# Chemical Age

Humglas-E. German Process Exchange Agreement

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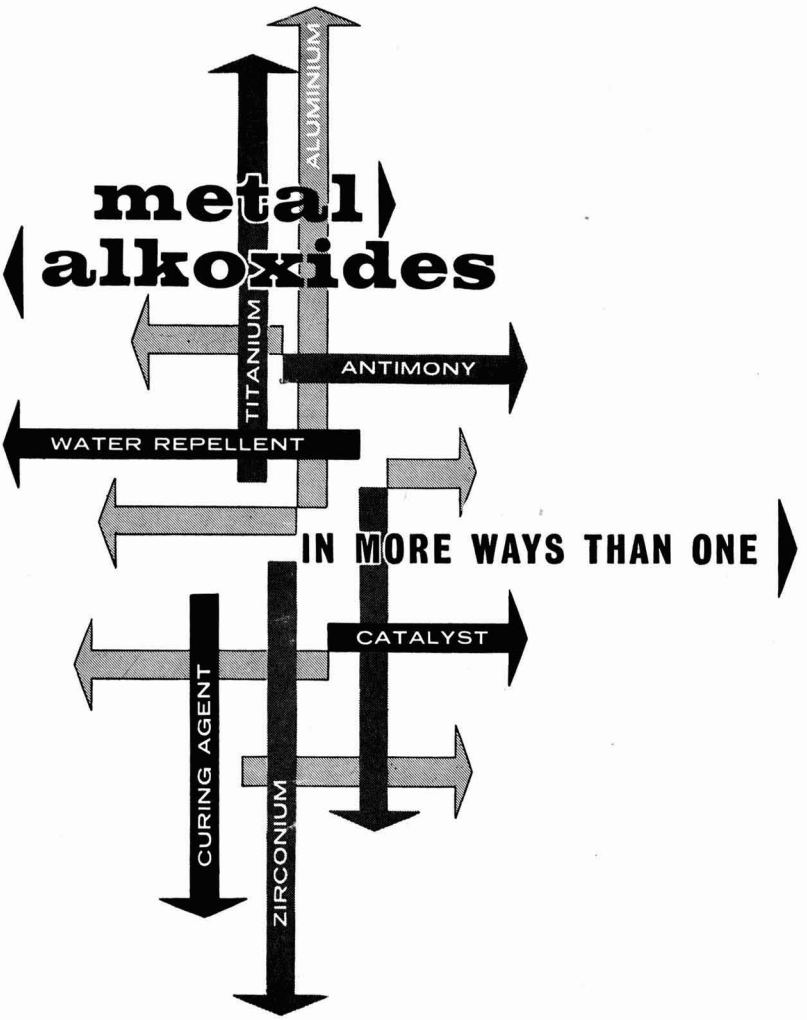


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# INDEX TO ADVERTISERS

*The first figures refer to advertisements in* **Chemical Age Directory & Who's Who,** *the second to the current issue*



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*Telephone:* **FLEet Street 3212** *(26 lines)*
*Telegrams:* **Benformula - Cent - London**

*Editor* M. C. HYDE
*Manager* R. C. BENNETT
*Director* N. B. LIVINGSTONE WALLACE

***Midland Office***
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

***Leeds Office***
Permanent House, The Headrow Leeds 1. [*Leeds* 22601]

***Scottish Office***
116 Hope Street, Glasgow C2. [*Central* 3954-5]

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CHEMICAL AGE

**BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4**

# MIGRANT GRADUATES

NEWS that the U.K. Atomic Energy Authority is sending an interviewing board to the U.S. to recruit from British scientists working there seems barely credible. But it is a fact that for the past five years, between 25 and 30% of our best young science graduates have seriously considered careers in the U.S. There are a variety of reasons, including higher salaries, better working conditions, more facilities for research and greater opportunities for more rapid advancement than is apparently the case in this country.

The loss of highly-trained graduates, mostly Ph.D.'s, is a matter of much concern coming as it does at a time when demand is so great.

This long-standing question of migration of graduates may resolve itself rather sooner than might be expected, for it is clear that many of the young scientists lured to the U.S. have been disillusioned. The large salaries shrink when the high cost of living in the U.S. is taken into account. Also, the promise of 'rapid' promotion has not always been as quick has had been hoped, nor has a feeling of security been engendered. At times of crises, the U.S. business world—and the chemical industry is no exception—shows no sentiment and a man can become redundant practically overnight. There is, too, no strong feeling for retaining a good scientific team through lean times. In the U.K., most companies tend to think twice about dispensing with highly-skilled personnel.

In order to survive the strong competition of today, research and efficient production are of paramount importance. Qualified staff should therefore only be cut down as a last resort in any drive for economy, but it seems that the U.S. may retrench in this direction and almost certainly as computer-controlled plants come into operation—despite many protests that this will not be the case.

It appears that U.S. companies are considering their present modes of operation and are comparing these with their competitors in Europe and Japan. One of the most important questions the larger American companies seems to be considering is how European companies of comparable size produce and sell goods with far fewer non-production workers. Some U.S. companies are understood to be studying the possibility that they may have become over-complex and that present activities might be such as to lead to the point of diminishing return and might be more spectacular than contributory to profits.

These are only 'straws-in-the-wind' and there is no room for complacency in this country. Every practical inducement should be made to retain our qualified scientists and to assist those who having left the country are unable to return owing to financial reasons.

Encouraging the outward flow of young science graduates has until recently been the nature of appointments offered in the U.K. and depressing reports from those already working in industry. It is said that some companies are not interested in trained scientists, but they feel they should have graduates on their staff for appearances' sake Four industries—electrical engineering, chemicals, plant and machinery, and aircraft—employ more than two-thirds of all qualified scientists and engineers.

*(Continued on page 1046)*

# U.K. Chemical Sales Worth Nearly £2,000 Million in 1959

SALES in the chemical and allied industries in 1959, other than mineral oil refining and paint and printing ink, were valued at £1,956.3 million, according to the 1959 Census of Production. This places chemicals third in importance after food industries and mechanical engineering.

At the beginning of 1959, stocks in hand; work in progress; and materials, stores and fuel were valued at £306.2 million compared with a figure of £324.7 at the end of 1959, giving a year-end rise of 18.5%. At the end of 1959, stocks were valued at £157.7 million, a rise of 12.3% on the beginning of the year, when stocks where worth £145.3 million.

Net capital expenditure in these industries in 1959 totalled £141.9 million (£154.9 million in 1958); if mineral oil refining and paint and printing ink are included, the 1959 total is £169.4 million. Excluding those industries, chemical and allied industries capital spending in 1959 was as follows: new building work, £26.7 million; plant machinery and other capital equipment—acquired, £111.7 million, disposed of, £1.5 million; vehicles—acquired, £7.7 million, disposed of £2.5 million.

Shown below are extracts from tne census report.

The 1959 census was much simplified, information being sought on only about three items: value of goods sold and work done; stocks and work in progress; and capital spending. Censuses for 1960, 1961 and 1962 will be based on sample enquiries, while detailed information will be collected for a full census for 1963, on the lines of the 1958 census.

| | *Sales & work done* | *Stocks & work in progress (total)* | | | *Goods on hand for sale in 1959* | | *Materials, stores & fuel, 1959* | |
|---|---|---|---|---|---|---|---|---|
| | 1959 | *Beginning of year* | *End of year* | *Change during year* | *End of year* | *Change during year* | *End of year* | *Change during year* |
| Total manufacturing industries ... | 22,376.0 | 4,925.3 | 5,063.2 | +137.8 | 1,244.7 | +17.3 | 1,983.4 | +48.0 |
| Mineral oil refining ... | 398.5 | 89.4 | 94.5 | + 5.1 | 38.9 | + 5.0 | 44.2 | — 1.9 |
| Paint and printing ink ... | 181.7 | 30.2 | 32.3 | + 2.1 | 16.8 | + 1.0 | 13.4 | + 1.0 |
| Other chemical & allied industries ... ... | 1,956.3 | 306.2 | 324.7 | + 18.5 | 157.7 | +12.3 | 136.6 | + 3.0 |

## I.C.I. and Shell Cut Propylene Glycol Prices

HOME market price of propylene glycol is being cut by I.C.I., who are also introducing a pharmaceutical grade of this material. Basic bulk price of the standard grade will, from 1 January, be £160 per ton (£5 per ton below the present level). A premium of £10 per ton will be charged for the pharmaceutical grade over the standard grade. Propylene glycol is assuming increasing importance, main use of the standard grade being in the manufacture of polyester resins. The new pharmaceutical grade can be used as a solvent, humectant, and preservative.

Shell Chemical Co. Ltd. are also reducing the prices announced for both pharmaceutical and standard grades of monopropylene glycol with effect from 1 January.

The reductions—each is of £5 a ton—have been made possible because of expansions in the manufacturing facilities at the company's Carrington works.

## Monsanto Phthalic Fire

A series of minor explosions, followed by a fire, delayed production in one unit of the phthalic anhydride plant at the Newport, Mon, works of Monsanto Chemicals Ltd. last week. The blaze was soon extinguished and no one was injured. Overheating, brought about by the failure of an instrument, is believed to have been the cause of the fire.

Damage to the unit was slight, the other phthalic unit is working normally.

## G.L.C. Analyses Trace Impurities in Styrene

GAS liquid chromatography has been used in the U.S. to analyse aromatic impurities of below 25 p.p.m. in styrene. According to Dow Chemical, Midland, Mich., the use of a detector separates most of the impurities.

Total impurities separated include *m*- and *p*-ethyltoluene and ethylbenzene free of *m*- and *p*-xylene, as well as xylenes themselves. A sample splitter enables a sample volume of less than 0.005 microlitre to be used.

## Migrant Graduates

*(Contined from page 1045)*

The criticism raised against some companies is that newly recruited graduates are not fully occupied during training or that they are called on to do work that is 'boring' or 'too easy'. On the other hand, employers find that the training period is helpful in determining the inclination and aptitude of new recruits and is necessary if membership of a professional institution is sought.

Perhaps criticism should more usefully be directed towards the universities who tend to overstress research aspects which can easily inflate the young graduate with too great a feeling of self-importance.

## Sir Miles Thomas Resigns Deputy Chairmanship of British Glues

SIR MILES THOMAS last week announced his resignation as deputy chairman of British Glues and Chemicals Ltd., because of "substantially divergent views on matters of basic policy." Sir Miles felt unable to offer himself for re-election for that reason, and stated that he could usefully employ the time thereby made available in furtherance of his activities as chairman of Monsanto Chemicals Ltd., and other interests.

Among his other interests, Sir Miles is chairman of Mead Carney and Co. Ltd., management consultants, and Neumo Ltd., pneumatic equipment specialists, and is a member of the British Productivity Council. He was a director of the Colonial Development Corporation, 1948-51, and chairman of B.O.A.C., 1949-56.

Chairman of British Glues and Chemicals is Mr. H. J. Cotes, formerly deputy chairman and managing director, who was appointed chairman in 1959, succeeding Sir Roger Duncalfe, who resigned from the chairmanship and from the board on medical advice.



## New Steelmaking Process Improves Ductility

A STEELMAKING process, which can reduce the nitrogen content of the product to negligible proportions, and hence improve the ductility, has been perfected by the Steel Co. of Wales. The use of a bottom blast of steam and oxygen in the converters eliminates the atmospheric nitrogen completely.

The process, known as the VLN process (very low nitrogen), produces steel with a nitrogen content of no more than 0.001 to 0.002%, about one-third of that found in steel made by the open hearth method. The little nitrogen there is present arises from the residual nitrogen in the pig-iron and a trace in the tonnage oxygen.

*Project News*

# Humglas Gain Access to All Main East German Processes

**A NEW agreement—the first ever of its kind—gives Humphreys and Glasgow Ltd., Carlisle Place, London S.W.1, access to all the main chemical processes of East Germany, the world's sixth largest chemical producer. These include low-pressure polythene and, presumably, polypropylene. The agreement is reciprocal, providing for the purchase of processes and know-how by the German Democratic Republic with the assistance of Humphreys and Glasgow.**

**This was disclosed by Mr. Ambrose Congreve, Humglas chairman, on 17 December. The agreement was signed with Limex GmbH, an East German State trading concern, follows the recent contract signed between Humphreys and Glasgow and East Germany on the design and engineering of an ethylene plant being erected at the Walter Ulbricht Werke, Leuna (see 'Chemical Ace', 29 October, p. 727).**

The agreement followed negotiations held in Berlin last week. Humphreys and Glasgow were represented by Mr. G. Gresle Farthing, managing director, and by Mr. D. C. Lennon, with Mr. K. Stern, director of the Anglo-Austrian Trading Co. Ltd. East Germany was represented by Dr. H. Stahl, managing director of Limex GmbH. Before the talks a reception was held by Professor Winkler, chairman of the East German Chemical Industry.

