Chase, West Wickham, Kent; Jacques G. Machizaud, 73 Oakwood Court, London W14; the last three named are directors of Roussel Laboratories Ltd. Secretary: R. H. Henriksen. Solicitors: Rowe & Maw, Stafford House, Norfolk Street, London WC2. Registered office: 845/7 Harrow Road, London NW10.

Company News

W. J. Bush & Co. Ltd.

A satisfactory increase in the turnover of the group is reported by W. J. Bush & Co. for the year ended 31 December 1955. Profit margins have, however, suffered as a result of more intensive competition and profit fell from £271,618 in 1954 to £245,339 in 1955. Turnover during the first five months of this year has been maintained, it is reported. The effect on trade of the credit squeeze in the United Kingdom and of restrictive measures imposed in many other parts of the world have not yet been fully felt. Present trends are by no means as favourable as have been experienced during recent years, however. During 1955 the company spent £144,449 on fixed assets at home and abroad. Full occupation of the new property at Isando near Johannesburg was achieved early in 1956. A final dividend

[turn to page 226.



Headaches from Emulsion breaking?

Sequestrol (ethylene diamine tetra-acetic acid Geigy) completely inhibits the action of polyvalent metal ions such as those of calcium, aluminium, iron, etc., which so often cause instability in oil-in-water emulsions. Also, by its solubilising action on many inorganic substances in aqueous suspension, Sequestrol can reduce the tendency to emulsion breaking by large particles. Enquiries are welcomed.

A pinch of
SEQUESTROL
may be the
answer.

THE GEIGY COMPANY LTD., Rhodes, Middleton



MANCHESTER

Company News

from page 224]

of 12½ per cent on the ordinary share capital was paid, making 15 per cent for the year. The 59th annual general meeting of the company was held in London on 27 July.

Johnson, Matthey & Co. Ltd.

'Once again I have the pleasure of reporting that your company has had a satisfactory trading year'. These words were spoken by Mr. Hay W. P. Matthey, chairman of Johnson, Matthey, at the company's annual general meeting on 25 July. Net profit for the year ended 31 March, after providing for taxation, was £760,997, compared with £769,372 for the preceding year. The gross manufacturing and trading profit attributable to the subsidiary companies is shown as £623,286. The figure for last year was £422,457. A final dividend of six per cent was recommended, which, with the interim dividend of three per cent paid in February, makes a total of nine per cent for the year.

Pinchin Johnson & Associates Ltd.

Consolidated profits of Pinchin Johnson & Associates Ltd., paint and enamel manufacturers, for the year ended 31 March 1956 increased from £1,902,580 to £1,956,738, after charges totalling £394,175, against £406,132, and including miscellaneous income of £139,569, compared with £103,590. A final dividend is recommended of 11½ per cent, making 16½ per cent, less tax, on the £3,944,699 ordinary capital.

Negretti & Zambra Ltd.

The directors of Negretti & Zambra Ltd., scientific instrument manufacturers, have increased the interim dividend on the £350,000 combined ordinary and 'A' ordinary from three per cent to four per cent.

Benn Brothers Ltd.

The directors of Benn Brothers Ltd., publishers of THE CHEMICAL AGE, recommend the payment of the following final dividends less tax, for the year ended 30 June 1956:— Three per cent on preference shares, which with the interim dividend of three per cent paid in February makes six per cent for the year; 10 per cent on ordinary shares, which with the interim dividend of 5 per cent in February makes 15 per cent for the year.

MARKET REPORTS

LONDON The call for industrial chemicals on home account has been reasonably good for the period of the year and, in the main, contract deliveries are going forward steadily. Export trade enquiry continues to be well maintained at recent levels, chiefly for Commonwealth destinations, but the possibility of transit problems, as a result of the Suez Canal appropriation, cannot be ruled out. The price position on the whole is steady and unchanged, and the decision by ICI to make no further increase in home trade prices, at least until 30 June 1957, is a welcome step and should assist the consuming industries who are contemplating a similar policy. It is understood that the ICI decision applies to chemical products in the Alkali, General Chemicals and Billingham divisions and, as the announcement states, is subject to the proviso that 'no unexpected or exceptional factors intervene'. Activity in the coal-tar products market remains steady, with cresylic acid and the creosote oils in good request on home and export account.

