The Chemical Age

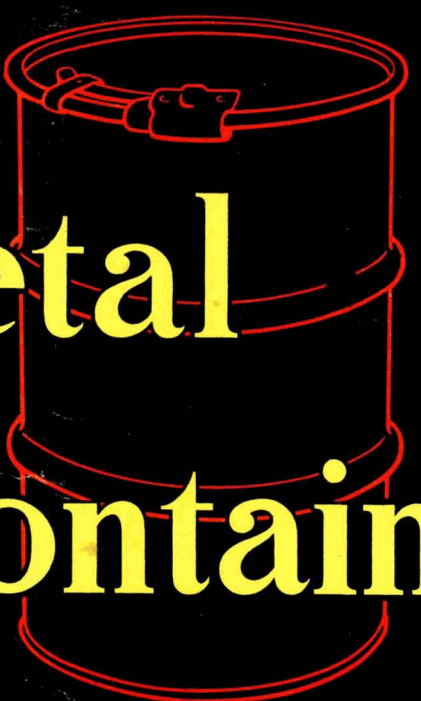
VOL. LXXVI No. 1944

13 October 1956

BRITISH OXYGEN LABORATORIES

(See page 70)

It's "Metal Containers" Age



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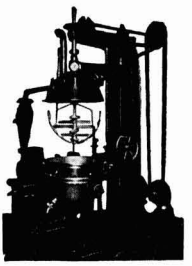

Steam jacketed copper Boiler and Mixers to tilt, with vacuum pump, and jet condenser. Cover and agitator raised by bevel gear and hand-wheel.

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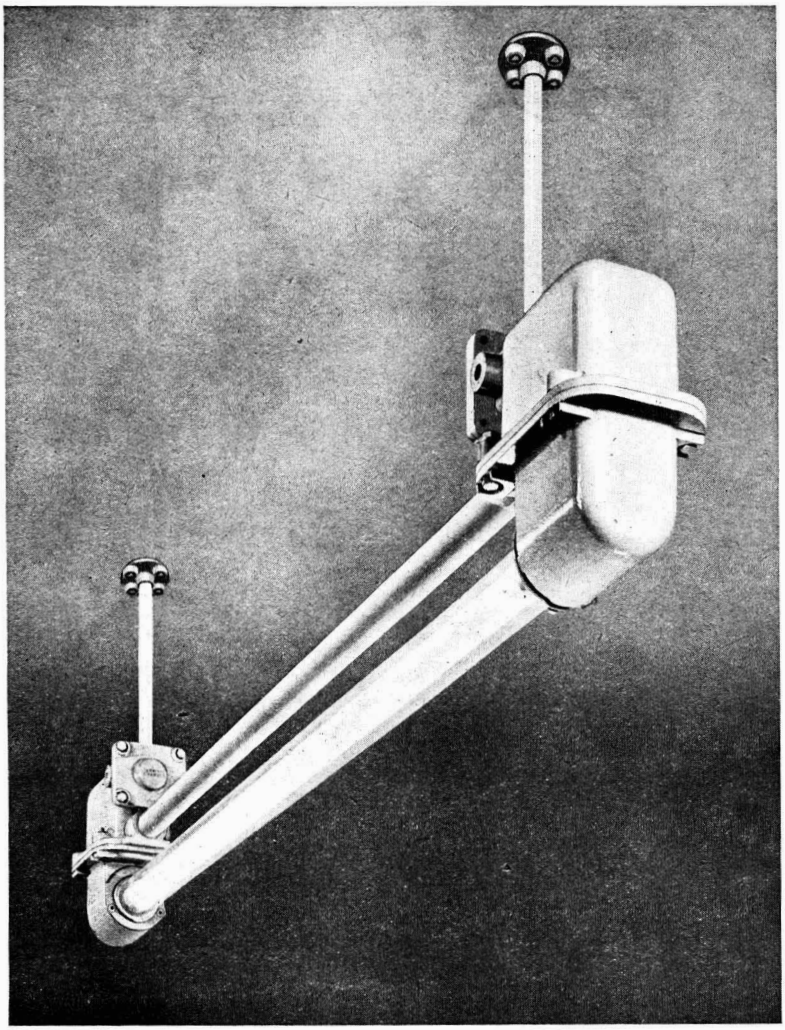

Fitting illustrated
F65801/2

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- *Each fitting is made to rigid factory standards for long arduous service.*
- *Operating efficiency is guaranteed because the control gear and tubes are made within the G.E.C. organisation.*
- *Consult your contractor for the most suitable G.E.C. fittings . . . with OSRAM tubes of course.*

G.E.C.

● *The General Electric Co. Ltd, Magnet House, Kingsway, London WC2*

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The first figures refer to advertisement in **The Chemical Age Year Book,** *the second to the current issue*

[*continued on page 48*

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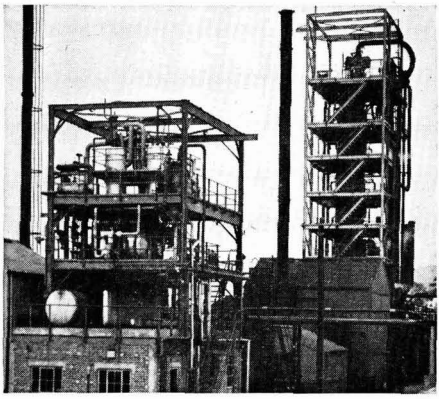

★ Primary Amines RNH_2	WHERE R IS	SOME TYPICAL APPLICATIONS	LITERATURE TO ASK FOR
ARMEEN 12D	pure lauryl	Intermediate for textile chemicals, quaternaries.	Armeens, L-12
ARMEEN T	technical oleyl, stearyl	Wax emulsions. Waterproofing, flotation.	F-2
ARMEEN HT	technical stearyl, palmityl	Hard rubber mould release, bitumen additive.	Armeens, L-12
ARMEEN HTD	pure stearyl, palmityl	Rubber industries. Fertilizer industry, anti-static.	L-3
ARMEEN 18D	pure stearyl	Boiler condensate control, intermediate for textile chemicals.	Armeens, L-2
ARMEEN C	pure lauryl, myristyl	Petroleum industry, corrosion inhibition. Pigment manufacture, paint industry.	G-3, G-5 L-7
★ Secondary Amines R_2NH			
ARMEEN 2C	technical lauryl, myristyl	For manufacture of quaternaries soluble in oils, etc., dispersible in water.	Armeens
ARMEEN 2HT	technical stearyl	Corrosion inhibition.	Arquads
★ Diamines $R.NH.C_3H_6NH_2$			
DUOMEEN T	technical oleyl, stearyl	Road making. Paper, Waterproofing, surface coatings.	C-2/3 Duomeens
DUOMEEN CD	pure lauryl, myristyl	Epoxy resins. Corrosion inhibition.	C-3/L/1 L-15
DUOMEEN T DIOLATE	technical oleyl, stearyl	Metal working, wire drawing. Paints, caulking compounds, pigments.	G-4, L-14 L-4, L-8
Water Soluble Quaternaries $[R.(CH_3)_3.N]^+Cl^-$			
ARQUAD 12	pure lauryl	Foam rubber. Emulsifier.	L-5
ARQUAD 18	pure stearyl	Anti-static for plastic.	L-11
ARQUAD C	technical lauryl, myristyl	Germicide, cosmetics, road emulsions. Textile industry.	E-5 G-2
Oil Soluble Water Dispersible Quaternaries $[R_2(CH_3)_2N]^+Cl^-$			
ARQUAD 2C	technical lauryl, myristyl	Corrosion inhibitor, petroleum production. Internal anti-static, germicide. Insecticide and other emulsifiers. Slip aid in transparent viscose films, etc.	E-3, E-6, G-3 E-5 E-4, F-2
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CLERKENWELL 9011

C.5

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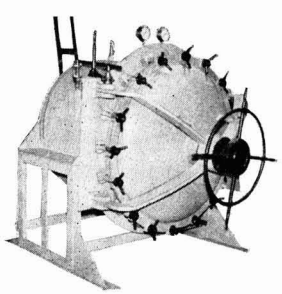

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COMPLETE CORROSION RESISTANCE

IMMUNITY TO THERMAL SHOCK

HIGH THERMAL CONDUCTIVITY

COMPACT ARRANGEMENT

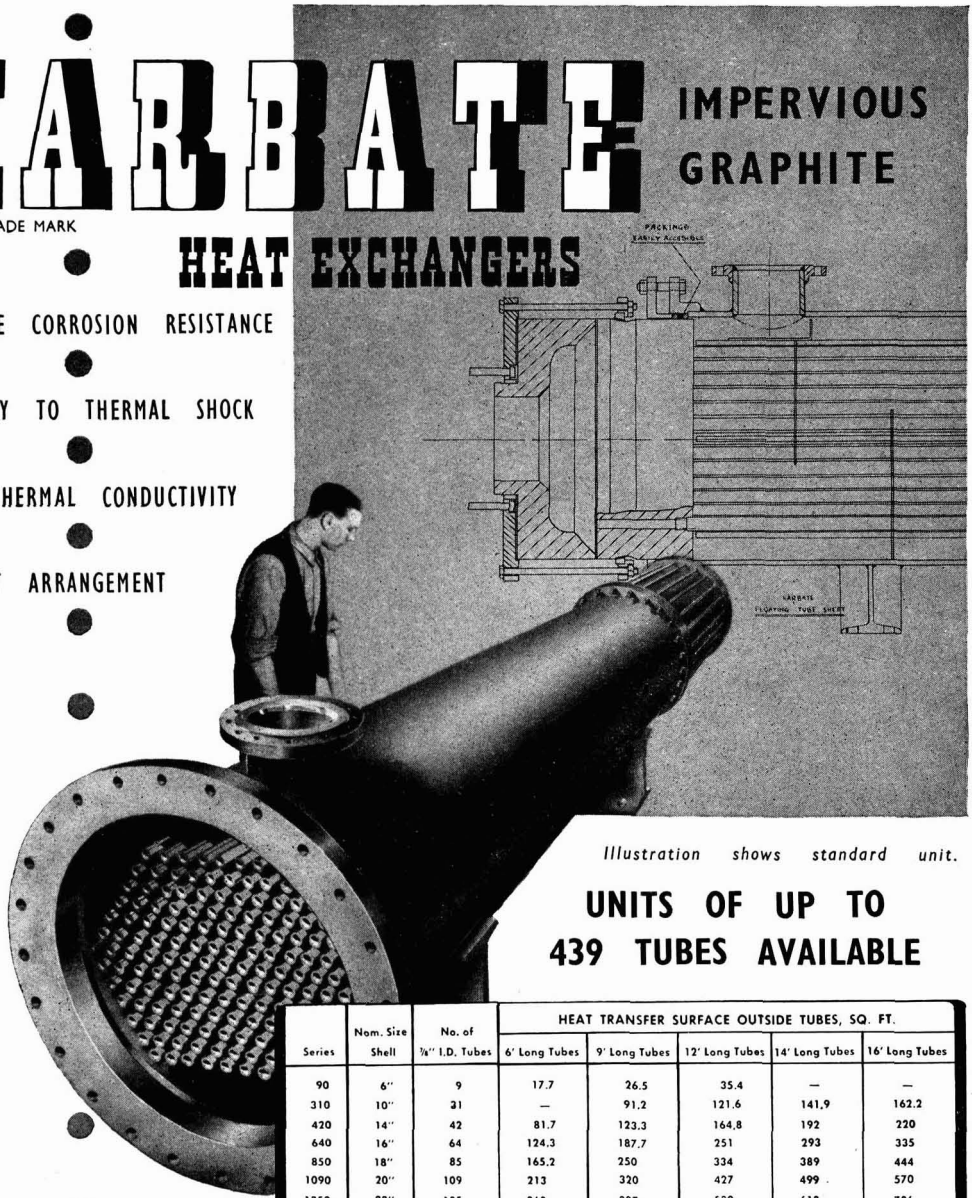

Illustration shows standard unit.

UNITS OF UP TO 439 TUBES AVAILABLE

Series	Nom. Size Shell	No. of ⅝" I.D. Tubes	HEAT TRANSFER SURFACE OUTSIDE TUBES, SQ. FT.				
			6' Long Tubes	9' Long Tubes	12' Long Tubes	14' Long Tubes	16' Long Tubes
90	6"	9	17.7	26.5	35.4	—	—
310	10"	31	—	91.2	121.6	141.9	162.2
420	14"	42	81.7	123.3	164.8	192	220
640	16"	64	124.3	187.7	251	293	335
850	18"	85	165.2	250	334	389	444
1090	20"	109	213	320	427	499	570
1350	22"	135	263	397	530	618	706
1630	24"	163	317	479	640	746	852
1950	26"	195	379	573	766	892	1017
2330	28"	233	453	684	914	1166	1217
2680	30"	268	521	786	1051	1225	1400
3490	34"	349	679	1024	1368	1595	1822
4390	38"	439	855	1289	1722	2009	2295

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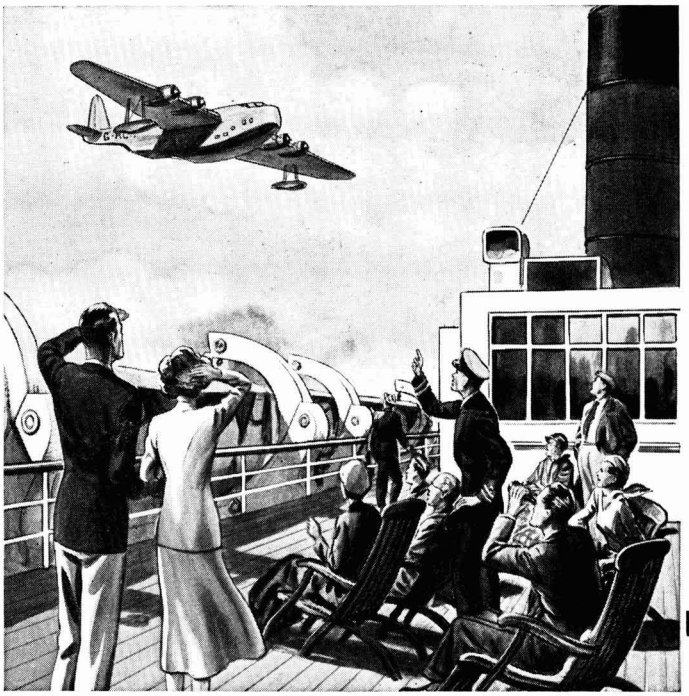


Laporte Progress

1939

Of 1939 few people remember more than September 3rd and the beginning of World War II, but earlier in the year peaceful ventures were being made in many fields. The new Cunarder "Mauretania" made her maiden voyage to New York, the British trans-Atlantic air mail service was started with Imperial Airways 'Caribou', and nylon stockings were first sold.

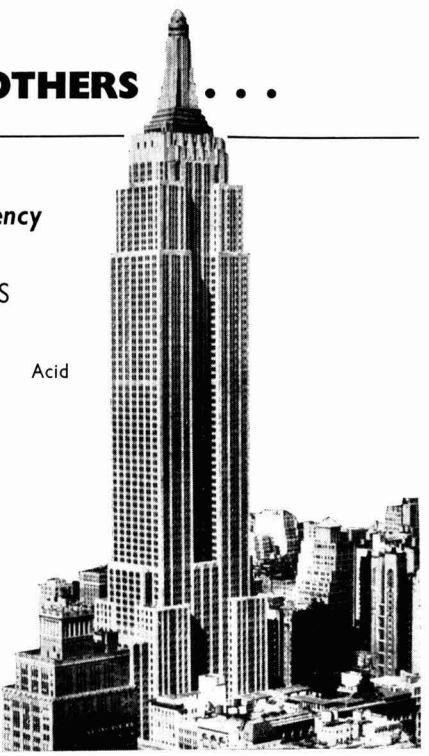
Progress was not lacking in the chemical industry, and Laporte were now making hydrogen peroxide in strengths of up to 90 per cent by weight.

Laporte have pioneered the production and development of hydrogen peroxide since 1888 and are the largest manufacturers in the British Commonwealth.

HYDROGEN PEROXIDE
by **LAPORTE**

Laporte Chemicals Ltd., Luton. Telephone: Luton 4390 Telegrams: Laporte, Luton.

HIGH ABOVE THE OTHERS . . .



. . . for quality and consistency

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Hydros — Formosul
Redusol Z — Hydros I

DYESTUFFS

Metachrome
Afterchrome — Acid

OTHER CHEMICALS

Liquor Ammonia — Ammonium Carbonate
Ammonium Bicarbonate — Bisulphite & Metabisulphite
Solium Sulphite — Liquid SO_2 Hexamine

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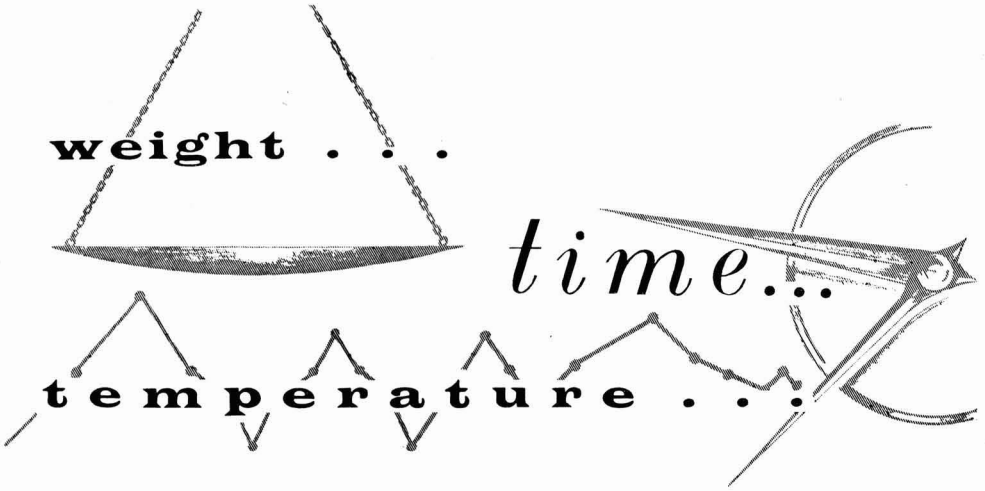
One of the world's largest manufacturers of hydrosulphites, liquid sulphur dioxide and hexamine. Makers of an extensive range of Metachrome dyes for dyeing wool in all its forms.