The low-pressure polythene process, which in principle follows the Ziegler-Montecatini process, was developed by Leuna over the last 10 years. This process is currently being operated on a pilot scale.

Among the more interesting processes involved in the agreement is the East German process for producing caprolactam from phenol as part of the brown coal-based chemical operations of the Leuna-Werke concern (CHEMICAL AGE 9 January 1960, p. 83), which is all the more interesting since the Humphreys and Glasgow announcement comes so soon after the news that I.C.I. are proposing to negotiate for the acquisition of a Soviet caprolactam process (CHEMICAL AGE, 10 December, p. 987). Other major processes involved will be for the extraction of aromatics; East German chemical industry has made considerable advances in the production of mono- and dimethyl amines and mono- and dimethyl formamide, while their polyacrylonitrile process is another one in which they appear to have much faith. Another important side of East Germany's chemical industry is illustrated by the considerable use made of butadiene derived from acetylene for Buna rubber production.

## I.C.I.'s 140,000 t.p.a. Capacity for Carbonylation Alcohols

● A FOURTH unit for the production of alcohols by the carbonylation of olefinic feedstocks is part of an expansion scheme being planned by **I.C.I. Heavy Organic Chemicals Division** to raise total carbonylation alcohols capacity to more than 140,000 tons a year. This unit, to be built at Billingham-on-Tees, will have a capacity of 30,000 tons/year of plasticiser alcohols. On-stream date is 1962; a substantial investment of some £ millions is involved. I.C.I. engineers will handle construction.

The extension is planned not only to meet the needs of the rapidly expanding U.K. plasticiser industry but also to enable I.C.I. to supply the increasing demands of overseas customers. I.C.I.'s range of plasticiser alcohols consists of iso-octanol, isodecanol, Alphanol 79 and nonanol which, when esterified with phthalic anhydride, are used as plasticisers for p.v.c.

Development work is in hand to modify the processes used for these alcohols; in addition the capacity of an existing unit producing normal butanol and isobutyl alcohol by the carbonylation of propylene will be increased. Main use of butanols is as solvents for paint manufacture.

[Consumption of the U.K. plasticiser industry for all types of p.v.c. is nearly 50,000 tons/year. Ed.]

## Schenectady-Midland to Build Plant in Midlands

● ERECTION of the plant of **Schenectady-Midland Ltd.,** a joint company set up earlier this year between the Midland Tar Distillers Ltd. and the Schenectady Varnish Co. Inc. will start shortly on the site developed by the Midland Tar Distillers at Four Ashes, near Wolverhampton. The plant, scheduled to be in production early in 1962, is to be built by the engineering department of Midland Tar.

Products have not yet been decided, but will come from the Schenectady Varnish range which now includes industrial resins and coatings used in rubber compounds, rubber-based adhesives, emulsion floor polishes, brake linings, laminated papers, reinforced plastics, paints, varnishes and enamels. These are based on phenolic, polyterpene, epoxy, urethane, alkyd, polyester, pure hydrocarbon and fortified natural resins.

## Third Durgapur Stage is Well Advanced

● CONSTRUCTION is now well advanced on the third and final units of the coke oven and blast furnace plant at the new £105 million Durgapur steelworks being built by a consortium of British firms, the **Indian Steelworks Construction Co. Ltd.** (ISCON). The structural work for the remaining four open hearth furnaces in the steel melting shop is complete and two are now lined with refractory bricks.

ISCON are determined to beat the scheduled completion date in April 1961 of Stage 3 of the new steelworks. At the end of Stage 3 more than three quarters of the work will be finished and at the present rate of progress it seems this target will be reached ahead of time.

The naphthalene plant associated with the tar plant at Durgapur was commissioned earlier this year—see CHEMICAL AGE, 3 September, p. 347.

## Oxygen Converter Furnaces for Australia

● AN order worth some £300,000 has been received by **Davy and United Engineering Co.,** a subsidiary of Davy-Ashmore, for the design and supply of two 200-ton basic oxygen converter furnaces to be installed in the Newcastle works, New South Wales, of the Broken Hill Proprietary Co. They will be made in the Stockton works of Ashmore Benson Pease and Co.

## D.C.L. Group's 1961 Projects Will Cost £29 Million

● NEW developments announced by **The Distillers Co.,** subsidiaries and associated companies, during the past year will involve a capital expenditure of some £29 m., covering all branches of the organisation, according to a statement issued by the company on 19 December. Significant additions to chemicals and plastics plants have been made or undertaken at Hull, Barry and Sandbach (Cheshire), while the current projects of British Hydrocarbon Chemicals (jointly owned with British Petroleum) are a proposal to erect a new petroleum chemical base at Baglan Bay, near Port Talbot, South Wales, and to expand units at Grangemouth.

## Injection Moulding Expansion

● ADDITION of an injection moulding shop has been made to the Aldridge plant of **A.E.I. Plastics (Aldridge) Ltd.,** manufacturers of all types of thermosetting and thermoplastic mouldings, at Redhouse Industrial Estate, Aldridge, in Staffordshire. It is estimated that the new facilities will increase productive capacity by 200-300%.

## Sulphur Recovery Unit

● AN ORDER to design, engineer and supply a sulphur recovery unit for Argentina has been received from the H. K. Ferguson Co. by **Parsons Power-gas,** London—an association of the Ralph M. Parsons Co. of Los Angeles, U.S., and the Power-Gas Corporation Ltd., of Stockton-on-Tees.

The plant will handle an acid feed gas to produce to 42 long tons per day of sulphur with a minimum purity of 99.5% at a recovery efficiency of not less than 95%.


★ With the end of the first of the 1960's in sight, many must be wondering how the industry as a whole fared during the year, and whether their performance matched those of other companies with similar product lines. A 'sneak preview' of the many returns to this journal's exclusive survey of sales trends in 1960 and companies' own estimates for 1961 shows that all sections of of the British chemical industry enjoyed higher sales in this year, although a few firms returning our survey forms reported lower sales.

The recession in the car and electrical goods industries does not seem to have had any major effect on chemical sales, although in the last few months of the year sales were not as high as in earlier months. This is borne out by the six months report of Howards and Sons (see 'Commercial News', p. 1058), but the chairman adds that although profits for the second half of 1960 might be down on those for the first six months, there is no reason to anticipate any serious downward trend.

The full results of the Chemical Age sales analysis, to be published in our issue of 14 January, will give valuable pointers to trends in the main sectors of the chemical industry, and will reveal an overall expansionist policy so far as extensions and new projects are concerned.

★ With the possible exception of butadiene, most of the chemicals that can be obtained as by-products from naphtha pyrolysis are currently produced well in excess of demand. In general, therefore, the economies of ethylene production by this route are such that no allocation of manufacturing costs can be set against by-products; instead all manufacturing costs can be set against the ethylene product. By-product credits can be taken only as justified by internal needs and/or markets for disposal.

With the introduction of polypropylene and other end-products in demand, by-product recovery from naphtha pyrolysis plants will assume greater importance; then the value assigned to such by-products will proportionately affect the production economics of ethylene. Ethylene, however, is likely to remain the principal 'building block' for U.K. petrochemicals. That is the view of one of our main engineers of petrochemical plant—Kellogg International Corporation, London.

The company has now published in brochure form a paper on the economics of ethylene production from light naphtha that was presented at an Institute of Petroleum meeting in Manchester last summer. The authors, J. Chrones and L. J. L. James describe three case histories on the production of 100 million lb./year of polymerisation-grade ethylene. The paper covers the effect of feed, fuel and by product values, profitability of ethylene manufacture and economics of plant size. This paper is likely to be a valuable source of reference for some time.

★ Got rid of that cold, ready for Christmas? Cleared up that cough? Then pity the poor Russian queuing up at his local pharmacist's for a remedy that the pharmacist may not stock, or, if he does, may not know about. For, according to a recent report I read in the *Daily Telegraph*, going to a pharmacist for proprietary medicines in the U.S.S.R. is likely to be a waste of time.

Contributing to this situation is the absence of advertising by the Soviet pharmaceutical industry, which is owned by the Government. So the public do not know what remedies for their minor ills are available, nor is the pharmacist much better informed. Compare this with the situation in the U.K., where one doctor saved up all the sales literature and circulars sent to him by drug manufacturers over a year, and found that they tipped the scales at nearly a hundredweight!

But even if Soviet pharmacists, like some British doctors, do not wish to receive literature by the hundredweight, there must be a rather odd distribution of drugs in the U.S.S.R. For, according to a recent report in *Soviet News*, the Soviet output of medical goods has shown a tremendous increase, and over 33,000 workers are engaged on research and development on pharmaceuticals and medical instruments. Are the drugs going only to the hospitals, or is Soviet medical research concentrated on only the more serious diseases (the mortality rate is claimed to be the lowest in the world)? If, as has been reported, Soviet surgical instruments are of a high quality, comparable with ours, it seems all the harder that the Russian public have to put up with such vague and apathetical treatment for those little ailments, the cure of which is vital to a sunny outlook.

★ The adage that you can prove anything by statistics would certainly seem to be true of the oil industry—or it might if you are a mathematical genius. It's all a question of units. Take a gallon of petrol, for instance. That's easy enough —or is it? It depends where you are; you will get eight pints all right in the U.K. but not in the U.S.—you will get only 0.8 of that quantity—and do make sure it is measured at 60°F.

If you are going to deal in much larger quantities you won't bother with the gallon. If you live in the U.S. or work for an American oil company overseas, you will deal in barrels—there are 42 gallons to a barrel (U.S. gallons, of course)—and you will measure the capacity of your plant or pipeline in barrels per day.

If your interests are in the U.K. or the Netherlands you will of course deal in tons—long tons, that is, not the short U.S. ton of 2,000 lb. or the metric ton of 1,000 kilogrammes—and your capacity or flow will be in tons per year. This is easily reduced to barrels per day.

While we are on the question of days and years, do you know how many days there are in an 'oil stream' year? Is your output in average barrels per calendar day the same as your output in actual barrels per stream day?

I won't worrry about the Continent; their units are not very complicated provided you stay there, and don't try to convert litres or metric tons to gallons (U.S. or Imperial) or tons (long or short).

By the way, about that conversion of barrels per day to tons per year—don't forget to take into account what is in the barrel. Its specific gravity can make quite a difference, say British Petroleum.

★ Reading a booklet called 'Quick identification methods', I was rather surprised to be told to "soak the material in water and rub between the finger and thumb", "contact with a hot iron, steam-pipe or hot plate", and "shake with hot water and steel tacks in a glass bottle". There is serious intent, however, behind these surprising tests. They are among several suggested by the British Waste Paper Utilisation Council, as a means of identifying waste paper which can readily be disintegrated.

The growing use of chemical and other additives in paper and board has been giving rise to many difficulties in the re-use of waste paper since the identification of such materials is difficult at the sorting stage. To deal with the problem the Council, a special study group of the Waste Paper Recovery Association Ltd. and the Waste Paper Merchants Association, was formed. Among other things, it aims to: investigate and publicise the effect of the inclusion of additives in waste paper; study ways and means of identifying and separating paper containing them; and study ways of influencing the use of suitable alternative materials.

The recently published booklet lists, as well as the simple tests I have mentioned, others giving more precise results, but the booklet is a deliberately untechnical handbook for the guidance of everyone concerned in the distribution and re-use of waste paper.

Since formed, the Council has wasted no time in achieving its objects. 'Quick identification methods' is not the only publication to be issued. 'Pernicious contraries in waste paper' is proving popular and is very much in demand.

Alembic

# Hong Kong Develops as Big Buyer of Plastics Moulding and Extrusion Materials

ALTHOUGH the production of plastics products in Hong Kong began only 12 years ago, it is now one of the colony's major industries. No plastics materials are produced locally and Hong Kong is a very substantial importer, 1959 imports from all countries of all types of plastics being valued at some £6.5 million.

Being virtually a free port, all plastics materials used in moulding and extrusion are imported free of duties, irrespective of origin. Since a big proportion of the industry's output is exported to Commonwealth markets, importers can claim preferential rates of duty provided sufficient Commonwealth material content can be shown. There is thus an incentive to import from the U.K., Canada, Australia and other Commonwealth countries.

## Polythene Materials

Plastics articles made in Hong Kong receive preferential rates when imported to Britain, if the producers or exporters can show "sufficient Commonwealth content". For plastics toys, buttons and electrical goods, this content must be 50%; for virtually all other plastics goods the percentage is 25. This is why Hong Kong imports much of its plastics raw material needs from other Commonwealth countries.

Polythene injection and moulding compounds are now imported in greater volume than any other single plastics material, imports last year totalling some 9,670 tons (rising this year to about 18,000 tons) with the U.S. accounting for 45% of the total and the U.K. for 40%. Indications are that this year U.S. shipments will rise by more than 100% with U.K. shipments up some 50%. The U.K. is the major supplier of polythene film, tubes sheet and scrap, accounting for 46% of a 1,090-ton market in 1959 followed closely by Australia and the U.S.; U.K. shipments of film, etc., should rise by some 100% this year.