MANCHESTER Traders on the Manchester chemical market during the past week have again reported a somewhat reduced call for deliveries of bread-and-butter lines of heavy chemicals against contracts. This is almost entirely due to holiday stoppages at the consuming end. Allowing for this seasonal factor the movement of supplies on the home market is regarded as reasonably satisfactory. There is little of which to complain at the moment regarding the shipping demand. A moderate aggregate business continues to be done in fertilisers. Most of the light and heavy tar products are finding a steady outlet.

GLASGOW As reported last week the holiday period is still having its effect on the Scottish heavy chemical market, and business generally has been rather quiet. Some prices are remaining firm, but there appears to be quite a number of price increases taking place. Demand for fertilisers has been reasonably steady, and on the export side the market continues favourable.

CLASSIFIED ADVERTISEMENTS

OFFICIAL APPOINTMENTS

AUSTRALIA—UNIVERSITY OF QUEENSLAND

Applications are invited for the position of
LECTURER IN INDUSTRIAL CHEMISTRY
Applicants should be the holders of a Degree in Industrial Chemistry or Chemical Engineering, preferably with Honours, or an equivalent degree, and have had industrial experience in the field of Industrial Chemistry and/or Chemical Engineering.

Salary: £A1,300-£A1,750 per annum, with commencing salary within this range according to qualifications and experience.

Further particulars are obtainable from

THE SECRETARY,

ASSOCIATION OF UNIVERSITIES OF THE
BRITISH COMMONWEALTH,

36, GORDON SQUARE, LONDON, W.C.1.

Applications close, in Australia and London, on the
30TH SEPTEMBER, 1956.

SITUATIONS VACANT

CHIEF CHEMIST required to take charge of Works Laboratories and to advise on Chemical Control of Production Processes. He should be a Chemist or Chemical Engineer, with good qualifications, training and experience. Some Organic Chemical experience is desirable but not essential. Applications, giving details of age, experience and qualifications, should be addressed to the **GENERAL MANAGER, LAPORTE CHEMICALS, LTD., BARONET WORKS, WARRINGTON.**

MECHANICAL ENGINEER

COURTAULDS, LIMITED,

Chemicals Division,

requires a

GRADUATE (or qualified) **MECHANICAL ENGINEER** for its large chemical manufacturing plant near Manchester. In addition to the day-to-day manufacture of heavy chemicals (which offers a great variety of work) there is also scope for investigational and development work on the design of new plant and on the maintenance side of works engineering. In short, the work combines traditional workshop practice with an original approach to new problems and requires an absence of professional prejudice. It also provides opportunities for a man to follow his own work through to the final fruition of commissioning and operation. Previous industrial experience is desirable but a new graduate would be considered if he has had practical vacation experience. The post is pensionable and the occupant will be eligible for the Company's Co-partnership Scheme.

Candidates should write for a detailed form of application to

DIRECTOR OF PERSONNEL,

COURTAULDS, LIMITED,

16, ST. MARTINS-LE-GRAND,

LONDON, E.C.1,

quoting reference number H.13.

INSTRUMENT ENGINEER required to take charge of new Instrument Department in a chemical factory. He should be a Qualified Engineer with good experience in the Instrument field. Applications, giving details of age, education, training, experience, should be sent to the **GENERAL MANAGER, LAPORTE CHEMICALS, LTD., BARONET WORKS, WARRINGTON.**

NORTH THAMES GAS BOARD CHEMISTS and PHYSICISTS

holding University Degrees are required in the Laboratories at Watson House, Fulham, S.W.6, to undertake research work on the utilisation and design of domestic and industrial gas and coke appliances, particularly on cookers, water heaters, gas and coke fires, refrigerators, and industrial apparatus.

The Laboratories have recently been modernised and extended, and are responsible for research work for the Gas Industry throughout the country.