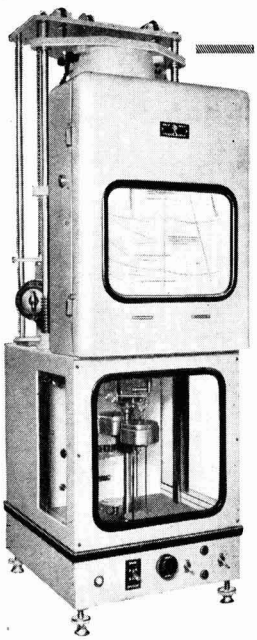
★

Brotherton & Co. Ltd., P.O. Box 6, Leeds 1. Telephone: 2-9321 Also at Manchester, Glasgow and London, Works at Birmingham, Wakefield and Birkenhead.



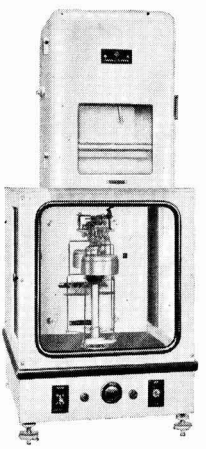
recorded simultaneously and continuously by the

stanton thermo-balance



Once set the new Stanton thermo-balance will reproduce and record weight changes, time and temperature for periods up to several days. The many applications of this precision balance include the recording of ignitions or similar studies; determination of moisture, volatile and ash; preparation of oxidation curves; oxidation rates on metal powders; investigation of sublimation phenomena; evaporation rates of solvents, etc.

The Stanton thermo-balance is air-damped and suitable for a total load of 100 grammes; it may be supplied with a sensitivity of 1 mg. or 1/10th mg. The standard furnace (as illustrated) is suitable for 1,000°C., but alternative furnaces for both low and high temperatures can be made. Furnace temperature and change of weight are followed simultaneously on a twin pen electronic recorder (incorporating Fielden "Servograph" patents).



STANTON RECORDING BALANCE

Similar to the thermo-balance, but without a furnace; the twin recorder is replaced with a single range instrument which records weight and time on a 5" chart.

Both balances incorporate an automatic timing device which operates the arrestment mechanism at known time intervals. Full details of these precision instruments are included in the Stanton catalogue—sent free on request.

stanton precision balances

Dept CA/1 Stanton Instruments Ltd., 119 Oxford Street, London, W.1 Telephone: GERrard 7533

chemical plant

New Twin Shaft Portable Propeller Stirrer (Patent Applied for

Kestner

Chemical Engineers

5 GROSVENOR GARDENS · LONDON · S.W.1

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 any new plant Kestners can help you on any of the following subjects:—

ACID HANDLING. Pumps, Fans, Pipe Lines, etc. **ACID RECOVERY PLANT. DRYING PLANT.** All types. **EVAPORATION PLANT** A complete range of plants to suit all evaporation problems. **FLUID HEAT TRANSMISSION SYSTEMS. GAS ABSORPTION AND REACTION SYSTEMS. ISOLETRIC SYSTEM FOR PROCESS HEATING. KEEBUSH** A constructional material resistant to the action of all corrosive liquids and gases. **LABORATORY AND PILOT PLANT. STIRRERS AND MIXING EQUIPMENT.**

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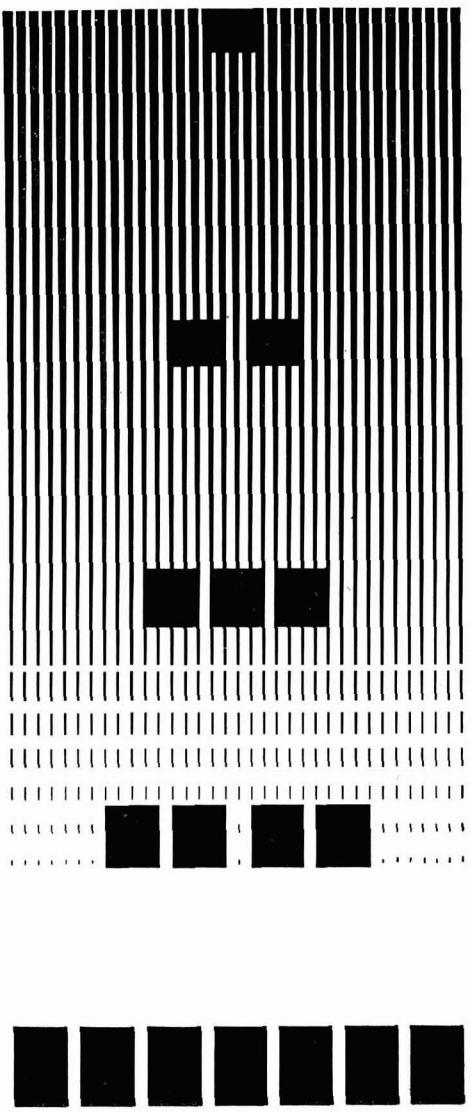

Production grows with good lighting

IN THE MAJORITY of works today the lighting is inadequate or unsuitable, or both. Production is slower than it could be, mistakes are made, health and tempers suffer.

Money spent on a planned lighting system is the best of investments. The foreman can see how things are going; the craftsman at his machine can work more accurately and easily because he can see what he's doing.

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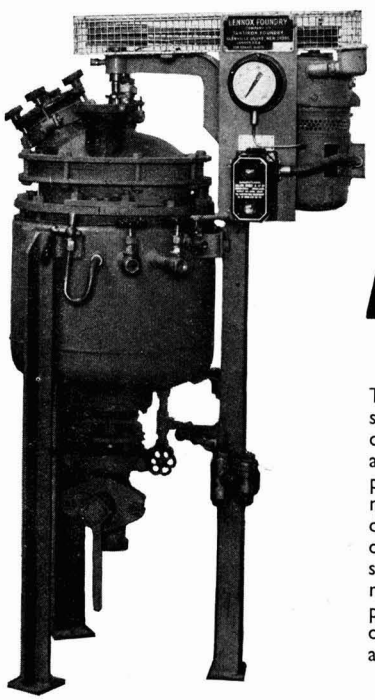
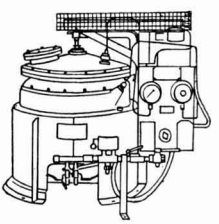
John W. Leitch & Co. Ltd. Milnsbridge near Huddersfield





steam or oil jacketed

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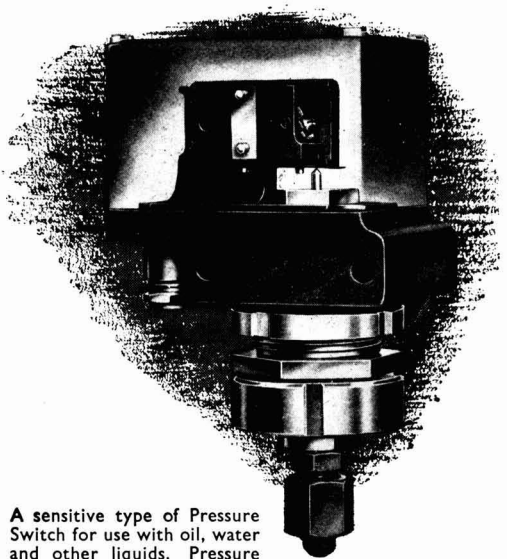

A sensitive type of Pressure Switch for use with oil, water and other liquids. Pressure range: 400-4,000 p.s.i.

Small and compact with pressure differential, adjustable between 100-500 p.s.i.

Short movement of piston ensures long and reliable service.

Maximum micro switch rating: 5 amps at 230 volts A.C., 3 amps at 28 volts D.C. For wide differentials the unit is fitted with two micro switches.

Ideal for use with any hydraulic equipment calling for sensitive pressure control.

(Manufactured under license, Patents applied for.)

Full size photograph of stripped switch with a ghosted cover to illustrate the cast shield.

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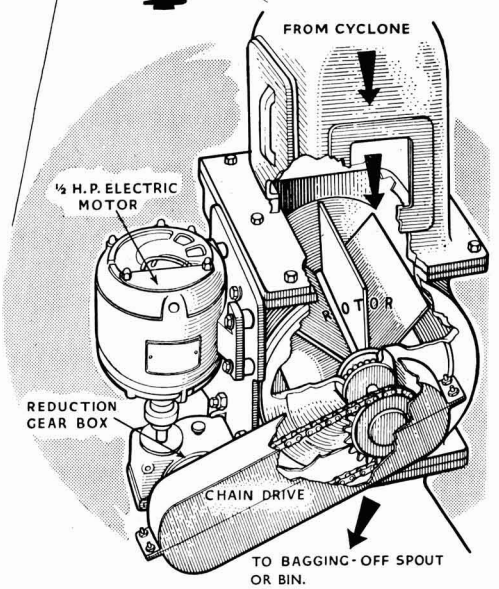
FF/20P4271

FOCUS

on *the* rotary valve



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The "Liverpool" Callow Rotary Valve is another important feature of our DUSTLESS Milling system that deserves serious study. This device, when attached to a Cyclone, gives continuous, controlled feeding, with reduced pressure, into the bags. It means dust-free bagging-off conditions in the mill, and also the increased efficiency of the cyclone. The illustration shows the Callow spacing piece (with combination observation and hand-hole) fitted above the Rotary Valve.

CAPACITIES UP TO 70 TONS PER HOUR

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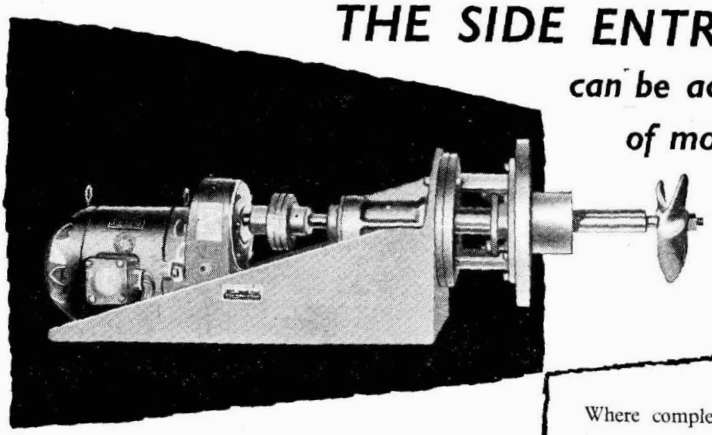
THE SIDE ENTRY AGITATOR

can be adapted to a number of mountings, with chain or V-belt drive



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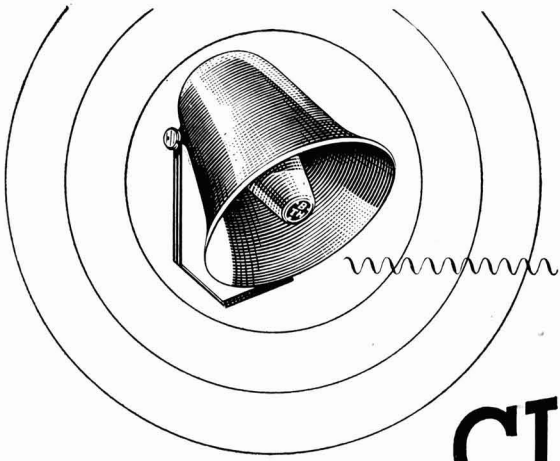
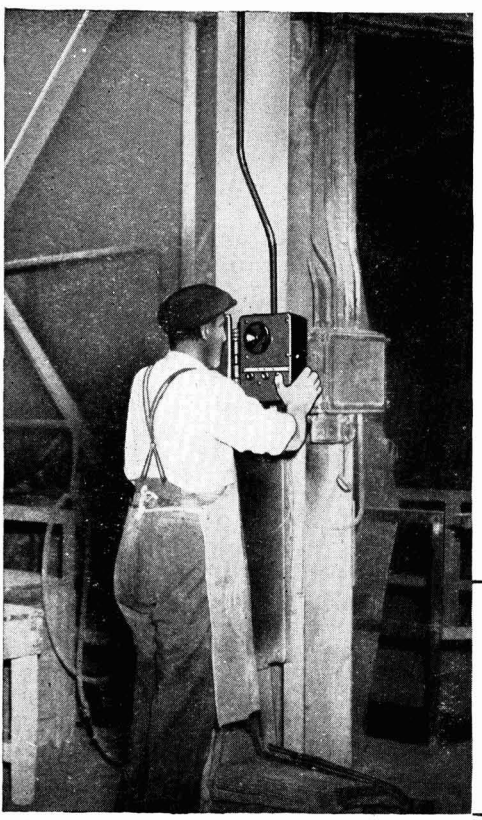


CLEAR AS A BELL

CLEARCALL



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With "Clearcall", speech can be clearly heard through the din of a noisy factory, or it can be adjusted for quiet surroundings.

"Clearcall" components are of rugged industrial design, and will not fail in spite of dirt, damp, and rough usage.

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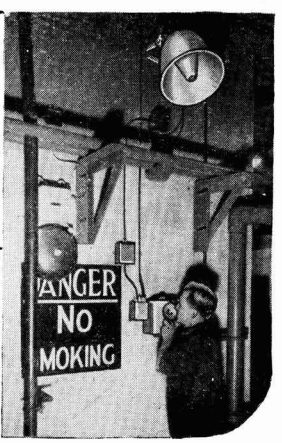
"Clearcall" components are the subject of an "intrinsic safety certificate" in respect of Pentane Vapour etc. Details on application.



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* * * A SMART **TERYLENE** OVERALL, WITH A HIGH FRONT CONCEALED FASTENING. AMPLE DECORATIVE POCKETS ON THE SKIRT AND A TOP BREAST POCKET.

VOL. LXXVI No. 1944

13 OCTOBER 1956

The international weekly chemical journal covering every aspect of industrial chemistry and chemical engineering

THE CHEMICAL AGE

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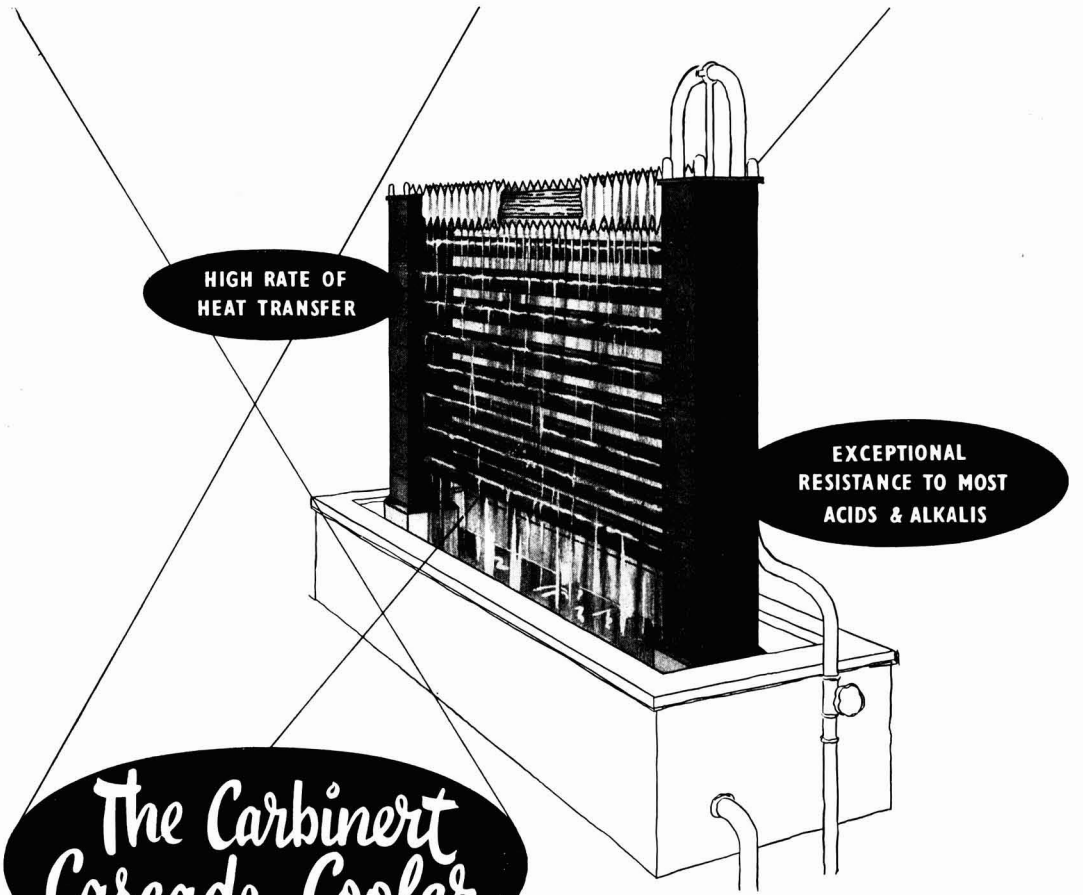
The annual subscription is 52s 6d ($7.40), single copies 1s 3d (by post 1s 6d). Overseas subscribers may send their subscriptions direct to London, or remit through any of our agents.



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CH/116A

VIEWPOINT

Demand for Alcohol

INDUSTRIES which use alcohol have been increasing their requirements over the past two years and suppliers are now reaching a stage where they have alcohol orders outstanding by several months. The demand for supplies is placing considerable strain, also, on production facilities.

United Kingdom yearly production of industrial ethyl alcohol is stated to be of the order of 100,000 tons. Unfortunately, UK alcohol production figures are not easily ascertained. Customs and Excise reports list for 1952-53, 102 million proof gallons, of which 70 million gallons were ethyl alcohol. For 1953-54 the total was 116 million proof gallons, of which 77 million gallons were ethyl alcohol. For 1954-55 the total was 146 million proof gallons, 96 million gallons of which were ethyl alcohol.

The August *Accounts Relating to Trade and Navigation of the United Kingdom* indicate reduced exports of the group consisting of ethyl alcohol, methyl alcohol, methylated spirits and alcohols other than complex functional alcohols and mixtures of such alcohols not elsewhere specified. In the month ended 31 August 1955 alcohol exports, as defined above, were valued at £109,373; for August this year they were £104,742. The value of exports for the eight months ended 31 August for the years 1954, 1955 and 1956 respectively were: 1954, £1,095,518; 1955, £954,376; and 1956, £884,967. Imports (ethyl alcohol is again included with methyl alcohol, alcohols other than complex function alcohols, mixtures of alcohol and naphtha) for the eight months ended 31 August for these same years were: 1954, £958,061; 1955, £1,039,620; and 1956, £1,661,431.