Second in importance are polystyrene and styrene copolymers, with 1959 imports of more than 7,400 tons; an increase of 40% is expected in 1960. Canada has 31% of this market, the U.S. 24%, the U.K. 19% and Italy 14%. Indications are that the U.S. will take the lion's share in Hong Kong's expanding imports, Canadian, U.K. and Italian shipments in the first five months of 1960 not having shown much change on the same period of 1959.

Britain's share of supplies of polyvinyl chloride resins has been declining, while that of Japan has increased over the past four years. In 1959 the U.K. accounted for 57% of a market which took 1,000 tons in 1959; Japan supplied 32% of the colony's p.v.c. needs. Hong Kong is expected to increase p.v.c. imports some 25% this year, but the U.K. share will probably amount to 50%, while Japan will supply about 46%.

Hong Kong's imports of thermosetting resins, comprising phenol, cresol, urea and melamine formaldehyde moulding compounds, totalled 1,000 tons in 1959, of which some 80% came from the U.K. Imports should rise by about 12% in 1960, with the U.K. share falling to under 60%. West Germany held second place in 1957 to 1958 and 1959—in the latter year accounting for 8%—but in the first five months of 1960 fell to third place behind the Netherlands, who supplied 21% of Hong Kong imports.

Imports into the colony of acrylic resins, sheets, rods and tubes amounted to 647,000 lb. in 1959 of which the U.K. accounted for 30%, followed by Denmark, the U.S. and West Germany. Total imports will probably decline to under 500,000 lb. this year with Denmark assuming major role, accounting for 30%, followed closely by the U.K.

# Crease-resistant Fabrics Obtained by Cross-linking of Cellulose

CROSS-LINKING of cellulose, a process which imparts crease resistance properties to cellulose fabrics, was the subject of a special series of lectures organised by the Manchester and District Section of the Textile Institute. The first lecture, on the chemistry of the process, was given by J. Honeyman, of the British Cotton Industry Research Association. Reactions were described between difunctional compounds and alcohols. The importance of the conformation of the cyclic molecules was stressed because in cellulose the glucose units are present predominantly in the most stable chain conformation with the hydroxyl groups occupying equatorial positions round the ring.

Several reactions will cause cross-linking but the type of crease resistance produced, whether wet or dry crease recovery, depends on the particular reaction. The ready addition of ethylene oxide to cellulose in alkaline solution to give hydroxyethyl cellulose has led to the use of diepoxy compounds from which cross-linked products may be obtained. This reaction has been carried out in alkaline solution or by baking the diepoxide with cellulose in the presence of an acid catalyst such as zinc borofluoride. It is important to remember that diepoxide are carcinogenic.

Some simple dihalogenated aliphatic compounds react readily with cellulose in aqueous alkaline solution. This reaction may occur directly or proceed via epoxide formation. Such a process confers wet crease recovery on cellulosic fabrics but has very little effect on dry crease recovery.

Other cross-linking treatments which were mentioned briefly included APO which is highly reactive and confers crease resistance as well as a certain degree of flame resistance. Unfortunately APO is an extremely dangerous compound to handle on a large scale.

Formals derived from dihydric and polyhydric alcohols have also been used for treating cellulose but these appear to be less effective than formaldehyde but nevertheless they give excellent wet crease recovery and dimensional stability.

Cellulose fabrics which have been oxidised with sodium periodate have similar properties to cellulose which has been treated with formaldehyde in aqueous solution—that is they have good wet crease recovery. This arises from the formation of hemiacetal bonds between the aldehyde group in one cellulose chain and the hydroxyl group in another. Unfortunately these oxycelluloses are easily degraded by alkali and attempts made to stabilise them at the Shirley Institute have so far failed.

It is difficult to decide whether the effect of formaldehyde on cellulose is due to cross-linking. Formaldehyde may form a compound with cellulose having the methylene groups attached to $C_2$ and $C_3$ of the same glucose ring. This means that formation of methylene ethers of cellulose does not necessarily prove that cross-linking has occurred, but it does not rule out that possibility.

The usual test is to see whether a cellulose derivative of a very low degree of substitution is soluble or not in cuproammonium; insolubility is strong evidence for believing that cross-linkages are present.

In general, it was emphasised that while cellulose reacts readily with difunctional reagents it is extremely difficult to prove whether cross-linking occurred.

## C.S. Awards 1959 Harrison Memorial Prize

THE Chemical Society's Harrison Memorial Prize for 1959 is to be awarded to Dr. Amyand David Buckingham for his contributions to the understanding of solvent effects upon molecular spectra and to the theory of pressure-reduced spectra. Dr. Buckingham is a demonstrator and lecturer at Christ Church, Oxford.

The Harrison Memorial Prize was created in 1922, and is awarded to the British chemist, under 30 years of age, who, in the opinion of the selection committee, has during the previous five years conducted the most meritorious and promising original investigations in chemistry and published the results.

# U.K.A.E.A. ENGINEERS DEVELOP IMPROVED ROTARY SAMPLER FOR GRANULAR MATERIALS

A SMALL rotary sampler for use with dry granular materials has been designed and tested in the Chemical Engineering Division of the U.K.A.E.A. Research Group at Harwell. Designed specifically for the sampling of ore products for quantitative mineralogy, it has applications in other fields. It incorporates improvements in design to a sampler devised by C. K. Wentworth and described previously in the literature.

Two methods are available for sampling a heterogeneous bulk of granular material. One may proceed by first mixing the bulk as thoroughly as possible then abstracting any suitably sized volume from the approximately homogenised product, or, alternatively, the bulk may be systematically sub-divided into a large number of equisized volume units; equisized perfect samples may be abstracted from each unit and these, if combined, will yield a representative sample of the whole.

However, small-scale hand sampling techniques cannot compare in efficiency with the various semi-automatic sampling devices intended to reduce or eliminate operator bias. The microriffle is much used as a laboratory sampler, its function being to divide the bulk into two similar size samples by means of a system of paired inter-digiting chutes. The rotary sampler is a further development of this idea.

The improvements in the new rotary sampler include subjecting the feeding and collecting mechanisms to mechanical control, thus improving consistency, eliminating operator errors and greatly increasing the degree of sub-division of the bulk. The collector was also redesigned to prohibit loss of material and to ensure that the whole of bulk is subject to sampling.

The A.E.R.E. sampler, in one automatic operation, divides the bulk into 20 samples of similar size and composition. Should larger fractions of the bulk be required the appropriate number of bottles may be selected at equal intervals around the disc and combined. Thus samples which are 1/20, 1/10, 1/5, ¼, ½ or additive combinations of these fractions of the bulk may be obtained directly. Alternatively further sub-division may be obtained by resampling the contents of one or more bottles with relatively little loss.

The sampler comprises a feeder unit and an integral splitter and collector. The splitter consists of a 7½ in. dia. brass annulus divided sectorially into 20 compartments by vertical knife-edge partitions. The annulus is mounted on a Perspex disc in which funnels, grading smoothly from a sector to a circle in cross section, have been machined to align accurately with the splitter sectors. Each funnel leads to a detachable glass sample bottle screwed into the base of the disc. This disc is secured at its centre to a vertical shaft by a hexagonal nut modified to accept a tachometer. The shaft in turn is mounted on a base-board and driven by a Variac controlled electric motor through a system of cone pulleys.

Above the splitter unit is mounted a vibrating feeder consisting of an inclined copper chute attached to a filter funnel which serves as a hopper. The whole assembly is clamped by a projection into the nose of a Vibro-Tool, and may be swivelled into position with the chute vertically above and tangential to the median line of the annulus.

The feed-rate from the chute is controlled by adjusting the vibration amplitude. The maximum capacity of the apparatus is approximately 500 g. (quartz), but quantities less than a gramme may be sampled satisfactorily.

The rotary sampler is described, and various aspects of sampling and sampling devices discussed, in a report (AERE-R.3051) by R. W. M. Hawes and L. D. Muller which is available from H.M.S.O., price 4s net.

# Vermiculite/Ciment Fondu Refractory Linings for Process Heaters

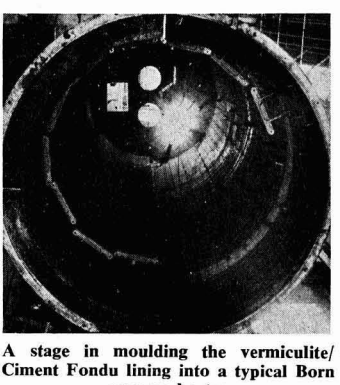
A MIXTURE of vermiculite/Ciment Fondu is being used in castable refractory linings throughout the range of American-designed Born direct fired process heaters manufactured in the U.K. by H. and E. Lintott Ltd., Horsham, Sussex. In some linings, Aglite (sintered clay) is added to the mix.

Lintotts—who state that the application is the outcome of some 40 years of development and research by their associated Born Engineering Co.—claim 100% results from vermiculite-based monolithic linings which can be cast on site or in the workshop.

The vermiculite in itself provides an excellent level of thermal insulation. The vermiculite/Ciment Fondu mix is claimed to introduce a new factor—a very high resistance to thermal shock, even to severe hot-face temperatures, often above 2,400° F. In addition the nature of fuels employed results in extremely hard service conditions.

A further virtue of the use of vermiculite is that an element of elasticity is introduced. This is important in absorbing physical shock, as when the heater linings are installed in the erection shop and the heaters then transported over long distances. It is reported that three heaters with vermiculite linings were recently transported by road from Horsham to Grangemouth without any damage to the linings.

On a typical horizontal heater, the special vermiculite/Ciment Fondu mix is used 6-in. thick on removable panels on the main chamber of the heater and around the main transition neck. The mix is 2-inch thick on the further transition neck. The removable panels are reinforced with welded wire mesh and have steel anchors.



**A stage in moulding the vermiculite/Ciment Fondu lining into a typical Born process heater**

## Five London Firms Win Safety Awards

FIVE chemical firms in the London area whose workers lost no time because of accidents in the first half of this year were presented with pennants by Mr. N. F. Patterson (Monsanto), chairman of the British Chemical Industry Safety Council. The firms are: Bakelite Ltd.; British Glues and Chemicals Ltd.; The Distillers Co. Ltd.; Fullers' Earth Union; and Plant Protection.

The Safety Council was set up in 1955 by the manufacturers' association jointly with the Association of the Chemical and Allied Employers. The pennant competition was instituted this year.

Another safety achievement was also recorded recently—that of Monsanto's Ruabon plant where a total of 1½ million man-hours have been worked without a lost time accident.

## Fluoroacetamide Derivatives

In our issue of 17 December, p. 1027, we published an article by Dr. M. A. Phillips on the preparation of mercury fluoroacetamide and phenylmercury fluoroacetamide. It should be made clear that the work described is original work carried out at the laboratories of Dr. M. A. Phillips and Associates, consulting chemists, 9 Western Road, Romford, Essex.

# Dehydration of Town Gas by Refrigeration in W. Australian Plant Yields Economies

A NEW type of refrigeration drying plant at East Perth Gasworks, Western Australia, has now concluded a period of successful operation. The dehydration of town gas before distribution has been practised for many years by a number of gasworks in Australia. A number of these have utilised calcium chloride as the drying agent, but plant of this type has certain disadvantages if atmospheric temperatures are high and fluctuate sharply throughout the 24 hours of the day. Under these conditions, a good case can be made for reducing the dew point of the gas by direct contact with refrigerated water. By this means, dew points of 36-38°F can be maintained at all times of the year. A number of installations of this type are already in operation in Australia.

A disadvantage of this system is that the chilled water is an intermediary between the ammonia in the refrigerator evaporator and the gas, resulting in greater cost of the plant, higher running costs and additional thermal losses. This disadvantage can, however, be minimised if the gas is cooled by direct contact with the coils of the refrigerator evaporator, as the heat abstracted from the gas is then taken directly into the boiling liquid ammonia.

## First Australian Plant

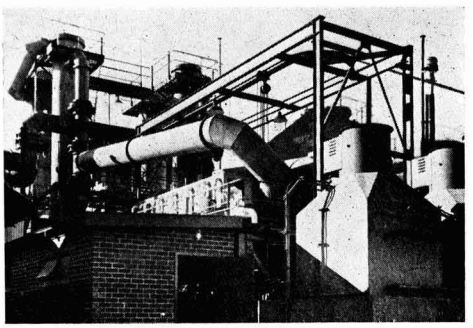
The first plant of this type to be installed in Australia was started up at the East Perth Gasworks, which is operated by the State Electricity Commission of Western Australia, in July 1959. This plant, which was designed by Woodall-Duckham, Australia, in conjunction with W. C. Holmes and Co. Ltd. and the refrigeration engineers, Gordon Brothers Ltd., Australia, handles two independent low pressure gas streams, each of 4 million cu. ft./day. During the summer, gas may enter the plant at 100°F saturated while at other times of the year the gas temperature is about 70°F.