The appointments will be permanent and pensionable, and the starting salary will be within the range of £680-£900 per annum, according to age, qualifications and experience.

Applications should be sent to

THE STAFF CONTROLLER,

NORTH THAMES GAS BOARD,

30, KENSINGTON CHURCH STREET, W.8,

quoting reference No. 666/280, to reach him within ten days of the appearance of this advertisement.

PRACTICAL WORKS MANAGER - ENGINEER

required for Chemical Works in Pontefract area (producing Sulphuric Acid, Synthetic Phenol, etc.), with experience in control of labour, progressive post for able and energetic man. Apply, stating full personal details and salary required, to **SECRETARY, SYNTHETIC CHEMICALS, LTD., KNOTTINGLEY, YORKSHIRE.**

FOR SALE

BRAND New **COCHRAN** Vertical and **ECONOMIC** Self-contained **STEAM BOILERS** in stock, also all sizes reconditioned and guaranteed. List on request.

STAINLESS STEEL TANKS, PANS, CONDENSERS, PLATES, VALVES AND COCKS Very wide selection.

4 new **ALUMINIUM CONDENSERS**, 14 ft. long, 2ft. 3 in. dia., 336 tubes $\frac{7}{8}$ in. o.d.

FRED WATKINS (BOILERS), LTD.,
COLEFORD, GLOS.

Phone : Coleford 2271/2.

COPPER CHLORIDE—70 carboys, each containing 50 lb. Copper Chloride in solution.—Drew & Co. Market Place, Devizes.

CYCLOHEXANOL ADIPATE, 3½ cwt. for sale. Sample on request. **BOX No. C.A. 3487, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

WANTED—Young Organic Chemist for technical sales of industrial chemicals made by Rohm & Haas, Philadelphia, and their English subsidiary. Technical sales experience required. Excellent opportunity. Send curriculum vitae to **BOX No. C.A. 3488, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

CHARCOAL, ANIMAL AND VEGETABLE, Horticultural, burning, filtering, disinfecting, medicinal. Also lumps, ground and granulated. **THOMAS HILL-JONES, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3 (TELEPHONE EAST 3285).**

For Sale—continued

**FOR SALE
IMMEDIATE DELIVERY**

R.S.J. MILD STEEL STANCHIONS
each 12 in. by 12 in. by 45 ft. high.

EXCELLENT CONDITION.

Inspection at our Works.
MADEN & MCKEE, LTD.,
317, PRESCOT ROAD,
LIVERPOOL, 13.

**MORTON, SON AND WARD, LIMITED,
STAINLESS STEEL VESSELS**

VESSELS of all shapes and sizes, jacketed or unjacketed—
with stainless steel mixing gear to requirements; also stainless steel storage tanks and vacuum vessels.

"MORWARD" "U"-shaped TROUGH MIXERS—
up to 2 tons, in stainless steel, with agitators, scroll or paddle type, jacketed or unjacketed.

Stainless Steel **TROUGHS, TANKS** and **CYLINDERS** made to requirements.

These items can also be fabricated in mild steel.

JACKETED PANS

100g., 150g., and 200g., new, in mild steel, for 100 lb. p.s.i. w.p.—with or without mixing gear.

3 cwt. **TROUGH MIXERS** by **CHALMERS** and **GARDNER**—stainless steel-lined troughs.

50g., 75g. and 100g. heavy duty **MIXERS** by **FALLOWS** and **BATES**. Agitators driven through bevel gears from fast and loose pulley.

200g. cast-iron **JACKETED MIXING VESSEL** with nickel-chrome impeller type agitator driven through bevel gears from fast and loose pulley.

BROADBENT HYDRO EXTRACTORS

21 in. **EQUAL TO NEW**, galvanized baskets, electrically driven through centrifugal clutch or belt driven. Safety inter-locks.

AIR COMPRESSORS

THREE 30 c.f.m. at 100 lb. pressure, water cooled, automatic overloads, with or without motors.

AIR RECEIVERS MADE TO REQUIREMENTS

PUMPS

Selection of new **MONO** and second-hand Pumps in stock—2 in. to 5 in.

