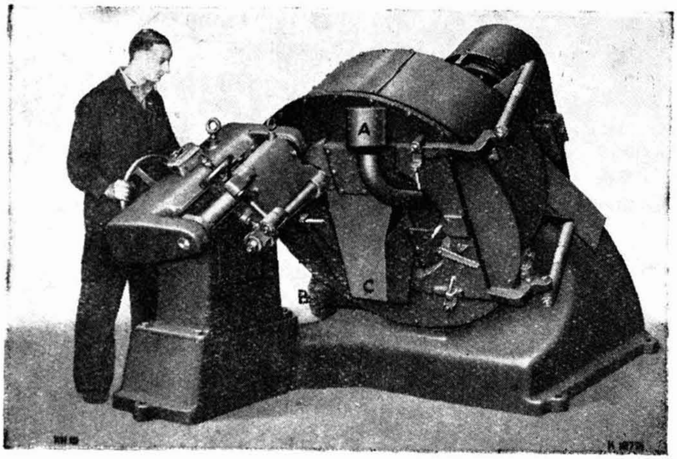
CORONATION NUMBER

The Chemical Age

VOL LXVIII 30 MAY 1953 No 1768

13911



The material to be centrifuged is fed into the down pipe A
Surplus liquor leaves the outer casing through discharge pipe B
Solids are ploughed out of the basket down discharge chute C

BROADBENT

HIGH SPEED CENTRIFUGALS
FOR SUCCESSFUL SEPARATION —

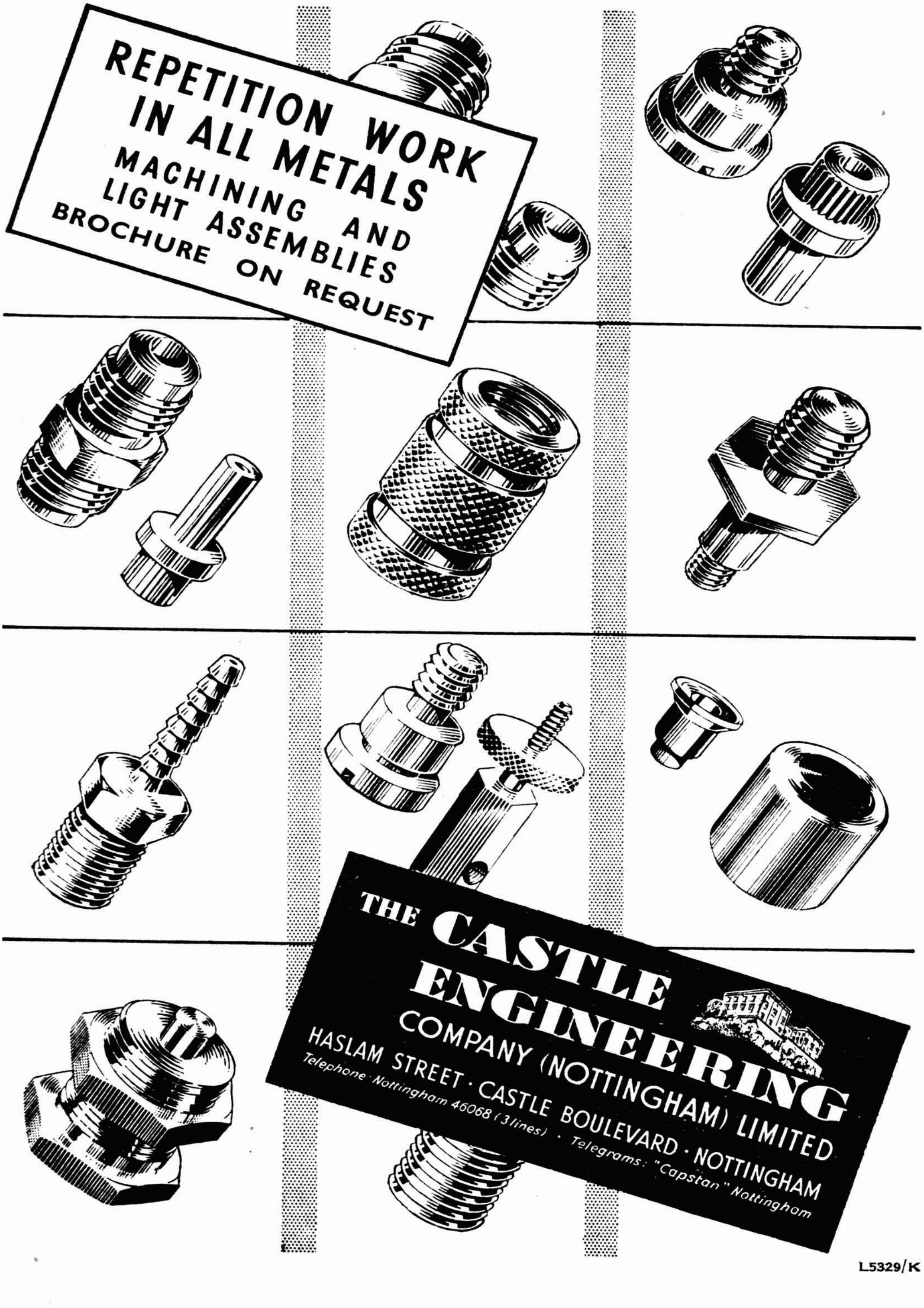
adopt modern methods for separating solids from liquids—install direct-electric Centrifugals designed by specialists to achieve the highest output with maximum reliability.

The Type 80 Centrifugal illustrated is particularly suitable for batch treatment by direct-filtration or sedimentation ; a complete range of machines is manufactured to suit customers specific requirements.

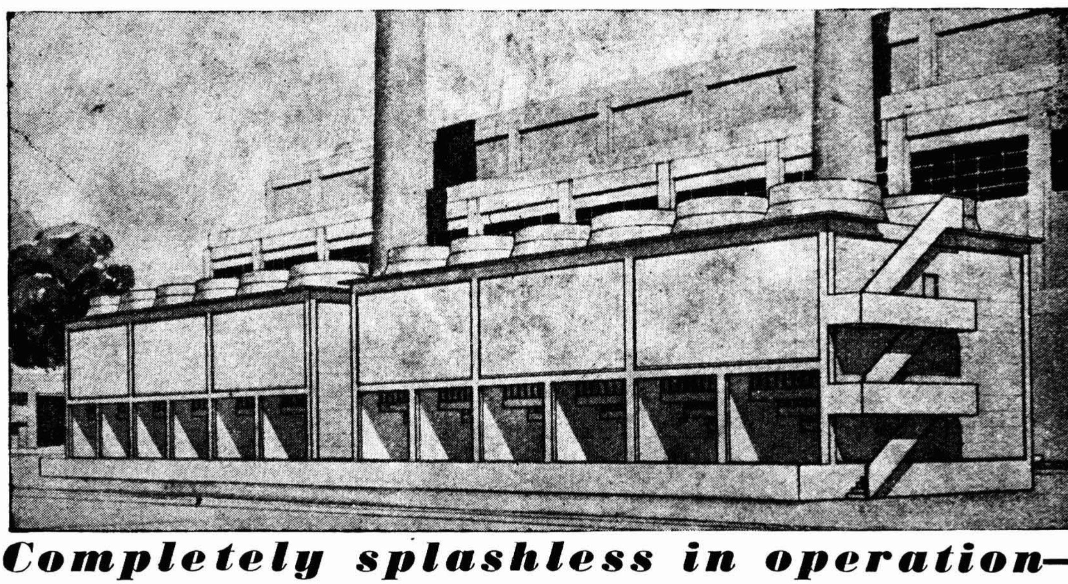
THOMAS BROADBENT & SONS LTD.,
HUDDERSFIELD. Phone 5520/5

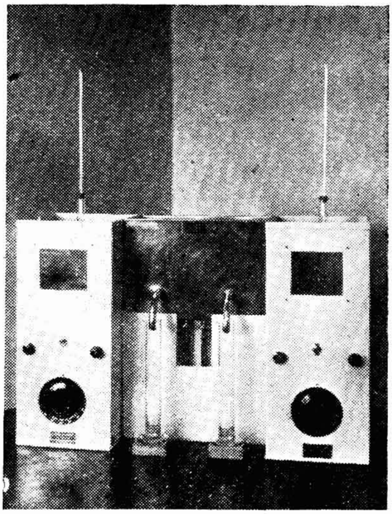
CENTRIFUGAL SPECIALISTS SINCE 1864

INDEX TO ADVERTISERS IN THIS ISSUE


REPETITION WORK
IN ALL METALS
MACHINING AND
LIGHT ASSEMBLIES
BROCHURE ON REQUEST
THE CASTLE
ENGINEERING
COMPANY (NOTTINGHAM) LIMITED
HASLAM STREET · CASTLE BOULEVARD · NOTTINGHAM
Telephone Nottingham 46068 (3 lines) · Telegrams: "Capstan" Nottingham

L5329/K





DUPLEX ELECTRIC
DISTILLATION APPARATUS

F. J. HONE & COMPANY

(N. E. BREWERTON)

324 STAFFORD ROAD, CROYDON.

Specialists in

PETROLEUM TESTING EQUIPMENT

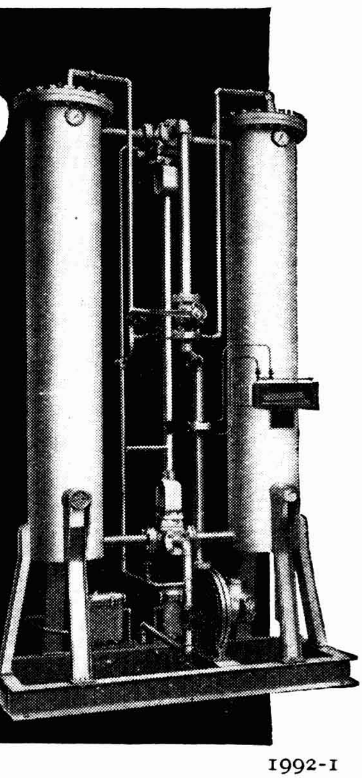
For Apparatus telepHONE CROydon 6453

HOLMES - KEMP

ADSORPTIVE

DRYERS

FOR AIR OR GAS



The Holmes-Kemp dynamic dryer treats air or gas for complete removal of water vapour utilising Silica Gel or Activated Alumina as the adsorptive medium.

Heat for re-activation can be supplied by electricity, towns gas or steam as desired.

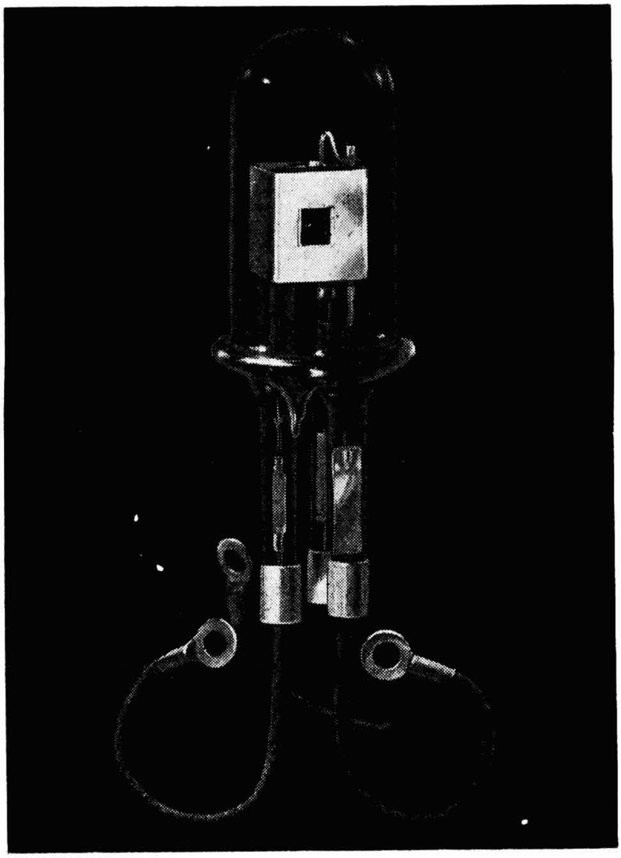
Detailed brochure available on request.