*Cooling Arrangements.* As a limited amount of bore hole water at 70°F is available, direct contact cooling towers are fitted by which the gas is first cooled to between 85 to 90°F. The gas then flows through a gas/gas heat exchanger where it is further cooled to about 75°F by heat exchange with cold gas leaving the refrigerator section.

The gas is finally cooled to its required dew point temperature by passing through the final cooler. This is of tunnel form and is fitted with finned cooling coils arranged across the gas stream. These coils are the ammonia evaporator section of the refrigerator, and the gas passing over them is cooled to 35°F; water vapour is condensed and the gas leaves with a dew point of 35°F. The dried gas after passing through the gas/gas heat exchanger, has its temperature raised to about 75°F at the outlet of the plant.

Condensate comprising water and a certain amount of light oils is deposited from the gas in the various cooling vessels; this leaves each vessel through standard seals.

Each gas stream has a single refrigerator, each of which is served by three electric motor driven 16-ton ammonia compressors.



**View of the refrigerant gas dehydration plants at East Perth showing the atmospheric ammonia refrigerant coolers in the foreground, the refrigerant gas cooling tunnels on the roof and the gas/gas heat exchangers and gas direct contact cooling towers in the background. Control room is on the left and ammonia compressors are on ground level beneath the cooling tunnels**

*Control.* Overall control of the plant is obtained from the temperature of the gas at the outlet of the final cooler. A controller maintains the ammonia in the evaporator at a pressure equivalent to a temperature of 30°F. The operation of the ammonia compressors is governed by a six-step controller which stops or starts individual compressors or unloads certain compressor cylinders so that the power demands of the refrigerator follows closely the thermal requirements of the plant. A complete set of recording instruments and the usual refrigerator indicators and alarms are installed.

*Operating Results.* Following a short settling down period after the initial start-up, the plant has worked steadily ever since. It has proved to be stable in holding the gas dew points to the required figure and has been surprisingly tolerant of very rapid alterations in the gas volume loading such as occur when a C.W.G. plant is put to work.

In practice there is a slow build-up of ice on the evaporator coils which results in a slow increase in back pressure in the gas stream. This is dealt with by raising the refrigerator evaporator temperature from time to time and re-setting it back to normal when the cooled gas temperature begins to rise. The back pressure at the design gas flow is about 3 in. w.g.

# A.E.I. Electric Cable Installation at Fawley Refinery

FUTURE progress at Esso's Fawley oil refinery calls for more electric power in the area and a year ago the C.E.G.B. awarded Associated Electrical Industries a contract for the supply, installation and jointing of some 2,500 yd. of 132 kV. oil-filled cable and 50,000 yd. of 11 kV. and multi-core auxiliary cables. The work, worth more than £95,000, is being carried out by the A.E.I. Construction (Cables and Lines) Division.

From Marchwood Generating Station, a 185 yd. run of three 132 kV. single-core oil-filled cables has been installed, terminating in sealing ends on reinforced concrete structures and connecting to overhead lines which run to Fawley North substation. This substation, and the Fawley South substation, are situated within the confines of the refinery some 1,500 yd. apart. The remaining 132 kV cable-laying took place at these substations and between them, by the side of the access roads and over rough ground inside the refinery.

Low lying and partly waterlogged ground, subject to contamination by seepage of oil and chemicals from refinery processing, necessitated cable coverings affording complete protection against corrosion. This and other considerations, together with the marshy land in which the cables had to be laid, involved a good deal of tricky construction work.

The contract at Fawley also involved considerable jointing of 132 kV. oil-filled sealing ends at terminations in the substations and the installation of pressure tanks and ancillary equipment.

## Will

**Mr. Robert Lawrence Wilson,** who died on 26 July 1959, left £24,172 net (duty paid £3,644). Mr. Wilson was director of J. Brown and Co., manufacturing chemists of Dewsbury.

# Styrene Co-Polymers Pioneer Honoured at Dinner

From l. to r.: Mr. C. G. Fry, Mrs. Moon, Mr. E. A. Bevan, and Mr. W. R. Moon

A DINNER was given recently by Styrene Co-Polymers Ltd., in honour of Mr. and Mrs. W. R. Moon, who will shortly be leaving Cheshire for the South of England, where Mr. Moon is to take up a new appointment. Among the guests were members of the company who had been colleagues of Mr. Moon since the factory began production in 1951.

Following his tribute to the exceptional abilities and loyalty of Mr. Moon, the managing director, Mr. E. A. Bevan, reviewed the outstanding success achieved by the company during its short history, and associated the name of Mr. Moon with this highly satisfactory position.

Reference was made to the pioneering by Styrene Co-Polymers, of new developments in the decorative field, such as the use of semi-drying oils, a technique now followed by competitive manufacture. It was stated also that an identical situation governs styrenated alkyds, and many of the company's competitors now possess a range of hydrocarbon modified alkyds, under licence.

## Original Patents

Mr. Moon was associated also with the successful introduction of the original patents. Exploitation of these patents was the basic, initial purpose for which the company was formed, and the effective development of the uses of styrenated alkyds and styrenated epoxy esters has been extended far beyond the U.K. to most of the industrial countries throughout the world.

The company is now developing a new field of thermosetting acrylic resins, under licence from Pittsburgh Plate Glass, U.S., and exploiting their patented processes in a manner similar to that followed in the case of the styrene co-polymer field. The Scopacron resins will ultimately introduce the company's activities to a field wider than that of the surface coating industry.

Since the company's inception, trade has continued to expand, progressing toward a "peak year" in 1960, when increased demand has called for considerably greater capacity which, in turn, will necessitate further extension of premises and plant.

Presentations to Mr. Moon were made on behalf of the directors, by Mr. C. C. Fry; a personal gift from the company was presented to Mrs. Moon by Mrs. Bevan, and a presentation was made by Mr. A. Batchelor, on behalf of the staff and works personnel.

## Production Index for Chemical Industry

LATEST index of industrial production shows that in August, the chemical and allied industries had a rating of 135 (1954 average = 100), compared with 137 in July, a second quarter 1960 index of 147 and a 1959 index of 131. August index for general chemicals, etc., was 133 (138 in August, 149 in second quarter and 132 in 1959).

A September index is given for coke ovens, oil refineries, etc. This was 143, the same as in August and eight points above both the July and second quarter ratings; 1959 index was 127.

## Buy Scottish—Paint Makers' Plea

The Scottish Association of Paint Manufacturers, formed last year and representative of 80% of the industry, have appealed to all local authorities in Scotland to "buy Scottish" and help reduce unemployment. It is estimated that if all paint used in Scotland were made by Scottish workers, almost 2,000 extra jobs would be made available in the paint industry, and rather more in the industries supplying raw materials, drums, tins, packaging and printing. It is hoped that other industries will follow the S.A.P.M. lead.

# *Expanding Quickfit Group Seeks New Factory Site on Farmland*

AN application by Quickfit and Quartz Ltd. for planning permission to build a new 150,000 sq. ft. factory for manufacture of scientific and industrial glassware on farmland in the Walton area of Stone, Staffs, was, on 14 December, the subject of a local inquiry conducted at Stone by Mr. E. Farricker, an inspector of the Ministry of Housing and Local Government. He will report to the Ministry, whose decision is expected early in 1961.

Mr. Howard Sharp, surveyor, appearing for the company, said Quickfit and Quartz with their associated firm Q.V.F. Ltd., of Fenton, were the world's largest manufacturers of scientific and industrial glassware. Both companies were bursting at the seams on their existing sites.

Mr. Brian H. Turpin, managing director of Q. and Q. and of Q.V.F. said the companies supplied 90% of the interchangeable laboratory glassware used in the U.K. and effectively all the glass pipeline and chemical plant. Nearly 40% of their combined production reached export markets. Sales reached £50,000 annually by 1946, £325,000 by 1952 and currently were estimated at £1,460,000. He expected sales figures to increase to over £2 million in 1961. The Board of Trade had granted an industrial development certificate in regard to relocation on the proposed site.

Mr. Turpin said that the need of expansion had been such that a subsidiary, Q.V.F. Glastechnik, had had to be formed in Western Germany. This company was making such an impact on Continental markets that by 1960 it had captured 50% of the market in Germany, recognised as the home of industrial glassware.

Mr. Turpin referred to past proposals to move certain production to Sunderland or elsewhere. This had been shown to be impracticable, involving disruption of a highly-skilled labour force built up over 20 years. British industry, research and scientific training would have been severely affected by loss of production which would have occurred in any such move.

Answering the inspector, Mr. Turpin said his firm would hope to occupy the first factory building on the Priory Farm site by late 1961, transferring part of Quickfit and Quartz plant from the present Stone premises and the whole Q.V.F. activities from Fenton. It was hoped the entire transfer would be concluded by late 1962.

Mr. R. E. M. Chaplin, senior assistant land commissioner, of Crewe, stated that the Ministry of Agriculture had registered a *prima facie* objection to the proposal.

Mr. Sharp said that it was a question of balancing 40,000 gall. of milk, valued at £12,000, against industrial sales of at least £1,460,000, of which at least 36% went overseas.

Overseas News

# U.S. HIGH-DENSITY POLYTHENE PRODUCERS SUFFER FROM OVER-CAPACITY

PRODUCERS of high-density polythene in the U.S. will suffer from over-capacity for some years to come. This year capacity is expected to total some 375 million lb., rising to 468 million lb. by the end of 1961 and 568 million lb. by end-1962. Production this year should total 210 million lb., almost double the 1959 figure; it may reach 300 million lb. next year, according to *Chem. & Engng. News*, 38, **50**, p. 29.

New plants are either in hand or planned by: Du Pont (50 million lb., at Orange, Tex.: on stream); W. R. Grace (extension to 75 million lb. at Baton Rouge, La.: due in 1962); Celanese (10 million lb. expansion at Pasadena, Tex.; completed 1960); Phillips Chemical (capacity of 100 million lb. at Pasadena: completed 1961); Goodrich-Gulf (13 million lb. at Port Neches, Tex.: start-up due April 1961, with other polyolefins later); Allied Chemical (25 million lb. at Orange, Tex.: on stream 1961 with polyolefins capacity, including polypropylene, to be raised to 50-75 million lb. later); Hercules Powder (first stage of 50 million lb. polypropylene plant at Lake Charles, La.: due on stream early-1961, when high-density polythene capacity will be doubled to 60 million lb. at Parlin, N.J.); and Rexall-El Paso Natural Gas (expected 25 million lb. h.-d. polythene as part of polyolefins complex at Odessa, Ted.: due on stream, 1962).

Some Ziegler-type plants, including those of AviSun, Dow Chemical and Hercules Powder, have been switched to polypropylene. It is expected that other U.S. chemical companies will enter the high-density polythene field, and possible new producers are Mobil, Texas Butadiene and Chemical, Humble Oil and Monsanto Chemical.

At present the injection moulding market is the largest outlet, taking about 47% of U.S. production; next year moulding demand is expected to increase by some 35% to 115 million lb. In 1960, some 37 million lb. went for blow moulding, a figure that may double next year. Next biggest outlets are: export (21 million lb. in 1960); pipe and conduit (17 million lb.); and film and sheet (8 million lb.).

## Petrochemical and Plastics Projects in S. America

The U.S. chemical producers Koppers Co. Inc. report a number of developments in their South American holdings. An Argentine subsidiary, Industrias Petroquimicas Argentinas Koppers S.A., is to start output of ethylene and polythene in early 1961. A Brazilian subsidiary, Companhia Brasileira de Plasticos 'Koppers', in which Koppers co-operate with Brazilian interests, is to expand its polystyrene production programme, while another Brazilian subsidiary, Companhia Brasileira de Estireno, has almost completed an expansion programme which will double its production capacity for styrene monomer.

## Coke-oven Gas and By-products Contracts for Koppers France

The recently-formed French concern Koppers France S.A., of Paris, has received orders for the building of gas processing plants, including an ammonium sulphate production unit, for the Carling cokery of the Houillères du Bassin de Lorraine and the Homécourt works of the Union Sidérurgique Lorraine. The company is also to build a benzole production plant at Homécourt for the latter concern.

## Record Production of Synthetic Rubber in U.S.

Production of synthetic rubber in the U.S. in 1960 should reach a new record of 1.45 million long tons, compared with 1.38 million long tons in 1959, according to a statement made in New York on 16 December by Mr. R. Ormsby, president of the U.S. Rubber Manufacturers' Association. Consumption of synthetic rubber in the U.S. this year is calculated to have represented 69% of the total consumption of new rubber (natural and synthetic). U.S. exports of synthetic rubber for 1960 should be about 350,000 tons, against 290,500 tons last year.