Inquiries Invited.

MORTON, SON AND WARD, LIMITED,
WALK MILL,
DOBCROSS, NEAR OLDHAM,
Lancs.

Phone Saddleworth 437

**FOR SALE
STORAGE TANKS
DISH-ENDED ALL WELDED.**

1—30 ft. by 8 ft. diam. by $\frac{1}{2}$ in. plate,
Immediate Delivery.

several more 6/9 weeks' delivery.

7—14 ft. by 8 ft. diam. by $\frac{1}{2}$ in. plate.

2—21 ft. by 6 ft. 6 in.

3/5 weeks' delivery.

also

Lancashire Boiler Tanks

30 ft. by 8 ft.

also

Air Receivers (Converted Lancashire Boilers)
100/120 lb. working pressure.

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

600

FILTER PRESSES

ALUMINIUM Plate & Frame type **FILTER PRESS** by S. H. Johnson, type J., pyramid plates 19 in. sq. forming 16 cakes 17 $\frac{1}{2}$ in. sq. by $\frac{1}{8}$ in. Hand operated closing.

Recessed plate **FILTER PRESS** by Edwards & Jones, for cakes 23 in. by 24 in. by 1 $\frac{1}{2}$ in. Top centre feed 4 in. diam. Ribbed type plate e.a. with bottom drain. Hand screwclosing.

Plate & Frame Filter Press by S. H. Johnson, Pyramid surface plates 24 in. sq. forming 30 cakes 1 $\frac{1}{2}$ in. thick. Hand closing gear.

No. 2 Sweetland Filter Press by Dorr-Oliver, cast iron construction chamber 16 in. diam. by 36 $\frac{1}{2}$ in. with 18 leaves at 2 in. centres.

Plate & frame cast iron **FILTER PRESS** by Johnson, 12 frames for cakes 17 $\frac{1}{2}$ in. sq., by $\frac{1}{8}$ in. Pyramid surfaces Bottom side feed 2 in. Hand closing. With Ram Pump 3 $\frac{1}{2}$ in. bore by 4 $\frac{1}{2}$ in. stroke.

Plate and frame **FILTER PRESS** by S. H. Johnson, 36 chambers with pyramid plates 32 in. sq. for 30 in. cakes. Hand ratchet closing. Individual discharge.

Plate and **FILTER PRESS** by Dehne, 35 chambers with ribbed plates for cakes 22 in. sq. Hand wheel closing. Individual discharge. With vert. twin cylinder Pump.

16 Horizontal cast iron Plate and frame **FILTER PRESSES**, forming 19 cakes 22 $\frac{1}{2}$ in. sq. by 1 in. Capstan closing gear with final hydraulic pressure.

GEORGE COHEN SONS & CO., LTD.

WOOD LANE, LONDON, W.12.

Tel: Shepherds Bush 2070 and

STANNINGLEY, NR. LEEDS.

Tel: Pudsey 2241.

MIXERS—1 Baker Hand-tilted Trough, 16 in. by 24 in. by 20 in. Fast and loose pulleys and clutch. "Z" blades.

1 Ditto Power-tilted Trough, 30 in. by 20 in. by 24 in. Pulley drive and clutch. Four "L" blades.

THOMPSON & SON (MILLWALL), LTD.,

LONDON, E.14.

TEL: EAST 1844.

PHONE 98 STAINES

STAINLESS STEEL EQUIPMENT

S.S. LINED AUTOCLAVES—6 ft. by 3 ft., 100 w.p.
S.S. JACKETED TILTING MIXERS—39 in. by 32 in. and 40 in. by 24 in.

S.S. 100-GALLON JACKETED TILTING PAN.

S.S. 65-GALLON TILTING PANS—2 $\frac{1}{2}$ ft. by 2 ft. 4 in.

S.S. JACKETED GAS-HEATED PANS—24 in. by 17 in. and 18 in. by 15 in.

S.S. 40 FT. ELEVATOR CONVEYOR.