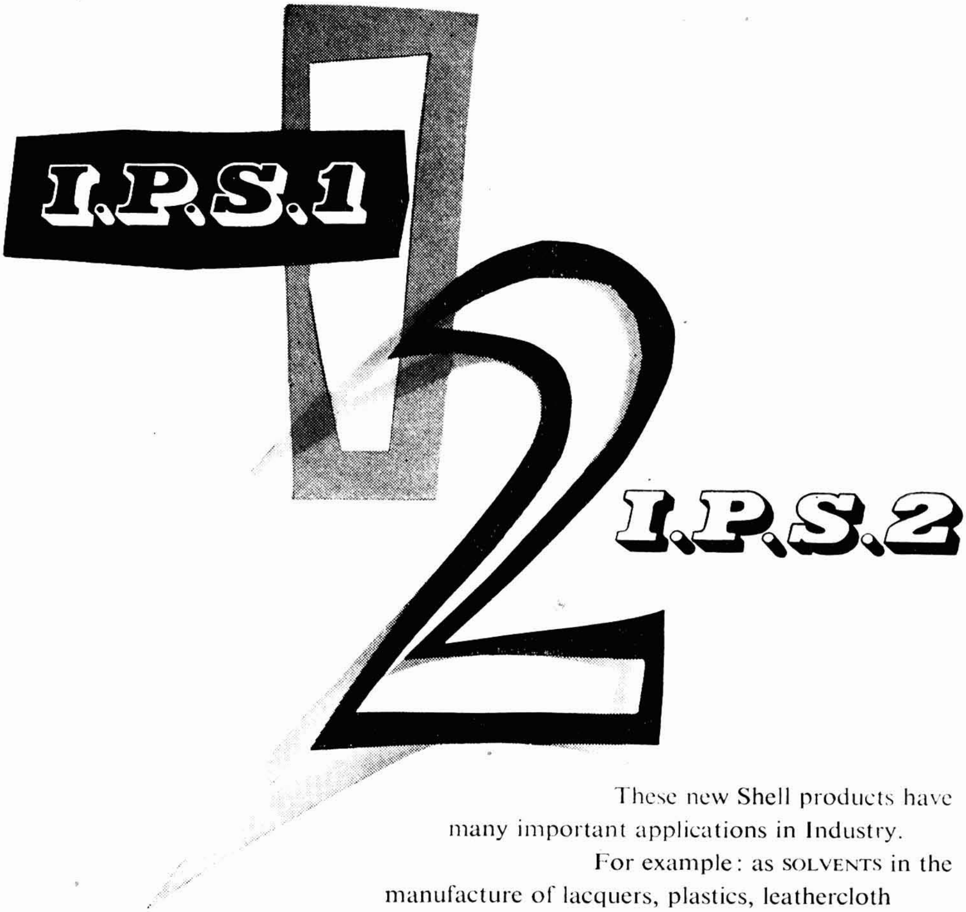
FOUNDED 1850 HOLMES HUDDERSFIELD

W. C. HOLMES & CO. LTD. HUDDERSFIELD

Telephones: Huddersfield 5280, London, Victoria 9971, Birmingham, Midland 6830.

B





These new Shell products have many important applications in Industry. For example: as SOLVENTS in the manufacture of lacquers, plastics, leathercloth and polishes; as CLEANING AND DEHYDRATING AGENTS in the photographic printing and electroplating trades.

I.P.S.1 specification

PURITY: 99% Isopropyl Alcohol by weight.
SPECIFIC GRAVITY at 20°/20°C: 0.785-0.790.
COLOUR: Water White.
DISTILLATION RANGE (A.S.T.M. D268): Minimum 95%, 81-83°C.
NON-VOLATILE MATTER: Maximum 0.01% weight.

I.P.S.2 specification

PURITY: Minimum 85% Isopropyl Alcohol by weight.
SPECIFIC GRAVITY: at 20°/20°C: 0.815-0.820
COLOUR: Water White.
DISTILLATION RANGE (A.S.T.M. D268): Minimum 95%, 78-81°C.
NON-VOLATILE MATTER: Maximum 0.01% weight.

SHELL

Shell Chemicals Limited, 105-109 Strand, London, W.C.2. Tel: Temple Bar 4455
(DISTRIBUTORS)

Divisional Offices: Walter House, Bedford Street, London, W.C.2. *Tel*: Temple Bar 4455. 42 Deansgate, Manchester, 3. *Tel*: Deansgate 6451. Clarence Chambers, 39 Corporation Street, Birmingham 2. *Tel*: Midland 6954. 28 St. Enoch Square, Glasgow, C.1. *Tel*: Glasgow Central 9561. 53 Middle Abbey Street, Dublin. *Tel*: Dublin 45775. A3

The
Chemical Age

Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE 154 FLEET STREET LONDON E.C.4.
Telegrams: ALLANGAS FLEET LONDON · Telephone: CENTRAL 3212 (26 lines)

Volume LXVIII 30 May 1953 Number 1768

The British Monarchy

THE first Queen Elizabeth's Coronation took place in mid-winter, six years short of four centuries ago. Spectacle and pageantry were unmarred by a little snow in the morning, and a thoughtful observer whose words have survived said, 'In pompous ceremonies a secret of government doth much consist.' We may doubt today whether that same thought could be as truthfully expressed. By evolution the rôle of monarchy has changed. The Sovereign has been lifted above the ruts and cobblestones of politics. Then England was concerned; now the Coronation of Her Majesty Elizabeth II concerns the Commonwealth and the United Kingdom. The accession of the first Elizabeth was ideologically delicate at a time when Europe was split by ideological differences; her Coronation was an act of diplomacy as well as a ceremony. Though monarchies in most of Europe have passed away, the Coronation of 2 June, 1953, will be a great ceremony of state above all doubts and questionings and far removed from those ideological disputes that belong just as fiercely to the twentieth century world. If now the processions and the ceremony subtly hold 'a secret of government', it is because we are a people steeped in history and heritage and the young Queen symbolises a unity of outlook that transcends the harshest political divisions and dissolves the longest distances that separate the Commonwealth. The Sovereign has become the symbol of the British way of life, and this remarkable achievement in a world that has become ever more republican is as much the personal triumph of the Royal Family as the outcome of our Constitution. The overwhelming homage that will be paid to Her Majesty a few days hence is at the same time homage to a great family, whose generations have successively carried heavy burdens, whose sense of duty has been undiminished even when age or ill-health has intensified the task.

It is difficult for us to realise the strength that the British monarchy has acquired in the last hundred years. At the time of the Coronation of George V, also in June and forty-two years ago, it was possible for two contemporary and esteemed weekly papers to write: (1) 'It is remarkable that King

George is the first king of his dynasty who has ever spoken English like a native,' and (2) 'The English Coronation rite is a thing unique. Regarded seriously, it is a meaningless anachronism and anomaly. But it makes a brilliant historic pageant.' Of Queen Victoria's accession, Lytton Strachey could accurately write: 'The new Queen was almost entirely unknown to her subjects . . . hardly a human being from the outside world had ever spoken to her. . . .' The 'anachronism and anomaly' has survived two world-shattering wars and an abdication, and we see it now with a sense of growth that blends the future and the past. It is not anomalous; and if our outward mood is festive the Coronation is far more than a brilliant pageant. The Queen comes to us not as a remote personality, but as a human person whose face and voice are intimately known. The modern press, the cinema (just beginning when George V came to the throne), the radio, and now television (little more than a scientific embryo when George VI was crowned) have changed barriers into bridges. It might once have been feared that these dispersals of mystery would weaken tradition. That they have not must be regarded as another triumph of the Royal Family. The test of greater familiarity found them unwanting and instead it has heightened the respect in which they are held. In person and personality Her Majesty now brings brilliant qualities to thousands of millions who will often see and hear her by radio and screen. It is an oddity of history that all recent British reigns have begun in greatly troubled times. The Coronation we are now to witness follows this rule of fate—yet none can feel that the monarchy will not continue to strengthen, that a long reign of a youthful Queen will not bring greater consolidation.

If we have been fortunate in our Sovereigns for well over a century, we have been fortunate, too, in their consorts, a fact brought home only too sharply by recent grief for Queen Mary. The Queen's Coronation is also a ceremony of dedication for H.R.H. the Duke of Edinburgh. His capacity for arduous public service needs no elaboration. As the father of a future king, who must one day reign over a much more technocratic community than even ours of 1953, the Duke's interests in scientific and technological developments are far-reachingly important.

Great cares rest upon Queen Elizabeth the Second and her family. For her and for them the forthcoming Coronation is a service of dedication, a time for solemnity as well as celebration. All thinking citizens will sense and feel this deeper spirit that underlies the occasion.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 42s. Single copies, 1s.; post paid, 1s. 3d. SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784/5). LEEDS OFFICE: Martins Bank Chambers, Park Row, Leeds, 1 (Leeds 22601). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

Notes & Comments

Designing Man

THOSE of us—and there are many—who thought that chemical engineers conceived their brain-children at the drawing-board, proceeding by easy stages from first principles to pilot-plant, from pilot-plant to carefully made scale-model, and then to the proud moment of final erection (and now and again to the discovery that something essential had been forgotten) were apparently self-deceived. Mr. M. H. Nickerson, of DeBell and Richardson Inc., Connecticut, has drawn back the veil a little to reveal the actual methods of the chemical engineer (*Ind. Eng. Chem.*, **45**, 4, 20A). The first step, it appears, is to find out how other people have solved the problem, pick out the best features of their several designs, and amalgamate them. With this beginning the engineer produces a flowsheet which should sufficiently impress the board of directors, thus giving him breathing time in which 'to find out how the Germans did it'—an infallible method. When *Chemical Abstracts*, journals and patent specifications have been read through, he is in a position to approach the Sales Department to ask them how much of the product is likely to be required; this makes estimation of the probable capacity of the plant a simple step, and he can calculate the necessary storage tanks and transfer equipment. Then, and only then it seems, does the drawing-board make its appearance, and the engineer his personal contributions to the design—or so Mr. Nickerson would have us believe.

The Truth About Dividends

FROM time to time there has been much ill-informed criticism of the so-called 'huge' dividends paid by some of the larger concerns in private enterprise. If the critics took the trouble to familiarise themselves with the full facts before making their assertions they would realise that they should change their tune. It is high time that the searchlight of truth should be directed on this problem of the relationship between dividends and total income. This has been admirably done in the 1953 edition of 'The Earnings in Industry', which shows the proportion of each £ of turnover taken by the tax-gatherer, by wages, by the cost of raw materials and by the benefits given to the wage earner which supplement his accrued earnings. These expenses are compared with the very small 'pieces of cake' usually known as dividends and show that, in general, what the stockholder gets is 3d. in the £, maybe 4d. in the £ and, very occasionally, 6d. in the £. Some of the larger chemical concerns are included in sections of the book showing in detail how revenues of companies in all branches of industry have been expended. We join with Aims of Industry Ltd. (who prepared the book, published by Hollis & Carter at 4s.) in commending Boots Pure Drug Company Ltd., for issuing a series of coloured diagrams emphasising the smallness of the dividend as compared with the payroll and direct taxation. More should be done in this and other ways to popularise balance sheets and thus dispel criticism which has no foundation in fact.

A Matter of 'PH'

'COLOR' instead of 'colour' is simplified spelling. So is 'program' instead of 'programme'. But 'sulfur' instead of 'sulphur' is not simplified spelling, as Dr. J. E. Baer has recently pointed out in a lecture to the Philadelphia Section of the American Chemical Society. British sticklers for tradition in nomenclature might note that 'etymologically, the best that can be said for sulphur is that it is an incorrect pseudo-Greek form of a Latin word'. The Romans called it 'sulfur' and occasionally 'sulpur'—the Greeks called it 'theion'. It is only in the 19th and 20th centuries that the 'ph' of 'sulphur' has become universally established in Britain. The Oxford English Dictionary mentions a case of 'sulfate' dated 1809. In the 18th century and before, 'sulfur' was a common form of spelling. This was the form of the word that emigrants to America took with them.

'F' Not Universal

HOWEVER, the 'f' form is not universal in the United States. As lately as in its 1947 edition, the highly authoritative Merriam - Webster dictionary gives 'sulphur' first, with 'sulfur' as the second-stated synonym. The element takes its position in the dictionary from the 'ph' spelling. Dr. Baer states that the next edition of Merriam-Webster will give preference to the 'f' form, thus giving 'ultimate recognition' after 'a 40-year campaign waged by American chemists'. Actually, it was in 1911 that the 'f' form was adopted by the *Journal* of the A.C.S. and *Chemical Abstracts*, other US journals beginning to follow this lead from 1913. There have been delays and exceptions. The American Medical Association's *Journal* accepted the 'f' spelling only in 1935, and the Government Printing Office waited until 1939. Students of US technical journals' advertising may have noticed that producers of the element offer 'sulphur' or 'sulfur' and their company titles utilise the 'ph' form, e.g., Texas Gulf Sulphur Co. These old-established organisations stick to the spelling that was generally accepted at the time of their formation. To change to 'sulfur' might involve considerable documentary adjustments. It is no small point that these US companies that resolutely retain the 'ph' spelling produce about 90 per cent of the world's total annual output of the element. Dr. Baer regrets that 'sulphur' is so firmly entrenched in this country. The 'ph' spelling in British scientific literature spreads to European journals that publish sections in English. We are unlikely to change, but it might be as well to remember that the history of the English language and etymological purity are against 'sulphur' and in support of 'sulfur'.

Fuel Economy

LAST month's annual luncheon of the Institute of Fuel produced some striking 'talking-points' on a national subject that is still taken for granted by a majority of the population. The Rt. Hon. Geoffrey Lloyd, Minister of Fuel and Power, stated that while coal production in Russia only a few years ago was 80 million tons less than ours, it is now 80 million tons greater. We now faced increasingly active competition from countries with greater fuel potentials than we still possessed. Dr. Foxwell, the Institute's president, urged that a fuel technologist should be employed by a firm even if the saving in fuel was no greater than the salary paid. As a rough guide, if a fuel technologist could save 10 per cent of the fuel consumption at a minimum, he was worth £300 for every 1,000 tons of fuel used per year. There were 658 firms using more than 10,000 tons of coal a year, 1,005 firms using from 4,000 to 10,000 tons, and 1,500 using between 2,000 and 4,000 tons. This meant that over 3,000 firms could and should employ one or more full-time fuel technologists. In addition, there were 10,000 firms using from 300 to 2,000 tons annually, one of whose technical employees should have enough knowledge of fuel technology to be admitted as a corporate member of the Institute. This implied a national need, including fuel specialists in the Civil Service, nationalised industry, etc., for 4,000 full-time specialists and 12,000 part-time or secondary specialists. At present the Institute of Fuel had over 4,000 members, no more than a hopeful start for a long journey.