Consumption of synthetic rubber in 1961 is expected to reach 1.15 million tons compared with 1,077,000 tons in 1960 and 1,072,726 tons in 1959. Natural rubber consumption in 1961 is likely to fall to 450,000 tons (1960 = 483,000, 1959 = 555,044 tons).

## Agricultural Chemicals Project in India

A new Indian company, Pesticides Ltd., is to erect at a cost of some 5 m. rupees a plant at Thana, near Bombay, for the production of agricultural insecticides and other chemical products. Products will include benzole hexachloride, acetyl acid and mercury and zinc phosphate compounds. Technical co-operation and equipment will come from the two Japanese firms Itoh and Co. and Kurecha Chemical Industry Co. Ltd.

## Petrochemical Possibilities in Rhodesia-Nyasaland

The Government of the Federation of Rhodesia and Nyasaland is considering a scheme to erect a petroleum refinery in which American interests would be involved and which would be large enough to produce the Federation's needs in petrol, diesel fuel, power and illuminating paraffin and perhaps aviation spirit. It is thought that the refinery would have a stimulating effect on the local chemical industry, which would have a steady source of supply of raw material. It would mean that a nitrogen factory could be established on a better level of output in relation to anticipated demand than one based on coal. The refinery would also serve industries manufacturing synthetic fibres like nylon and Terylene, detergents, plastics, and carbon black. Subsequently there could be other development in the chemical production field.

In addition to the American company, the Shell have shown increasing interest in the prospects for an oil refinery in the Federation, which might demand a £5 million investment.

## Japan-U.S. Chemical Venture

Imports of lubricating oil additives into Japan will fall drastically in the future with the formation of a U.S.-Japanese production company there. Bearing the name of Karonite Chemical Co., the new concern will start in 1962 with an annual production of 1,200 tons of alkyl phenol and 6,500 tons of lubricating oil additives. Parent companies are the Oronite Chemical Co., of the United States, and the Kao Manufacturing Co., of Japan.

## Plastics Pumps for Russian Chemical Plant

Russia's first plastics pumps for the chemical industry are now being produced at a specialist plant in Sverdlovsk, it is announced. The noiseless pumps, which need no lubrication, will be used mainly for corrosive chemical manufacture.

## Monsanto Develop New Process for Urea

A novel route to urea in which carbon monoxide, sulphur and ammonia are reacted, has been developed by the Lion Oil Division of Monsanto Chemical Co. of the U.S. Reaction conditions are said to be mild, temperature being only 120°C, but the economics of sulphur recovery are a big drawback to commercial exploitation. The present method involves reacting hydrogen sulphide with sulphur dioxide. At a recent meeting of the American Chemical Society, it was suggested that a possible use for the new process might be to make various substituted ureas.

## Gas Pipeline from Sahara to Italy

A group of Italian firms have formed a new company, Societa Siciliana Mentanodotti-Sicilian Methane Gas Pipeline Co. (S.O.S.I.M.), which proposes to build an underwater gas pipeline for the transport of methane from the Sahara. It is planned that the pipeline will cross the Sicilian Channel joining Cape Bon with Mazara del Vallo, near Trapani. The capacity of the pipeline is expected to be in the

region of 1,500,000,000 cu. m. of methane a year. Later on other gas pipelines will be built to increase the possibility of transporting the natural gas, to be absorbed by the Sicilian industries.

Many firms are participating in the group, including SINCAT (an association of Monsanto Chemicals and Edison).

## Dominican Republic Ships Furfural to Germany

First shipment of 130 tons of furfural, used in the production of nylon, was shipped to Hamburg from the Dominican Republic on 1 December. A further consignment will be shipped to the West German firm of Otto Aldag.

This is the first time that furfural made from bagasse has been sent to Europe: two-thirds of the Dominican company's production of 15,000 tons annually goes to the new Du Pont nylon plant in the U.S.

## U.S. Butadiene Capacity Now Running at 80%

Butadiene capacity in the U.S. is at present running at about 80%, an encouraging state of affairs considering that two years ago butadiene makers were using only 65% of their available capacity. This change has been the industry was brought about by the increasing demand for styrene-butadiene rubber (SBR) since 1959: business from polybutadiene rubber and other outlets is also expected to increase.

U.S. butadiene production in 1960 is expected to be 950,000 short tons, 4% higher than last year, and 29% higher than 1958. Styrene-butadiene rubber accounts for 85% of butadiene consumption. The present annual capacity for rubber grade butadiene is at present 1.21 million tons and next year will be increased by 40,000 tons with the Copolymer Rubber expansion and the new plant of Socony Mobil, both now under construction.

## Fluorinated Thermoplastics from Allied Chemical]

Plastics and Coal Chemicals Division, New York, of Allied Chemical has introduced fluorinated thermoplastics for moulding and extrusion, the company claiming that Halon resins are unaffected by most inorganic compounds and oxidising agents. The products are said to be serviceable at 390°F, while sections of $\frac{1}{4}$ in. thickness are transparent and flexible at 320°F. Uses are expected in electrical components, gaskets and equipment that has to be sterilised.

## Hummel Chemical to Make Rocket Propellants

Newark, N.J., plant of Hummel Chemical Co., is to be used to make hexanitroethane, hydrazinium, nitroformate, trinitromethane and other chemicals used as rocket propellants.

## Pakistan Chemical Industry

The Pakistani Government has announced in Karachi that within the framework of the country's second five-year plan some 100,000,000 Pakistani rupees are to be spent on the plastics industry, 165,000,000 rupees for mineral oil refining and 240,000,000 rupees for the expansion of mineral oil production processing. A further 320,000,000 rupees is to be spent on power production and the exploitation of indigenous raw materials. All these sums are part of a total of 2,200,000,000 rupees to be expended by the Government on industrial development and exclude further investments to be made by private industry.

## U.S. Synthetic Rubber Plans for S. Africa

According to a statement made by the South African Firestone Tyre Co. Ltd., U.S. tyre companies are considering the erection of a synthetic rubber plant in the Union of South Africa. To be built in Port Elizabeth, the works would cost some £20 million.

## Dutch Firm may Build New Chemical Plant

The Dutch chemicals and synthetic fibres concern Algemene Kunstzijde Unie N.V., of Arnhem, has started negotiations aimed at the future building of a chemical works at Delfzijl in Holland. The A.K.U. has been offered a site already which is situated directly on the waterside in this Dutch port town. The municipality's port authority, which disposes over the site concerned, has promised to clear the area as soon as possible. Should the company decide on the site, work will begin on construction by January, 1962, at the latest.

## Stauffer Acquire Interest in U.S. Polyurethane Foam Firm

Stauffer Chemical and Hewitt Robins, Stamford, Conn, are to set up a joint company to acquire the polyurethane foam division of Hewitt Robins at Franklin N.J. Stauffer will own two-thirds of the new company, to be called Stauffer-Hewitt Inc.

Staffer are also to install an additional sodium sulphate unit at their Westend, Calif., plant to raise capacity there to 200,000 tons a year.

## U.S.I. Sodium Process Cuts Thiophene Contents

Among expanding uses for sodium is demand for the new economical sodium process for reducing thiophene levels in hydrocarbons that was developed by U.S. Industrial Chemicals Co., a division of National Distillers and Chemical. To meet increased interests in its plant design service for sodium users, U.S.I. plan to make available a larger team of experts to advise on plant problems, including those involved in hydrocarbon desulphurisation.

# Koppers Reveal Details of Propane Hydrate Process for Desalination of Water

DETAILS of the hydrate process of Koppers and Co. for the desalination of sea water were disclosed at a recent meeting held in Washington, D.C., of the American Institute of Chemical Engineers. Still in the initial stages of commercial development, the process is expected to compete strongly with other desalination techniques.

According to Syracuse University, the Koppers process offers about 5% higher coefficient of performance for the main refrigeration cycle and 50% better performance for the auxiliary refrigeration cycle, compared with freezing processes.

In the Koppers method, propane is combined with sea water to form salt-free hydrate crystals which are then separated out, washed and decomposed to yield potable water. The crystals form above the freezing point of water and the process is said to need less energy input than either freezing or distillation. Compared with freezing techniques, the hydrate process requires 28% less energy. The company estimates that potable water can be produced at less than 50 cents per 1,000 gall. in a 10 million gall./day unit.

Reactor in the Koppers process operates at about 35°F and 56 p.s.i.g. Propane combines with water to form insoluble clathrate crystals made up of 1 mole of propane and 17 moles of water. The washer operates at between 35°F and 40°F, high enough not to freeze the water. The decomposition tank is operated at between 45°F and 70 p.s.i.g. Brine is recycled from the washer to the reactor, keeping the slurrry concentration in the reactor at a workable level and holding the overall conversion at about 40%.

Inlet sea water is cooled with product water and waste brine thus conserving energy so that on entering the reactor, seawater is within a few degrees of the operating temperature. Propane was chosen as the hydrate because of its cheapness, low-water solubility, the fact that it reacts with water at pressure temperature conditions that are economic and because it is a direct heat-transfer medium.

Some propane is vaporised in the reactor to remove the heat caused in forming hydrate crystals; later propane gas is compressed and condensed on the washed crystals, thus supplying the heat for hydrate decomposition. Purified water is said to have a solids content of less than 500 p.p.m.

Koppers are now studying ways of increasing the particle size of the hydrate crystal in order to raise filter efficiency. Temperature control of the reactor reduces the driving force, to about 1° to 2°F, yielding crystals that should be practical to handle on a commercial scale. The process is covered by U.S. patent 2,904,511.

## Bookshelf

# STRUCTURE AND BIOCHEMICAL ASPECTS OF STEROIDS

BIOCHEMISTRY OF STEROIDS. By *Heftman* and *Mosettig*. Reinhold, New York, 1960; Chapman and Hall, London. Pp. 231. 55s.

The 169 pages of the text are divided almost evenly between chapters on: cholesterol, sterols, vitamin D group, steroid sapogenins and alkaloids, cardiac glycosides, bile acids, progesterone, corticosteroids, androgens and estrogens, except that rather less space than average is allotted to the vitamin D group and more to corticosteroids. Each chapter follows the approximate pattern: structure without discussing the organic chemistry; occurrence and/or biosynthesis; activity, clinical significance and characteristics; analysis. The chapters are sub-divided where appropriate (e.g. $C_{27}$, $C_{28}$ and $C_{29}$ sterols). The chapter on cardiac glycosides includes two pages on the pharmacology, and those on progesterone, corticosteroids, androgens and estrogens discuss the endocrinology (11 pages in all) and analogues (17 pages in all). It is intended to be a supplement to an earlier classical treatise ('Steroids' by Fieser and Fieser).

The text is very readable and is illustrated with more than 120 diagrams of structures, inter-relations and/or metabolic sequences which are clearly set out. The bibliography, which should prove valuable to research workers and students, consists of 44 pages of classified literature followed by two pages of unclassified literature mostly published in 1959 and 1960 which have been added in proof. The 12-13 pages of the index cover the material of the text comprehensively.

## Fluidisation Techniques

FLUIDIZATION AND FLUID-PARTICLE SYSTEMS. By *F. A. Zenz* and *D. F. Othmer*. Reinhold, New York; Chapman and Hall, London, 1960. Pp. x + 513.

The authors are chemical engineers of the type that has long been trained in the United States but which was until recently almost unknown in this country. Both are distinguished examples of the type and are professors at the Brooklyn Polytechnic. They have written an educative book that provides organised coverage of a technique with many ramifications but which was first introduced commercially as recently as 1937. The treatment should appeal to the advanced student and chemical engineer. There are many clearly drawn diagrams and figures together with a few less successful photographs. There are also extensive tabulations of useful data. Each of the 15 chapters carries 50 to 100 references—only a few of them are to the patent literature. The mathematical expressions are printed in a smaller type than the text. Consequently the subscripts can sometimes only be read with difficulty.

The full scope of the book cannot be stated in a few lines as the authors have deliberately set out to present the fundamentals of the subject and to note all important applications.

## Data on Boron

BORON; SYNTHESIS, STRUCTURE AND PROPERTIES. Edited by *J. A. Kohn, W. F. Nye* and *G. K. Gante*. Plenum Press, New York, 1960. Pp. xiv + 189. $8.50.

This volume contains the text of 21 short papers that were given at a conference held near Fort Monmouth in September 1959. The organisers were primarily interested in the element because of its possible uses in solid state devices and restricted the papers to three topics: crystallisation, purification and crystal growth; crystal structure and bonding; and fundamental physical properties, especially electronic and optical.

There is no record of any discussion that took place. Many of the papers are short reviews or progress reports and do not contain the full experimental details normally given in journals. The editors presumably do not expect that most of their readers will be chemists. Boron is, however, such a fascinating element that many chemists will if they browse through the book find many points of interest. This will be the only way in which they are likely to gain much from it. There is, as usual for these symposia, no index and it is unlikely that the material will be abstracted.