In the US, it is stated, suppliers of alcohol have recently been working with a three or four week inventory rather than the normal five or six month inventory. Even an increase in US alcohol prices of five cents a gallon in July last has not affected demand. The US alcohol industry is said to be faced with a demand at the rate of 350 million gallons, compared with a rate last year of 250 million gallons per year —an increase in production requirements of 40 per cent.

Main sources of alcohol today are synthetic ethylene and molasses. In the United Kingdom about 33,000 tons, or one-third of the yearly production of ethyl alcohol is derived from petroleum and is produced by British Hydrocarbon at Grangemouth. Here, the plant capacity is to be doubled by the installation of a second cracker. Imperial Chemical Industries has recently announced that it will soon have in operation a third oil-cracker to produce ethylene. Esso is constructing a £9 million plant at Fawley to produce ethylene and butadiene.

From ethylene are produced (besides ethyl alcohol) tetra ethyl lead, styrene rubber, rubber, paints and plastics, ethylene glycol for antifreeze, resins, Terylene fibre, and of greatest importance, the thermoplastic, polythene.

Plastics, such as the last mentioned, consume very large quantities of ethylene. So it would seem that ethylene as a raw material for alcohol production is far from plentiful. Indeed, short supplies of ethylene in the US recently forced some companies there to purchase ethyl alcohol and reverse the normal process by converting it into ethylene.

In the US, some 70 per cent of alcohol is produced from ethylene and about 30 per cent from molasses. Molasses obtained from Cuba and other sugar-producing areas is now highly priced, and it is expected that the price will increase with demand. The alcohol industry was once almost completely based on molasses as a raw material but today, with increased ethylene production, it would be of interest to learn how much alcohol-from-molasses production capacity is available.

Mention has already been made of the plastics industry's demands on alcohol. Another of the largest consumers of alcohol is the synthetic rubber industry, which requires butadiene as a raw material. Butadiene is produced from alcohol. Liquid detergents are also very large consumers of alcohol; heavy duty detergents contain about five per cent alcohol.

The cosmetics industry has sharply increased its requirements for alcohol recently. Aerosol hair sprays contain a high proportion of anhydrous alcohol. The industry is expanding, too, and developing newer types of products; its demand for alcohol is therefore increasing. The paint industry is increasing its alcohol requirements for reasons similar to those of the cosmetic industry, and there are many other industries in the same position.

Further price increases for raw materials for the production of alcohol seem likely. While increased supplies of ethylene will no doubt considerably ease the ethyl alcohol position, the other uses for ethylene must be remembered. Indeed, because of their importance to this country's economic welfare they must not be denied their share of this raw material. The answer to the problem is to increase the production of ethylene, but this will entail heavy capital expenditure on new plant and equipment. There is a case to be made for concerted action by Government and industry to solve this problem before it becomes acute.

Lustrex T-6

Monsanto Plastics Toughened Polystyrene in Sheet Form

MONSANTO Plastics Ltd. announces that Lustrex T-6 toughened polystyrene is now available in sheet form for the vacuum forming process.

Lustrex T-6 sheet is said to exhibit all the favourable properties of a toughened polystyrene and its impact strength is superior to that of any comparable product. It has high elongation at break and good flexibility, combined with excellent flow properties during vacuum forming. Thickness of the sheet can be controlled to very close limits.

It may be obtained in the form of a laminated sheet. This consists of a thin layer of biaxially orientated general purpose polystyrene laminated to the toughened sheet. The laminated surface has a high degree of gloss but imparts a lower elongation at break to the composite material.

Monsanto Plastics Ltd. does not supply Lustrex T-6 in sheet form, but will direct prospective users to suppliers of sheet.

Fertiliser to be Imported

SHELL Chemical Co. Ltd. has decided to import considerable quantities of its new fertiliser Nitra-Shell from Holland until the company's proposed £6½ million plant in Britain begins production.

Nitra-Shell is a granular nitrogenous fertiliser with a guaranteed nitrogen content of 20.5 per cent and 36 per cent carbonate of lime. This, claims the company, makes it one of the most concentrated nitrogenous fertilisers available in this country. The main use of this new product will be as a top dressing.

Since such solid fertilisers can readily absorb moisture from the atmosphere, the manufacturers have designed an especially effective package which consists of a five-ply paper bag which includes one-ply bitumen lining and one-ply polythene lining. The polythene lining gives extra protection from damp as it is not as liable as bitumen to become hard and crack.

Display Awards

AT the 'Minibition' held at Scarborough, in conjunction with the annual conference of the Purchasing Officers' Association, Midland Silicones Ltd. were highly commended. British Oxygen Chemicals Ltd. received first prize in the display class. A record number of firms—over 130—exhibited at this year's 'Minibition'.

BP Kwinana Refinery

AN EXPENDITURE of £A3.5 million will be made by British Petroleum (Kwinana) on additions to the Kwinana refinery. An early start will be made on the project which will employ 300 to 400 men.

Planned in association with Commonwealth Oil Refineries, the expansion will involve the erection of a catalytic reforming plant and a number of extra storage tanks with a capacity of 17.5 million gallons. It is expected that the Kellogg International Corp.—the original contractors for the refinery—will erect the catalytic reforming plant.

Local contractors will undertake the additional tankage and pipelines.

New British Standard

WHAT exactly is 'glace kid' and what does 'aniline dyed' mean? Questions of this kind, and the variety of answers they receive, have proved something of a headache for the leather industry, and the public. It is to avoid possible confusion that a British Standard, *Glossary of Leather Terms* (BS 2780), has now been published.

Prepared by the industry's own leather descriptions council, the glossary of more than 200 terms and definitions represents nearly three years' work.

The glossary should help to provide clear descriptions of the materials from which leather goods are made. Any possibility of misrepresentation of the nature of the leather should be eliminated. For example, the glossary takes as a fundamental principle that no leather may be described, without suitable qualifications, by the name of an animal unless it has been made solely from the hide or skin of that animal.

Copies of this standard are obtainable from BSI, Sales Branch, 2 Park Street, London, W1, price 5s. each.

Distillation Plant Model

A MODEL of the continuous tar acids distillation plant at the Beckton, London, by-products works of the North Thames Gas Board, has been constructed by the makers of the plant, The APV Co. Ltd., Crawley. It will be handed over to representatives of the Science Museum, South Kensington, by Dr. Richard Seligman, chairman of APV, on 16 October.

The model will be permanently displayed in the new organic industrial chemistry gallery of the museum. The Beckton plant, now on stream, is stated to be the largest in the country.

Du Pont of Canada

Further Expansion Planned for Kingston Research Centre

TWO YEARS AGO Du Pont of Canada Ltd. decided to start a programme of research. As a result the company went ahead with construction of a research centre at Kingston, Ontario. The building was completed about a year ago and since then the work of setting up special equipment and gathering staff has proceeded.

A total of $1.5 million has now been spent and further expansion is planned which will include at least two more buildings near the present one.

Dr. H. F. Hoerig, manager of the research and development department of Du Pont of Canada, discussed recently the reasons why the company decided to pay increasing attention to research.

He said that of the three courses open to the company in mid-1954, namely, full reliance on the US company's research, entirely independent research in Canada, or a middle course, the company chose the third. This is based on the conduct of an independent research programme by the Canadian company, at the same time utilising the developments coming from the research laboratories of the US company.

However, Dr. Hoerig said, in planning our own research programmes we think in terms of long range needs in this country and our own efforts are directed to long term problems of scientific and commercial importance to us in Canada.

N. Ireland Acrylic Plant

THE CONTRACT for the design and construction of the £3½ million Acrilan acrylic fibre plant of Chemstrand Ltd. near Coleraine, Northern Ireland, has been awarded to Costain John Brown Ltd. It is estimated that the plant will take two years to complete and will produce 10 million lb. of Acrilan fibre a year in the first stage.

In the meantime Chemstrand is importing Acrilan from the US and the first British goods made from this material should be on sale within the next few months.

Industrial Clothing

DISPLAYS of all types of industrial clothing and safety wear, including overalls, headwear, facewear and gloves will be arranged at the Protective Clothing & Safety Equipment Exhibition in the Empire Hall, Olympia, London S.W., from 13 to 17 May next.

NOTE & COMMENT

RADIO-FARMING

GROWING plants that provide medicinal drugs is probably the most specialised form of cropping man has attempted. In the new atomic age it has taken on an even more unusual shape—growing such plants in a radioactive environment so that the drugs produced are naturally radio-labelled! In many cases this is being recognised as an easier method of producing radio-labelled drugs for research than the more obvious method of synthesising them from materials containing radio-active elements.

So far this unique kind of cropping is largely a greenhouse venture, and the source of radio-activity is atmospheric—from carbon dioxide made from isotopic carbon-14. It is apparently necessary for plants to be raised entirely in a radio-active environment to ensure that the plant products are uniformly radio-labelled. Even then, only a few atoms of isotopic carbon-14 appear among the millions of ordinary carbon atoms in the chemicals made by plants. However, this small proportion is enough for using the chemicals in research.

Lucerne, soya bean, buck wheat, foxglove, tobacco, and poppies have all been grown in this way for the production of useful radio-labelled chemicals. Digitoxin, morphine, nicotine, sugars, certain amino-acids and proteins, and vitamins have all been 'cropped' by greenhouse radio-farming. A new radio-isotope 'farm' was recently opened at the Medical College of Virginia.

Other possibilities besides that of introducing radio-carbon into plant-produced chemicals are being investigated. Radio-isotopic sulphur, phosphorus, and sodium could be used as fertilisers. Nor is it likely that the uses of these radio-labelled crop products will remain limited to research. Drugs that give off mild amounts of radiation may have a considerable future in the treatment of diseases; if so, a considerable expansion in radio-farming can be expected.

FLUORIDE ADDITIVES

MOST reforms have to fight their way through controversies. Fluoridation—now a more commonly used term than 'fluoridisation'—is still facing tough resistance, even though by now the argument is widely accepted that fluoride fortification reduces dental decay, especially for children, in areas where the water's fluoride content is low.

Nothing at first seemed simpler than the regulated addition of fluorides to public water supply. But in the US, home of the idea and not often a sluggish country in utilising new scientific benefits, resistance has shifted from a bluntly anti-chemical theme to two other themes that are more practical—economic and ethical. The economic theme is sadly narrow but it carries the usual 'why-put-the-rates-up' appeal. Although the cost of fluoride per 10,000 gallons of water would be very small and virtually impossible to charge for, the total cost of adding fluoride to a city's annual water supply is measurable. So, in some cities, while public health departments urge fluoridation, rates-minded councillors stoutly oppose it. The ethical theme is generally linked with this cost argument. Fluoridation of the public water supply is attacked as 'compulsory medication.' It would more fairly be called 'compulsory nutrition' for the function of the fluoride is to make up the dietary amount that is in fact insufficient for good dental maintenance. But in any democratic country the argument that the individual who does not want extra fluoride should not be forced to have it must make something of an appeal.

CONTROVERSY OVERSEAS

THE controversy has raged most fiercely in the city of New York. Here the water supply commissioner has said it would be cheaper to issue free fluoride tablets to mothers for giving to their children. In Switzerland tablets are issued at many schools; and in one Swiss town fluoride is being added to milk when it is pasteurised, and the optional right of individuals is preserved as milk with or without added fluoride can be bought.

In this country at least one firm is already selling sodium fluoride tablets. A year's supply costs between 5s and 10s according to the dosage rate required. The sales-approach is admirably correct. Areas whose water has a high natural content of fluoride and the few areas being used as fluoridation-experimental areas are named as areas in which these tablets should not be used. Doses recommended during pregnancy and for children of different ages are based upon dental research evidence, etc. Also, the tablets are not advertised to the general public, so that their use will be dependent upon dentists' or doctors' advice. The tablets, being nutritional and not therapeutic in function, do not qualify for NHS prescription; on this point, however, it is not an idle thought to wonder whether the tablet approach with NHS support might not be nationally cheaper than water supply fluoridation.

At present the use of fluoride tablets for children deserves serious consideration. Even if the present water fluoridation studies established a case for national-scale fluoridation, it would be some years before most supplies contained enough fluoride and it would be children as yet unborn who would gain the dental benefits. By the time a child is 15 or 16, the benefits are small indeed. In the US, 10 years after fluoridation of water supplies began, only about one-sixth of the population has a fluoride-fortified water supply; progress may well be slower here.

People in the NEWS

● MR. H. L. REICHART, Jun., vice-president, Carbide Chemical Company division of Union Carbide Canada Ltd., announces the appointments of MR. R. S. HUGHES, B.Sc. (Chem. Eng.), as technical director; DR. S. A. V. DEANS, B.Sc., Ph.D., as associate director of development—chemicals, and MR. G. L. BATA, B.A., M.Sc., associate director of development—resins. Dr. Deans and Mr. Bata will be in charge of the product and process development and customer service laboratories for chemicals and resins respectively. They will be located at Carbide's Montreal plant and will report to Mr. Hughes.

● The appointment of MR. JOHN S. DEWAR as vice-president of Union Carbide Canada Ltd., is announced by MR. A. A. CUMMING, president. Mr. Dewar also retains the presidency of National Carbon Company, division of Union Carbide Canada Ltd.

● Chemstrand Ltd. has appointed as sales manager MR. DAVID W. H. GALBRAITH. He trained at Bradford Textile College and on the continent. During the war he was with the Ministry of Supply, and was later managing director of Baerlin Bros. Ltd., textile manufacturers and merchants, Manchester. For the time being Mr. Galbraith will have his headquarters at Chemstrand's technical sales office in Manchester.

● MR. E. T. POWERS has joined the Chemstrand Corp. as director of market research and product development. Mr. Powers has been director of the central development department of Celanese Corp. since 1953.

● Three new staff members in Food Machinery & Chemical Corporation's newly opened chemical research centre at Princeton, NJ, are DR. BORIVOJ R. S. FRANKO-FILIPASTIC (process section supervisor, organic chemistry department); DR. HAROLD K. LATOURETTE (exploratory section supervisor, organic chemistry department); DR. CHARLES F. FERRARO (research chemist for polymer application research, plastics and polymers department).

● MR. F. E. WARNER has become a partner in the firm of Cremer & Brearley, consulting chemical engineers.

● After 35 years' service with Scottish Oils Ltd., MR. GEORGE GRANT, who for the last three years has been manager at Pumpherston oil refinery, has retired. A native of Glasgow, Mr. Grant came to Pumpherston in 1921 and after two years on the laboratory staff was appointed chief chemist in succession to the late E. M. BAILEY. He became manager in 1953.

● MR. FRED FORTESS, manager, dyeing and finishing laboratories, Celanese Corp. US, Charlotte, NC, has been awarded the sixth annual American Dyestuff Reporter Award.

● MR. W. S. ROBERTSON, technical secretary of the Scottish Council (Development and Industry) has been appointed secretary in succession to DR. MACRAE. Over the past eight years he has been responsible for much technical development in Scotland and has largely operated the Council's work on science-based industrial development.

● After 33 years' service with the Celanese Corporation of America, MR. CHARLES F. BERAN is retiring as a director. He will be succeeded by MR. RICHARD W. KIXMILLER, vice-president in charge of the Celanese chemical division.

● Managing director of Rapid Magnetic Machines Ltd., Birmingham, MR. W. B. LANE, is making a world trip in a drive for increased exports of the company's specialised separation, extraction and lifting equipment. He will visit India, Ceylon, Singapore, Australia, New Zealand, US and Canada.

● MR. H. T. D. DAY, secretary of the Billingham-on-Tees Division of ICI Ltd., for 21 years, is to retire at the end of October, after about 30 years with the company. He will be succeeded by MR. C. F. THRING, assistant secretary. Mr. Thring joined ICI at its head office in 1948, and became assistant secretary at Billingham in 1949.

● MR. HARVEY CASH, general manager of Texaco's foreign operations department since 1954, has been appointed assistant to the chairman of the company.

● THE HON. R. J. ASSHETON, assistant to the research and development director of Borax Consolidated Ltd., is now in the US for discussions with officials of the associated company, the United States Borax & Chemical Corporation, Pacific Coast Borax Company Division, and in order to study US developments in the chemistry of boron.

● The Umney Memorial Prize for 1956 has been awarded by the Pharmaceutical Society of Great Britain to MR. KENNETH R. WEBSTER of Stoke-on-Trent. The prize consists of pharmaceutical books or apparatus to the value of £25.

● Lecturer in physiology and pharmacology at Leicester College of Technology, MR. DONALD HOLSTEAD, has been appointed lecturer in these subjects at Dundee Technical College.

● MR. J. L. S. STEEL, J.P., M.A., main board director of ICI Ltd., heavy chemicals group, was to be one of the speakers in a BBC Home Service programme on 11 October, entitled 'Commonwealth and Common Market.' The speakers considered how far artificial barriers to trade among six West European nations could be removed without detriment to UK, Commonwealth and Empire trade.

● DR. W. M. ASKWITH, Bishop of Gloucester, laid the foundation stone of the new factory of Permali Ltd. at Gloucester on 4 October. The Bishop was accompanied by the Mayor and Mayoress of Gloucester (ALDERMAN and MRS. M. G. LEWIS), by the City Sheriff and his Lady (MR. and MRS. J. F. ACLAND), and by MR. A. A. HEATH, Permali's managing director. The factory is being built to bring together the various premises occupied by the company under one roof.

● MR. C. A. VESSEY has been appointed to the Board of British Chrome & Chemicals. He will be the Glasgow works director and group chemical engineer.

MDMH Production

Glyco Products Co. Inc. Publish Bulletin Giving Data

MONOMETHYLOL dimethyl hydantoin (MDMH) is now being produced commercially by the Glyco Products Co. Inc. at Williamsport, Pa., US. MDMH is offered as white crystals, practically odourless, with a melting point above 110° C. It is soluble in water, methanol and acetone.

It reacts as a substituted hydantoin and as an almost odourless formaldehyde donor. It reacts with proteins such as glue, gelatin, soybean protein and casein.