Murmurings of Doubt

YOUNG scientists might assume from this that expanding careers can be founded on a good knowledge of fuel usage. Clearly much depends upon industry's willingness to reward such capability, especially when it is exercised as a secondary function. Though rises in the price of fuel provoke great grumblings by industrialists, it remains a fact in many industries that the cost of fuel per unit-measure of goods produced is still small. Another deterrent, perhaps one that is exaggerated, is the unknown future of atomic energy. The young scientist of today might reasonably wonder if the needs of a coal or solid fuel age will last out for a future career of, say, 35 to 40 years' duration. So long as atomic fission remains a major branch of science wrapped in mystery and official secrecy, no one can disregard such murmurings of doubt.

Chemistry Under Four Queens

Queen Victoria

Queen Elizabeth II

Queen Elizabeth I

SCIENCE and chemistry, particularly the latter in the reign of Queen Elizabeth I, were passing through a transitional stage which, although it did not seem to have a very marked effect at the time, was nevertheless a prelude to events of vital and lasting significance.

For chemistry it was a period of change from the alchemists and their search for the 'philosopher's stone,' to the movement to turn chemical knowledge to medicinal use, known as iatro-chemistry, which was to lead in its turn, some 50 years later, to the foundations of the modern period of chemical investigation.

In 1540, Valerius Cordus, a neglected scientist about whom little else is known, described the preparation of ether from alcohol and sulphuric acid. In the same year was born in Halle, Germany, Andreas Libavius, destined to become one of the noted iatro-chemists. In 1597, under the title of '*Alchemia,*' Libavius published the first real text book of chemistry which contained a full description of chemical apparatus of the time. He also made a number of original contributions to chemical knowledge. He discovered stannic chloride, described a compound of tartar solution and calcined antimony, and was the first person to prepare ammonium sulphate.

One of the most outstanding figures of this era was Johann Baptiste Van Helmont, who was born in Brussels in 1577. A wealthy nobleman by birth, he forsook the pleasures of the Court for research in his laboratory. His chief contribution to chemistry was to show scientifically the material character of gases and their variety, and he thus became the forerunner of the pneumatic chemists of the 18th century.

In science, William Gilbert of Colchester (1540-1603), who practised as a doctor and became Court physician to Queen Elizabeth I, was the greatest experimentalist of his time. His book '*De magnete, magneticisque corporibus, et de magno magnete tellure; Physiologia Nova*' (London, 1600), was the result of 17 years' work, and set forth for the first time in clear scientific language, all that was known about magneticism and electricity. Gilbert was awarded a pension by the Queen to give him leisure to carry out his researches, a notable early Royal appreciation of the value of scientific experiment.

Another prominent personality of the

ACKNOWLEDGMENTS

Queen Victoria, after a portrait by Thomas Sully in the Wallace Collection, London.

Queen Elizabeth II, photograph by Dorothy Wilding, London.

Queen Elizabeth I—portrait by an unknown artist.

Queen Anne, from a painting by J. Closterman in the National Portrait Gallery, London

period was Dr. John Dee (1527-1608), who was presented to Queen Elizabeth I on her accession by William Herbert, Earl of Pembroke, and Lord Robert Dudley, afterwards Earl of Leicester. At Dudley's command, Dee wrote an astrological calculation respecting the choice of a fit day for the coronation. In 1577 he was summoned to Windsor to discourse on the appearance of a new comet which had alarmed the Court. During October of the following year, by command of the Queen, Dee held a conference with Dr. Bryly 'concerning Her Majesty's grievous pangs and pains caused by toothache and the rheum.' After 1581 Dee devoted all his attention to alchemical experiments, and his 'shew' or holy stone, which he asserted was given to him by an angel, is in the British Museum. Despite the evil reputation as a sorcerer which he acquired as the result of his alchemy, the Queen continued to hold him in high esteem.

Sir Walter Raleigh (1552-1618), although better known as soldier, sailor, courtier, explorer, poet and philosopher, was also a scientist and historian. For over 12 years he was a prisoner in the Tower of London, and it was during this period of confinement when he could no longer go adventuring that his mind sought release in writing and experiment. Sir George Harvey, who was Governor of the Tower when the imprisonment began, allowed Raleigh to use his private garden, and even to build a small hut for his chemical laboratory where, according to Sir William Waad, who succeeded Harvey as Governor, Raleigh spent 'all day in his distillations.'

Soon Raleigh gained an international reputation largely through his 'Great Cordial or Elixir,' a 'Balsam of Guiana,' which was widely sought after and was believed by the Queen (wife of King James), to have saved her life. Among the notes of his work in the Tower are some for the preparation of crystalline mercury sublimate crystalline mercuric chloride), and a process for curing tobacco.

A bright precocious boy to whom Queen Elizabeth I enjoyed talking was Francis Bacon, who was an undergraduate at Trinity College, Cambridge, when only 13 years of age. Later in his life, although much employed by the Queen in legal and political business, he never really seems to have been trusted by her, and held no important office during her reign.

Organised Scientific Research

Bacon was not a practising scientist. His fundamental interest was to discover and propagate a general method by which men might gain scientific knowledge of the ultimate laws and structure of matter, and might thus acquire ever-increasing practical control over nature. His Utopian *New Atlantis*, with its picture of organised scientific research (House of Salomon), helped forward the subsequent establishment of the Royal Society, which may be regarded as the realisation of Bacon's dream on the part of men like Boyle and others, who had been impressed by his writings.

In technology in the first Elizabethan era, the first knitting machine, the so-called 'stocking frame,' appears to have been invented in 1589 by the Rev. William Lee, curate of Culverton, near Nottingham, who failed to get a patent of monopoly either from Queen Elizabeth I or from King James, and emigrated to France. His frame was, however, soon extensively used in England, especially by the Spitalfields silk makers in London, and by craftsmen in Leicester and Nottingham.

During the lifetime of Queen Anne (who reigned 1702-1714) all the old alchemical ideas were scrapped and chemistry began to be studied as a science for its own sake. Unfortunately, the progress towards the true theory of combustion made by Boyle, Hooke, Mayow and Rey was interrupted by the appearance of a false theory which was to hold its ground for nearly a century.

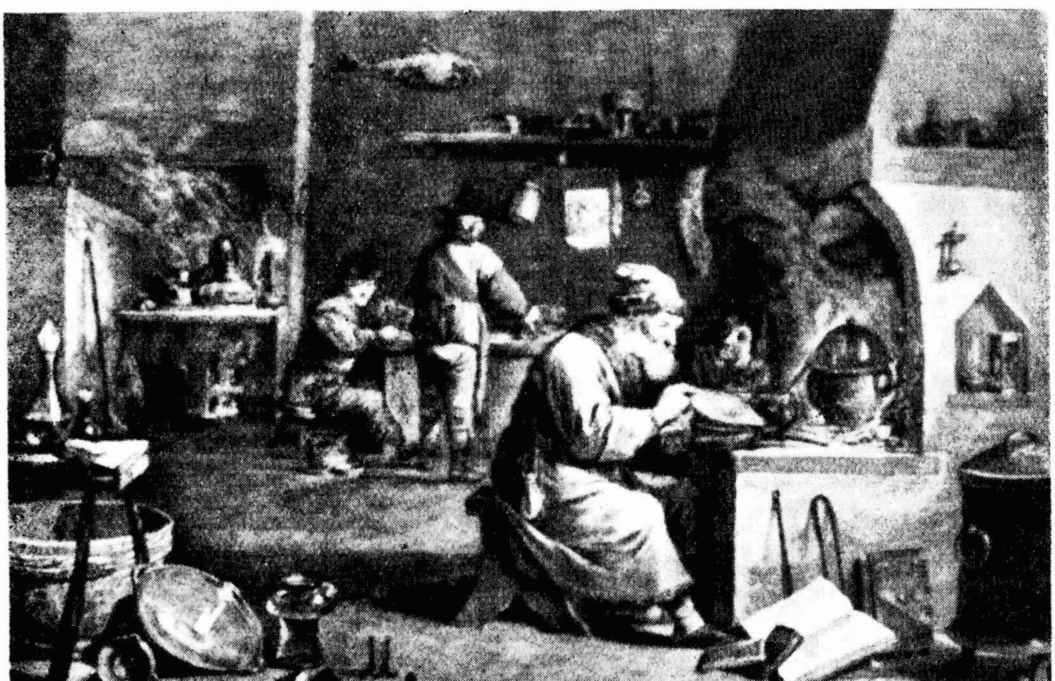
The theory of phlogiston, as it was called, was introduced by two German chemists, Johann Joachim Becher and Georg Ernst Stahl. Becher (1635-82) conceived the idea of an inflammable earth (*terra pinguis*) to explain combustibility (1669), which was extended by Stahl (1660-1734), professor of medicine and chemistry in the new university of Halle.

All combustible bodies and metals, according to Stahl, contained a common principle, phlogiston, the same in all, which escaped on combustion or calcination, but could be transferred from one body to another, and restored to the metallic calces by heating with substances rich in phlogiston (charcoal, oil, etc.), when the metal was reproduced. In the *old* phlogiston theory, phlogiston was equivalent to *minus* oxygen; in the later theory it was sometimes assumed to be hydrogen (Cavendish, Kirwan and Priestley).

During the 18th century practically every chemist adopted the phlogiston theory, which had the advantage that it co-ordinated into one system a great number of previously isolated facts, but as it was based on a totally erroneous foundation and was completely incapable of modification to suit changing conditions, it had to be destroyed. Its chief harm was that it prevented a number of the best investigators from realising the correct explanation of the facts which they had brought to light, and thereby retarded the progress of chemistry.

The long reign of Queen Victoria was to prove for Britain to be an era rich in outstanding scientific personalities, presided over, it might be said, by Prince Albert the Prince Consort, of whom Disraeli wrote in a telling phrase: ' he formed and guided his generation with benignant power.'

Besides his interest in science, the arts, and music, Prince Albert showed a keen appre-



[Crown Copyright Reserved

An alchemist's laboratory (c. 1650). A typical 17th century laboratory scene depicting the alchemist engaged in a distillation process. From an engraving after D. Teniers, by courtesy of the Science Museum, London

ciation of the welfare of the people of the nation which he had adopted on his marriage. This was to become an increasingly predominant care of succeeding monarchs, culminating in the life service of King George VI which so endeared him to all his peoples.

Prince Consort Presided

It was in May 1848 that the Prince Consort presided at a meeting of the Society for Improving the Condition of the Working Classes and made the first of his many expressions of sympathy and interest that he felt 'for that class of our community which has most of the toil and least of the enjoyment of this world.' His idea was that while the rich were bound to help, yet 'any real improvement must be the result of the working people themselves.'

For 18 years Prince Albert was president of the Royal Society for the Encouragement of Arts, Manufacture and Commerce, which was formed in 1754, and is now generally known as the Royal Society of Arts. In 1847 he was elected Chancellor of the University of Cambridge, and 12 years later as president of the British Association for the Advancement of Science at its first meeting in Aberdeen, he delivered, what was considered by many, one of his best speeches.

The Great Exhibition of 1851 was largely conceived by the Prince Consort, and the numerous objections and difficulties to the project put forward would certainly never have been overcome but for his encouragement and unflagging support. After the stirring opening ceremony in May, 1851, on their return to Buckingham Palace, Queen Victoria and the Prince Consort came out on to the balcony, which would appear to be the first occasion on which this was done by an English sovereign.

Contrary to the expectations of many, the Exhibition was a great success and made a handsome financial profit. With the surplus Prince Albert intended the building of four institutions in South Kensington, and proposed the housing in one building of the Royal and public societies, such as is now planned on a site on the South Bank of the Thames for the learned societies and associations of the new reign.

The Victorian period provided a background for great scientific advancement, and the stage was crowded with figures too well known to need recording here, such as Darwin, Louis Pasteur, Lord Kelvin, J. J. Thomson, William Bragg, Lord Rutherford, and many others. Dalton and Faraday were both still alive on the Queen's accession, but perhaps some of the personalities who by their outstanding achievements helped to build up the British chemical industry may be recalled.

Founder of the British alkali industry was James Muspratt, born in Ireland of English parents, who came to Liverpool in 1822 and set up a plant to produce sulphuric acid, extending it the following year to make sodium carbonate. In 1828, in partnership with Josias Gamble, he built an alkali works at St. Helens in Lancashire, but the fumes from the works were allowed to escape into the air, and were the cause of much damage to the crops of neighbouring farmers. In 1836, however, a method of absorbing these objectionable gases was invented by William Gossage. The fumes were recovered and converted into hydrochloric acid, thus ending what was becoming a dangerous nuisance and at the same time obtaining a valuable by-product from what had formerly been considered merely as industrial waste. The foundations of the British heavy chemical industry were complete.

Half the sulphuric acid output of the world today is made by the contact process which, although patented in 1831, was not developed commercially until nearly 70 years later. The inventor was Peregrine Phillips about whom surprisingly little is known except the indisputable date of his patent. Even the dates and places of his birth and death are uncertain.