S.S. AND CHROME PORTABLE STIRRERS/EMULSIFIERS— $\frac{1}{2}$, 1, and 2 h.p. A.C.

TANKS, PUMPS, MIXERS, OVENS, CONDENSERS, HYDROS, PANS, DRYERS, EDGE RUNNERS, DISINTEGRATORS, etc.

HARRY H. GARDAM & CO., LTD.

STAINLESS STEEL 'Z' MIXER, about 20 gallons, with Reduction Gear.

STAINLESS STEEL 'Z' MIXER, about 5 gallons. Two speeds. Built-in A.C. Motor.

JACKETED 'RIBBON' BLENDER, 50 gallons.

STAINLESS STEEL, 200-gallons. Pan with Electric Agitator. Water Jacketed.

25 GALLON VERTICAL Jacketed Mixer.

20 GALLON DETACHABLE BOWL Electric Mixer.

REVOLVING DRUM, 6' x 2' 4" wide.

EDGE RUNNER with 5' Granite Base.

WILKINSON OINTMENT MILL, 18".

WINKWORTH MACHINERY LTD., 65 High Street, Staines, Tel.: 1010.

WANTED

WANTED—LABORATORY BENCHES in good condition. Please give full details, including price and condition. Write **BOX No. C.A. 3486, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

SERVICING

RAILWAY TANK WAGONS, 14 and 20 ton capacity, available for simple hire. For particulars, apply Messrs. E. G. Steele & Co., Ltd., 93, West George Street, Glasgow, C.2.

WORK WANTED & OFFERED

CRUSHING, GRINDING, MIXING and DRYING for the trade.

THE CRACK PULVERISING MILLS LTD.

Plantation House,
Mincing Lane,
London, E.C.2.

GRINDING, CRUSHING AND GRADING

FINE GRINDING LTD.,
BLACKHOLE MINE, EYAM
TELEPHONE: EYAM 227

PATENTS & TRADE MARKS

KINGS PATENT AGENCY, LTD., (B. T. King A.M.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. **ADVICE Handbook, and Consultation free.** Phone: City. 6161

THE proprietor of British Patent No. 674,710 entitled, "A METHOD OF PREPARING ALIPHATIC ACY" **HYDROXYPOLYCARBOXYLIC ACID ANHYDRIDES**, offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 14 E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

For Classified Advertising
THE CHEMICAL AGE
PULLS IN RESULTS

PULVERISING of every description of chemical and other materials. Collections, storage, deliveries. **THOMAS HILL-JONES, LIMITED, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3 (TELEPHONE EAST 3285).**

Rockets and Guided Missiles

by **JOHN HUMPHRIES, B.SC.ENG.(HONS)**

A.M.I.M.E., A.F.R.A.E.S.

A **HIGHLY** practical book for engineers and an invaluable introduction for those professionally interested in the field of rockets and guided missiles, this is a complete survey of present-day achievements and possible future developments of rocket motors and their application. The first half of the book is devoted to propellants, motors and components, the second to the applications of these motors to missiles and aircraft, and, finally, there is a review of the potentialities for the future.

The author has had considerable practical experience in this field and is at present actively engaged in research. There are numerous illustrations and photographs, some hitherto unpublished, as well as diagrams.

Published by
ERNEST BENN LIMITED

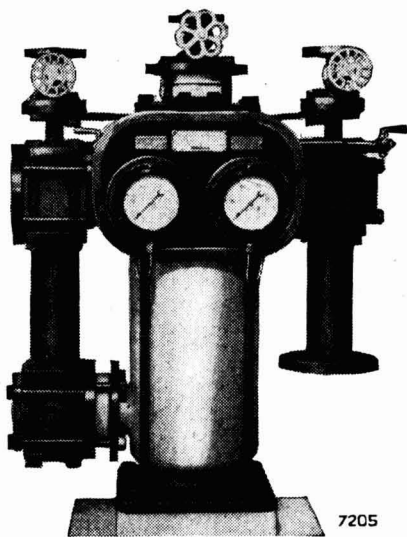
Price 31s. 6d.
(postage paid)

Bouverie House · Fleet Street · London · EC4



A Special Steam Ejector Air Pump

Designed for the production and maintenance of Vacuum, and developed to meet the needs of a section of the Chemical Industry.