It is recommended as an odourless formaldehyde donor in those cases where the odour of free formaldehyde is undesirable. MDMH contains 19 per cent combined formaldehyde which is capable of liberation. It can be used for modifying starch, textiles, fur, leather, paper and wood. It is being tested as a disinfectant, preservative, embalming agent, soil fumigant and seed disinfectant.

A three-page bulletin including detailed data on insolubilisation of glue and casein is available from the Glyco Products Co. Inc., Empire State Building, New York 1, NY, US.

Atomic Agreement

THE GOVERNMENTS of the United Kingdom, United States and Canada have entered into an agreement interchanging rights in inventions and discoveries in the atomic energy field on which patents were held or applied for by one government in one or both of the other countries on 15 November 1955. The purpose of the agreement is to allow internal use of the inventions in each country by government and industry without interference by the other governments. Under a non-discrimination clause each government must grant licences to nationals of the other governments on the same terms as to its own nationals.

Works to Close

PLATT METALS LTD. has decided to close down its lead smelting works at Castleside, Consett (Co. Durham), owing to difficulty in overcoming air pollution. Plant and stocks are to be transferred to the firm's other works at Enfield, Middlesex. At one time the Castleside works employed 80 men recovering non-ferrous metals from scrap cables, but this number has been considerably reduced during the past few years.

GERMAN CHEMICAL INDUSTRY

Safety Organisation Under Review

ACCORDING to Professor Dr. S. Balke, West Germany's PMG and formerly an active director of Wacker-Chemie GmbH, experience in countries having a chemical industry has shown that the direct danger to the worker from chemicals, or the production processes themselves, can be lessened if appropriate safety measures are taken. Safety measures are called for on grounds of humanity; they are also a component of rational production.

International exchange of information on sources of danger and safety measures plays an important part in increasing works safety in all countries. Better international statistics are necessary, however.

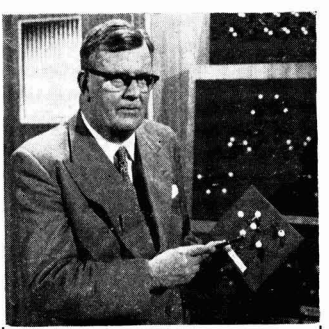
Dr. Balke believes that two broad points can be established from existing statistical data, most of which is on a national basis: (1) Accidents of a specific chemical nature are rarer than those arising in transport operation, or of a mechanical origin, or occurring on the roads. (2) On the whole, works safety is greater in chemical industry than in other industries.

Safety in factories has been helped in recent years by techniques of psychological accident prevention developed in UK, France and US. In protection against occupational diseases of chemical origin, accent is increasingly on prevention rather than cure.

In addition to international co-operation by governments and appropriate organisations, states Dr. Balke, active personal interest on the part of industrial undertakings is of great importance in the promotion of works safety.

Statutory provisions should be limited to general regulations; detailed implementation and execution are the province of self-administering organisations in association with the factories themselves. Appropriate safety measures, human aspects apart, increase efficiency, advance production and serve technical progress.

On 29 October at 5.30 p.m., Dr. Balke will lecture on 'Safety Organisation in the German Chemical Industry.' He will describe the safety organisation of German chemical industry and compare it with other industries in Germany and with the chemical industry of other countries. Dr. Balke will speak about particular accidents from which useful lessons can be learned. The lecture will be at the Caxton Hall, London S.W.1.



Mr. J. R. Whinfield, discoverer of Terylene polyester fibre, illustrates the arrangement of atoms in ethyl alcohol in the recent ICI film 'Point of New Departure'

Suit Settled

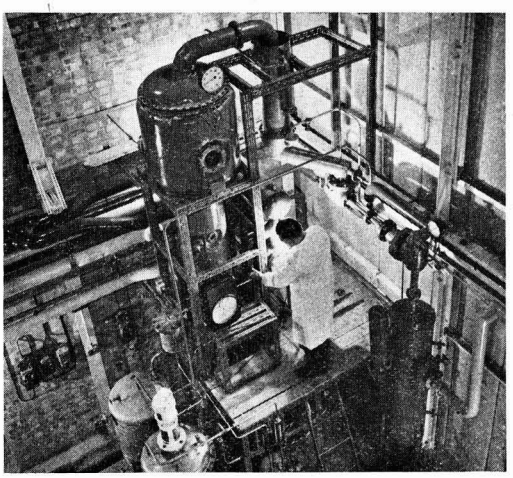
'AGREEMENT has been reached for the settlement of the suit filed in the US on 4 April 1956 by Park & Tilford Distillers Corp. against The Distillers Co. and certain of its subsidiaries. Under the settlement no monetary consideration will be made.

New Section of RIC

THE inaugural meeting of a new section of the Royal Institute of Chemistry, the Thames Valley Section, has been arranged for 13 October 1956. The section will serve members in Berkshire, Oxfordshire and parts of Hampshire. A meeting is planned to be held at the University of Reading at which the president of the Institute, Dr. D. W. Kent-Jones, will speak on 'Food and Drink.' Details may be had from the secretary, Dr. P. F. Holt, University, Reading. The meeting will be followed by dinner.

New Organo-Silicon Size

MIDLAND SILICONES LIMITED announces that a new organo-silicon glasscloth size has been developed by its associate company, Dow Corning Corporation. The size will be known as experimental silicone D 9132, and is said to show considerable promise as a glasscloth size for use in the preparation of epoxide, phenolic, polyester and silicone laminates with improved flexural strengths.



Forced-circulation high-vacuum evaporator at the new process laboratories of W. J. Fraser & Co. Ltd.

PILOT-SCALE PROCESS LAB

Facilities Offered by Fraser

COMMISSIONING of new pilot-scale process laboratories adjacent to the design and engineering offices at Harold Hill, Romford, Essex, is announced by W. J. Fraser & Co. Ltd.

The purpose of the new unit is to provide clients with facilities for easy, economical, pilot-scale testing that can bridge the gap between research results and full-size design. The arrangements have been made essentially flexible, to accommodate as many different kinds of processes as possible.

The unit consists of a central process building in which plants are erected, flanked by a chemical laboratory equipped with experimental distillation and normal analytical facilities, and by an annexe supplying services which include water, gas, electricity, steam, compressed-air and high and low vacuum lines. These are permanently piped round the process building and are led off at intervals for connection to pilot processes. Provision is also made for process-heating by Dowtherm vapour.

Rotating Disc Contactor

Among the items installed for investigation is a $2\frac{1}{2}$ in. Shell rotating disc contactor. Developed by Shell largely for liquid-liquid extraction in the petroleum and petroleum-chemical fields, it is now being manufactured under licence in UK by Frasers who are also using this pilot-scale model to develop the contactor for processes in chemical industry generally.

Of the other plants installed one is a Dowtherm-heated, stainless-steel, forced-circulation still for high-vacuum distillation of high-boiling organic liquids, which has contributed to the design and engineering of glycerine and fatty acid distillation plants for Fraser clients. Another unit is an open-circuit pneumatic drier with a steam-heater battery to heat the incoming air and a cyclone separator and bag fitted to recover dried material. In the near future investigations will begin on a pulsed, liquid-liquid extraction column with perforated plate-packing.

Pilot-scale work has usually to be carried out quickly and the new pilot unit is closely linked with Fraser's chemical engineering works at Barnsley, where all plant for pilot investigation is made and where also Frasers carry out parallel researches in fabrication techniques and the use of special materials.

The building of the new unit is part of a series of current developments at Harold Hill, including a large extension to the drawing office. It is significant of the expansion of chemical engineering generally that the drawing office now accommodates nearly twice the number of draughtsmen that it did even so recently as 1953, when the Harold Hill offices were built.

GROWTH OF PLASTICS

World Output 2.5 Million Tons

AT the British Plastics Federation Conference at Torquay (27-30 September), Mr. P. A. Delafield, reading a paper entitled 'Plastics in Proportion,' said that the UK produced 350,000 tons in 1955, the US 1.3 million tons and the whole world, excluding Russia, about 2.5 million. The UK thus accounts for one-eighth of the world output. Prices of older plastics materials, such as the phenolics and others based on coal tar distillation, have risen over the last twenty years. The newer thermo-plastics, namely, polystyrene, pvc, methyl-methacrylate and polythene, have tended to decrease in price as production has risen and the basic materials from which they are manufactured have become available in greater quantities. The speaker said he felt that the new polythene materials, the new co-polymers of pvc, the new polystyrenes, etc., would all prove of great interest and value. He pointed out that although, so far, only organic plastics materials had been used, the field of inorganics and plastics based thereon could well be fertile.

Mr. Delafield commented on US estimates of plastics output in five years' time, which it has been suggested, will be about 2.7 million tons in 1960-61, that is, double the present US rate. The speaker considered this estimate is on the high side. With regard to UK production five years' hence, he said that he did not think it unreasonable to assume that this would be of the order of 500,000 tons a year. The industry was certainly working with that as the target figure.

Laboratory Presses

UNIVERSAL 10 ton laboratory presses to which can be attached a wide range of auxiliary equipment are manufactured by Apex Construction Ltd., 15 Soho Square, London W1, who have produced a descriptive brochure on the subject. Model A1 is a self-contained bench instrument to which a variety of hotplates can be attached for working with different materials, plastics mouldings, laminated board, rubber mixes etc. Where uniformity of thickness of the pressed material is essential more accurate alignment of the platens is obtained by using model A14. Also available are presses for powder metallurgy and laminating.

by
Peter Pain M.A.

Restrictive Trade Practices

THE NEW ACT EXPLAINED

LAST summer saw the passing of an Act of Parliament of peculiar interest. The Restrictive Trade Practices Act has made substantial changes in the constitution by the creation of a new and powerful Restrictive Practices Court, has profoundly affected commercial law by requiring the registration of restrictive agreements, and has made equally far-reaching changes in the law of contract. In addition it has substantially altered the scope of the Monopolies Commission. How these changes will work out in practice remains to be seen, but on paper, at least, this Act is of the greatest importance.

Not 'Trust-busting'

Before plunging into detail, it will be useful to see how the Act is intended to work. There is nothing so far-reaching as the 'trust-busting' legislation with which our American friends are familiar. The Act proceeds in a more modest manner, its object being to check, and in many cases prohibit, price rings and other restrictive practices. It therefore requires a wide range of agreements and understandings dealing with restrictive practices to be registered. It sets up a registrar whose duty it will be both to register these agreements and to bring them before the Restrictive Practices Court which will consider whether any of the restrictions contained in them are contrary to the public interest.

Burden of showing that the agreement is not contrary to the public interest will be thrown on the parties to the agreement. The Act contains a good deal of guidance as to where the public interest lies but, none the less, much is left to the discretion of the members of the Court, which consists of High Court judges and laymen with a specialist knowledge. If the Court declares a term to be contrary to the public interest, it becomes void.

Resale Price Maintenance

The Act also contains some highly important provisions as to resale price maintenance and these stand on their own. Broadly speaking the usual machinery of resale price maintenance by machinery for the establishment of standard prices throughout the trade, with the sanction of private courts and stop lists is swept away. Such agreements are made unlawful. The manufacturer is given instead an entirely new right to take action against a retailer. He may sell his goods to the wholesaler subject to resale price conditions, and may enforce these conditions against a retailer who buys with notice of them.

Agreements Which Must be Registered. Agreements made between two or more persons carrying on business in the UK with or without other parties, where the business of those persons is in the production of goods the supply of goods, or the application to goods of any process of manufacture, will be subject to registration if any of the types of restriction mentioned below are accepted by two or more of the parties. The parties who accept the restrictions need not be in the UK. Agreements made by a trade association will be treated as if those agreements were made between all the persons who are members of the association or are represented thereon by members; if they contain such a restriction, they will be registrable. Where a trade association makes an agreement with an outside body by which it accepts such a restriction, the agreement must be registered.

Registration is required where the restriction deals with:

(a) Prices to be charged, quoted or paid for goods supplied, offered or acquired, or for the application of any process of manufacture to goods.
(b) Terms or conditions on or subject to which goods are to be supplied or acquired or any such process is to be applied to goods.
(c) Quantities or description of goods to be produced, supplied or acquired.
(d) Processes of manufacture to be applied to any goods, or the quantities or descriptions of goods to which any such process is to be applied.
(e) Person or classes of persons to, for or from whom, or the areas or places in or from which goods are to be supplied or acquired, or any such process applied.

Trade Association Recommendations

For these purposes the word 'agreement' is to be taken in its widest sense. It includes any agreement or arrangement, whether or not it is intended to be enforceable by legal proceedings.

Where a trade association makes a specific recommendation (whether express or implied) to its members, or to any class of its members, as to the action to be taken or not to be taken in relation to any particular class of goods or process of manufacture in respect of any of the matters (a) to (e) above, the agreement for the constitution of the association (which will normally be its rules) must be registered. Further, whatever the rules may say, the constitution will be treated as containing a term by which each member agrees to comply with such recommendations. Trade associations will therefore have to proceed with the greatest caution.

Levy arrangements are registrable in certain cases. If the figure to be paid is calculated by reference to the quantity of goods produced or supplied or processed,

The Restrictive Trade Practices Act

or the quantity of materials acquired or used, so that an increased levy is to be paid if a certain figure is exceeded, then the arrangement must be registered.

Agreements Which do not Require Registration. A number of agreements, which would otherwise come within the registration provisions, are specifically exempted. In the case of an ordinary agreement for the sale or processing of goods, no account is to be taken of any term relating solely to the goods to be supplied or processed. Provisions as to the observance of British Standards are to be disregarded; so are terms as to conditions of employment, for example, a fair wages clause. Certain arrangements in the iron and steel industry are also outside the Act.

Exempted Agreements

There are other types of agreement which are completely exempted as a whole from the Act. These are agreements made under express statutory authority, such as the Milk Marketing Scheme and statutory rationalisation schemes. The Act does not apply to sole agency agreements. Nor does it apply to licences, assignments and agreements made in connection with patents and designs or agreements relating to trade marks.

Agreements for the exchange of 'know-how' are excluded, provided they are made between two parties, neither of whom is a trade association, and the agreement does not relate to any other of the above mentioned restrictions. Nor does the Act apply to agreements relating solely to exports and other transactions outside the UK.

Board of Trade Order

Date For Registration. The Restrictive Practices Act does not lay down any date for registration, but leaves it to the Board of Trade to specify dates for various classes of agreement by order. A draft order has been laid before Parliament to take effect on 30 November; but the order requires the approval of both Houses of Parliament before it comes into operation. The agreements specified in the order must then be registered within three months (in the case of existing agreements by the end of February). If an agreement is rescinded, there is no need to register.

This order applies to many of, but not all, the types of restrictions mentioned previously. It includes those covered by (a) and (b) relating to prices and the terms and conditions on which goods or services are provided. It does not cover (c) which deals with restrictions as to quantity, or (d) which deals with restrictions as to process. It includes (e) so far as it restricts the persons to or from whom goods are to be acquired or services provided, but does not affect agreements restricting the areas or places in or from which these things may be done.

Agreements dealing with these other types of restriction will doubtless be listed for registration by the Board of Trade at a later date.

(to be continued)

US EXPORTS TO ARGENTINA

Chemicals Decreased in Value

FIGURES published by the US Department of Commerce, Washington, show that the value of chemicals and related products exported to Argentina decreased in 1955 to $19,551,771 ($24,955,009 in 1954). Coal tar products accounted for $1,322,289. These were mainly rubber compounding accelerators, antioxidants, etc., carbolic acid, coal tar intermediates, diphenylamine and finished coal tar products, excluding medicinals. The chemical specialities subgroup totalled $4,085,130. The most important single item in this group was gasoline anti-knock compounds, followed by lubricating and fuel oil additives. Weedkillers came next and materials for insecticides.

Synthetic resins for plastics production were prominent, the chief ones being styrene polymer and copolymer resins, vinyl and vinyl copolymer types, tar acid and alkyd resins. Other synthetic resins such as resin film, cellulose acetate moulding and extrusion compositions, unfinished plastics and various laminated plastics came next. Detergent alkylates and detergents were among the speciality cleaning compounds. Other items of note included organic surface active agents, water softeners, liquid gum inhibitors for treating petroleum distillates, synthetic aromatic chemicals, paradichlorbenzene, and metal-working compounds.

Industrial chemicals exported were valued at $3,060,665. The most prominent items in this group were solid sodium hydroxide, soda ash, sodium bicarbonate, non coal-tar industrial chemicals, alcohols, industrial organic acids and anhydrides and organic fluoride compounds. In the pigments, paints and varnishes sub-group which totalled $2,583,134, outstanding items were carbon black and lampblack, titanium dioxide and other pigments and dry colours.

Exports of fertilisers and fertiliser materials were valued at $22,667.

New Equation of State

RESEARCH on a new equation of state from which engineers can derive the pressure exerted by a gas or liquid at any given density and temperature, was first started by Olaf A. Hougen and K. M. Watsen at the University of Wisconsin and followed by work by A. L. Lydersen, R. A. Greenkorn, and Hougen. The work has now been reported at the annual meeting of the American Chemical Society by Joseph O. Hirschfelder, R. J. Buehler, H. A. McGee, Jr., and J. R. Sutton, all of the US Naval Research Station.

With the equation, it is possible to derive the pressure of any substance at any given density and temperature, in addition to other thermodynamic properties such as internal energy, specific heat, entropy, and enthalpy. Although it is not the first equation of this type to have been devised, it is considered to be of value for work in the chemical engineering industry. Information required before the equation can be worked out includes the critical point of the substance and the temperature and density at its normal boiling point.

From all Quarters

India's Aluminium Requirements

IT HAS been announced by the Minister for Heavy Industries that India's aluminium requirements, now estimated at 20,000 tons per annum, are likely to be doubled by the end of the Second Five-Year Plan. Present production is stated to be running at about 7,500 tons per annum. The Indian Aluminium Company was recently granted a licence to set up a 10,000 ingot tons capacity plant at Hirakud. A similar plant will now be established at Mettur in Southern India.

Nigerian Metal Ores

THERE has been a substantial increase in the weight of metal ores shipped to the UK from Nigeria in the first five months of this year. Metalliferous ores total 7,917 tons (valued at £3,462,000) compared with 6,520 tons in the same period of the previous year. Production of tin and columbite is stated to have been retarded by the dry weather. It is reported that there will be an increased demand for columbite for use in the production of stainless steel. Consumption in the US is increasing.