Professor Thomas Graham

Born in Glasgow in 1805 was a young Scotsman who was to become Professor of Chemistry at Anderson's College at the early age of 25. This was Thomas Graham, rightly regarded as one of the fathers of physical chemistry and the first person to investigate the manner in which charcoal absorbs gases. He is best known for the formulation of Graham's law, which makes it possible to calculate the relative rate at which gases of different densities will pass through small apertures. Graham's other researches included work on colloids and osmosis, and the occlusion of hydrogen by metals. He was elected the first president of the Chemical Society in 1841 when only 36 years of age.

John Glover was a chemist who had a high sense of the value of scientific discipline. He maintained that devotion to scientific investigation should be regardless of material gain, a principle which he carried out himself. He greatly improved the commercial manufacture of sulphuric acid by building in 1859 the first of the 'Glover Towers' which resulted in a great saving of fuel and sodium nitrate, and the concentrating plant was no longer required. He declined to take out a patent for his invention and was always ready to show visitors, and even competitors, how it worked.

Among the first to develop the theory of valency was Sir Edward Frankland (1825-1899), who in collaboration with the British astronomer Sir Norman Lockyer, also discovered the existence of helium in the sun. Frankland was president of the Chemical Society from 1871-73 and of the Royal Institute of Chemistry from 1877-80. In 1894 he was awarded the Copley Medal, highest honour of the Royal Society.

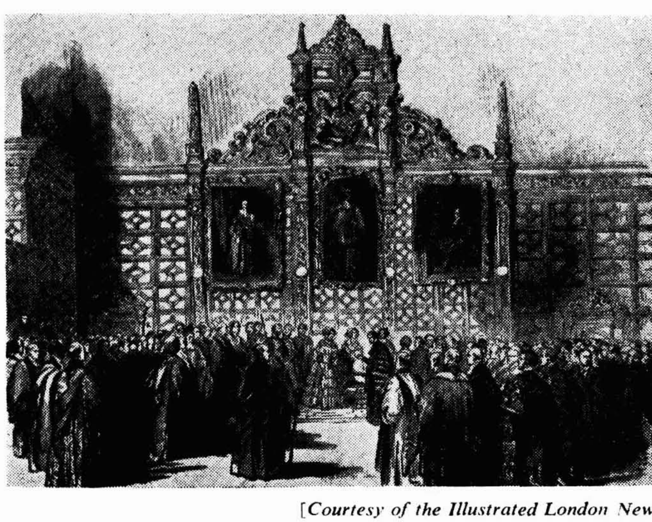
Last of the great independent investigators was Sir William Crookes, for research today is all sponsored by the universities, the Government, or large industrial concerns. Born in 1832, Crookes was a Londoner and studied at the Royal College of Chemistry. He is recognised as one of the fathers of spectroscopy and discoverer of thallium, but is probably best known for his invention of safety glass to shield the eyes of workers from harmful rays. In 1856 he started publication of *The Chemical News*, a journal of which he remained the editor-proprietor for nearly 50 years. He also wrote a number of books, of which his 'Select Methods of Chemical Analysis' was for a long time recognised as a standard work on the subject. He was one of the original members of the Order of Merit.

Isolation of vanadium was first achieved by Sir Henry E. Roscoe, who was a pioneer in realising the importance of popularising science, and in 1862 organised a series of Science Lectures for the People, which proved a great success and in printed form had a world-wide circulation.

The founder of the modern synthetic dyestuffs industry was Sir William Perkin. His first major discovery was made in his spare time in a rough laboratory at home in 1856 when he was no more than 18 years of age, when failing to obtain synthetic quinine he produced mauve, the first of the great family of aniline dyes. He also worked on the formation of carbon rings, the chemistry of camphor and the terpenes, and the constitution of berberine and other alkalis.

A whole family of elements—an achievement unparalleled in the entire history of chemistry—was discovered by Sir William Ramsay. These were the gases argon, helium, neon, krypton, and xenon, which when first isolated were regarded as chemical curiosities, but are now considered of great industrial importance.

The chemistry of nutrition was revolutionised by Sir Frederick Gowland Hopkins, who succeeded in isolating a vitally important amino-acid, trytophane, which led to his dis-



The Prince Consort reading his address to Her Majesty Queen Victoria after his installation as Chancellor of Cambridge University on 5 July, 1847. The scene in Trinity Hall

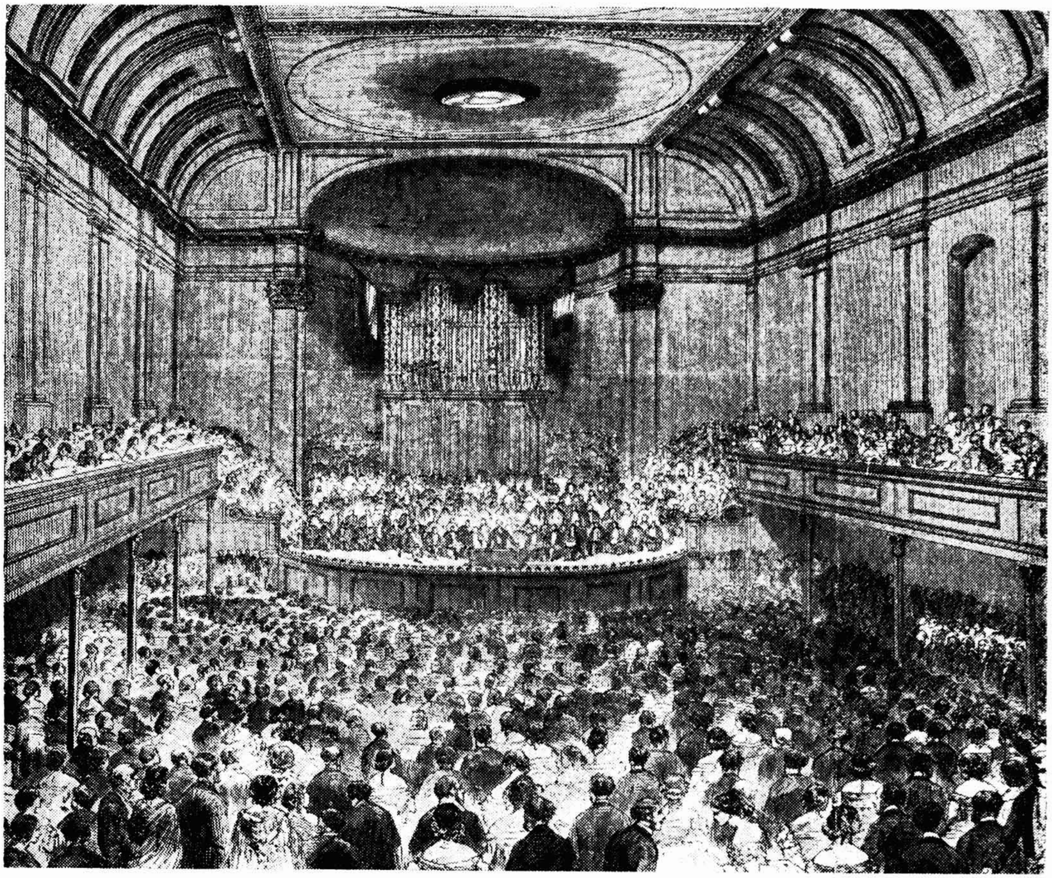
[*Courtesy of the Illustrated London News* covery of the accessory food factors now known as vitamins.

Today the new Elizabethans may well consider that they are living in a chemical age, for chemistry touches nearly every aspect of life both individual and national. Health, disease and expectation of life; the production and preservation of food; diet, vitamins and the battle against malnutrition; development of new materials to substitute those in short supply, and the manufacture of man-made fibres, serve as but a few examples. While the adaptation of atomic energy to industrial purposes holds out enormous possibilities, the difficulties to be overcome are immense, but the prospects are brought a stage nearer by the recent announcement that work has been started on clearing a site at Windscale, Sellafield, to build an experimental atomic power station which, when completed, will be used for the generation of electricity.

Her Majesty Queen Elizabeth II has always shown a keen appreciation of the importance of science and its applications, and before her accession was president of the Royal Society of Arts, an office in which she was succeeded by her husband. The Duke of Edinburgh, like his ancestor, the Prince Consort, is an enthusiastic supporter of all scientific matters and possesses more than a superficial knowledge, as was revealed in his address as president to the British Association for the Advancement of Science at its meeting in Edinburgh in 1951.

Already the Duke of Edinburgh has, despite his manifold other duties, found time to

[continued on page 813



Courtesy of the Illustrated London News]

The scene in the New Music Hall, Aberdeen, in September, 1859, as His Royal Highness Prince Albert delivered his inaugural address as president of the British Association for the Advancement of Science. From a drawing by Samuel Read

Chemical Engineering
Queen Victoria — Queen Elizabeth II

IN the industrial achievements of the second Elizabethan Era the chemical engineer will play a leading part, for without his technological 'know-how' modern chemical processes could not be operated on a scale capable of satisfying the national requirements of the present day. Yet chemical engineering is still a relatively new profession, which had its genesis about the time when Queen Victoria came to the throne. Its growth was a logical consequence of the remarkable advances made by manufacturing chemists during the nineteenth century, and of the changed situation provided by the development of new materials, the advent of cheap electrical power, and the activity of capital in exploiting new inventions of potential commercial value.

The entire character of the chemical industry was transformed during the nineteenth century by the creation of new products and the discovery of radically new methods of making old ones. These developments were closely linked with the advent of chemical engineering, which led to the application of scientific and engineering principles to production problems. Examples drawn from two different branches of the chemical industry should be sufficient to indicate the magnitude of the services rendered by the early chemical engineers.

'Cake Alum' Problems

At one time potash alum was the sole source of alumina available to dyers, calico printers, papermakers and other users, but soluble aluminium was the only constituent of value to these industries and 'alum cake' was therefore introduced as a cheaper article. This product used to be made by mixing calcined china-clay with sulphuric acid and heating with a current of live steam until the reaction had just started. The boiling charge was then run out into moulds to cool and set and was subsequently roughly ground for sale. The introduction of sulphate of alumina made from the alumina of the cryolite soda process stimulated the alum-cake makers to produce a 'cake alum,' which was simply the soluble sulphates of alum-cake dispersed in water, the insoluble impurities being separated and the clear solution concentrated until it would set into a cake when cool. This product often contained much free acid and was always more or less contaminated by the iron content in the china-clay.

Removing Impurity

Eventually bauxite began to be employed as the raw material in place of china-clay, 'cake-alum' being produced either by calcining this material with soda-ash or by treating it with a solution of caustic soda, the soluble alumina being precipitated as aluminate of alumina by treatment of the aluminate of soda with alumina, and the caustic soda being liberated for use over again. The alumina was then washed, dissolved in sulphuric acid, and concentrated. Since bauxite contains more iron than the best qualities of clay, many processes were devised to eliminate this troublesome impurity, but without much success. Eventually the chemical engineer was able to solve the problem by devising suitable apparatus for dealing with the pulp alumina in all its forms and the concentration under a vacuum of the solution of caustic soda.

A still more impressive example of early chemical engineering achievements is afforded by the development of Scotland's shale oil industry. The history of shale retorting began when Dr. James Young discovered that lamp oil, lubricating oil and paraffin wax could be successfully produced from the famous Boghead mineral and similar cannels. The process of retorting and destructively distilling these cannel coals and shales was at first conducted in a very crude and costly manner, but at that time the prices of all paraffin products were so high that in spite of the excessive production costs the industry was extremely remunerative.

The early retorts consisted of oval, circular or rectangular cast iron tubes arranged either vertically or horizontally; they were so inefficient that from four to six cwt. of fuel were required for the distillation of each ton of fuel. The incondensable gases produced from the shale along with the oil had great heating power, but they were allowed to blow away into the air, the only service obtained from them being the lighting of the works at night. The ammoniacal liquors, which were distilled along with the fuel, were considered to be so valueless that they were allowed to run to waste into the nearest ditch or stream. Since steam was frequently employed to sweep out the oil products from the retort, the quantity of condensate ammonia water was considerable.

'Waste' Put to Use

Owing to the complaints of riparian owners whose streams were polluted, and also to the persistent fall in the prices of lamp oils resulting from the introduction of American petroleum, it became necessary for more economical methods of production to be developed.

The most obvious improvements were to utilise the heat of the gases that were going to waste in the retort fumes, and to collect the ammoniacal liquor and manufacture sulphate of ammonia from it, thus converting a waste article into a profitable one and at the same time solving the pollution problem. There was also scope for various structural improvements in the design of the retorts themselves.

The first important step forward in the process of retorting was a change in the system of distillation introduced in 1867 by W. Young, works manager of William Taylor & Co., at Straiton, near Edinburgh. Up to then products distilled from shale had invariably been drawn off from the highest point of the retort above the level of the surface of the shale. Since oil vapours are many times heavier than atmosphere, it occurred to Young that the proper place to draw them off was from below instead of above the shale undergoing distillation, since the vapours would naturally gravitate to the lowest point. Young therefore constructed retorts on that principle, and to ensure that the shale would be evenly heated he did away with the flueing arrangement and placed his retorts in an open chamber, into which the gas from the furnaces was distributed through a perforated screen. The retort was enclosed in a casing, leaving a space into which the incondensable gases, after they had passed the condenser, were introduced. Heat applied to the external casing had to permeate through the gas in the casing before reaching the shale in the retorts, thus diffusing the applied heat, and the gases so heated entered the top of the retort and by sweeping out all the oil vapours, prevented decomposition of the oil. This system of retorting proved highly satisfactory. Less fuel was required for distillation and the oil was of excellent quality, giving a high yield of refined products.