7205

NO METAL PARTS
IN CONTACT WITH
CORROSIVE GASES

COMPRESSION STAGES OF CARBON
CONDENSER OF PORCELAIN.

The MIRRLEES WATSON
COMPANY LIMITED
SCOTLAND ST. GLASGOW

CECA

DUST AND MIST ELIMINATION

- ELECTROSTATIC
PRECIPITATION
- MULTICYCLONES
- AEROJET VENTURI R.B.

CONSULTATIONS INVITED
WITHOUT OBLIGATION

THE BRITISH CECA COMPANY LTD.
175 PICCADILLY, LONDON, W.1
Tel: Hyde Park 5131-5 Cables: Acticarbon, London

LACTIC ACID

for

TANNING · TEXTILES · CHEMICALS
PRINTING INKS · BREWING · SOFT DRINKS
PICKLES · SWEETS · CONSERVES

BOWMANS CHEMICALS
LIMITED
WIDNES · LANCASHIRE

"ZULO"

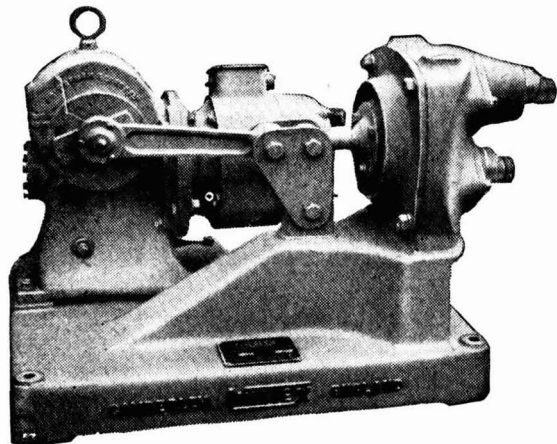


**LEIGH
& SONS
METAL
WORKS**
Orlando LTD.
St., BOLTON

CARBOY HAMPERS

CARBOYS PACKED CARBOYS
CARBOY FILTERS AND BARROWS
SAFETY CRATES TOP PROTECTORS

Solve your pumping problems



with motor or

THE LINATEX MOTOR DRIVEN DIAPHRAGM PUMP

Built on a cast iron base, this pump has an aluminium body and an electric geared motor drive. The body is lined throughout with Linatex rubber and employs solid Linatex Valves and Diaphragm with resistance to chemicals up to 65 C. Rubber bearings, requiring no lubrication, give trouble-free operation and reduce maintenance.

- Positive action
- Self priming
- No packing
- Continuous operation
- 8 Galls. min. capacity

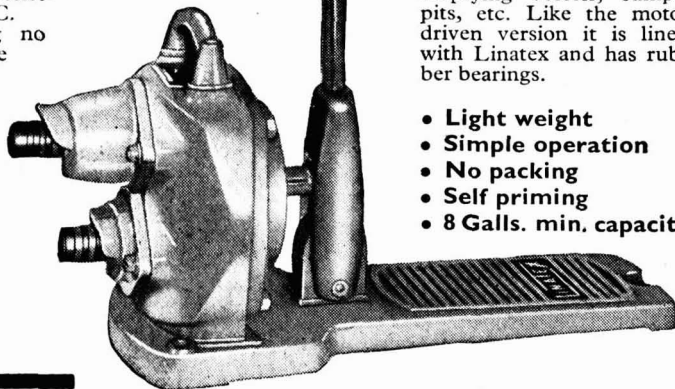
Linatex, being 95% pure, natural rubber, has proved invaluable to all branches of industry as a wear and corrosion resistant material. Now, Wilkinsons, its makers, have adapted its enduring qualities to the problems of pumping. They have designed a range of pumps which, by incorporating Linatex into their construction, are capable of withstanding the heaviest wear from abrasives and the corrosive effects of most chemicals. The two Linatex pumps illustrated below are both specially designed to meet the needs of the chemical and allied industries.

manual

THE LINATEX HAND OPERATED DIAPHRAGM PUMP

A portable, easily operated pump specially suitable for emptying vessels, sumps, pits, etc. Like the motor driven version it is lined with Linatex and has rubber bearings.