Heavy Water Plant

THE US Government heavy water plant at Trail, British Columbia, has been bought by the Consolidated Mining and Smelting Co. of Canada (which is controlled by the Canadian Pacific Railway Co.). The price given for the plant has not been disclosed. Some of the heavy water plant equipment will be adapted for the production of hydrogen which the company uses in the manufacture of fertilisers.

Dead Sea Chemicals

ACCORDING to reports, a contract has been concluded in London under which Hemingway & Co. of London will permit the use of a new, cheap process, for which it holds the patent rights, covering the production of magnesium oxide and hydrochloric acid from the magnesium chloride found in the Dead Sea.

Fertiliser Consumption

CONSUMPTION of fertilisers in Finland is stated to have reached a fairly stable level. The industry has been operating, however, with its full capacity limited primarily by a shortage of sulphuric acid. This will now be overcome by the new Petersen plant in Harjavalta. Production of sulphuric acid in 1955 was 133,000 tons, compared with 132,600 tons in 1954 and 134,725 tons in 1953. Ammonium sulphate production was slightly down on the 1954 output (10,417 tons compared with 11,700 tons) but was almost double that of 1953 (5,686 tons). It is hoped that production of superphosphate as well as Kotka-phosphate will increase now by 60-80,000 tons a year.

Assam Oil Development

AN AGREEMENT in principle is reported between the Assam Oil Company and the Government of India regarding the development and exploitation of the new oilfield at Nahorkatiya in Assam. Three companies are to be established; the first (major shareholder will be the Assam Oil Company) will produce crude oil and carry out further exploration; the second will operate the projected pipeline between the oilfields and a new refinery; and the third (in which the Government of India will have a majority shareholding) will operate a new refinery with a possible throughput of one million tons of crude oil per annum.

Peruvian Chemical Factory

TOGETHER with Peruvian investors, W. R. Grace & Co. propose to establish a factory costing 100 million soles for the production of caustic soda, sodium carbonate and other chemical products. The exact situation of the factory has not been decided, although Callao and Huacho have been mentioned as possible sites. Production is expected to be about 10,000 tons per year.

Brazilian Atomic Energy Institute

A DECREE has been signed creating the Institute de Energia Atómica, which will be attached to the University of São Paulo. The new Institute will receive the experimental atomic reactor ordered from the US. It will conduct atomic research and train technicians in this field. The Brazilian Government will control production, trade and export of mineral needed for atomic power projects. Exports of uranium, thorium and other materials are being temporarily suspended until substantial reserves have been proved. Such material may be exported by the Government only after approval by the National Security Council and exclusively for the purpose of obtaining specific compensation in the form of equipment and technical assistance for industrial atomic power development. A contract signed with the US providing for the export of 300 tons of thorium oxide has been cancelled, according to reports.

Electrochemical Industry in Finland

IT IS reported that both Kymmene Co. and Finnish Chemicals Ltd. have increased considerably their chlorine-alkali capacity and have modernised cells and auxiliary machinery. Kymmene Co. have installed an adiabatic hydrochloric acid absorber for the manufacture of pure acid from weak vapours of impure HCl. This company has also begun manufacturing Pulpasan (phenyl mercury acetate) for slime prevention in fast-moving paper machines.

BRITISH OXYGEN RESEARCH

New Company Formed at BOC Morden

A NEW COMPANY, British Oxygen Research & Development Ltd. (BORAD for short), has been formed from the research and development department of the British Oxygen Co. (see THE CHEMICAL AGE, 29 September, p. 581, and 6 October, p. 38). The new company came into existence on 1 October.

The research and development section at Morden, Surrey, has been in operation for 10 years, and is well provided with special equipment and facilities. The first properly designed laboratories went into service in October 1946 and by 1950 it was at a strength which was thought to be appropriate for the British Oxygen Co.

Principal Instrument

BORAD is the principal instrument for research and development work in the British Oxygen Group, which comprises 17 home companies and 12 companies abroad. The company employs about 400 people.

This research and development work is financed either by the operating companies or from a central fund, depending on circumstances. In addition, some work is carried out for outside organisations, including Government departments.

The five principal departments are: Basic research, chemical products, gas applications, gas separation and engineering. There are also ancillary groups responsible for analytical work, intelligence, patents, administration and accounting.

One of the major sections of work is the production and handling of industrial gases. Both theoretical and practical investigations are in progress on new methods of production of atmospheric gases. Basic studies are being made of new cycles and techniques.

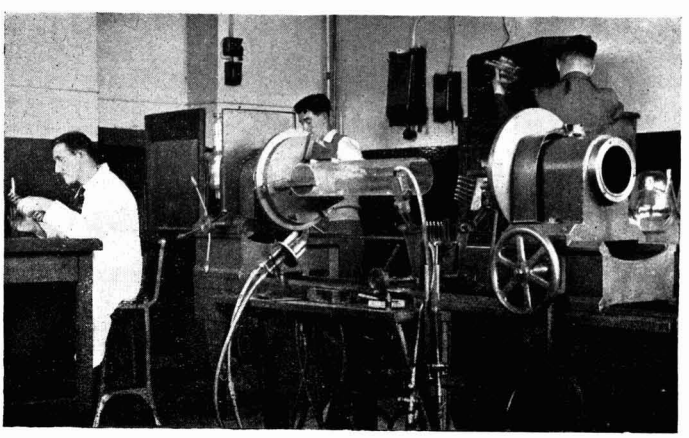
Attention has been paid to the separation of the rare gases, particularly argon. The rapid development in the uses for this gas has changed the production requirements during the last few years from being little more than a laboratory preparation to a production rate of several tons per day. Fundamental work is also carried out in obtaining physical data for the atmospheric gases.

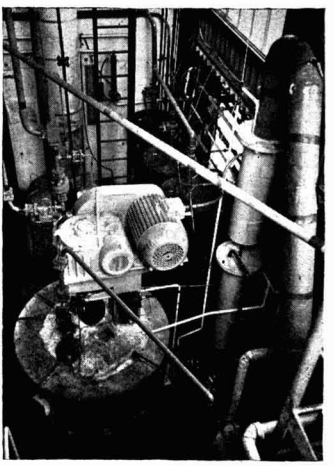
Oxygen for purposes other than steelmaking is increasingly being distributed in liquid form, and many investigations have been carried out to find the conditions under which losses during transport and losses during transfer from one vessel to another can be reduced. Systems have been devised for the filling of stationary cylinders on sites from a mobile cylinder filling unit. Investigations are in hand to improve evaporators in which gaseous oxygen is generated from liquid at customers' works and also to handle liquid nitrogen and liquid argon more efficiently and economically.

Acetylene Production

In addition to the atmospheric gases, a range of studies has been made on acetylene production and handling. Laboratory and semi-technical scale work have been carried out on the possibilities of making acetylene from hydrocarbons or of making carbide more cheaply.

On the medical side, contact is made with specialists on anaesthesia and oxygen therapy. Investigations are carried out on the British Oxygen equipment to make sure that it is designed on the most modern principles and is as safe as possible. Investigations to find improved anaesthetics are also in hand.





Two photographs taken at BORAD. Above: pilot scale vinyl pyrrolidone plant; Below: glassblowing shop for making experimental equipment

In the field of metallurgical uses of oxygen, BORAD is responsible for carrying out special trials in collaboration with steel companies on, for example, flame enrichment with oxygen in the open hearth furnace or oxygen pretreatment of steel prior to introduction into the open hearth furnace.

A series of studies currently in hand is concerned with making use of the low temperature and relative safety of liquid nitrogen; four different types of process are currently under investigation here. A variety of argon applications, for example, in connection with flushing of steel or in powder metallurgy, are in progress.

The British Oxygen Group has at its disposal chemically important raw materials such as calcium cyanamide and acetylene. As a result of this it has been thought advisable to see what products could usefully be made in the chemical field. A proportion of the work of BORAD is therefore concerned with organic chemical reactions. Products already on the selling range in the group include calcium carbide, calcium cyanamide, dicyandiamide, melamine, vinyl acetate, polyvinyl acetate and vinyl pyrrolidone.

The staff of approximately 100 qualified scientists and technologists at BORAD includes experts on physical chemistry, organic chemistry, chemical engineering, physics, metallurgy and mechanical engineering. Some of the staff also have knowledge of other subjects such as electrical engineering, medicine, economics or statistics.

INDIAN *NEWS*LETTER

by Our Special Correspondent

THE seven-man Russian team, which recently carried out an extensive survey of the pharmaceutical industry in India, has submitted its report to the Government. The team studied the question of the manufacture of penicillin, streptomycin and other antibiotics, vitamins, analgesics, antipyretics, anti-malarials, anti-TB drugs and glandular products.

The Russian experts consider that there is every scope for producing in India essential drugs in adequate quantities and also the intermediates required for the production of these drugs from local raw materials.

Essential Drugs

As production targets for essential drugs set in the Second Five Year Plan are considered inadequate, higher targets have been suggested, taking into consideration future requirements. The following suggestions have been made for attaining the targets recommended:

(1) Expansion of the Hindustan antibiotics factory at Pimpri at a cost of Rs 3.5 crores (i) to step up the production of penicillin from the present level of 15 million mega units to 40 million mega units a near, (ii) to build new units within the factory for the production of 45 tons of streptomycin, 40 tons of tetracycline and 3 kg. of vitamin B_{12}, and (iii) to set up a unit for the production of 1,000 kg. of vitamin D_2.

Antibiotics

(2) The establishment of a new antibiotics plant at a cost of Rs 8.5 crores to produce the following: penicillin, 60 million mega units; streptomycin, 45 tons; new antibiotics, 20 tons; vitamin B_{12}, 2 tons; and dextran, 500,000 litres.

(3) The setting up of a new synthetic drug plant at a cost of Rs 11 crores to produce 2,300 tons of synthetic drugs and 2,300 tons of intermediates a year.

(4) The setting up of a plant for the production of endocrines at the new slaughter house being planned in Bombay. The processing of the products will be carried out at the Haffkine Institute, Bombay, which has most of the equipment necessary for the purpose.

(By implementing these schemes it will be possible to produce most of the essential drugs in adequate amounts and obviate the necessity of importing drugs to the tune of Rs 27 crores a year.)

(5) The construction of a new factory at a cost of Rs 11.5 crores for the production of basic chemicals and intermediates is suggested. The total output of this plant will be 94,000 tons a year, including 58,400 tons to be utilised within the factory for conversion into intermediates, 17,700 tons to be supplied to chemical and pharmaceutical industries, and 15,500 tons to be made available to dyestuff, plastics and other industries.

For the production of essential drugs and the intermediates required, 93,300 tons of basic chemical raw materials will be required. A preliminary study shows that 69,000 tons, made up of 32 items, can be supplied from the existing plants. For the supply of 10,800 tons of raw materials, made up of 23 items, it will be necessary to expand or install new capacities at the existing plants. The rest of the raw materials, consisting of 29 items, is to be met by imports for the present.

Lignite

The Government of India has decided to implement the multi-purpose Neyveli Lignite Project (see THE CHEMICAL AGE, 1 September, p. 405) in the South Arcot district of Madras State, following the successful conclusion of the preliminary investigations. The project envisages the mining of 3.5 million tons of lignite per year for (1) generation of 211,000 kw of electricity, (2) production of 380,000 tons of carbonised briquettes for use as industrial and domestic fuel, and (3) production of urea and/or sulphate-nitrate of a fixed nitrogen content of 70,000 tons.

The project is estimated to cost about Rs 68 crores. A provision of Rs 52 crores has already been made for the project in the Second Five-Year Plan.

The mining part of the project is to be implemented immediately. Plans for the mining of lignite have been finalised in consultation with the technical consultants for the project, Powell Duffryn of the UK Technical Services Ltd. whose services have been obtained under the Colombo Plan.

It is expected that mining of lignite on a commercial scale will begin early in 1960. The generation of electricity will also start about the same time. The production of fertilisers is expected to start six months after the mining of lignite and generation of power.

The Government of India has decided to undertake the exploitation of the salt bitterns at Sambhar Lake in consultation with the Government of Rajasthan. The Council of Scientific and Industrial Research has decided to establish a research station near Sambhar Lake for carrying out necessary investigations.

Salt Bitterns

The annual output of salt bitterns at Sambhar Lake is estimated at 211,286 tons which can yield about 35,000 tons of sodium sulphate and 20,000 tons of sodium carbonate.

A bill to grant protection to the calcium carbide industry and to continue or discontinue protection already granted to certain other industries was introduced in the Indian Parliament by the Minister for Trade. The Bill is based on the recommendations of the Tariff Commission. Industries which continue to be protected include: Calcium lactate, non-ferrous metals and phenol-formaldehyde moulding powder.

During the period January-March 1956, the Government of India has accorded sanction to some industrial undertakings, under the Registration and Licensing of Industrial Undertaking Rules 1952, for the manufacture of certain chemicals and dyestuffs. Jayashree Tea Gardens Ltd., Calcutta, are to produce in their factory 50 tons of sulphuric acid and 100 tons of superphosphate per day. The Mettur Chemical Industries Corp. Ltd. will be producing the following products (tons per month): Caustic soda, 170; chlorine, 146; potassium chlorate, 52; ferric chloride (anhydrous), 52; aluminium chloride (anhydrous), 16; and barium chloride, 52.

Dyestuffs

Atul Products Ltd., Bombay, will be producing the following dyestuffs: (in lb. per year): Yellow GS, 9,000; Orange 3RS, 14,000; Scarlet R, 20,000; Scarlet G, 23,000; Red S, 5,000; Red R, 37,000; Bordeaux P, 23,000; Violet B, 42,000; Blue B, 42,000; and Navy Blue, 9,000.

A plant for the manufacture of carbions—a type of cation exchange resin developed from coal at the Fuel Research Institute, Jealgora, for use in

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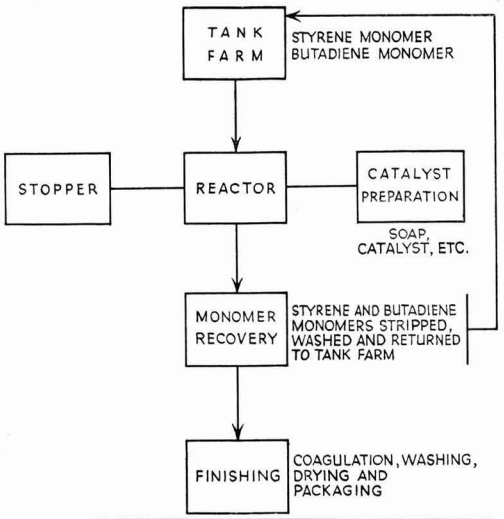
BUTADIENE COPOLYMERS



Styrene butadiene resins are being made in this country by Monsanto Chemicals Ltd. and ICI Ltd. (The Chemical Age, 15 and 22 September.) Left, flow diagram of manufacture according to Monsanto's process. Right, rubber processing with styrene butadiene resins. Below, ICI's butadiene plant under construction at Wilton. Both companies are supplying resins principally for the rubber footwear trade

IMPELATOR DESIGN ADVANCED

Intense Mixing with High Velocity

COMBINING centrifugal force, suction and shearing action the Plenty impelator designed by Plenty & Son Ltd., Newbury, Berkshire, creates an efficient intense mixing zone and a high velocity of flow through an entire vessel. This is said to ensure maximum dispersion with minimum particle size.

The apparatus consists of a number of small conical tubes mounted round the periphery of a set of discs. One set is fitted to the bottom of a vertical rotating shaft. Above this set, adjustable up or down the same shaft, is assembled a second set. Others are added according to the height of the vessel in which the operation of mixing, etc., is to be carried out. The conical tubes are set at such an angle that controlled turbulence in an upward and downward direction is created.

No Sediment Formed

Lower tubes of the lower set of discs cause a powerful downward flow preventing the formation of a sediment at the bottom of the vessel.

Standard types of the impelator are the laboratory type fitted with a quarter inch diameter stainless steel shaft and fitted with a variable speed motor from 600 to 2,000 r.p.m. The semi-industrial type has a half inch shaft, single or double impelators, for capacities up to 30 gallons, and is supplied with driving motor and fixing brackets for vessels up to 18 inches in diameter.

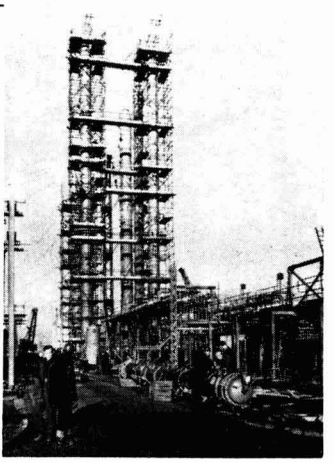
Several sizes (from A to G) are available in the industrial type, which is provided with two or more impelators, the upper units of which are adjustable for large capacities. The industrial type can be supplied as a stationary unit flange mounted or portable, with adjustable mounting to suit any size of vessel.

Petrochemicals Production

IMPERIAL OIL has awarded the contract to build its recently announced $25 million petrochemical plant to Canadian Bechtel of Toronto. Construction will begin in the spring of 1957 and expected completion is in the following spring. The plant will be erected on a 50-acre site adjacent to Imperial's Sarnia (Ontario) refinery. Materials received from the refinery (Canada's largest which uses 78,000 barrels of crude oil daily), will be converted into such basic chemicals as ethylene, propylene, normal butylenes, iso-butylenes, butadienes, aromatic distillates and tars.

Shawinigan Build Soda Plant

SHAWINIGAN Chemicals Ltd., wholly-owned subsidiary of Shawinigan Water & Power Co., is to build a caustic soda and chlorine-producing plant at Shawinigan East, Quebec. Construction is expected to start early next year. Caustic soda produced in the new plant will be used in the pulp and paper industry while the chlorine will be used mainly by the company itself.

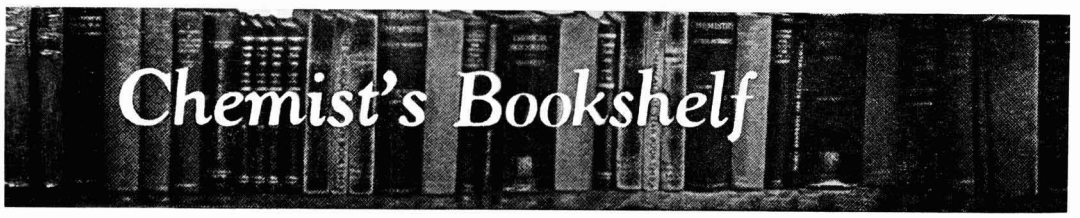


Indian Newsletter

From previous page

water softening plant—has been set up at Loyabad (Bihar) by Bird & Co. The present output of the plant is 10 cu. ft. of resin per day and it is expected to step it up to 15 cu. ft. shortly.