The next step in retorting was made at the Straiton Works in 1872, when Young succeeded in utilising the spent shale as fuel. This was done by redesigning the retorting arrangement so that all the spent shale dropped out of the bottom into a combustion chamber. A bench of the redesigned retorts was operated at the Straiton Works and gave excellent results, but in 1874 it was superseded by a new retorting arrangement devised by Norman Henderson, who combined the leading principles in the two retorting systems introduced by Young, namely the downward system of distillation and the use of the spent shale as fuel.

The incondensable gases obtained from retorting the shale were highly luminous, but they were so volatile that they could not be condensed by simple cooling under atmospheric conditions and were consequently burned along with the gas. The next economy was obtained by abstracting these vapours from the gas and obtaining them as naphtha and gasoline. This problem was simultaneously tackled by Young and Coleman. Young discovered that to catch the more volatile hydrocarbons a continued stream of fresh oil must be presented to the gas in the scrubber. He therefore devised a process based on this principle, which proved very successful.

Low Pressure Steam

By 1879 it was common knowledge that the use of steam to sweep the products of distillation out of the retorts increased not only the yield of oil but also that of ammonia, and that by using a large quantity of steam a higher heat could be used with less injury to the oil, resulting in a still higher yield of ammonia. For many years the supply of steam for that purpose was taken direct from high pressure boilers, but the cost of fuel was so considerable that it limited the amount of steam which could be profitably used. In 1880, Young discovered that low pressure steam, such as waste steam from the manufacture of sulphate of ammonia from the ammonia water of the shale, was equally suitable for this purpose. He therefore devised mechanical methods for making this steam available and the results proved so satisfactory that the use of waste steam in the retorts became standard practice throughout Scotland.

In a preliminary series of experiments before the introduction of Young's downward distilling retorts, Young and George Beilby both observed that the shale residues, after the oil had been distilled out at the low temperature necessary to produce the best yields, still contained a considerable quantity of nitrogen that could be liberated as ammonia by the application of a greater heat, together with considerable quantities of steam. Both men worked independently on this problem, and in 1881 they both applied at the Patent Office for a patent for a retorting process embodying substantially the same principle but carried out with slightly modified forms of apparatus. On discovering that they had practically invented the same process, they became colleagues and worked together on its further development. An improved design embodying the best points of both the former designs proved so successful that for some years it was almost exclusively employed. It saved the oil industry many hundreds of thousands of pounds and without it many companies could hardly have remained in existence.[1]

First Specialised Plant

The application of engineering principles to chemical problems soon led to increasing specialisation in the construction—and subsequently in the design and construction of chemical processing plant. Miall[2] points out that in the latter part of the eighteenth and the early part of the nineteenth century, coppersmiths and lead burners were much employed for this purpose, copper being easy to handle and lead both easy to handle and not much affected by acids. The Coffey still, invented by Aeneas Coffey in 1831, was made by him and his sons at Bow, and later developed by J. Dore & Sons, the coppersmiths, also of Bow. George Scott owned several sugar refineries in London and employed his own mechanics on plant maintenance and construction. In 1834 his son Frank ran the engineering side as a separate concern and began to undertake work for all who needed his assistance. Certain mechanical engineers and boiler-


The first chairman of the Chemical Engineering Group (SCI) and convenor of the Institution of Chemical Engineers, Professor J. W. Hinchley (left), and Mr. Stanley Robson (right) the present president of the Institution

(The portait of Professor Hinchley is in the collection of the Institution of Chemical Engineers from which it is reproduced by kind permission)

makers also laid themselves out to satisfy the chemical manufacturers.

About the middle of the nineteenth century special filters were required for industrial use, while centrifugal machines began to be used by sugar refineries, makers of sulphate of ammonia, and other chemicals to manufacturers. The construction of all this new equipment became the basis of an important industry in which many firms took part. In the vicinity of the Scottish sugar and distilling industry other engineers specialised in stills, boiling plants, etc., while the heavy chemical industry and gas works had also to be supplied with special plant. Miall mentions many firms who pioneered the production of processing equipment in these various fields and most of the companies he cites are today among the leading manufacturers of chemical plant. The first firm to advertise in the *Journal of the Society of Chemical Industry* under the title of Chemical Engineers was Kirkham and Co. of Runcorn, in 1884, after which the term soon became fairly common. Miall points out that some of the Society's earliest advertisers could also have described themselves as chemical engineers.

During the First World War the unprecedented demand for acids, explosives and other chemicals led several engineers who had not previously been interested in the chemical field to embark on the construction of plant, while the advent of new metals and materials created further opportunities for chemical plant manufacturers.

The first public recognition of chemical engineers was made in 1880 when an attempt was made to form a 'Society of Chemical Engineers' in London. It was soon found, however, that membership would be too limited in its numbers and the project was therefore discontinued.

Davis's Contribution

Lewis[3] considers that the first truly constructive step towards the establishment of the new profession came in the recognition that the problem was primarily one of education. The credit for this belongs to George E. Davis, who, in 1887, gave the first course of lectures on chemical engineering in the Manchester Technical School. These formed the basis for his two-volume 'Handbook of Chemical Engineering,' published in 1901.

The Society of Chemical Industry was formed in 1881 and it is noteworthy that the occupation of thirty-five of those signing the Articles of Association was given as 'chemical engineer.' The original aim of the Society was to embrace all branches of chemical industry, including chemical engineering, but although many excellent papers on chemical engineering subjects appeared from time to time in its *Transactions,* the great development in chemical discovery during the early years of the present century caused the engineering and industrial aspect of the science to be somewhat overlooked.[4] This state of affairs continued until the First World War, when the national importance of chemical engineering became widely recognised. After informal discussions with various members of the Society, Professor J. W. Hinchley, at that time the only professor of chemical engineering in the country, called a meeting at the Chemical Industry Club in February, 1918, to suggest the formation of a society—if possible within the framework of the Society of Chemical Industry—which should deal exclusively with this subject.

As a result of this meeting Professor Hinchley personally submitted to the Council of the Society a formal petition for the establishment of a chemical engineering subject-section or group. The formation of a section based on subject interest rather than on geographical location being outside the scope of the Society's Charter and by-laws, a committee was appointed to investigate the proposals. This committee having recommended the provisional recognition of the Chemical Engineering Group as a subject group, the Council gave its formal agreement thereto on 24 October, 1918. The Committee of the Society and a provisional committee of the Group under Hinchley's chairmanship then proceeded to discuss the draft rules of the Group, which in their final form were approved by the Council on 10 April, 1919. At the inaugural meeting held at the Abercorn House, London, on 21 March, 1919, Professor Hinchley was appointed chairman and Dr. E. F. Armstrong vice-chairman, the hon. treasurer being Mr. F. Heron Rogers and the hon. secretary Mr. H. Talbot. By the end of 1919 there were 510 members on the roll.

The Group has always had its own offices. first in Buckingham Street, Strand, London. then at Abbey House, Victoria Street, Westminster, and finally at 56 Victoria Street, Westminster, where its offices have been situated since 1936.

Following the formation and success of the Chemical Engineering Group, a number of practising chemical engineers urged the formation of a separate society which might act as a qualifying body. During the fourth conference of the Group at Newcastle in July, 1920, a meeting was held to promote the formation of an Institution of Chemical Engineers. A guarantee fund of £1,425 was soon founded and a Provisional Committee was formed, the chairman being Sir Arthur Duckham, K.C.B., and the convenor Professor Hinchley. The Institution was finally incorporated on 21 December, 1922, with Sir Arthur Duckham as its first president and Professor Hinchley as its first honorary secretary.[5] The first examination for Associate Membership was held in the summer of 1926 and of the six entrants only one satisfied the examiners. The Institution of Chemical Engineers is today a qualifying body with a standard of attainment for its members comparable with that of the most privileged societies.

REFERENCES

1 Davis, George E., 'Handbook' of Chemical Engineering.'

2 Miall, Stephen, 'A History of the Chemical Industry.'

3 Lewis, W. K., 'Chemical Engineering a New Science,' *Chem. Eng. Progress* (Jan., 1953).

4 Society of Chemical Industry—Chemical Engineering Group.

5 Hinchley, Edith M., 'John William Hinchley,' a Memoir.

Coronation News

SIR HARRY JEPHCOTT, president of the Royal Institute of Chemistry, will attend the Abbey ceremony of the Coronation as official representative of the institute.

* * *

CORONATION plans for its staff by Negretti and Zambra, Ltd., include a dinner and dance in the restaurant of Robinson & Cleaver today, 30 May. A ballot will also be held for seats to view the procession from the head office in Regent Street.

* * *

FORTUNATELY situated in Park Lane is the head office of the Hercules Powder Co., Ltd., commanding an excellent view of the royal route. A large number of guests will be entertained and friends in the trade, members of the staff, their families and friends have been invited. Television will be provided and meals and refreshments arranged and everything organised to make the day a memorable occasion.

* * *

A NUMBER of important overseas visitors will be the guests of Thomas De La Rue & Co., Ltd., at its head office in Regent Street. and a representative gathering of members of the staff, allocated positions by ballot, will also be entertained by the company to see the Coronation procession.

* * *

BROTHERTON & Company, Ltd., Leeds, are giving a Coronation bonus of one week's extra pay to every employee of the company, and one week's salary to all staff. This will be enclosed in specially designed souvenir pay packets.

* * *

FORTUNATE members of the London office of Albright & Wilson, Ltd., will have a 'grandstand' view of the Coronation procession from the headquarters of the company in Park Lane, where they are being entertained and will also be able to view the ceremony on television.

* * *

A CORONATION bonus of £1 is being paid by Imperial Chemical Industries, Ltd., to every member of the staff of the company and all those in receipt of pensions.

* * *

MEMBERS of the staff of Monsanto Chemicals, Ltd., lucky enough to draw lots, have been invited to be guests of the company at its office in Waterlo Place on Coronation Day. Besides the excellent view of the procession, meals and television will be provided.

* * *

MAYOR of Bury St. Edmunds at two coronations will be the record of Alderman R. A. C. Olle, chairman of Consolidated Chemicals, Ltd. He was mayor of the town at the coronation of King George VI in 1937 and will again be in office for the crowning of the young Queen. He has served on the town council ever since his election in 1929.

* * *

OVERSEAS representatives of The Permutit Co., Ltd., will be entertained and able to have a first rate view of the procession from the company's West End office in Regent Street.

Chemistry Under Four Queens

continued from page 808]

make personal visits to most of the research associations and organisations, taking a keen and intelligent interest in all he sees. He was elected the first honorary Fellow of the Royal Institute of Chemistry in February, 1952.

So rapid has been the advance of science during the lifetime of our young Queen that it is wellnigh impossible to foretell what developments the future may hold in store. Under the influence of Her Majesty and the Duke of Edinburgh there can be no doubt that British scientists will feel inspired to fresh efforts, assured in the knowledge that their investigations will be keenly followed and the application of the results of their work to industry encouraged.

(*Grateful acknowledgement is made of the advice and co-operation of the Science Museum, the National Portrait Gallery, and the Westminster Reference Library*).

BIBLIOGRAPHY

Wolf, A., 'A History of Science, Technology and Philosophy in the 16th and 17th Centuries.' (George Allen & Unwin, Ltd., 1935.)

'The History of Science'—a symposium, edited by Jean Lindsay. (Cohen & West, Ltd., 1951.)

Partington, J. R., M.B.E., D.Sc., 'A Short History of Chemistry.' (Macmillan & Co., Ltd., 1948.)

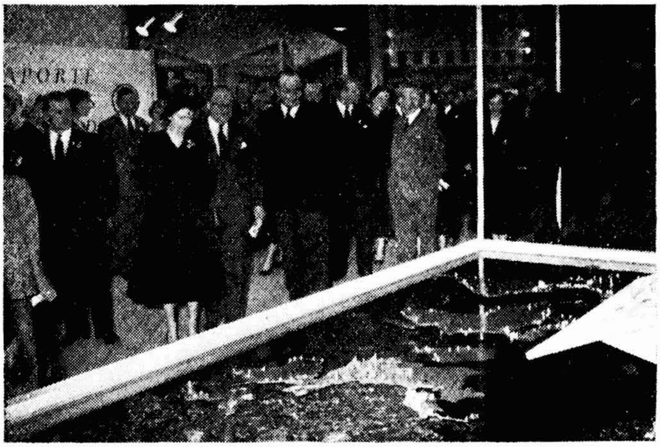
Williamson, Hugh Ross, 'Sir Walter Raleigh.' (Faber & Faber, Ltd., 1951.)

Fulford, Roger, 'The Prince Consort.' (Macmillan & Co., Ltd., 1949.)

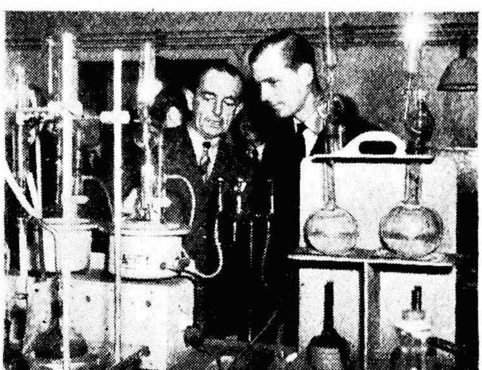
'Ancestors of an Industry,' Imperial Chemical Industries, Ltd. (The Kynoch Press, 1950.)