The book appears to have been photographically printed from a typescript of extremely high quality.

## Inorganic Chemistry

SMALL SCALE EXPERIMENTAL CHEMISTRY. By *T. A. H. Peacocke*, Longmans, London, 1960. Pp. 164. 8s 6d.

The author is offering a course in practical inorganic chemistry to the G.C.E. advanced level. Except for 21 pages describing some inorganic preparations and 10 pages on reagents, construction of apparatus and the subject index, the text is devoted to qualitative analysis by a conventional scheme and using semi-micro techniques. There is a short account of the basic theory, the apparatus and techniques, and a proper emphasis on the use of ionic equations. The reactions of cations, of anions, analysis of simple salts and mixtures, the theory of the separation of groups of cations, and the analysis of more complicated mixtures are dealt with in separate chapters. All is adequate for the level intended but an improvement would be to combine the schemes for simple and more difficult mixtures so that the student does not develop the habit of attempting to identify a group precipitate without resolving it into sub-groups. This is not important for a G.C.E. examination with its restricted syllabus and combinations of permissible ions, but is important if the student continues with chemistry after the examination.

## Practical Plastics

EXPERIMENTAL PLASTICS: A PRACTICAL COURSE FOR STUDENTS (2ND. EDN.). By *C. A. Redfarn* and *J. Bedford*. Iliffe and Sons, London. Pp. 140. 22s 6d.

This book provides a practical course of study for students taking the examinations of the Plastics Institute or reading for a University degree or diploma in technology which include plastics in their curricula.

The book is divided into four sections, the first of which deals with the production of synthetic resins and polymers used in the manufacture of plastics materials; the second, with the conversion of synthetic resins and polymers into plastics materials; and the third, with methods for fabricating plastics materials by moulding, extruding, casting, etc. The fourth section deals with the identification of plastics, and methods of testing (acidity, mechanical and electrical properties), both for intermediate and final products.

## Volumetric Analysis

A CONCISE SCHEME OF VOLUMETRIC ANALYSIS. By *J. H. Skellon*. Pitman, London, 1960. Pp. 58. 6s 6d.

This book aims at aiding candidates preparing for practical examinations in chemistry at the G.C.E. advanced level. It includes the usual experiments which are likely to occur in such examinations and the candidate who follows it slavishly will score some marks which are frequently lost by inadequate or careless recording. The section on apparatus and techniques is remarkably short, there being no advice on the use of the pipette nor on the production of solutions of accurately known concentration (despite the emphasis in the directions for individual experiments that solutions must be made up without loss). The calculations are effective but the equations used in the section on oxidation-reduction could be replaced by ionic ones with benefit to many of the intended users. The final pages include notes to be studied prior to an examination, tables of logarithms and anti-logarithms, and of some A.W.s, that of hydrogen to three decimal places and those of 20 other elements to one place.

# Research Association Reports on Toxicity of Nitrates in Potable Water

MANY deaths, particularly of infants, have been caused by methaemoglobinaemia, a disease which results from the formation of a compound, methaemoglobin, from haemoglobin, thus reducing the oxygen carrying power of the blood.

It is generally held that methaemoglobin is an oxidation product of haemoglobin, but it is well known that nitrates in water are liable to cause this disease in infants, although nitrates are very feeble oxidising agents.

Nitrates may be present in water naturally or by industrial pollution. However, the nitrate ion is only one of the many forms, from protein to ammonia, in which nitrogen may be found. In the U.S. explosives industry, nitrate dust in the factory atmosphere is continually washed down to reduce the risk of spontaneous explosion. The organic chemical industry, too, produces waste water which often contains inorganic nitrogen in one form or another. Once nitrates are in the potable water there is no chemical means of removing them.

The correlation between the incidence of methaemoglobinaemia and the presence of nitrates in water was established after the last war. That it was then recognised may be ascribed to the great increase of nitrate pollution resulting from the explosives and artificial fertiliser industries.

The addition of certain chemicals to the blood will result in the formation of methaemoglobin. For many years it has been thought that the effective difference between this molecule and the haemoglobin molecule was the change from the ferrous to the ferric state. Suggestive of this are the reports that oxidising agents such as potassium ferricyanide, potassium dichromate, potassium chlorate and hydrogen peroxide will produce methaemoglobin. However, the condition has frequently been observed in very young infants fed with baby food prepared with water containing a high concentration of nitrates and the child will recover slowly if its food is prepared with water free from nitrates.

It is clear that nitrates in water are ultimately responsible for the formation of methaemoglobin but it is equally clear that they are not the only type of compound capable of inducing the effect. It has been suggested that there are two reactions involved (*Water Research News* No. 10). It seems conceivable that an oxidising agent acts directly on the haemoglobin molecule while the effect of the nitrogen containing compounds is exerted indirectly by blocking an enzyme system responsible for the balance between the methaemoglobin and the haemoglobin.

It appears that the nitrate radical seems to exert its toxic effect only after it has been reduced to the nitrite. The nitrates of potassium and sodium are without effect, whereas the related nitrites will produce methaemoglobin.

The picture is a complicated one and such a theory needs substantiating. It would be valuable to follow the path of say, sodium nitrite, by radioisotope techniques with the nitrate radical labelled with either an oxygen or nitrogen tracer.

## Newton Chambers Acquire Chemical Plant Firm

THE business of George Royston and Son Ltd., of Pogmoor, Barnsley, has been acquired by Newton Chambers and Co. Ltd., of Thorncliffe, Sheffield. Roystons design and manufacture chemical plant and equipment fabricated in mild steel, stainless steel, aluminium and special alloys, and specialise in sulphate of ammonia plants for the manufacture of Grade A sulphate. They manufacture rotary dryers and cyclones and also undertake a considerable amount of lead lining work for the coal, by-product and chemical industries.

Newton Chambers also bought the business of Ronuk Limited, polish manufacturers, of Portslade, Sussex, in May this year and this is linked with the Chemicals Division of the parent company.

For board changes involved at Royston's, see 'People,' p. 1057.

## H.O.C. 1960 Sales Should Show Big Increase

A BIG advance on 1959 sales is expected this year by I.C.I.'s Heavy Organic Chemicals Division, although conditions are more difficult now than they were early in the year. This was stated recently by Mr. K. W. Palmer, joint managing director of the division. The third quarter showed the usual seasonal setback, but the signs were that the fourth quarter would show an improvement.

Mr. A. E. Hodgson, development director, stated that if the division continued its current growth rate, by 1965 it would be as big as the present Billingham Division and by 1970 it would be twice as big as that division now was.

Economies in the use of raw materials and services were referred to by Dr. C. Cockram, production director, who said that technical improvements had cut plant costs by around £750,000 in 1960.

## Third Midsil Price Cut Heralds Bulk Production for Silastomers

THIRD price cut within five months for Silastomer silicone rubbers is announced by Midland Silicones Ltd. The cut of 2s-a-lb. lowers the price of the Silastomer 2452-2455 series of general purpose grades to 28s/lb. These rubbers, until now development products, have been reclassified as regular grades in bulk production.

These grades were first introduced as development products some two years ago, and represent improvements over the older well-established grades in properties as well as in ease of processing.

The price cuts, which follow those announced in the last four months for 16 other grades of MS silicone rubbers, have been made possible by the wide acceptance of the Silastomer 2452-2455 series by rubber processors and by industry generally; this in turn has enabled Midsil to pass on the advantages of large-scale manufacture.

Main improvements which the Silastomer 2452-2455 silicone rubbers embody older, established grades, include: Better heat-ageing characteristics; more easily processed; components show less batch-to-batch variation in final physical properties; better surface finish for mouldings, extrusions and calendered sheet; lower compression set, higher tear strength and lower shrinkage on curing; thick sections can be more easily fabricated; greatly improved resistance to boiling water and steam.

# PEOPLE in the news

● **Mr. M. A. L. Banks, Mr. A. F. McDonald** and **Mr. R B. Southall, C.B.E.,** have been appointed to the board of British Hydrocarbon Chemicals Ltd., and **Mr. C. E. Evans, O.B.E.,** has been appointed managing director. Mr. Banks is a director of the British Petroleum Co. Ltd.; Mr. A. F. McDonald is a director of The Distillers Company Ltd., and Mr. R. B. Southall is a director and general manager of B.P. Refinery (Llandarcy) Ltd. Mr. C. E. Evans was previously general manager of B.H.C.

● **Mr. E. R. Griffiths, M.A., B.C.L., A.C.I.S.,** has been appointed deputy secretary of Monsanto Chemicals Ltd. Mr. Griffiths joined Monsanto in 1956 as assistant secretary.

● **Sir Alexander Fleck, K.B.E.,** treasurer of the Royal Society, president of the Society of Chemical Industry and formerly chairman of I.C.I., has been appointed a vice-president of the Royal Society for the year ending November 1961. Other vice-presidents appointed are **Sir Lindor Brown C.B.E., Sir William Hodge, Sir Patrick Linstead, Prof. T. M. Harris** and **Dame Kathleen Lonsdale,** professor of chemistry at University College, London.

● The British Transport Commission has announced the appointment of **Dr. L. C. F. Blackman,** lecturer at Imperial College, London, as assistant director of the Chemical Services Division, Muswell Hill.

● The Minister of Power has appointed **Mr. C. H. Leach,** chairman of the Southern Gas Board, to be chairman of the West Midlands Gas Board in succession to **Mr. G. le B. Diamond,** who will retire on July 31 next. **Mr. A. F. Hetherington,** deputy chairman of the Southern Gas Board since 1956, has been appointed chairman.

**Mr. Glanvill Benn, a portrait by James Gunn, A.R.A., LL.D., president, Royal Society of Portrait Painters, which has been on view at the Society's annual exhibition at the Royal Institute Galleries, 195 Piccadilly, W.1. Mr. Benn is chairman of Benn Brothers Ltd., publishers of 'Chemical Age' and other trade and technical journals**

● **Mr. C. J. Bullock, B.Sc., A.M.I.Gas E.,** who was appointed chief chemical engineer of Bennett, Sons and Shears Ltd. during October, has now taken up this appointment at the company's head office, Pepper Road, Leeds 10. Bennett, Sons and Shears are the food and chemical engineering subsidiary of H. Pontifex and Sons Ltd., and as such are manufacturers and suppliers of specialised types of distillation and evaporative equipment. The company has recently completed the consolidation of its activities at the Leeds works which has been extended.

● **Mr. E. J. Langford,** overseas controller, Imperial Chemical Industries Ltd., and **Mr. T. E. Peppercorn,** director of Dunlop Rubber Co. Ltd., are included in the delegation which the Federation of British Industries will be sending to Nigeria in January 1961 to take part n a Nigerian industrial development conference. The delegation will be headed by **Sir Norman Kipping,** F.B.I. director-general.

● **Mr. A. Kennaway** has been appointed controller of technical operations to B.T.R. Industries Ltd. with responsibility for major engineering projects, process and machine experimentation and the development of new techniques relative to plant and factory layout, methods and instrumentation in the field of production engineering. Mr. Kennaway was for 12 years with I.C.I. Plastics Division, and subsequently chief engineer of plastics operations for Metal Box Co. Ltd.

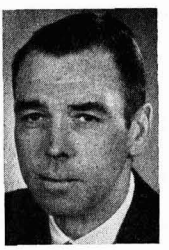
● **Mr. H. Ainsworth,** formerly technical manager of the Elton Cop Dyeing Co. Ltd., of Bury, has joined the Alliance Dye and Chemical Co. Ltd., Bolton, agents for Francolor, as technical representative in the Lancashire area.

● **Capt. Henry F. Ellis** has been appointed commercial manager of Dr. M. A. Phillips and Associates Ltd., consulting chemists and chemical engineers.

● Under the new arrangement for George Royston and Co. Ltd., which has just been acquired by Newton Chambers (see p. 1056), **Mr. K. E. Walker,** director in charge of the engineering division of Newton Chambers, will be chairman of the company, and **Mr. D. B. Royston** (son of the founder) will continue as managing director. **Mr. E. H. King,** a well-known chartered accountant and company director in the Midlands will continue on the board, together with **Mr. M. W. Wilby,** former secretary, who will be responsible for day-to-day management. Joining the new board from the engineering division of Newton Chambers will be **Mr. S. B. Rippon,** general sales manager, **Mr. K. Sheard,** contracts manager, and **Mr. R. Middleton,** engineering sales manager.

● **Dr. A. C. Klixbull-Jorgensen,** of Denmark, and **Dr. Emmanuel Mooser,** of Switzerland, will join the staff of the Cyanamid Institute in Geneva early in 1961 as group directors in charge of basic scientific research in the fields of theoretical inorganic chemistry and solid state physics respectively. The appointments were announced in Geneva on 19 December by **Dr. R. O. Roblin,** president of the research centre, who noted that Cyanamid's new research centre, which will be devoted to long-range research in the chemical and physical sciences, is scheduled for completion in May of next year.