A new fluidised-bed process has been developed at the Fuel Research Institute, Jealgora, for the production of phthalic anhydride, based on the oxidation of coal tar oil. In this process, which is covered by Indian Patent No. 54960 (1950), the catalyst employed consists of vanadium pentoxide supported on an inert base such as alundum, silica or pukice. Special care is taken to see that the supporting material is free from alkali metal oxides. The yields of phthalic anhydride obtained from neutral tar oil fraction (b.pt., 231-70°C.) and the crude naphthalene fraction are 60 and 78 per cent respectively.



THE LAW OF RESTRICTIVE TRADE PRACTICES AND MONOPOLIES. *By* H. HEATHCOTE-WILLIAMS, EMRYS ROBERTS & RONALD BERNSTEIN. Eyre & Spottiswoode Ltd., London. *1956*. Pp. xv+221. *36s.*

The Restrictive Trade Practices Act has created a brand new branch of the law. It is a branch of the law which cannot be left to lawyers tucked away in their offices and chambers, but is of the greatest importance to industry at large; this is especially so in the chemical industry which, just because it is so highly organised, is likely to be closely affected by the Act.

A book giving a reasonably simple explanation of the new provisions is therefore assured of a welcome. This book explains the Act in terms which will be readily understandable in the industry at large and yet at the same time gives sufficient detail to answer the questions of those who are immediately affected by the Act.

First the book deals with the provisions as to which agreements are to be registered under th[illegible]hen sets out the procedure for registration. It expla[illegible]the position of the Registrar and his powers and the constitution of the Restrictive Practices Court. Then it passes to the subject which is likely to be most fruitful of litigation—what agreements may be invalidated on the grounds of public interest.

A further chapter treats of the considerable changes which have been made in the law with regard to resale price maintenance. In return for having his resale price maintenance machinery of stop lists and private courts invalidated, the manufacturer secures the right to enforce his conditions as to resale upon the retailer. A further chapter deals with the adjustments which have been made in the limits of the powers of the Monopolies Commission in order that it shall not come into conflict with the Restrictive Practices Court.

The relevant statutes are usefully collected in an appendix. An index helps the reader to find his way.

PETER PAIN

LIGHT SCATTERING IN PHYSICAL CHEMISTRY. *By* K. A. STACEY. Butterworths Scientific Publications, London. *1956*. Pp. viii+230. *40s.*

Light scattering technique has undergone very rapid development in the past decade. Debye's extension, in 1944, of the theories of Rayleigh and others provided a stimulus to the use of light scattering techniques in many branches of physical chemistry. Development has been most spectacular in the field of polymer chemistry where the configuration, weight and size of large molecules can be determined, polymer-solvent interaction parameters evaluated and association and aggregation studied by means of measurements of the light scattered from dilute solutions. This timely book gives a good general account of the theory, techniques, uses and scope of the method in this field.

About one-half is concerned with theory and practice. The different approaches to the theoretical consideration of scattering are clearly explained, together with the theory underlying the evaluation of polymer configurations, molecular weights and interaction parameters. Complications resulting from anisotropy and polarisation of scattered light and special cases arising when the polymer chains are stiff or branched are also considered. There are some useful tables of particle scattering, dissymmetry and other factors.

Practical problems of light scattering are largely optical, involving measurement of the intensity of scattered light, which is small in comparison with that of the incident light, the change of refractive index of solution with concentration and the degree of depolarisation. These are considered in reasonable detail. Different types of apparatus are described and the design of cells, clarification of solutions, calibration of apparatus and the treatment of experimental data discussed. Several types of differential refractometer are described. It is worth noting, however, that in some cases refractive index is directly proportional to concentration over a wide concentration range and if concentrated solutions can be used a differential refractometer may not always be necessary.

The rest of the book is concerned with the application of light scattering techniques to solutions of uncharged high polymers, proteins and polyelectrolytes. Determinations of polymer molecular weights are discussed and there is a good account of polymer-solvent interaction and coil size in terms of the more recent theories of Flory and others. The study of polydispersity and the effects of branching are considered. The results of studies of typical proteins and their reactions are discussed. More complex multicomponent systems are also considered. The influence of charge on the scattering of solutions of polyelectrolytes and the evaluation of shape and size are illustrated by reference to particular systems. Uses of light scattering in the study of colloidal electrolytes and of the aggregation of polymers in solution are also discussed.

The complementary nature of light scattering to other methods of study of polymer-solvent interaction is clearly shown. There are many clear diagrams and well over 500 references, up to the end of 1955. Misprints and errors appear to be few, but the function F(X) on page 118 is not strictly the excluded volume and the expression given for (X) differs slightly from that given by Flory. These are, however, very minor errors and the author is to be congratulated on providing physical chemists in general, and polymer chemists in particular, with a very useful account of the main aspects of the theory, uses, practice and scope of a rapidly developing technique.

W. R. MOORE

DIARY DATES

MONDAY 15 OCTOBER

Royal Institute of Chemistry

Dartford: North-West Kent College of Technology, Miskin Road, 7.30 p.m. 'Melting and Crystal Structure' by Professor A. R. Ubbelohde.

Chemical Society

Cardiff: Chemistry Department, University College, 5.30 p.m. 'Some Recent Studies in Relation to Biosynthesis' by Professor A. J. Birch.

Society of Chemical Industry

Leeds: Chemistry Lecture Theatre, University of Leeds, 7 p.m. Jubilee Memorial Lecture: 'The Study of Biologically Active Agents as a Vocation' by Professor F. Bergel.

TUESDAY 16 OCTOBER

Institution of Chemical Engineers

London: The Geological Society, Piccadilly W1, 5.30 p.m. 'Liquid-liquid Extraction. Parts IX & X' by R. Gayler and H. R. C. Pratt; Part XI by H. R. C. Pratt, L. E. Smith and J. D. Thornton.

Manchester: Reynolds Hall, The College of Technology, 7 p.m. 'A Method of Design of Continuous Through-Circulated Dryers' by H. C. Glover and A. A. H. Moss.

Royal Institute of Chemistry

London: University College, Gower Street WC1, 5.30 p.m. Meldola Medal Lecture: 'The Chemistry of Dinitrogen Tetroxide' by Dr. P. Gray.

Chemical Society

Durham: Applebey Lecture Theatre, Science Laboratories, The University, 5.15 p.m. 'Isotopes in Industry' by Dr. H. Seligman.

Institute of Petroleum

Manchester: Engineers Club, Albert Square, 6.30 p.m. 'Additives for Lubricants' by G. H. Thornley.

WEDNESDAY 17 OCTOBER

SCI & RIC

London: Institute of Metals, 4 Grosvenor Gardens SW1, 6.30 p.m. 'The Design of Research Laboratories' by R. Llewelyn Davies.

SCI (Corrosion Group)

London: 14 Belgrave Square SW1, 6.30 p.m. 'Hydrazine as a Corrosion Inhibitor' by M. A. Pearson.

Fertiliser Society

London: Lecture Hall, Geological Society, Burlington House, Piccadilly W1, 2.30 p.m. 'Work Study, with Special Reference to Improvement of Productivity in the Fertiliser Industry' by A. F. Shepherd.

Oil & Colour Chemists' Association

London: Royal Society of Tropical Medicine & Hygiene, Manson House, 26 Portland Place W1, 7 p.m. 'Liability for Harm and Damage Caused by Paint' by M. H. M. Arnold.

THURSDAY 18 OCTOBER

Chemical Society

London: Burlington House, Piccadilly W1, 7.30 p.m. Meeting for reading of original papers.

Bristol: Chemistry Department, The University, 7 p.m. 'Degradation of Cholesterol and the Origin of its Carbon Atoms from Acetate' by Dr. G. Popjak.

Edinburgh: Pharmaceutical Society Rooms, York Place, 7.30 p.m. 'An Aspect of Natural Product Chemistry' by Professor F. S. Spring.

Hull: Organic Chemistry Lecture Theatre, The University, 6 p.m. 'The Separation of Volatile Substances by Gas-Liquid Chromatography' by Dr. A. T. James.

Sheffield: Chemistry Lecture Theatre, The University, 7.30 p.m. 'The Chemistry of Vitamin B_{12}' by Professor A. W. Johnson.

FRIDAY 19 OCTOBER

I.Chem.E. (Graduates' & Students' Section)

London: Caxton Hall Westminster SW1, 6.30 p.m. 'Impressions of the German Chemical Industry': Conversazione on the Overseas Industrial Tour, 1956.

Chemical Society

Manchester: College of Technology, 6.30 p.m. 'Recent Studies in the Stereochemistry of Sub-group VI_B' by Dr. S. C. Abrahams.

Southampton: Chemistry Department, The University, 5 p.m. 'Steric Hindrance in Analytical Chemistry' by Dr. H. M. N. Irving.

Society for Analytical Chemistry

Manchester: Robinson Laboratory, The University, 6.30 p.m. Joint meeting of Physical Methods Group and North of England Section on 'Ion Exchange.'

NEWS BRIEFS

ACCLES & Pollock Ltd., Oldbury, Birmingham, has revised and enlarged its publication *Practice & Specifications*. Copies of the new issue, now called *Tube Manufacturing Practice & Specifications* will be sent, while the supply lasts, to readers. Application should be made on business letterheads.

●

THE LABORATORIES of the Chalk, Lime & Allied Industries Research Association moved on 26 September to Church Street, Welwyn, Herts. (Telephone: Welwyn 771/2).

●

TWO films about industrial lubrication, 'Hydraulic Systems' and 'Diesel Engine Lubrication', will be screened for the first time in London on 16 October. They have been produced for the Mobil Oil Co. The first deals with the transmission of energy by means of pressurised fluids, the second with the operation and lubrication of every type of Diesel engine.

●

QVF LTD. has acquired extensive premises at Fenton, Stoke-on-Trent, to which it will in the near future transfer its offices. Until then, the firm asks all customers to continue to send communications to its present address: Mill Street, Stone, Staffs.

●

THE FULLERS' Earth Union Ltd. has offered to support for three years a research studentship in chemistry under the direction of Professor R. M. Barrer, F.R.S., in the Chemistry Department at the Imperial College of Science & Technology.

●

AFTER consultation with the trade, the Commissioners of Customs and Excise have decided that in future plastic line with steel wire core will be chargeable at the rate of 30 per cent under Group 11(a) of the Tax Schedule (which includes clothes lines), whether the line is sold cut to specified sizes or supplied in bulk.

Society of Dyers & Colourists

Manchester: Textile Institute, 10 Blackfriars Street, 7 p.m. 'Dyeing and Printing with Reactive Dyes' by Dr. T. Vickerstaff.

SATURDAY 20 OCTOBER

Institution of Chemical Engineers

Loughborough: The College of Technology, 3 p.m. 'The Manufacture and Industrial Uses of Hydrazine' by W. S. Stevens and J. West.

Analytical Chemistry of Mercury

This is the second part of a paper presented at a meeting of the Midlands section of the Society for Analytical Chemistry at Nottingham on 27 March. In the absence of the author, Mr. G. J. W. Ferrey, the paper was read by Dr. D. C. Garratt of Boots Pure Drug Co. The paper discusses aspects of the analytical chemistry of mercury with special reference to pharmaceutical applications.

IN THIS COUNTRY, mercury was usually isolated from complex organic mercurials by processes involving refluxing with zinc. In the US, reliance was normally placed on oxidation with sulphuric and nitric acids to obtain the mercury in an ionised form. Permanganate in acid or alkaline solution, peroxide, perchlorate and persulphate had also been used.

Waterhouse (**51**) assayed mersalyl by refluxing with formic acid for three hours, the precipitated mercury being filtered off on a fine sinter. Pierce (**52**) showed that three hours' boiling was not enough; even 4½ hours' boiling gave low results. He added zinc to the formic acid and found 30 minutes' boiling adequate. This was the method used in the BP, now. Chambers (**53**) in 1943 examined several methods in relation to phenylmercuric nitrate. He showed that refluxing with dilute hydrochloric acid to destroy the complex and ionise the mercury was unsatisfactory since insoluble decomposition products were formed which contaminated the precipitate of mercuric sulphide, the form in which the mercury was weighed in the then official method. He found the Waterhouse formic reduction method, the zinc-acetate acid method and wet combustion with sulphuric and nitric acids gave closely agreeing results, and recommended the second. Stross and Stuckey (**54**) emphasised the necessity to recover volatilised metallic mercury from the condenser tube in zinc-reflux methods.

TABLE VII

Assays on organic mercurials by various methods

Mercurochrome (% Hg on dried)

Zn-alkali method (BPC; 15-240 mins. boiling)	Zn-HCl method (BPC 1934)	Corran & Rymill method	Fitzgibbon method
26.4; 25.9	26.0; 25.9	26.1	—
27.5; 27.4; 27.3; 27.2; 27.2	27.2; 27.2	—	27.3; 27.4
26.4; 26.4	26.6; 26.5	—	26.3
26.0; 26.1; 26.0	25.9; 26.0	—	26.0

Thiomersal (% Hg on dried)

NF (Zn-alkali method):	48.7
BPC method ($H_2SO_4-H_2O_2$):	48.5

Mersalyl acid (% Hg on dry)

NF (Zn-alkali method):	42.4 (1 hr.)

Mersalyl (% Hg on dried)

NF (Zn-alkali method):	38.8 (½ hr.)
BP method:	39.1

Phenylmercuric nitrate (% Hg on dry)

NF (Zn-alkali method):	100.1 (+10 ml. EtOH; 1 hr.)
BP method:	99.8

Mercurochrome was assayed (BPC 1934) by boiling with hydrochloric acid and zinc, a lengthy and tedious process. Corran and Rymill (**55**) found it gave low results and recommended oxidation in alkaline solution with permanganate. Mercurochrome was soluble in alkaline solutions but precipitated by acids, and so it seemed to be more logical to effect reduction in alkaline solution by boiling with zinc and aqueous-alcoholic potash (**56**), the method now used in the BPC. In Mr. Ferrey's hands, the BPC (1934) method, Corran and Rymill's method and the zinc-alkali method all gave closely agreeing results, the last having the advantage of convenience.

Rauscher (**6**) proposed an omnibus method in which the solvent was also the reducing agent. He offered it as applicable to all inorganic and organic salts of mercury, organic mercury halides and other organic mercurials and also ointments and tablets. The mercury compound was gently boiled under reflux for five minutes with monoethanolamine. Mercury metal collected as a globule, was separated by means of a micro-filter, washed, dried, weighed and titrated.

Use of Diethanolamine

With organic compounds in which mercury was strongly linked to carbon, reduction was not completed in a reasonable time. The use of diethanolamine and 30 minutes boiling was suitable for some compounds but a more general method was to reflux with a mixture of monoethanolamine and dioxan, adding from time to time small quantities of sodium metal. Rotondara (**7**) used reduction with triethanolamine in the presence of zinc and aqueous potassium hydroxide solution, xylene or toluene, and butyl alcohol. Some preparations required a preliminary oxidation with bromate-bromide and acid. Green, Green and Powers (**8**) used a similar method, effecting solution with bromine and reduction with zinc and triethanolamine.

Bartlett and McNabb (**9**) used reduction with stannous chloride, and filtered off the precipitated mercury using a Brindle-Waterhouse technique. Stschigol (**5**) separated mercury by reduction with glycerol in alkaline solution. Fitzgibbon (**37**) was mainly concerned with seed dressings and used bromine water to effect solution, followed by the precipitation of mercury by the Rupp technique. A large number of mercurials and their dilutions with inert materials were adequately dealt with, according to Fitzgibbon, by heating with concentrated sulphuric acid, followed by bromine water. Readily volatile and stable alkyl compounds were more safely decomposed by reacting them with pure bromine. The resulting mixture of mercuric bromide and brominated organic compounds was heated with sulphuric acid in the usual way, with precautions to avoid loss by sublimation.

In compounds such as ethyl mercuric chloride, the

C-Hg linkage was remarkably stable and required drastic treatment, heating carefully over a bunsen flame with sulphuric acid and pure bromine. After cooling and diluting with water, the heating was continued until bromine had almost ceased to appear as drops in the condenser tube. The liquid was diluted further with water and boiled free from bromine.

Mr. Ferrey himself used bromine for the oxidation of mercurous chloride in admixture with large amounts of vegetable matter in the assay of three BPC 1949 pills (**57**).

TABLE VIII

Recovery of calomel from admixture with vegetable matter (vegetable matter 1-2 g.)

	No bromide treatment	With bromide treatment
Calomel ..	0.154—0.334 g.	0.32—0.607 g.
Recoveries ..	76.3 —92.9%	98.5 —100.1%

Vegetable Matter

It was found that the vegetable matter was sufficiently destroyed by oxidation with a mixture of bromide-bromate solution and glacial acetic acid, the addition of a little nitric acid assisting the destruction. Filtration from the small residue of resistant vegetable structure was easy and rapid and in some cases unnecessary. Zinc filings were then added to the acetic acid solution and the mixture boiled under reflux. The zinc removed the excess of bromine and amalgamated with the mercury. The method had been found useful for the determination of mercury in other combinations and was not necessarily confined to the determination of calomel. A somewhat similar method for the assay of tablets containing small amounts of an organic mercurial with larger amounts of insoluble material had recently been published by Berggren and Kirsten (**58**), together with a variant procedure, carried out in the cold, in which acetic acid was replaced by hydrochloric. The use of zinc granules, as in their method, or filings, instead of powder was often convenient, since decantation from the amalgam could replace filtration, which was sometimes tedious. Theimer and Arnow had recently published a method for the direct titration of mercurial diuretics of similar constitution to mersalyl by standard thiocyanate in 50 per cent v/v sulphuric acid.