McGowan, Lord, K.B.E., D.C.L., Ll.D., 'One Hundred Years of Chemistry,' Seventh Dalton Lecture. (Lectures, Monographs and Reports, 1951, No. 3, The Royal Institute of Chemistry.)

Royal Interest in Science

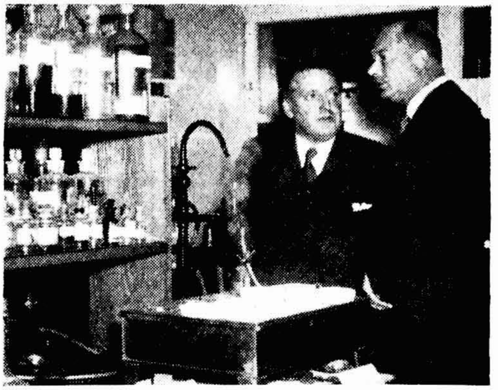


The Queen inspecting the stand of Shell Chemicals, Ltd., at the British Industries Fair in 1952. Below: His Majesty King George VI with Queen Elizabeth, the Queen Mother and Princess Margaret looking down from a gallery in the Dome of Discovery at the Festival of Britain, in 1951



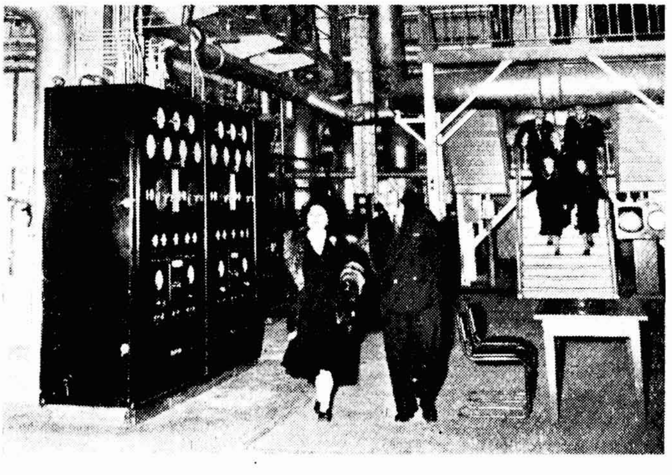
Above: The Duke of Edinburgh at the Fuel Research Station. Right: At the Chemical Research Laboratory

& Industry



The Duke of Gloucester visiting the British Boot & Shoe Allied Trades Research Association. Left: The Duchess of Kent at the British Baking Industries Research Association

King George V during an informal visit to the National Institute for Research in Dairying



Right: Queen Elizabeth, the Queen Mother, with Sir William Fraser, chairman of the Anglo-Iranian Oil Co., Ltd., during an informal tour of the company's oil refinery at Grangemouth

IN THE EDITOR'S POST

Trace Element Deficiencies

SIR,—In THE CHEMICAL AGE of 16 May, 1953, your short article on trace element deficiencies contains the statement:

'It is . . . . dangerous and difficult to supply the small amounts of trace elements required such as copper, cobalt and molybdenum. Cauliflowers may require 3-6 lb. of borax per acre on a light soil, but 12 lb. per acre would be detrimental.'

While it is well known that certain trace element deficiencies—iron, for example—are not easy to correct and that the rate at which one or two trace elements must be supplied to correct deficiencies can vary considerably in different soils, we do suggest that your article in no way reflects the large amount of research and the considerable progress made in trace element nutrition in the last twenty years. Some notable contributions have come from this country, and it is a consequence of the work of such men as Professor T. Wallace, M.C., F.R.S., D.Sc., A.I.C., that the diagnosis and correction of trace element deficiencies is, in the majority of cases, no longer a matter of either hazard or great difficulty.

No Danger

More work has been done on boron than any other trace element and in the case of a recognised boron deficiency in the soil, revealed either by characteristic and well-known plant diseases such as brown curd in cauliflower or by low crop yields, combined with soil and plant analysis, there is no danger or difficulty in correcting the deficiency by applying borax to the soil at the required rate of about 20 lb. per acre. Indeed, boronated fertilisers which do supuly roughly this amount of borax have been used in the UK and elsewhere for many years.

Where there is no recognisable boron deficiency disease, the application of from 5 to 10 lb. borax per acre, intimately mixed with a compound fertiliser or diluted by mixing with dry sand or earth and distributed uniformly, will have no detrimental effect, but will help to replace some of the boron continuously removed from the soil by crops and by leaching. The regular use of borax in amounts larger than about 10 lb. per acre must depend entirely on the crop, soil conditions, rainfall and other factors and is certainly not to be recommended indiscriminately. The brassicas, as it happens, have a high boron requirement and it is difficult to believe that 12 lb. borax per acre properly applied would have a detrimental effect in any soil.

As your article infers, one of the drawbacks of borax and of some of the other trace element compounds is that they are fairly rapidly leached downwards by rain; this is a particularly serious problem in tropical soils. The use of relatively insoluble compounds of some trace elements has recently been under investigation, but there is no doubt that much work remains to be done before their potentialities can be fully assessed.—Yours faithfully,

D. MONTGOMERY.

Technical Service Department,
Borax Consolidated, Ltd.

Novel Use for Plastic

AN acrylic plastic helps people in Kansas City to know what type of weather to expect. All they have to do is to note the colour of a large beacon on the roof of a ten-storey office building and watch the pattern of lights flashing up and down the 78 ft. tubular steel mounting mast.

Contained in the box-like beacon are nearly 500 electric bulbs of three different colours, the colour code being flashing orange for rain, flashing white for snow, steady orange for cloudy and steady green for clear weather. Incandescent bulbs fixed to the mounting mast at 3 ft. intervals are flashed on in sequence from bottom to top to show that a rise in temperature is expected; the direction is reversed to indicate a possible drop in temperature.

Each of the four main faces of the beacon is about 5 ft. by 7 ft. and they consist of clear sheets of Plexiglass—the Rohm & Haas Company's acrylic plastic, coated on the inner side with translucent white acrylic base paint.

The lights are controlled by an operator at the main switchboard in a nearby building where advance reports from the Kansas City Weather Bureau are recorded at six-hourly intervals. The beacon is put into operation automatically by photo-electric rays whenever conditions permit the coloured signals to be seen.

Storage & Packaging Problems

Recent Progress in Research by US Ordnance Authorities

REPORTS of the poor condition in which material reached the hands of troops led the US ordnance authorities to embark upon intensive programmes of research. It was found that the deterioration resulted primarily from damage due to the effects of moisture or from mechanical injury. The effect of climatic conditions on equipment and packaging materials is therefore being studied from every angle and improved methods of protection are being developed. Recent US progress in this field has been reviewed by a Panel on Ordnance Materials, whose papers on preservation of materials and packaging have been published by the US Research and Development Board (PB 105,172). A report of this conference in the form of a microfilm has been acquired by the Technical Information and Documents Unit of the DSIR.

Climatic storage problems occurring with army equipment were examined by ordnance experts and details are given of flexible protective coatings which have been found satisfactory. According to Max Frager, of Frankford Arsenal, the latest estimate of the life expectancy of a strippable-film packaged anti-aircraft gun having about four man-hours of maintenance per year is of the order of twenty years. Originally it was thought that at best this system could only be good for standby storage, but by using strippable film, followed by a bituminous coating, and finally by an aluminised bituminous coating, it has proved possible to hold the water-vapour permeability to less than 50 mgm. per 100 sq. in. per 24 hours, and in temperate climates no serious problem has been encountered. At lower temperatures difficulty has been experienced in providing sufficient flexibility in the film system.

Vinyl Films Perfected

The vinyl plastic films have been perfected to a point where they will flex at least to an 80° bend on a radius of ¼ in. at a temperature down to −35°. The asphaltic films, however, become very brittle at temperatures below about −7° and fail at the slightest flexing. Attempts are being made to obtain improved low-temperature flexibility by means of Buna-S additions to the asphaltic materials. It is known from preliminary laboratory studies that with these additives flexibility at −45° is quite possible, and asphaltic films which are reliable at this temperature should very shortly be obtained.

The US Ordnance Corps is engaged on a 10-year experimental programme, in which various containers and methods of packaging are being tested at a number of storage sites. The containers are hermetically sealed, welded steel tanks of various types of construction, which are used in conjunction with a breather arrangement containing a desiccant through which all air passes into and out of the system. Different atmospheres are being tested in these tanks. The atmosphere is usually nitrogen, but in some cases reduced pressure effects on corrosion and storage stability in general are also being studied.

Controlling Condensation

A problem constantly encountered by the Ordnance Corps is condensate formation in optical instruments. The solution has not yet been found, but it is known that if the same optical instruments, which proved to be faulty not because of moisture but because of an oily material, are put into atmospheres at reduced pressures, the condensate tendency is considerably reduced. From laboratory studies it is known that steel panels exposed over water at reduced pressure will show a smaller weight loss than the same panels exposed over water in a nitrogenous atmosphere at ordinary pressures. The experimental programme appears to be yielding parallel results.

In accordance with a general directive to make all material as light as possible, the use of magnesium has been encouraged. Because of its reactivity magnesium presents quite a problem in corrosion resistance, and attempts have been made to overcome the normal tendencies of the metal to react by producing on it electrolytically an outstanding coating, which has been named after H. A. Evangelides, a scientist at Frankford Arsenal, who was responsible for its development. The film is about 1½ mm. thick and there is an actual net increase of about one-thousandth of an inch as a result of the coating. The hardness is of the order of being able to scratch glass, and the refractory qualities are so outstanding that the flame of a 1,200° laboratory Meker burner can be placed against the treated surface without any apparent physical changes in the coating other than a slight bleaching action in the area in direct contact with the flame, although the magnesium behind the coating will liquefy. In the salt spray a performance of up to 90 hours is obtained without any corrosion breakdown visible to the naked eye. If the same coating is given a simple waxing with a material found by investigators at the arsenal to be at least 60 times superior to other waxes, it can be subjected to a salt spray for 4,000 hours without any corrosion being observed in the surface of the magnesium. The dielectric strength is 560 volts at 60 cycles and the surface is excellent for paint retention. It is considered that the coating offers potentialities for a much greater usage of magnesium.

Vapour Phase Inhibitors

Vapour phase inhibitors were discussed by Major Gilbert Foster, of the USAF, Chief of Ordnance Office, who dealt specifically with the Shell product dicyclohexylamine nitrite, known as VPI. In the Weapons Section of the department, it is considered that a good preservative should fill four requirements: it should protect against corrosion; it should be easy to remove; it should be easy to apply; and it should be both economical and readily available.

It is concluded that, though not a packaging cure-all, VPI will solve most of the problems involved in the preservation of weapons. As an example of its effectiveness, the conference was shown a pinion packed in a VPI paper wrap, which had been handled by many persons who did not realise that finger prints were one of the biggest causes of corrosion. Though it could not yet be said that the material would prevent corrosion from fingerprints, there was no evidence of fingerprint corrosion during the period that these pinions had been protected by VPI.

Storage tests were carried out on 1,500 items using both VPI and the regular methods of preservation. Five hundred items were sent to Frankford Arsenal, where they went through a tropical test chamber, 500 were sent to Canada for Arctic storage conditions, and 500 were kept at Texarkana in Texas under temperate storage conditions. A chart prepared by the Operation Branch, Field Service Division, showed 64.6 per cent failures on control items, 30.8 per cent failures for VPI, 35.3 per cent for water vapour barrier, and 35.4 per cent for the standard pack. The test covered both ferrous and non-ferrous metals, but the use of volatile corrosion inhibitors on non-ferrous materials has not yet been recommended, although some work done suggested that VPI might be successfully used.

The first large-scale application of volatile corrosion inhibitors for the Air Force by the Ordnance Department was the packing of 30-calibre M3 machine guns. It resulted in a saving of 20 per cent per weapon in money and a 5 per cent reduction in shipping weight. By the substitution of a heavy-weight VPI coated paper for cosmoline, packing costs for rifle-sight pinions were reduced from $27 to $21 per thousand. By using a lighter paper they were subsequently brought down to $16. Moreover, many of the parts used to be damaged during the cleaning operation. They had to be run through a degreaser and because of the construction of the part, the temperature had to be held so high that the enamel was constantly being knocked off some of the index lines.

The use of VPI packaging completely eliminated cleaning losses and costs. Only 11⅓ tons of VPI crystals are needed to preserve 1,000,000 rifles. Shell has licensed several contractors in the US to apply VPI coating materials. One contractor alone stated that he could produce a minimum of 10,000,000 linear yards of coated material per month. VPI can thus be made available in adequate quantities, and it is also easily applied and removed.

Wood Preservation

Wood preservation was discussed by G. M. Hunt, of the Forest Products Laboratory, who stated that each of the many preservatives used to protect wood from fungi and insects had its advantages and disadvantages. For the protection of wood piles in salt water from marine borers, it was considered that only coal-tar or creosote-coal-tar solution should be used, since no other preservative had been found that was equally effective for this purpose. For railway ties and rough construction timber, Hunt recommended creosote, creosote-petroleum solutions, creosote-tar solutions, and heavy oil solutions of toxic chemicals such as pentachlorophenol or copper naphthenate, which should be dissolved in colourless, volatile petroleum solvents such as Stoddart solvent, kerosene, or even light grades of fuel oil. For most purposes, wood impregnated with water dissolved preservatives needs to be dried after treatment to remove the excess water. Similarly, when preservatives dissolved in light oils are used, the oil should be allowed to evaporate after treatment to bring the wood to a satisfactory condition for use. It was emphasised that, in general, too much attention was paid to comparing preservatives and far too little to thoroughness of treatment.