● **Mr. J. P. V. Woollam** has been appointed deputy chairman of Simon-Carves Ltd. He joined the company in 1916 and was appointed a director in 1945 and a joint managing director in 1953. He is also a director of the holding company, Simon Engineering, and of a number of subsidiary and associated companies.



**Mr. J. C. Garrels, Jr., deputy managing director of Monsanto (see C.A., 17 December)**

● **Mr. R. W. Ricketts, M.A.** has joined Reddish Chemical Co. Ltd., of Cheadle Hulme, Cheshire, as an executive on the brewing and mineral water side of their activities. Mr. Ricketts will be responsible for organising the development of better methods of detergency to meet the requirements of new technical advancements.

● **Dr. Arthur C. Cope** (Massachusets Institute of Technology) will become president of the American Chemical Society on 1 January. He will be succeeded as president-elect by **Dr. Karl Folkers,** executive director of Mersck and Co.

● **Dr. T. V. Arden, Ph.D., F.R.I.C., M.I.M.M.,** chief development chemist of the Permutit Co. Ltd., has been awarded a Doctorate of Science from the University of London for work in the field of chemistry and extraction metallurgy of uranium, and on applications of ion exchange.

● **Mr. T. E. H. Birley,** deputy overseas manager of British Insulated Callender's Cables, has retired after 40 years with the company.

# Commercial News

- Howards and Sons Declare 7% Interim
- Glaxo's £1m./year Research Expenditure
- Vickers in German Chemical Plant Field
- Big Capital Increase for Saint-Gobain

## Aspro-Nicholas

Trading results generally for the second quarter were satisfactory, says Mr. M. A. Nicholas, chairman of Aspro-Nicholas. A second interim of 3½% is declared. This makes 7% (5.2% equivalent) to date on account of the year to March 31, 1961, on a capital increased by a three-for-two scrip issue. The equivalent total for 1959-60 was 13.6%

## Glaxo Laboratories Ltd.

At the A.G.M. of Glaxo Laboratories Ltd. held on 12 December it was disclosed that the current expenditure of the group on research was in excess of £1,000,000 per annum. (See also CHEMICAL AGE, 17 December, p. 1034).

## Howard and Sons

Pre-tax group profits of Howards and Sons Ltd. for the half-year ended 31 October were £130,000 (£104,000), representing a profit earning that was 72½% above that for the 16 months covered by the last accounts. It is reported that business was "very brisk" but that since the end of October, the easing of demand in industry generally has resulted in the value of orders received falling slightly below the average for the first half of the year.

Although profits for the second half may be lower than for the first, Mr. T. W. Howard, chairman, says the directors have no reason at present to anticipate any serious downward trend. The improvement in profit is stated to be directly due to additional plant capacity installed in 1959-60.

The directors of Howards have now declared an interim dividend of 7% less tax (previous interim 4% for 16 months' period). The dividend is payable on 5 January, 1961.

## London Adhesive Co.

Two paste and adhesive manufacturers, The London Paste Co. Ltd. and British Paste Co. Ltd., will now operate under the single name of London Adhesive Co. Ltd., Arlington Avenue, London N.1.

The two companies have been working in close co-operation for some time and the joint company has been formed to rationalise research, production and distribution of the range of industrial and consumer adhesives manufactured by the separate companies and by the Reliance Adhesive Co., an associate company.

## Vickers and Zimmer

Vickers Ltd., of London, and Hans J. Zimmer Verfahrenstechnik, of Frankfurt-on-Main are the joint founders of a new German joint stock company for the production of chemical and nuclear plant, Hans J. Zimmer AG. The company, with a Frankfurt-on-Main seat, have an initial capital of DM3 million (£¼ million). The company's board consists of Hans Zimmer, Heinz Jacobi (chairman), Dr. Eberhard Roethe, James Ribbie (U.K.), Robert Wonfor (U.K.), Denes Szentkuti and Werner Kegel. The company's aims are the projecting and construction of chemical plants, equipment for processing of chemical products, units for the radioactive and nuclear field and powder-feed units.

## Holmes Homalloy Ltd.

Holmes Homalloy Ltd. have declared an interim dividend of 6% on the ordinary shares of 2s each, in respect of the year ending 31 December 1960. This dividend is payable on 21 January 1961.

## Péchiney

In a letter to shareholders the French chemical producers Péchiney announce that over the first ten months of the current year turnover has been 20% higher than for the corresponding period of 1959. This gives rise to the expectation that the 1960 financial year will be a satisfactory one for the firm.

## Saint-Gobain

Saint-Gobain, Paris, are to raise their capital from N.Fr. 387,597,075 to N. Fr. 516,796,050 with a one-for-three issue of 1,722,653 shares of N.Fr. 75 at N.Fr. 180. The increase will finance part of a large modernisation programme, stresspoint of which will be development of organic chemicals by Cie des Produits Chimiques et Raffineries de Berne—a joint St. Gobain and Shell company.

### INCREASE OF CAPITAL

STRATTON CHEMICALS LTD., 17 Stratton Street, W.1. Increased by £25,000, beyond the registered capital of £25,000.

### NEW COMPANIES

VIGNY PERFUMES (DISTRIBUTORS) LTD. Cap. £1,000. To carry on the business of distributors of and dealers in perfumes, scent, cosmetics, etc. Directors: J. S. Lee and S. E. Lee. Reg. office: 10 Bury Place, New Oxford Street, London W.C.1.

LEMANTEAU LTD. Cap. £100. Inventors, physicists, research, analytical and manufacturing chemists, etc. Directors: Dr. S. A. Young, H. Glover. Reg. office: 22 Wilton Road, Beaconsfield, Bucks.

FELTHAM PAINT AND CHEMICAL CO. LTD. Cap. £100. Manufacturers of and dealers in paints, pigments, varnishes, oils, oxides, dyeware and chemicals of all kinds, etc. Solicitors: Lovell White & King, 1 Serjeants Inn, London E.C.4.

# New Scheme for Regulation of N.H.S. Proprietary Drug Prices

A SCHEME for regulating the price of drugs prescribed under the National Health Service has been drawn up in agreement with the Association of British Pharmaceutical Industries. The new scheme retains the same general framework, but in future the Ministry may call for direct negotiations about prices on some widely used drugs for which export prices may not be competitive and which are patent protected.

The existing scheme allows for direct negotiation of prices only at the manufacturers' option.

Commenting on the announcement of the renewal of the voluntary price regulation scheme for most medical specialities prescribed under the N.H.S., Mr. Herbert Palmer, president of A.B.P.I., said "Retaining the same general framework as the previous scheme, the new scheme continues to encourage the pharmaceutical export trade (last year: £40 million) and the research effort (now running at £6¼ million) essential to the advancement of medicine. It reflects our desire to provide the Ministry of Health with acceptable evidence of the fairness and reasonableness of the prices charged for our products.

Further, the industry's record as to price is a good one, the wholesale price index for pharmaceuticals having risen since 1954 by only 1.01%, whereas that for all manufactured products has risen by 12.94%.

The total amount received by manufacturers for drugs remains less than 7% of the cost of the Health Service.

## Conference on Physics of Polymers

The Institute of Physics and the Physical Society are arranging a conference on 'Physics of polymers' to be held at the University of Bristol from 10-12 January 1961. Topics for principal sessions are: Statistics of chain configurations; Molecular motions in polymers; Fibre structures and crystallinity in polymers; and Irradiation effects.

Further information is available from the Secretary, The Institute of Physics and The Physical Society, 47 Belgrave Square, London S.W.1.

# NEW PATENTS

*By permission of the Controller, H.M. Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.*

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

## ACCEPTANCES

### Open to public inspection 1 February

Polymerisation of unsaturated organic compounds. Dunlop Rubber Co. Ltd. **860 067**

Processes for the production of graphite. General Electric Co. Ltd. **860 342**

Compositions containing polyethylene. Minnesota Mining & Manufacturing Co. **860 344**

Silica-free welding flux. Union Carbide Corporation. **860 071**

Solvent-resistant pressure-sensitive adhesives. Minnesota Mining & Manufacturing Co. **860 346**

Processes for the separation of substances by fractional sublimation. Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. **860 406**

Process for the manufacture of grafted vinyl polymers. Compagnie de Saint-Gobain. **860 347**

Catalysts for polymerisation and process for polymerisation and co-polymerisation using these catalysts. Solvay & Cie. **860 407**

Method of making polyurethane and polyvinyl formal foams. Hudson Foam Plastics Corporation. **860 135**

Modification of synthetic polymers. Du Pont de Nemours & Co., E. I. **860 408**

Substituted anthranaphthacridone vat dyes. Fairweather, H. G. C. (American Cyanamid Co.). **860 384**

High temperature organopolysiloxane lubricant and process of making same. General Electric Co. **860 349**

Magnesium-nitrogen fertilisers. Wintershall AG. **860 385**

Stabilised polyoxymethylene plastic compositions. Du Pont de Nemours & Co., E. I. **860 410**

Stabilised polyoxymethylene compositions. Du Pont de Nemours & Co., E. I. **860 411**

Dimensional stabilisation of cellulose materials. Upson Co. **860 025**

Film-forming compositions. Forestal Land, Timber & Railways Co. Ltd., and Research Association of British Paint, Colour & Varnish Manufacturers. **860 277**

Tetrazo-dyestuffs. Ciba Ltd. **860 278**

Azo-dyestuffs derived from 1:3-dihydroxyphenyl ketones. Farbwerke Hoechst AG, Vorm. Meister, Lucius & Brüning. [ Addition to 854 404.] **860 279**

Process for the production of polyvinyl chloride/polymer mixtures and the productions obtained by this process. Compagnie de Saint-Gobain. **860 348**

Esterification process. Esso Research & Engineering Co. **860 242**

Coating and coating compositions comprising polytetrafluoethylene. Acheson Industries Inc. **860 299**

Production of water-soluble derivatives of compounds. Shionogi & Co. Ltd. **860 300**

Unsaturated N-substitution products of ethylene imine. Badische Anilin- & Soda-Fabrik AG. **860 285**

Radiochemical polymerisation processes. Nobel-Bozel. **860 244**

Lubricating composition and method of preparing same. Gulf Oil Corporation. **860 286**

Surface-coating composition comprising polyglycidletus and aromatic petroleum residues. Bataafse Petroleum Maatschappij N.V. **860 287**

Tetraiodoanthranilic acid and derivatives thereof, and their preparation and compositions containing them. Glaxo Laboratories Ltd. **860 292**

Polymerisation of ethylene. Du Pont de Nemours & Co., E. I. **860 353**

Pharmaceutical compositions comprising, α-aryloxy-aliphatic carboxylic acids and/or α arylimino-aliphatic carboxylic acids, their esters and salts. Imperial Chemical Industries Ltd. **860 303**

Polymerisation. Union Carbide Corporation. **860 413**

Polymerisable compositions and resins made therefrom. Union Carbide Corporation. **860 354**

Cobalt complexes of monoazo dyestuffs and their preparation and use. Badische Anilin- & Soda-Fabrik AG. **860 356**

Polymerisation process. Distillers Co. Ltd. **860 046, 860 047**

Process for the polymerisation of lower olefins. Sumitomo Chemical Co. Ltd. **860 308**

Low-pressure catalytic polymerisation of olefinic compounds. Petrochemicals Ltd. **860 363**

Method for the preparation of aromatic perchloryl compounds. Pennsalt Chemicals Corporation. **860 309**

Process for preparing heterocyclic tertiary amines. Farmochimica Cutolo-Calousi S.p.A. **806 404**

Herbicides and compositions containing them. Hooker Chemical Corporation. **860 310**

Process for the separation of a binary gaseous mixture by absorption. Soc. L'Air Liquide Soc. Anon. Pour L'Etude et L'Exploitation des Procedes G. Claude. **860 311**

Solid polymers containing inorganic materials. Esso Research & Engineering Co. **860 316**

Separation of methyl borate-methanol azeotrope. United States Borax & Chemical Corporation. **860 318**

Seminitrile esters of beta-hydromuconic acid. Montecatini. **860 320**

Preparing beta-hydromuconic seminitrile and esters thereof. Montecatini Soc. Gen. Per L'Industria Mineraria E. Chimica. **860 321**

Triacyl-hexahydro-triazines and a method of hardening gelatine layers. Filmfabrik Agfa Wolfen Veb. **860 323**