Somewhat Cumbersome

An interesting method, though somewhat cumbersome, Mr. Ferrey found, was published in 1940 by Sandilands (**59**). The organic mercurial mixed with an excess of dried iodic acid was heated in a small boat placed near one end of a hard glass tube, the further half of which is cooled by means of a water jacket. The mercury was volatilised along the tube by a slow current of air and condensed as red mercuric iodide. After cooling, the iodide was dissolved in water containing a little sodium thiosulphate, excess of which was removed by alcoholic iodine solution. The solution was acidified and the mercury precipitated as sulphide. Sandilands obtained good and consistent results, but it was not to be compared with the zinc amalgamation technique for ease and convenience.

Among the gravimetric methods for determining mercury, its precipitation as sulphide had received considerable attention. Mercuric sulphide was the least soluble of the sulphides, its solubility product being

ANALYTICAL CHEMISTRY

4×10^{-53}. Its insolubility in hot dilute nitric acid of s.g. 1.2 to 1.3 distinguished it from all other sulphides. It was normally precipitated in slightly acid solution, but when nitric acid was present, the solution was rendered ammoniacal before passing hydrogen sulphide into it.

Several workers (**39, 53, 60, 61**) had found that weighing as mercuric sulphide gave slightly high results, even after extracting the precipitate with carbon disulphide or other solvent. Allport (**62**) suggested an ingenious use of sulphide precipitation for the assay of mercuric oxide and ammoniated mercury ointments, which were dissolved in suitable proportions of benzene, glacial acetic acid and alcohol to give a clear solution and effect ionisation of the mercury. Hydrogen sulphide was passed into the warm solution and the precipitate filtered off, washed, dried and weighed. Mr. Ferrey found this method gave slightly high results when tested against pure mercuric oxide (**49**); even after prolonged extraction with carbon disulphide, results still about 0.8 per cent too high were obtained.

The gravimetric sulphide method was used in the USP, for the assay of mercuric chloride, tablets of mercuric chloride and two ointments of ammoniated mercury, although ammoniated mercury itself was assayed by a zinc-acetic acid method. The *Danish Pharmacopoeia* used sulphide precipitation to assay mercuric chloride, and it could be significant that an upper limit of mercury equivalent to 100.9 per cent of $HgCl_2$ was allowed.

Other Methods

Of other gravimetric methods, for several years Mr. Ferrey had assayed mercuric chloride by precipitation of the double salt, mercury zinc thiocyanate (**63**), $ZnHg(CNS)_4$, in preference to the official BP method. Routine assays over five or six years had fallen between 99.7 and 100.1 per cent. The mercuric chloride was dissolved in water, N sulphuric acid added, followed by the zinc ammonium thiocyanate reagent. The solution was set aside for five minutes, stirred thoroughly, and allowed to stand for three hours. The precipitate was filtered off and washed with water containing two per cent of the reagent solution, dried to constant weight at 105°C and weighed. Jamieson (**63**) supplied a volumetric finish to this method, but it gave slightly low and erratic results, due to destruction of thiocyanate by strong acid. The iodate titration of thiocyanate was studied in detail by Hammock, Beavon and Swift (**64**) in 1950:

$$HgZn(CNS)_4 + 6KIO_3 + 12HCl \rightarrow HgSO_4 + ZnSO_4 + 2H_2SO_4 + 6ICl + 4HCN + 6KCl + 2H_2O$$

The Gentry and Sherrington (**65**) iodate method gave satisfactory agreement between gravimetric and volumetric finishes. Halides should be absent. The solution of the mercuric salt, faintly acid with nitric acid, was boiled with a solution of iodic acid added slowly, the precipitate being washed with dilute iodic acid solution,

OF MERCURY

dried at 140°C and weighed as $Hg(IO_3)_2$. The precipitate could be dissolved in potassium iodide solution, which was acidified, and titrated with thiosulphate. The precipitation of mercuric periodate was also rapid and accurate (**66**). Halides and iron interfered. The acidity should not exceed 0.15N as nitric acid or 0.1N as sulphuric acid. To the boiling solution, a solution of sodium or potassium periodate was added. The precipitate was washed with warm water, dried at 100°C for two to three hours, and weighed as $Hg(IO_6)_2$. It could be dissolved in acid potassium iodide solution and titrated with thiosulphate, or treated with a measured excess of standard arsenite, followed by hydrochloric acid and titration of the excess arsenite with iodate, using chloroform as indicator:—

$$Hg_5(IO_6)_2 + 34KI + 24HCl \rightarrow 5K_2HgI_4 + 8I_2 + 24KCl + 12H_2O,$$

$$Hg_5(IO_6)_2 + 6H_3AsO_3 + 12HCl \rightarrow 5HgCl_2 + 2ICl + 6H_3AsO_4 + 6H_2O$$

A method which Mr. Ferrey had occasionally found useful was the gravimetric reineckate method, due to Mahr (**67**). For example, to a sample of eye lotion of mercuric oxycyanide was added hydrochloric acid to make the solution 0.5N, a slightly acid solution of ammonium reineckate was added dropwise, set aside for a few minutes, filtered, washed with alcohol and water, dried at 105°C and weighed as

$$Hg[Cr(NH_3)_2(SCN)_4]_2,$$

which contained only 23.96 per cent of mercury. Mahr provided a volumetric finish also but this required so much manipulation and attention that the gravimetric finish was much more satisfactory.

Not Much Used

Mr. Ferrey did not think the old method of Rose, reduction to calomel by phosphorous acid, H_3PO_2, was used much nowadays. The solution of the mercuric salt was acidified with hydrochloric acid and excess of phosphorous acid added. After 12 hours, the precipitate of calomel was filtered off, dried at 105°C and weighed. Treadwell and Hall (**68**) recommended this method, although it gave results consistently about 0.4 per cent low. Jamieson used this method with a volumetric iodate finish (**69**).

The only mercurous salt of medicinal importance was calomel, which was assayed officially by solution in decinormal iodine. Additional potassium iodide was added to hasten the speed of solution which was usually quite slow. Other mercurous salts could be assayed by this method after conversion into calomel by treating with excess of sodium chloride, allowing to stand for 12 hours and filtering. Lyons (**70**) had suggested the use of fifth-normal iodine to hasten solution. Sloviter *et al.* (**3**) used standard bromine to dissolve more quickly the mercury precipitated in their modification of the Rupp process, and this reagent could be of use in speeding up the assay of calomel. Mr. Ferrey's own preference was for the iodate method of Jamieson (**71**) which gave excellent results:

$$4HgCl + KIO_3 + 6HCl \rightarrow 4HgCl_2 + KCl + ICl + 3H_2O,$$

and since many forms of organic matter were indifferent to iodate, the method could be used for the assay of calomel tablets (**72**). Spacu and Spacu (**73**) investigated the precipitation of mercurous mercury as the iodate, $Hg_2(IO_3)_2$, which was almost insoluble in water, the solubility product being 3.4×10^{-13} at 15°C. To the neutral or weakly acid solution was added, with constant stirring, excess of potassium iodate solution. After standing for 1½ hours, the precipitate was filtered off, washed with water, alcohol and ether, and dried in vacuo. Alternatively, the precipitation could be carried out with a measured excess of standard iodate solution, and the excess iodate in the filtrate determined in the usual way.

Small Quantities

Mr. Ferrey closed with a few remarks on the detection and determination of small quantities of mercury, but he did this only in general terms and in so far as it affected pharmaceutical analysis because Mr. Duffield was going to deal with the intricacies of the microchemistry of mercury (to be published later).

In most pharmaceutical preparations, the amount of mercury present was so large that it would be difficult to miss it, and the methods to be used did not need to be discussed. Some preparations did, however, contain very small amounts of mercury; for example, in washes of mercuric chloride, which could be 1 in 10,000 or less; the addition of phenylmercuric nitrate in concentrations of 0.001 to 0.002 per cent as a bacteriostatic, and the use of thiomersal in the region of 0.1 per cent in aqueous solution, in paraffin base or in creams.

For the detection of traces, the old Reinsch test in which an aqueous solution containing two to eight per cent hydrochloric acid was boiled with bright copper was very sensitive, and could be made more so by volatilising the mercury from the copper and causing it to react in a constricted tube with iodide vapour. Or the copper strip with its trace of mercury could be put with freshly prepared cuprous iodide between watch glasses, when, on standing, a red colorisation appeared. Phenylmercuric nitrate and thiomersal reacted in the Reinsch test.

Chromatography

Chromatographic methods for detecting mercury were available but were not of first importance in pharmaceutical analysis. Chlorides of the metals of Group IIa, bismuth, cadmium, copper, lead and mercury were readily separated by paper chromatography by development with normal butyl alcohol saturated with 3N hydrochloric acid. Mercury, which moved the fastest, appeared as a pink band just behind the solvent front when the dry strip was sprayed with a solution of dithizone in chloroform. Mercury could be isolated from many other metals by developing a spot of the chlorides with methyl acetate containing 10 per cent v/v of water and three per cent v/v of methyl alcohol (**74**). The chloride solution must have a *p*H less than two, and not contain more than five per cent of hydrochloric acid. Mercury was again close to the solvent front.

Fortunately, in pharmaceutical preparations the

Analytical Chemistry of Mercury

metal was rarely found in association with other metals, and the methods of estimation often needed only to be quite simple. For colourless solutions, comparison with a standard preparation after treatment with hydrogen sulphide or diphenylcarbazone under standard conditions might suffice. In solutions containing added colouring matter, preliminary treatment for its removal might be necessary.

For more accurate work, methods depending on extraction of mercury with dithizone solutions in chloroform or other solvent were beginning to appear in the pharmaceutical literature. Mercury was extracted under standard conditions, usually quite acid, with weak dithizone solutions and the mercury dithizonate measured colorimetrically or titrimetrically against standards.

For example, the National Formulary (1955) of US assayed thiomersal preparations containing 0.1 per cent of the drug by decomposing the preparation by boiling with N/4 hydrochloric acid and bromine, the mercury being finally extracted at a *p*H of 3.5 to 3.7 by a standard dilute solution of dithizone. An interesting observation was made by Miller, Polley and Gould (**75**) that organic mercurials of the type of phenylmercuric acetate and ethylmercuric acetate reacted intact with dithizone at a *p*H of 4.5 to give yellow dithizonates soluble in chloroform:

$$\underset{\text{dithizone}}{Hg-OOCCH_3+HD} \rightarrow \underset{\text{yellow}}{Hg-D+CH_3COOH}$$

In the course of the work it was found that phenylmercuri-compounds were much more stable than ethylmercuri-compounds in acid solution, the latter decomposing to a large extent overnight while the former were practically unaffected. By determination of the residual mercuri-compound, it was possible to distinguish phenyl from ethyl in minute concentrations.

(This concludes Mr. Ferrey's paper)

REFERENCES

(**51**) Waterhouse, *ibid*, 1938, **11**, 458.
(**52**) Pierce, *ibid*, 1942, **15**, 367.
(**53**) Chambers, *ibid*, 1943, **16**, 6.
(**54**) Stross & Stuckey, *J. Pharm. Pharmacol*, 1949, **1**, 421.
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LOW TEMPERATURE STUDIES

Helium Liquefaction Now Routine

HIGH TEMPERATURES and high pressures are now required for many processes. Certainly high temperatures will be required if harnessing of thermo-nuclear reactions for industrial purposes is to be achieved. On the other hand, the attainment of very low temperatures is being studied particularly in connection with liquefaction of gases. A case in point is the production of 'tonnage oxygen' by the British Oxygen Co. at the special plant at Margam, S. Wales, for liquid air boils at $-180°C$.

Professor G. O. Jones, professor of physics, London University, has recently dealt with research below zero (*Science Progress*, No. 176, Oct. 1956). He reports that Sir Francis Simon and colleagues, at Oxford, have been conducting experiments where temperatures of about 20-millionths of a degree of absolute zero have been obtained. Such temperatures are 50 times lower than any previously reached.

In the US liquefaction of helium has now become a routine laboratory reaction. By liquefying helium which boils at 4° absolute, it is possible to work down to 1° absolute.

Today, liquid oxygen is transported in bulk and it has been suggested that natural gases might be transported in the liquid state in specially constructed ships (*Nature*, 1956, 178). Low temperatures are of importance in the separation of many special isotopes, eg, heavy hydrogen or deuterium. At Boulder, Colorado, US, there is a plant that can produce continuously over 300 litres of liquid hydrogen per hour.

Professor Jones reports on phenomena discovered during low temperature studies. Thus liquid helium below 2.2° absolute loses all its viscosity and property of 'super-conductivity,' a property also shown by many metals at temperatures in the liquid helium region. The Oxford experiments have indicated that attainment of exceptionally low temperatures appears to depend upon forces between the nuclei of atoms and further experiments should certainly increase present-day knowledge of the properties of nuclei. Professor Jones also considers that US industry is finding the attainment of low temperatures is of value for there are now some 70 helium liquefiers in use in the US.

Industrial Engineering Conference

A CONFERENCE on 'Work Study and Industrial Engineering in the Small and Medium-Sized Organisation' will be held by the Society of Industrial Engineers and the Work Study Society at the Esplanade Hotel, Porthcawl, on 26 and 27 October. The purpose of the conference is to show the smaller firms how they may improve their efficiency without heavy capital expenditure, through the application of industrial engineering techniques.

Mr. L. G. Humble, work study manager of the metals division of ICI and chairman of the Work Study Society, will be among the speakers.

Full particulars and application forms may be obtained from: The Conference Secretary, 15 Alder Avenue, Ystradgynlais, Swansea Valley, South Wales.

Commercial Intelligence

Increase of Capital

EVERS & WALL LTD. (481,511), manufacturers of chemicals and insecticides, etc., West Hill, Aldbourne, Marlborough, Wilts, increased by £24,900 in £1 ordinary shares, beyond the registered capital of £100.

Changes of Name

TYPKE & KING LTD. (90,051), Birtley, Co. Durham, changed to Durham Chemicals Ltd., on 2 August 1956.

DURHAM CHEMICALS LTD. (150,170), 66 John Street, Sunderland, changed to Durham Chemical Group Ltd., on 2 August 1956.

ORGANIC LABORATORIES LTD. (568,338), manufacturers of chemicals, etc., Queens House, 8 Queen Street, London EC4, changed to K. & K. Organics Ltd., on 1 August 1956.

New Registrations

J. A. Dale (Baker Street) Ltd.

Private company (572,228). Registered 1 October. Capital £1,000 in £1 shares. Objects: To carry on the business of wholesale and retail manufacturing druggists, opticians, etc. The directors are: Aaron Melzack, 338a West End Lane, London NW6 (director of J. A. Dale Ltd.); Mrs. Wendy Melzack, 102 Valley Drive, Kingsbury, London NW9. Secretary: Wendy Melzack. Solicitors: Parker Thomas & Co., 171 Shaftesbury Avenue, London WC2. Registered office; 17 Baker Street, London W1.

Northern Valve & Engineering Co. Ltd.

Private company (572,281). Registered 1 October. Capital £3,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in valves and other ancillary equipment, particularly, but not exclusively, for use in the chemical and allied industries, and in the field of atomic research and of engineering equipment, etc. The permanent directors are: Clifford H. Kershaw, 43 Strathtay Road, Sheffield, 11; and Philip J. Swales, 12 Prospect Street, Rawdon, Yorks. Secretary: P. J. Swales. Solicitors: E. Clapham & Co., Guiseley, Yorks. Registered office: 87 Meadow Lane, Leeds.

Tootell & Co. (Liverpool) Ltd.

Private company (572,300). Registered 1 October. Capital £20,000 in £1 shares. Objects: To acquire the business of starch and dextrine manufacturers and dealers carried on by Hugh M. Simpson and Guy Simpson at Liverpool, etc. The subscribers (each with one share) are: Guy Simpson, 2 Eshe Road North, Blundellsands, Liverpool, 23, starch and general merchant; and Reginald J. Rubery, Edge Hill, Woodhead Road, Hales, Ches., solicitor's articled clerk. The first directors are Guy Simpson and Gordon Slater. Solicitors: J. & E. Whitworth, Manchester. Registered office: 24 Chapel Street, Liverpool, 3.

COMPANY NEWS

Calico Printers' Association

For years the Calico Printers' Association has gained considerable income from licences connected with its Everglaze process. Now it is the turn of Terylene which, says the chairman (Mr. Roger M. Lee) in the annual report, may have 'a considerable effect on the profits of the association.' There has been a substantial increase in sales of the fibre during the year, and prospects are 'most encouraging.' In addition to ICI and CIL, five continental firms now manufacture the fibre under licence.

Glaxo Laboratories Ltd.

Subject to completion of audit Glaxo Laboratories Ltd. announce that the profits of the Group for the year ended 30 June 1956 amounts to £1,765,000 (£1,556,000) after providing for all charges including £1,441,000 (£1,453,000) for taxation. The proportion of these profits attributable to outside shareholders is £25,000 (£11,000). Group profits include profits of previous years £16,000 (£75,000).

The directors propose: (a) to place to capital reserve—general (including obsolescence and replacement) £1,000,000 (£500,000); to revenue reserve—general nil (£500,000) and to exchange £100,000 (£100,000); (b) to provide for superannuation and widows pensions, £100,000 (£100,000); and (c) to recommend a final dividend of 7¾ per cent on the ordinary stock (making 14 per cent for the year compared with 12½ per cent last year). The final dividend requires £141,949 (£183,160) after income tax, payable on 11 December 1956, leaving £537,416 (£438,772) to be carried forward.

The directors also announce that it is proposed to increase the authorised capital to £10,000,000 and subject to the consent of the Capital Issues Committee, to capitalise £1,592,700 of the capital reserves of the company and to issue to the ordinary stockholders one share of 10s. for every two 10s. units of stock now held by them. The purpose of this issue is to bring the nominal capital into closer relationship with the capital actually employed in the business.

The Annual General Meeting will be held at the Charing Cross Hotel on Monday, 10 December 1956 at 12.30 p.m.

Goodlass Wall & Lead Industries Ltd.

The directors of Goodlass Wall & Lead Industries Ltd. have declared an interim dividend of five per cent actual, less tax (same) on the ordinary stock, in respect of the year ending 31 December 1956. This dividend will be payable on 30th November 1956.

Lawes Chemical Co. Ltd.