- Light weight
- Simple operation
- No packing
- Self priming
- 8 Galls. min. capacity



LINATEX pumps

Please write for full particulars stating whether you would like our resident engineer in your district to call on you. He will gladly assist you with your pumping problems.



WILKINSON RUBBER LINATEX LIMITED
Factories and Distributors throughout the World

• **CAMBERLEY • SURREY**
Telephone: Camberley 1595

INDEX to advertisers in this issue

	<i>Page</i>		<i>Page</i>
Aimer Products Ltd.	193	Leigh & Sons Metal Works Ltd.	230
Baker Perkins Ltd.	Cover iii	Meigh Castings Ltd.	196
Beryllium & Copper Alloys Ltd.	198	Metafiltration Co., Ltd. (The)	196
Bowmans Chemicals Ltd.	230	Mirrlees Watson Co., Ltd.	230
British Ceca Co. Ltd.	230		
British Tar Products Ltd.	200	Power-Gas Corporation Ltd. (The)	Cover iv
Brotherton & Co., Ltd.	Cover ii	Prodorite Ltd.	197
Cruickshank, R., Ltd.	Cover ii	Shell Chemical Co., Ltd.	195
Classified Advertisements	227, 228, 229		
		Richard Simon & Sons Ltd.	194
English Glass Co., Ltd.	232		
Ewart, M. D., & Co., Ltd.	223	Streamline Filters Ltd.	Cover ii
Geigy Co. Ltd. (The)	225	Wallach Bros. Ltd.	197
		Wilkinson Rubber Linatex Ltd.	231
Jones Tate & Co., Ltd.	200		
		Borax Consolidated Ltd.	Cover i
Kestner Evaporator & Engineering Co., Ltd.	194		
Kestner Evaporator & Engineering Co., Ltd.	196		