Many other aspects of preservation and packaging research are discussed in the report. The relation between temperature, humidity and time of day is shown graphically for a variety of storage conditions in tropical situations. Examples are given of the deleterious effect of humidity on normal packing materials. The necessity for accelerated humidity tests is discussed and conditions of simulation are stated. A test is described for evaluating the moisture resistance of components. Papers were also presented on fungicides and leather treatment.

'The Industry of the Future'

THE chemical industry was described as 'the industry of the future' by the Earl of Home when addressing Grangemouth Chamber of Commerce after visiting the works of I.C.I. Ltd., British Petroleum Chemicals Ltd., Scottish Oils, Ltd., and Forth Chemicals Ltd. He said the chemical industry was not new in Scotland and with one foot in the door there was a chance to enter more fully. The need for water dictated the location of chemical plants and few areas could offer two million gallons a day. In Grangemouth they provided nine millions gallons a day, and had no need to search for pure water.

Apparently waste products offered scope for further development, and in chemicals and electronics Scotland had vast opportunity. Lord Home stressed the need for more continued research in these fields and believed that Scotland had the brains to achieve the required results.

Licenses Exchanged

USA & UK Firms Sign Agreements

TWO important agreements have been signed between Flexibox, Ltd., Nash Road, Trafford Park, Manchester, and the Sealol Corporation, Providence, Rhode Island, USA. Main points are: (1) Sealol have an exclusive licence to manufacture and sell Flexibox mechanical seals in the USA and Canada; (2) Flexibox, Ltd., have exclusive rights to manufacture and sell Sealol seals in Great Britain, Northern Ireland, Eire, France, Belgium, Luxembourg, Holland, Switzerland, Austria, Italy, Western Germany, Denmark, Sweden, Norway and Finland.

Flexibox mechanical seals are widely used in the chemical, oil, food, refrigeration and aircraft industries to prevent leakage along the rotary shafts of pumps, agitators, mixers, compressors and fuel pumps, etc.

The large-scale introduction of Flexibox seals into the USA—where mechanical seals were invented—is a considerable achievement for a British company which only started manufacturing these components in 1944. Their success is due to the combination of a highly original design—which features a positive coil-spring drive—and precision manufacture. Optical methods are used to check the lapping of seal faces to within about 22 millionths of an inch.

Sealol will at first concentrate on the manufacture of Flexibox type RR seals, for petroleum-chemicals plants, chemical works and oil refineries. Manufacturing facilities of Sealol include the main works at Providence, Rhode Island and a branch factory at Keene, New Hampshire. Sealol are at present represented in Chicago, Cleveland, Los Angeles, Philadelphia, etc. Canadian representation is by Lyman Tube and Bearings, Ltd.

Flexibox, Ltd., sales and services in the UK will be handled from Manchester and London, and on the Continent by the appropriate agents and representatives.

THE Pharmaceutical Society's representative at the Coronation will be the vice-president, Mr. T. Heseltine. As Lord Mayor of Liverpool, the president, Mr. W. John Tristram, will also be present at the Abbey ceremony.

Oil Production & Refining

Anglo-Iranian's Operations in 1952

WORLD-WIDE activities of the Anglo-Iranian Oil Company, Limited, are reviewed in the illustrated statement by the chairman, Sir William Fraser, C.B.E., LL.D., which accompanies the annual report and accounts for the year ended 31 December 1952.

Refineries Output

At the refineries in Great Britain throughputs were considerably increased in 1952. Llandarcy refined 4,254,000 tons against 3,671,000 tons in 1951, and Grangemouth 2,375,000 tons against 1,512,000 tons. At the end of the year work was completed on the new catalytic cracking units at both Llandarcy and Grangemouth and these plants were in commission in January 1953. Good progress was also made on the new lubricating oil plant at Llandarcy, which is expected to be in service by the middle of this year.

Operations at the new Kent refinery began early this year, and by March a crude throughput corresponding to an annual rate of 3,000,000 tons was being processed, which it is hoped to increase to 4,000,000 per annum by December. The catalytic cracking unit was expected to be in commission during the second half of this year, followed by the lubricating oil plant.

The company's post-war programme for increasing its refining capacity in the United Kingdom was thus being brought to fruition. The result would be to have expanded this capacity over ten-fold, from under 1,000,000 tons per annum pre-war to 10,500,000 tons per annum by the end of this year, with a corresponding improvement in the diversity and quality of products.

At Grangemouth the British Petroleum Chemicals Ltd. plant encountered the troubles often occurring in the early operational stages of complicated plant, but since the second quarter of 1952 has operated satisfactorily. The construction of the adjacent plant of Forth Chemicals Ltd., for the production of monomeric styrene had not been completed at the end of the year, but was now in commission.

In Belgium, the refinery at Antwerp, owned jointly with the Petrofina Company, processed 1,718,000 tons as against 318,000 in 1951. Plans had been approved for a catalytic-cracking unit to be installed and certain modifications made to existing plant.

A substantial increase in throughput was shown in France by the refineries of Société Générale des Huiles de Pétrole BP. At Dunkirk 1,697,000 tons were processed as against 617,000 tons in 1951, and at Lavera 2,061,000 tons compared with 1,814,000 tons.

In Germany the Hamburg refinery processed 663,000 tons compared with 620,000 tons in 1951. Construction had begun of additional plant which would increase refining capacity to 1,250,000 tons per annum.

The Marghera refinery of Industria Raffinazione Olii Minerali, in Italy, which is jointly owned with Azienda Generale Italiana Petroli, refined 1,167,000 tons of crude oil as against 687,000 tons in 1951. The new thermal reformer was commissioned in October.

In Australia, Laverton refinery at Melbourne throughput was 161,000 tons, against 143,000 in 1951.

Work was proceeding satisfactorily at the two large new refinery projects at Aden and at Kwinana in Western Australia. Both these refineries, of 5,000,000 tons and 3,000,000 tons throughput capacity respectively, are expected to be in operation in 1955.

Research and Development

Research and development activities had been fully maintained and resulted in important contributions towards efficient and economic operations. The 'autofining' desulphurisation process had proved successful in operation at Llandarcy refinery, and similar plant was to be installed at Aden.

After providing £22,666,344 for taxation on profits, the amount available for reserves and dividends was £25,165,966, compared with £24,233,050 for 1951. A sum of £1,000,000 had been allocated to preference stock reserve, bringing the total to £10,000,000, and £16,000,000 placed to general reserve which now stood at £97,000,000. A final dividend on the ordinary stock of 25 per cent was recommended and in addition a cash bonus per £1 stock of one shilling, both less income tax.

The A.P.V. Company, Ltd.

New Factory & Foundries at Crawley in Operation

THE first stage in their move to Manor Royal, Crawley, Sussex, was completed by The A.P.V. Company, Ltd., some time ago, and last week representatives from the chemical, gas and allied Press visited the new factories and foundries to see for themselves how smoothly the transfer has taken place. The second stage is due to commence shortly and within two years it is hoped that the head office and coppersmith shops, now at Wandsworth, will be accommodated on the new 17-acre site at Crawley.

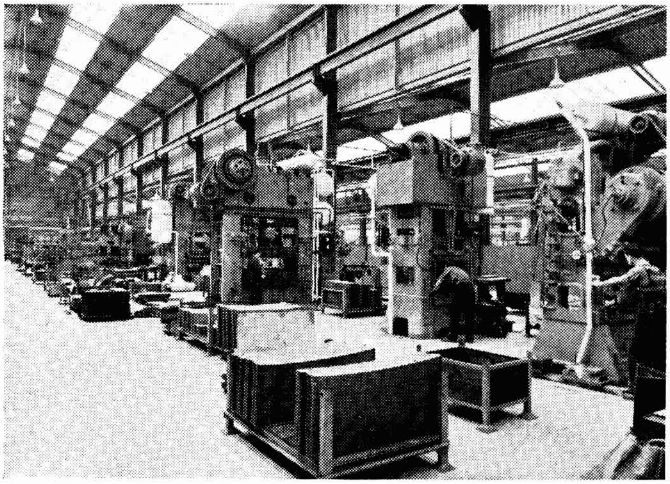
The rapid growth of The A.P.V. Company in recent years had made it necessary to disperse its production facilities among four factories at Point Pleasant and Garratt Lane, Wandsworth in London, White City, London, and at Slough, Bucks, and the move will make both production and administration much easier.

A.P.V. is one of the largest manufacturers of plant in stainless steel, aluminium and copper for the dairy, brewery, food, chemical, oil and varnish and pharmaceutical industries. It was founded at Wandsworth in 1910 by Dr. Richard Seligman for fabricating industrial tanks and vessels in aluminium and was known as The Aluminium Plant and Vessel Co., Ltd. Dr. Selgiman held the patent for the autogenous welding of aluminium in conjunction with a Swiss firm and the company have always taken a leading part in developing new welding methods for corrosion-resistant metals. They pioneered the commercial welding of stainless steel, nickel and copper in this country.

In 1922 Dr. Seligman invented the plate-type heat exchanger known as the 'Paraflow' and this is today the company's principal product, being standard equipment in dairies, breweries and in many other industries for the pasteurisation, heating and cooling of liquids. The company have developed more and more as process engineers and today they design and manufacture complete installations for the many industries they serve.

The factory and foundries at Crawley cover an area of 200,000 square feet and are by far the largest works in the Crawley New Town. The factory block covers 128,000 sq. ft. and consists of five 475 ft. bays with parts of three further bays which will be extended later. The frontage is taken up by the works offices and the block also contains

The new A.P.V. factory at Crawley, Sussex



The press shop

the fitting, machine, press and polishing shops.

The layout of the factory provides for a general flow of production from the front to the rear. The stores take up the front ends of the bays and are served by the large goods entrance that forms the most noticeable features of the frontage. The machine, press and polishing shops stretch across all bays, while the fitting shop occupies most of the large 60 ft. bay and one other.

Travelling cranes serve the bays from the stores in front to the doors in the rear for despatch of the finished products. A broad gangway permits the passage of trucks from one bay to another. Fork lift trucks are used extensively with box and other pallets.

All machine tools are of the latest types and wide use is made of automatics and semi-automatics for the production of stainless steel pipe fittings, etc. A number of the machines and methods were designed by the company's own engineers for its special requirements.

The factory building is of welded steel portal-framed construction giving an abundance of headroom and there is a complete absence of cross members. There is an abundance of natural and other lighting and the use of the British Standard Colours for Factories creates a cheerful and clean atmosphere which is quite striking. The steelwork is blue, while cranes and all moving parts are red. Machinery is green and all pipes and mains are painted according to their purpose. The roof is of aluminium and glass.

The aluminium and copper base alloy and the stainless steel foundries are operated by A.P.V.-Paramount, Limited, a subsidiary company formed in June, 1952, to take over the stainless steel foundry of the former subsidiary company, Paramount Alloys, Limited, of Slough, Bucks., and the aluminium foundries of the parent company. Before they were planned, the leading foundries of the USA, Great Britain and Europe were visited and they embody the latest ideas in planning and equipment. They bear little resemblance to the old-fashioned, smoky, dark and inferno-like foundries seen so often in our older industrial areas. A large fume and dust extraction plant is installed and working conditions are unusually bright and clean.

Material handling has been given a great deal of attention as it is estimated that the production of one ton of castings requires the movement of between 100 and 200 tons of sand, metal, moulding boxes and castings. The latest type of sand reconditioning plant is used and this forms an important part of the construction of the two foundries. Conveyors carry the used sand from tunnels under the foundry floor to the reconditioning plant and it is then served back by overhead belt conveyors to the hoppers which feed the moulding machines.

The two foundries are housed in a building consisting of two 60 ft. main bays each 250 ft. long. A 20 ft. middle bay houses the furnaces and other equipment including the generators. The stainless steel furnaces are electric high-frequency and arc types, while

The fitting shop

the furnaces for the aluminium and copper-base alloy foundries are fired by fuel oil.

The front part of the foundries' building is occupied by the foundries' offices, stores and pattern shops and the fettling shops are in the rear. The X-ray and other test rooms run along the side of the aluminium foundry. The boiler house occupies a separate building.

More than 1,400 people are involved in the two stages of The A.P.V. Company's move and houses are being provided in the Crawley New Town for all who require them. Already 500 people are working in the new factory and most of them are housed in the new town. More than 90 per cent of firm's employees who were asked if they would move accepted and the loss of skilled personnel has been practically nil. A.P.V. employees now are concentrated in a single, compact community and are playing an important part in the life of the new town, the works manager being recently elected a town councillor.

Special efforts have been made to please employees for the firm realises that the happy workman is the efficient worker. A great deal of attention has been given to heating and ventilation in the factory and an equable temperature is maintained throughout the year. The lavatories and cloakrooms are most spacious and well-fitted. The permanent canteen has yet to be built, but the company purchased Jordan's Country Club and converted it into an athletic and social club and as a temporary measure the canteen is housed there. The club has nine-and-a-half acres at its disposal and seven acres of this have been converted into playing fields.