During the past three years approximately £160,000 has been spent by Lawes Chemical Co. on improved methods of receiving, loading, storage and manufacture. This was stated by the chairman at the 84th annual general meeting which was held in London on 1 October. He went on to

[*Turn to page 80*

MANUFACTURERS' AGENTS FOR: IMPORTERS OF PRODUCE FROM:

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Company News

From page 79]

say that the directors proposed in the near future to apply to the Capital Issues Commission for permission to issue the unissued portion of the authorised capital. 'The capital and reserves are now double the issued capital of the company,' said the chairman, 'and the members have the right to enjoy the success of their investment. We have therefore decided to recommend the payment of 12½ per cent dividend this year. Your directors have also noted that of companies quoted in *The Financial Times* your dividend has one of the highest covers.

The Monckton Coke & Chemical Co. Ltd.

Trading profit of The Monckton Coke & Chemical Co., before charging depreciation, was £158,608 for the year ended 30 June 1956, an increase of over £20,000 over the previous year. These figures were given at the 55th annual general meeting which was held in Sheffield on 27 September. During the past year a reorganisation of the company has taken place. The subsidiary company changed its name from Monckton Coke & Chemical Co. Ltd. to Monckton (Carbonisation) Ltd. and simultaneously went into liquidation. The main company changed its name from Monckton Holdings Ltd. to The Monckton Coke & Chemical Co. Ltd. and absorbed the whole of the assets and liabilities of the subsidiary company.

Organic Chemicals Manual

MORE than 335 organic chemicals are described in a 24-page booklet issued by Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corporation. Data on applications are presented and physical properties are given in tabular form. An alphabetical index is included for the convenience of the user.

The 1957 edition of Physical Properties of Carbide and Carbon Chemicals features 21 new products. Sorbic, a new fungistat for foods, and Niatex antistatic AG-2 are two of the new products described in the section on chemicals for special applications.

MARKET REPORTS

LONDON Trading conditions on the general chemicals market have been fairly active during the past week with deliveries to home consumers covering good quantities. The demand for the textile and kindred trades continues to show improvement and a steady call is reported for the plastics industry. Export trade demand is well sustained and a good volume of enquiry is in circulation for the Commonwealth and Far Eastern destinations. There have been no important price changes on the week. Activity on the coal-tar products market has been fairly steady with supplies adequate to meet current needs. Pitch is moving well on home account.

MANCHESTER The price position on the Manchester market for heavy chemical products during the past week has fully maintained its generally steady undertone and little actual change has occurred since the last report. Leading consumers, including the textile and allied trades are taking reasonably steady deliveries under contracts, and a fair number of both home and export enquiries have again been dealt with. Basic slag and nitro-chalk are meeting with a good demand, but in most other sections of the fertiliser trade fresh bookings have been only moderate. On the whole, the tar products section is fairly active so far as contract deliveries are concerned.

GLASGOW The impetus in the chemical trade experienced last week has been maintained throughout the various sections of the industry. Prices have remained steady and the week has been satisfactory from a trading point of view. Some interesting bookings have been completed in the export market; a lively interest is being shown from overseas in a wide range of materials.

WILL

MR. FREDERICK HORACE PRIEST, of 219 Woodcote Road, Purley, Surrey, manager of the Mitcham Works of W. J. Bush Ltd., who died on 29 July last, left £11,943 3s 3d gross.

CRL Open Days

Visitors Inspect Work Being Done by Six Research Groups

OPEN days at the Chemical Research Laboratory, Teddington, were held from 2 to 5 October. Visitors were able to inspect the work being done by the six research groups which comprise the CRL.

Group 1 (corrosion of metals) is undertaking research in the mechanism and prevention of corrosion in soils, liquids and gases at normal and high temperatures. Group 2 (inorganic) is concerned with the isolation and study of less common elements and with methods of analysis.

Group 3 (microbiology) is studying sulphate-reducing bacteria, bacterial oxidation of aromatic compounds, and continuous fermentation techniques. In group 4 (organic) research in progress includes: Preparation of organic materials of very high purity as standards; development of analytical methods; measurement of properties of organic compounds used in industry; study of particular organic reactions; synthesis of new ion-exchange resins and application of isotopic tracer techniques to the study of chemical reactions.

Research in progress in Group 5 (high polymers) includes studies of ion-exchange and other properties of high polymers; structure and permeability of polymer membranes, and polymer fractionation.

The radiochemical group (Group 5) is considering new techniques of extraction and analysis in a laboratory specially designed for radiochemical work.

Director of the CRL is Dr. D. D. Pratt, C.B.E. His staff of approximately 200 includes 45 scientific officers, 75 experimental officers and 30 scientific assistants. CRL is one of the stations of DSIR and was founded in 1925.

Low Pressure Polythene

BRITISH Hydrocarbon Chemicals Ltd., jointly owned by the British Petroleum Co. Ltd., and The Distillers Co. Ltd., has decided to build a plant of advanced design for the production of polythene according to the low pressure process of Phillips Petroleum Co.

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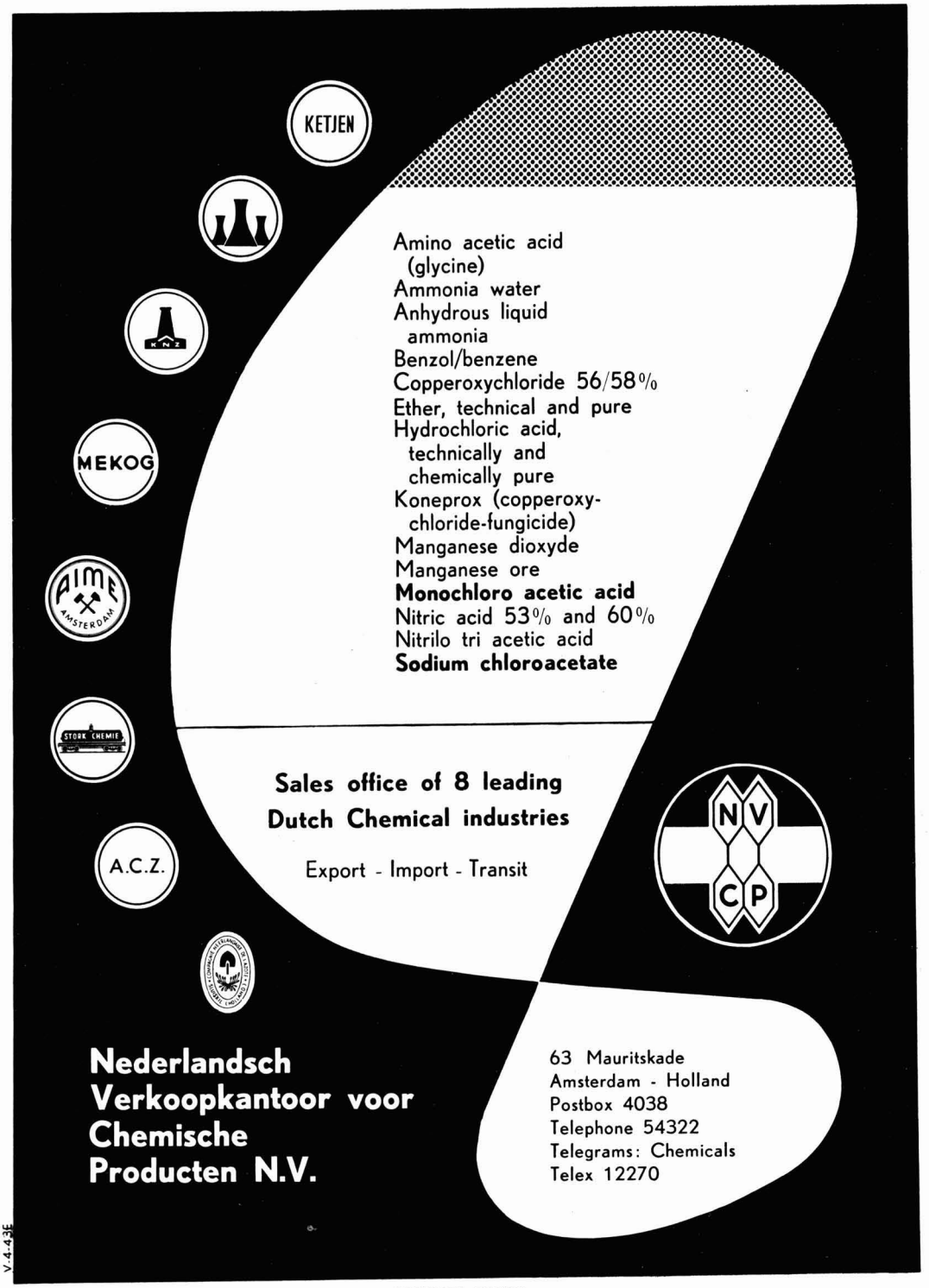

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PUBLIC NOTICES

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Further particulars may be obtained from the Secretary, Insignia Award Committee, City and Guilds of London Institute, Gresham College, Basinghall Street, London, E.C.2.

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SENIOR SCIENTIFIC OFFICERS; SCIENTIFIC OFFICERS. The Civil Service Commissioners invite applications for pensionable appointments covering a wide range of scientific research and development in most of the major fields of fundamental and applied science. In biological subjects the number of vacancies is small: individual vacancies exist in the Natural History Museum for candidates who have special knowledge of, or who are interested in, malacology, helminthology, acarology, mammalian taxonomy, taxonomic botany (monocotyledons), X-ray crystallography.

Candidates must have obtained a university degree with first or second class honours in an appropriate scientific subject (including engineering) or in Mathematics, or an equivalent qualification; or possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience.

Interview Boards sit at frequent intervals.

AGE LIMITS: Senior Scientific Officers, between 26 and 31, but specially suitable candidates under 26 may be admitted; for Scientific Officers between 21 and 28 during 1956 (up to 31 for permanent members of the Experimental Officer class). Salary (London) Senior Scientific Officers: (men) £1,135-£1,345; (women) £1,026-£1,240. Scientific Officers: (men) £605-£1,055; (women) £605-£962. Women's scales being improved under equal pay scheme. Somewhat lower rates in the provinces.

Further particulars, for which early application is advised, from **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, 30, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. S.53/56 for Senior Scientific Officers and S.52/56 for Scientific Officers.

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is now in large scale production at the Henderson, Nevada plant of AMERICAN POTASH & CHEMICAL CORPORATION. This development of Electrolytic Manganese Dioxide, accomplished with the co-operation of the U.S. Bureau of Mines and U.S. Signal Corps provides a source of superior quality MnO_2 for use as a depolarizer in high performance dry-cell batteries.

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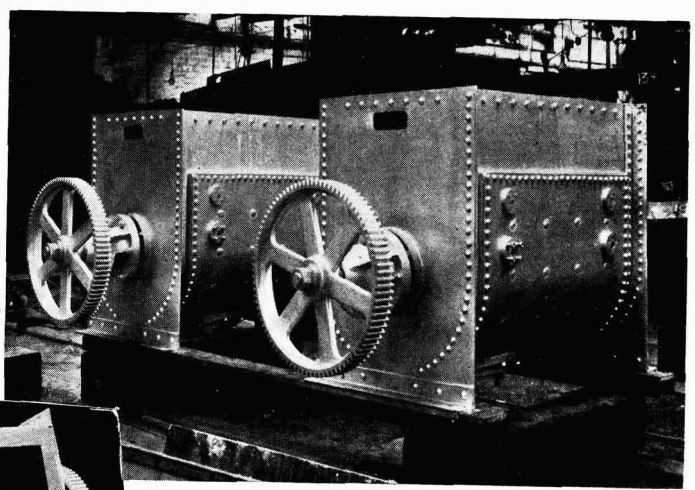
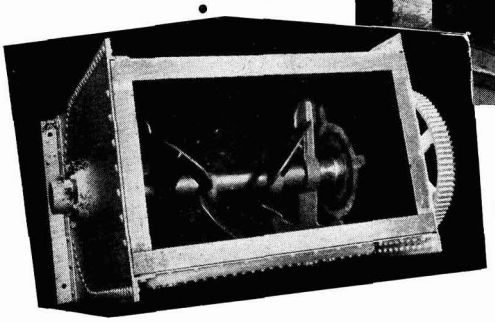
MIXING VESSELS





These hot water jacketed Mixing Vessels (capacity ½ ton each) are for use in chocolate manufacture. The lower photograph shows the stirring gear.

We manufacture Mixers, Blenders and Process Vessels for a wide range of industries and applications.

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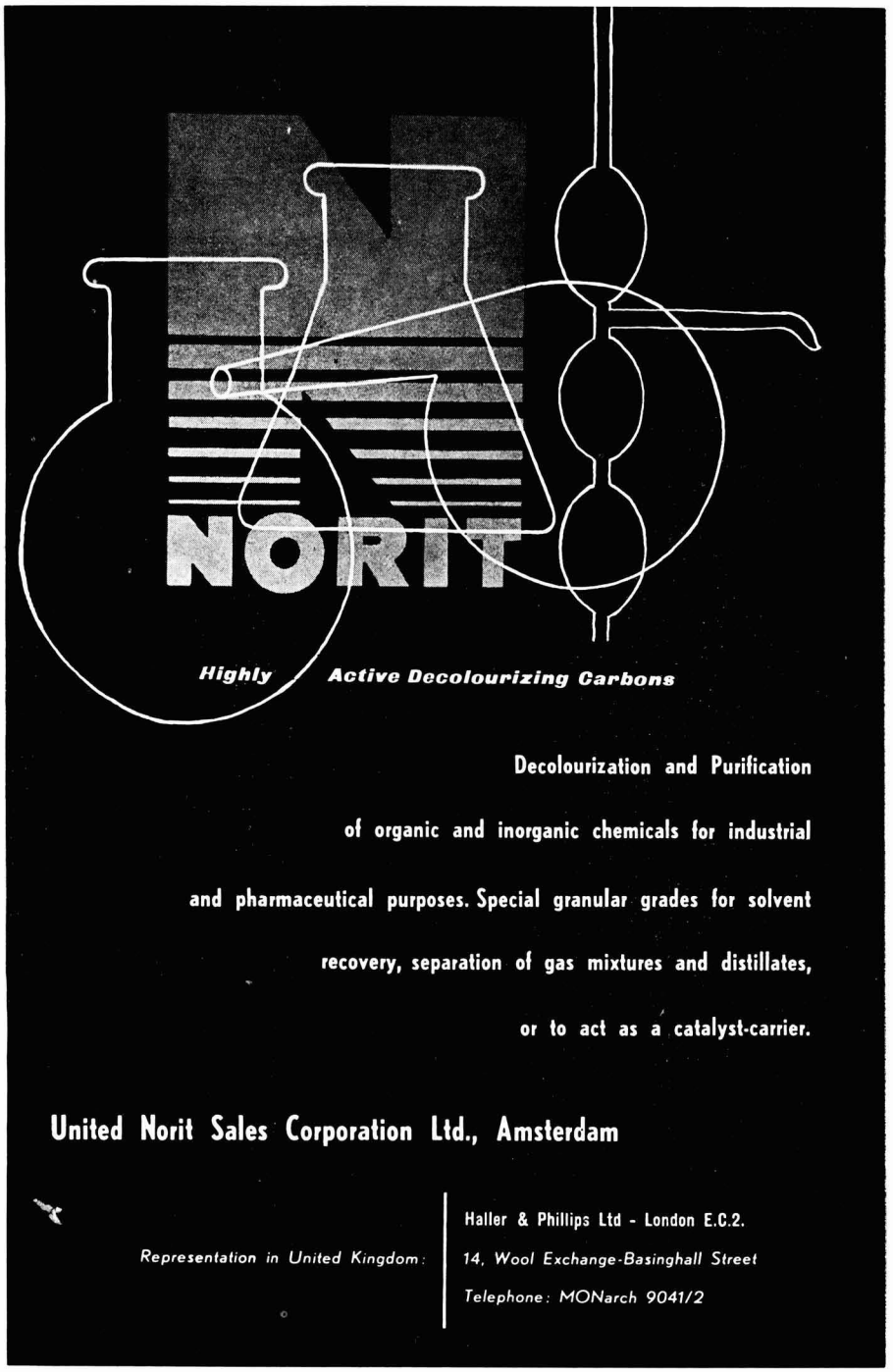

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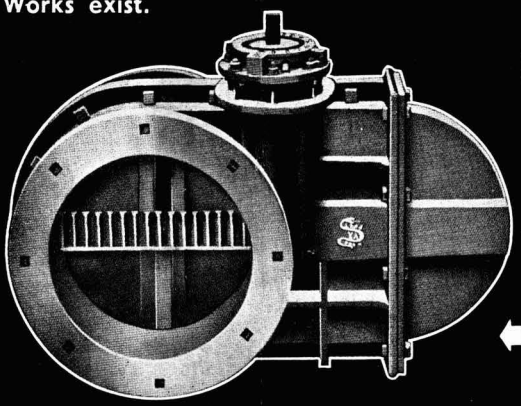
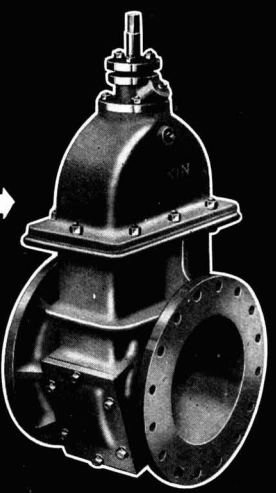
This is the number of DONKIN VALVES sold ANNUALLY. Unmistakable evidence of their popularity and reliability. They are in use in all parts of the World where Gas Works exist.



High Pressure Valve for pressures up to 100 lbs.



The Standard Donkin Rack and Pinion Low Pressure Valve which has been in general use for a great number of years.

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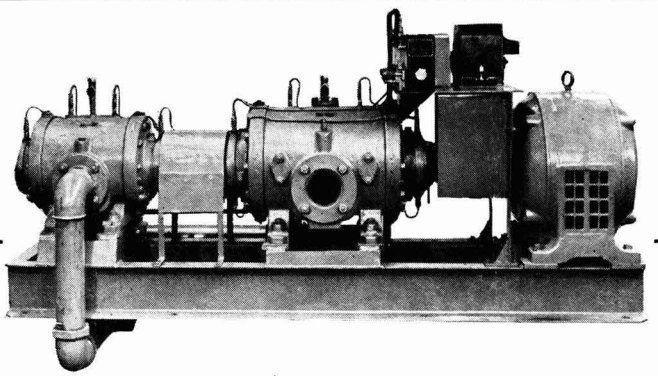

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