Solid Round Glass Beads **BALLOTINI**

in clear and coloured glass

Range .06mm. to 12mm. diameter

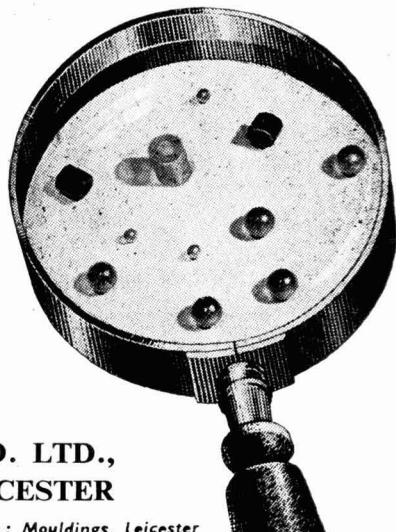
Stocks kept in most sizes

**Glass Mouldings
and Precision
Ground Glass
Balls** to instructions
up to 2" diameter

**THE ENGLISH GLASS CO. LTD.,
EMPIRE ROAD, LEICESTER**

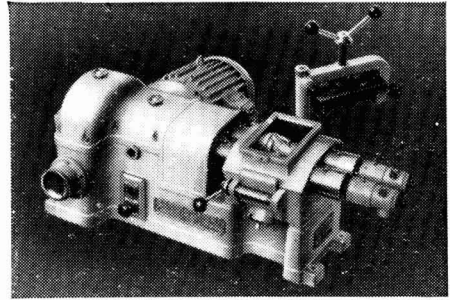
Telephone: Leicester 23481/2

Telegrams: Mouldings, Leicester



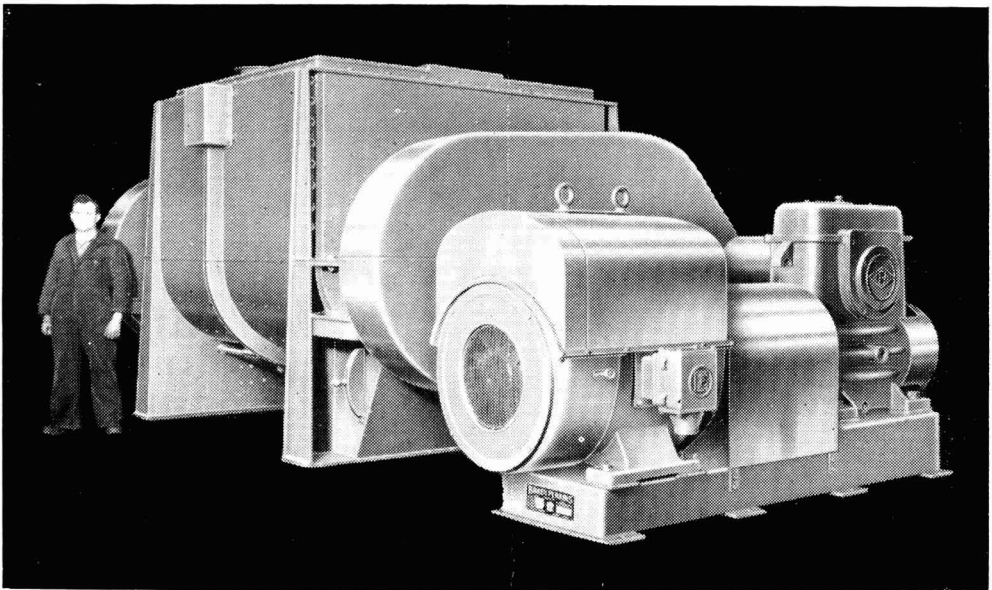
UNIVERSAL MIXING MACHINERY

These machines are produced in several standard types and classes to serve a wide variety of industrial purposes and they are capable of numerous adaptations to special requirements, capacities range from 1½ pints to 2,200 gallons per mix: troughs can be jacketed and blades cored for steam or brine circulation: many are supplied for mixing under vacuum and or pressure.



Above is illustrated a simple Laboratory machine of 1½ pints batch capacity and below — by way of contrast

a large and elaborate machine of over eleven hundred gallons capacity per mix

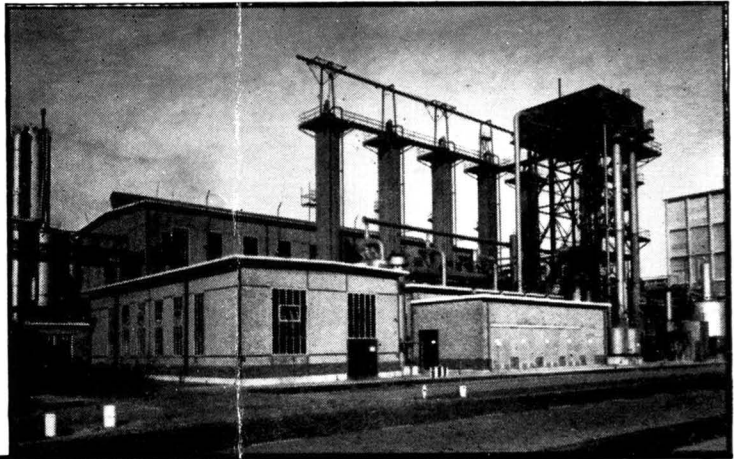


BAKER PERKINS

Engineers

LTD

WESTWOOD WORKS - PETERBOROUGH



JAPAN
S. AMERICA
INDIA

ITALY
HOLLAND
SPAIN

BRITAIN
AUSTRALIA
S. AFRICA

Synthesis gas
 for
 ammonia production
 in
 fertilizer factories

Designed manufactured and erected by



THE POWER-GAS CORPORATION LTD
 (PARENT COMPANY OF THE POWER-GAS GROUP)
STOCKTON-ON-TEES AND LONDON
 AUSTRALIA · CANADA · INDIA · FRANCE · SOUTH AFRICA

212