Nitroethylenes. Dow Chemical Co. **860 324**

Production of alphaglycols. California Research Corporation. **860 326**

Preparation of graft copolymers. Midland Silicones Ltd. **860 327**

Polyethylene blends. Union Carbide Corporation. **860 329**

Phenothiazine derivatives. Soc. Des Usines Chimiques Rhone-Poulen. **860 330**

Preparation of halogen-substituted poly-cyclic epoxides. Newby, H. (Universal Oil Products Co.) **860 334**

Tantalum and the electrolytic production thereof. Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. **860 335**

N-substituted 2-phenyl-7-aminoalkoxy chromones and a process for preparing them. Chemiewerk Homburg AG. **860 336**

Polyvinyl alcohol shaped articles. Kurashiki Rayon Kabushiki Kaisha. **860 337**

Process for the purification of dilute sulphuric acid. Shell Internationale Research Maatschappij N.V. **860 370**

Di-sulphonamides and compositions containing them. Pfizer & Co. Inc., C. **860 371**

Process for producing dihydroesoxystreptomycins. Rikagaku Kenkyu-Sho. **860 375**

Process for the production of cyclododecatri-(1, 5, 9)-enes and other cyclic hydrocarbons. Studiengesellschaft Kohle. **860 377**

Basic alkylthioalkyl esters of phenothiazine-10-carboxylic acid and their salts. Ayerst, McKenna & Harrison Ltd. **860 306**

Production of β-trichloroborazols. United States Borax & Chemical Corporation. **860 378**

Process for the preparation of ketoximes. Du Pont de Nemours & Co., E. I. [Addition to 797 985.] **860 340**

Halogenated oxathianes and oxathienes. Diamond Alkali Co. **860 380**

## Market Reports

**MANCHESTER** Seasonal factors have left their mark on business in chemicals and allied products. Allowing for this, new bookings and actual movement into consumption have been on a fair scale. Textile bleaching, dyeing and finishing products have met with a reasonably steady demand and, all things considered, there has been a satisfactory movement to other major industrial outlets. Quotations generally have been well maintained

**SCOTLAND** Although a reasonable volume of business has been transacted during the past week in the Scottish heavy chemical market, there is a slight tendency to ease with the approaching holiday period. Demands have mostly been against immediate requirements, but some orders have been received for forward delivery. Quite some interest has been shown in inquiries received for delivery during 1961. Some variation in prices did take place, but on the whole the tendency is to firmness.

## B.O.C. Interest in N.Z. Carbide Industry

DR. R. F. GOLDSTEIN, British Oxygen Chemicals Ltd., expert on the manufacture of carbide, visited the West Coast of New Zealand's South Island to study the prospects for the establishment of a calcium carbide industry there. He was accompanied by Ministry of Works engineer-in-chief C. W. O. Turner.

A six-month Government deadline on preliminary calcium carbide industry studies will end in about three months, and a decision reached. The most favoured sites are in the Buller Gorge.

The Government is prepared to offer both power concessions and rail freight concessions to any successfully established calcium carbide industry. Such an industry was a major recommendation in the recently released supplementary report on the West Coast committee of enquiry.

Low sulphur content coal for the production of calcium carbide would probably come from reserves at Millerton or Denniston.

# TRADE NOTES

### Styrene Monomer

Monsanto Chemicals Ltd., Monsanto House, Victoria Street, London S.W.1, have published a technical service bulletin on styrene monomer. The publication covers the physical and chemical properties of styrene, specifications, applications, storage and handling, and health and fire and explosion hazards.

Styrene monomer is manufactured by Forth Chemicals Ltd., and Monsanto are the sole selling agents for the Forth product.

### New Shell Epoxide Resin

An addition to their range of Epikote epoxide resins of a medium-viscosity plasticised grade—Epikote 817—has been announced by Shell Chemical Co. Ltd. The inclusion of a plasticiser in the resin results in an improved exotherm during the reaction and also gives an increase in the 'pot-life' of the system compared with other Epikote resins. The new grade is, therefore, particularly recommended for electrical work where cure must be effected at or near room temperature but it is also useful for laminating applications.

### Plastics Exhibition and Symposium

A two-day plastics exhibition and symposium will be held by BX Plastics Ltd. on 21-22 February 1961 at the Grand Hotel, Sheffield. A programme of papers on packaging, design trends, technical and other uses of plastics will take place, together with an exhibition of plastics materials and their products. Admission tickets are available from the Publicity Department, BX Plastics Ltd., London E.4.

### Change of Address

The sales department of G. A. Harvey and Co. (London) Ltd., Greenwich Metal Works, London S.E.7, will now operate from Villiers House, Strand, W.C.2. The publicity department will remain at Greenwich.

### Plastics Coatings for Metals

Vitel, a new polyester coating resin, is being used to protect wheel covers and other metal trimmings on vehicles.

Produced in U.S. by The Goodyear Tire and Rubber Co. (Akron, Ohio) in a resin or pellet-like form, Vitel can be made into clear or tinted liquid solutions that form hard, glossy protective films. It is claimed that they adhere well to chrome, aluminium, steel and other metals and will not peel off. The plastic coating prevents rust and tarnishing and has good scratch and abrasion resistance.

Coatings utilising the new plastic can be applied by brushing or dipping or can be adapted to handy spray applicators.

### Specifications for Rubber Products

The physical behaviour of rubbers differs so profoundly from that of metals and other engineering materials, and rubber technology has advanced so rapidly that rubber specifications present special difficulties to the engineer. For some time rubber manufacturers have been concerned by the number of specifications met with in everyday practice.

As a first step towards rationalising the present confusion, a short 'Guide to the Drafting of Specifications for Rubber Products' has been published by the Federation of British Rubber and Allied Manufacturers. It gives advice on the kind of test most useful for performance testing (by the user) and quality control testing (by the manufacturer), and on the dimensional tolerances appropriate to different kinds of rubber content.

Copies may be obtained free of charge from the Secretary, Federation of British Rubber and Allied Manufacturers, 43 Bedford Square, London W.C.1.

### Borates in Vitreous Enamels

The use of borax and boric acid in vitreous enamels is of special importance. Because of this, Borax Consolidated Ltd., Borax House, Carlisle Place, London S.W.1, in 1949, produced the first edition of a book on vitreous enamels with the object of providing some fairly detailed information about commercially available forms of borates and boric acid, and at the same time, giving a broad review of the part that borates play in the vitreous enamelling industry.

During the past 10 years there have been a number of developments in the technology of enamelling which are particularly noteworthy, such as the introduction of titania and zirconia opacified frits. It is to include these new developments that the book, available from Borax Consolidated, has been brought up to date.

### Additions to B.D.H. Range

Additions to the B.D.H. range of chemicals include: Dextran, in three grades with molecular weights ranging from 90,000 to 200,000; and *N*-benzoyl-*N*-phenyl-hydroxylamine, which has been used in the development of a rapid and sensitive method for the determination of vanadium.

### Titration in Non-aqueous Solvents

Third edition of a booklet entitled 'Titration in non-aqueous solvents' by A. H. Beckett and E. H. Tinley has been published by British Drug Houses Ltd., B.D.H. Laboratory Chemicals Division, Poole, Dorset. The booklet covers a wide range of basic, acidic and other titrations in non-aqueous solvents, which can be carried out, using conventional apparatus, as easily as titration in aqueous solution. Theoretical considerations are covered as are also applications to synthetic organic chemistry and applications of chelating agents.

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# *Natural Gas Fuel Cell Increases Possibility of Home Generator*

RESEARCH on gas-operated fuel cells has in the past tended to concentrate on hydrogen, propane and mixtures of carbon monoxide and hydrogen, but an experimental natural gas-operated fuel battery has now been built by research workers of the Institute of Gas Technology, an affiliate of the Illinois Institute of Technology.

The battery, consisting of six cells which generate about 2 watts at 4 volts by electrochemical oxidation of the fuel, is designed to show the feasibility of using natural gas and to test various cell components. According to Dr. E. B. Schultz, supervisor of the process research, the test unit is the first big step towards a power pack for the home that will generate electricity directly from natural gas, water and air.

The experimental cell contains a number of thin, disc-shaped high temperature cells, each consisting of a ceramic matrix sandwiched between a silver cathode and a porous nickel diffusion anode. The electrolyte is a mixture of molten sodium and lithium carbonates held by surface tension in the pores of the matrix. The cell is set in operation by feeding a mixture of methane and steam to the anode, and oxygen and carbon dioxide to the cathode. Temperature is maintained at 600 to 800°C.

The key to the use of methane in the cell is the reaction which takes place at the anode. Methane in itself is essentially unreactive but fed with steam to an anode of nickel, which is a very good steam reforming catalyst, it reacts to form carbon monoxide and hydrogen. The hydrogen dissociates at the anode to give hydrogen ions and releasing electrons. The electrons travel through the external circuit and return to the cell at the cathode.

At the cathode, oxygen molecules pick up the electrons and form oxygen ions. These ions link with the carbon dioxide, fed with the oxygen gas, to form carbonate ions which migrate through the electrolyte to the anode. Finally, the carbonate ions combine with the hydrogen ions at the anode to produce water and carbon dioxide.

Although the experimental unit does demonstrate that natural gas can be used to operate a fuel cell, many problems remain to be solved. For example, the carbonate electrolyte has many drawbacks due to its corrosive nature and its tendency to decompose at the operating temperature. As a long term solution to this drawback, the Institute is developing solid oxide electrolytes to replace the carbonates currently in use.

Development is at present in the laboratory stage, but prototype fuel cell batteries are planned for 1961.

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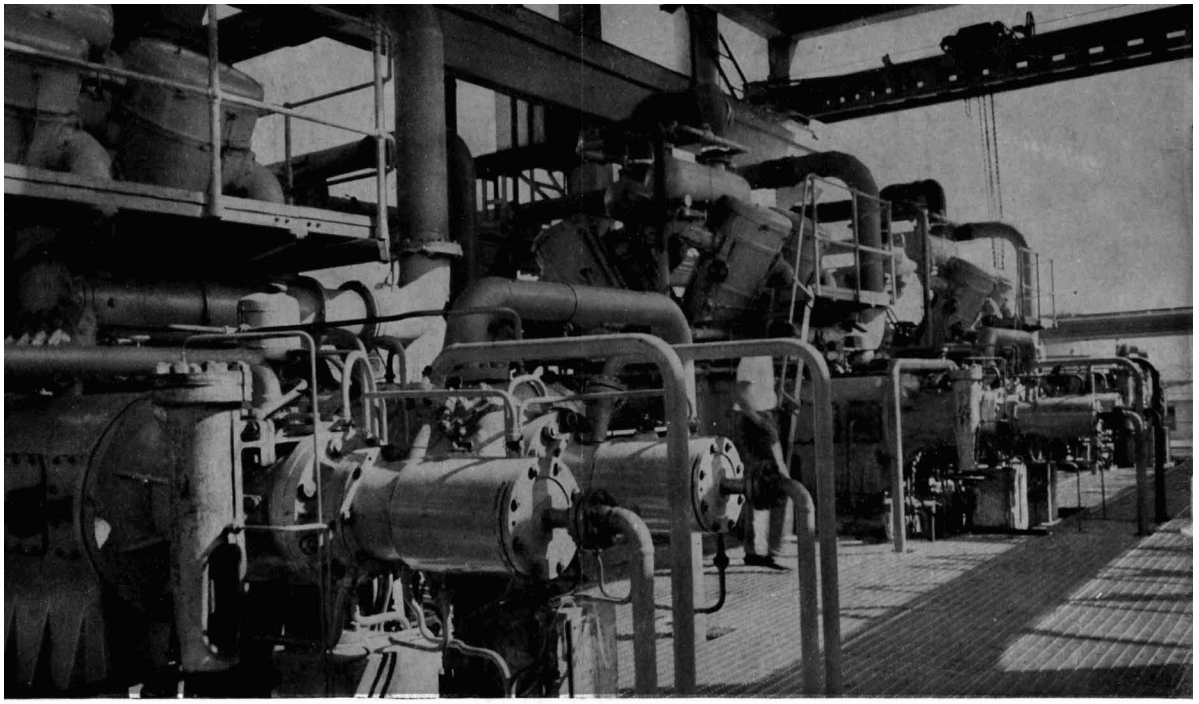

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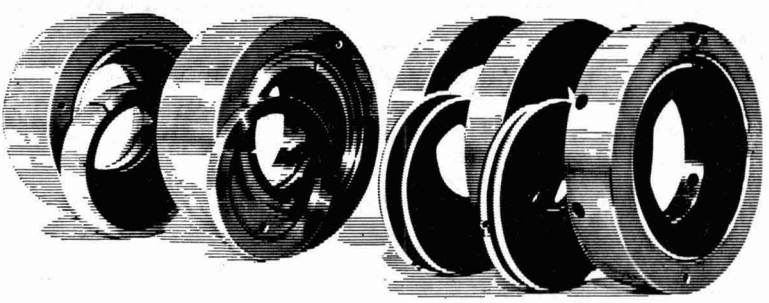

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