The stainless steel foundry

Salters' Honour Scientists

Many Chemists in Distinguished Company

THE Master, Wardens and Court of Assistants of the Worshipful Company of Salters gave a dinner recently at Ironmongers' Hall to the past Fellows of the Salters' Institute of Industrial Chemistry and to those who had been elected to Salters' Fellowships prior to the foundation of the Salters' Institute. The Fellows were invited to meet a representative company of distinguished scientists, mainly chemists.

Applied Science Recognised

The Salters' Institute of Industrial Chemistry owes its origin to the recognition by the Salters' Company of the growing importance in the modern world of the applications of chemical science in industry. This interest may be regarded as a natural outgrowth or modern interpretation of the original interests of the Salters' Company in the provision of common salt for the preservation of food, and the use of this and other salts and of natural dyestuffs in the arts and manufactures.

The main purpose of the Institute has been the election to Salters' Fellowships of young chemists of high scientific qualifications who have also given evidence of personal qualities which would enable them to advance to positions of responsibility in the technical control of industrial operations. Since 1894 appointments to Fellowships have numbered 116, of which 87 have been awarded since the formal inauguration of the Salters' Institute in 1918. The candidates have been drawn from a wide range of University chemical departments, and a number of them have been enabled during their tenure of Salters' Fellowships to widen their experience by research and training in centres of industrial chemistry in other countries. Many of these Fellows have since risen to prominent positions in the chemical industry. This year there has been an unprecedented number of applications for its Fellowships and Scholarships.

The Institute is controlled and financed by the Worshipful Company of Salters, of which Sir Henry Dale, O.M., G.B.E., F.R.S., is the Master this year. Sir Alfred Egerton, F.R.S., formerly head of the Department of Chemical Engineering and Applied Chemistry at Imperial College, succeeded Sir Robert Robertson as director of the Salters' Institute in 1949.

Those present at the dinner included:—*The Court*: Sir Henry Dale, O.M., G.B.E., F.R.S., Mr. J. D. Christopher, Professor W. E. Le Gros Clark, F.R.S., Sir Herbert Cohen, Bt., O.B.E., T.D., Sir Ralph Glyn, Bt., M.C., D.L., M.P., Mr. Wilfred Price, Mr. H. J. Barrett, Mr. E. Mitchell Crosse, Major H. E. Stebbing, Mr. Jeffery Hicks, Mr. S. Vyvian Hicks, the Lord Bishop of Peterborough, D.D., Dr. E. W. Hicks, Mr. L. T. S. Hawkins, Lt.-Colonel B. B. N. Woodd, Sir Charles Goodeve, O.B.E., F.R.S., and Professor A. R. Todd, F.R.S.

Some of the past Fellows present were: Mr. H. D. Anderson, Chief Chemical Engineer, Albright & Wilson; Dr. L. C. Bannister, Research Manager, Applications, British Oxygen Co., Ltd.; Mr. E. A. Bevan, Managing Director, Styrene Co-polymers Ltd.; Dr. H. K. Cameron, Head of Chemistry and Engineering Division, Research Laboratory, General Electric Co.; Dr. M. O. Coulter, Chief Chemist, Pergatroyd Salt and Chemical Co., Ltd.; Mr. H. Diamond, Directorate of Chemical Inspection, Ministry of Supply; Mr. G. C. Eltenton, Assistant Chief Technologist, Shell Refining and Marketing Company; Mr. R. H. McDowell, Technical Service Manager, Alginate Industries Ltd.; Dr. J. H. Oliver, Senior Partner, Briant & Harman; Mr. T. B. Phillip, The Distillers Company, Ltd.; Mr. J. D. Rose, Research Director, Dyestuffs Division, I.C.I.; Mr. H. Smith, Division Director in charge of Production, Dyestuffs Division, I.C.I.; Mr. H. B. Spalding, I.C.I.; Mr. J. L. Sweeten, Chief Chemical Engineer, Metal Propellers Ltd.; Dr. D. T. A. Towend, C.B.E., Director General, British Coal Utilisation Research Association; Mr. D. Turner, Chief Chemist & Ceramic Engineer, Lodge Plugs Ltd.; Dr. D. E. Wheeler, Joint Managing Director, Wellcome Foundation Ltd.; Mr. P. N. Williams, Divisional Manager, Research Department, Unilever Ltd. and Dr. V. E. Yarsley, President of the Plastics Institute.

Biological By-products

Serious Ignorance of Methods of Utilisation

DURING 1950, industry in Great Britain used a total of 358,000,000 tons of raw materials, of which 96,000,000 tons were of biological origin and renewable. Out of 35 important industries, thirteen—agriculture, paper-making, forestry, brewing and distilling, fisheries and whaling, horticulture, wool, leather, oilseed, fruit, tobacco, antibiotics and jute—were mainly responsible for the production of 25,000,000 tons of organic by-products and waste, containing about 10,800,000 tons of dry matter. Of this, about 70 per cent is retained by or returned for use on the farm, and the remaining 3,600,000 tons (dry weight) of organic matter is dumped, destroyed, allowed to rot or run to waste. These are the conclusions of a survey into the utilisation of agricultural, forestry and fishery products in the United Kingdom, published by the Development Commission on 19 May.

It has been realised for many years that insufficient use has been made of waste products in this country, and in 1948 a survey team was appointed to study the matter. Their findings present a challenge to very many of the chemists in Great Britain. Information was obtained not only by extraction of data from published statistics, but by interviewing individuals and organisations who were specialists in the various industries. A brief summary of the data shows how much there is yet to be done in the utilisation of wastes:

BIOLOGICAL RESIDUES
(Thousand tons p.a. dry weight)

	Used on farms	*Not used*	*Total*
Agriculture	7,033	2,350	9,383
Forestry	—	289	289
Horticulture	146	88	234
Fisheries	—	93	93
Blood	—	2	2
Paper	—	438	438
Brewing	40	220	260
Wool	13	33	46
Leather	11	33	44
Oilseed	29	13	42
Minor foods	11	7	18
Tobacco	—	6	6
Antibiotics	—	5	5
Jute, etc.	—	4	4
Total	7,283	3,581	10.864

Perhaps the most surprising outcome of the investigation was the discovery that, although more than 300 products of biological origin occur in the United Kingdom detailed chemical analyses for less than 5 per cent of these are available. Such analyses as have been carried out are, with very few exceptions, limited to a determination of ash, moisture, crude protein and fat, fibre and N-free extractive contents. Obviously, without analyses, not only of the elements but of the compounds present, it would be impossible to assess the possible value of a waste. Recent foreign investigations of this sort have led to the isolation of rutin from buckwheat; antibiotics from cabbage, banana and sweet potato; tomatine from tomato; and α-cellulose from agricultural wastes.

Another Disturbing Fact

Another fact which has been revealed is equally disturbing, but not, on the other hand, in the least surprising: of the 100 or so Government-aided research stations concerned with the utilisation of raw material, not one has as its primary aim the development of new uses for animal and vegetable materials, by-products and wastes. 'Practically no chemical engineers are employed by DSIR and its Research Associations, none by the Ministry of Agriculture and Fisheries, the Department of Agriculture for Scotland or the Agricultural Research Council, and only six state-aided non-defence research organisations possess any significant amount of pilot-scale chemical equipment. At two of these stations much of the plant is very old and is not connected with services nor is it adequately housed. None of these six organisations as at present staffed or equipped is capable of undertaking the development of new uses for biological substances outside their own particular limited field.' In industry, since the object of research is generally the production of some saleable commodity, the firms concerned are generally not prepared to make their results available.

The survey team make a number of suggestions of problems which appear to be particularly worthy of investigation. They feel that it is important, in view of increasing world demands for paper, that more work should be done on the utilisation of straw as a source of cellulose; the design of a suitable plant for processing would be a great step forward. Other research which should be carried out on cellulose wastes includes an investigation of the utilisation of lignin, one of the most prolific of waste chemicals; the use of hydrolysates as substrates for microbiological growth in production of antibiotics, food yeasts such as *Torula utilis* and *Rhodotorula gracilis*, and alcohol, butanol, acetone, lactic and citric acids, and other fermentation products; and the development of a more economic hydrolysis process. The extraction of protein from beet and turnip tops, fish, leather, distillers' dregs, mycelial felts, etc., and the pilot-scale synthesis of proteins and polypeptides should be encouraged, in view of the world-wide shortage of protein. The synthesis of starch is another practical possibility, and the extraction of waxes from peat, lignite, linseed straw, etc.

Among the many other suggestions made in the survey are: production of furfural from oat husk or linseed straw; isolation of glutamic acid, glutamine, ascorbic acid, etc., from beat-sugar residues; extraction of theobromine, Vitamin D and tannins from cocoa shell; production of lactose from whey, isolation of many medically important hormones and other substances from slaughter-house wastes; and extraction of cholesterol from wool-wax.

Although the survey has been limited to the United Kingdom, certain of the inquiries have indicated that in many British Colonial territories the annual crop residue is enormous, and, with few exceptions, has neither been surveyed nor has any attempt been made to assess its possible industrial utilisation. The Interdepartmental Committee and the Development Commissioners conclude, however, that 'with the present shortage in scientific manpower and materials, and the absolute need for careful husbanding of the country's resources, the creation of a new Institute of Biochemical Engineering to investigate many of the aspects of the utilisation of biological products and waste materials would not be possible.' Readers of the report may be forgiven for thinking that the 'absolute need for careful husbanding of the country's resources' makes the establishment of such an Institute a matter of prime importance.

The report is published by HMSO, price 7s. 6d.

Tricks With Perspex

Amusing Exhibits at Royal Society

SOME striking demonstrations with Perspex attracted a great deal of attention at the Royal Society's Conversazione on the evening of 21 May. When it is deformed by applying a stress, it appears to exhibit plastic (non-recoverable) flow. That such deformation is, however, completely reversible can be demonstrated by heating the material, on which it returns to its original shape. Above about 120°, Perspex behaves like rubber, and may be stretched several hundred per cent without breaking. It can be frozen in a strained state by cooling, but will revert again to its original dimensions on heating. A number of amusing effects were obtained by heating, for instance, an apparently straight rod of square cross-section, which quickly reverted to a spirally-twisted rod.

Among a number of interesting exhibits were three concerned with the application of germanium: transistor trigger circuits for use in radar and calculating machines, an infra-red communication system employing a germanium modulator, and photoconductivity effects with P-N junctions.

It was observed by Destriau in 1936 that when specially prepared phosphors were placed in an alternating field they emitted light. This effect was shown by placing a thin coating of zinc sulphide phosphors, containing about 0.25 per cent of Cu, between a metal surface and a front glass backed with transparent conducting film, thus forming a capacitor. When an alternating potential was applied to the front and back conductors the surfaces emitted a glow. The efficiency of this lighting is very low, however, being about 0.1 of that of a normal lamp bulb, and no important uses are anticipated. Since the actual power requirements are small, it has been suggested that switch covers and handles might afford a possible application.

Unilever's Bigger Sales

Lower Prices Reduced the 1952 Figures

DURING 1952 the volume of operations of Unilever Ltd., and Unilever N.V. reached a higher total than in any previous year, according to the directors' annual report. Chief contributory factors were an increasing demand for margarine and a general expansion in the sales of food and toilet articles.

Excluding the United Africa group, sales figures showed a decrease in general, however, as a result of lower prices and compared with the previous year as follows:—

	1952 £	1951 £
Europe	734,699,000	746,178,000
North and South America	149,113,000	153,340,000
Africa, including Middle East and Australasia	38,159,000	32,100,000
Orient, excluding China	57,899,000	58,681,000

A new high level was reached in the total value of merchandise and produce handled and services supplied by the United Africa group, this being shown as £247,000,000, compared with £215,000,000 for the previous year.

There was a drop of £15,000,000 in the combined trading profits, which were shown as £38,900,000. This was due to adverse conditions during the first six months of the year. Afterwards raw materials making rose slightly but continuously for the remainder of the year, and sales of finished products recovered.

This improvement has been maintained and the volume of sales and profits so far earned in 1953 have been satisfactory.

Although the trading profit was substantially lower, the net figure for the group rose from £18,800,000 to £21,100,000 due to movements in reserves, changes proposed UK tax and exceptional credits.

It is pointed out that the changes in taxation reduce the 1952 burden on Unilever Ltd., and make possible the release of part of the amounts previously provided in respect of undistributed overseas profits.

Besides resources provided by retained profits, the liquid position was strengthened also by reducing stocks from £212,000,000 to £182,000,000 consequent on reductions in prices and the net current assets of the group at the end of the year were £173,500,000.

Capital expenditure in recent years, the report points out, has been substantially in excess of the reserve for depreciation set aside on a replacement basis, the excess for 1952 being £10,000,000. The net expenditure in 1952 was approximately £27,000,000 and new proposals approved involved about £17,000,000.

The present liquid position is regarded by the directors as 'satisfactory' in the light of present conditions.

UK Oil Consumption

More Than Ever Used in 1952

BRITAIN used more oil in 1952 than ever before according to figures just published by Petroleum Information Bureau on behalf of the UK Petroleum Industry Advisory Committee. Total consumption of all products last year was 17,520,145 tons (excluding bunkers for ships in the foreign trade), against 16,887,908 tons in 1951. The principal items were motor spirit (5,440,552 tons), fuel oil (3,456,832 tons), gas/diesel oil (1,641,362 tons), kerosene (1,443,173 tons) and diesel oil for vehicles (1,180,440 tons).

Study of the details of individual products shows that the high rate of tax on road fuel —2s. 6d. per gallon—is affecting consumption. Deliveries to commercial consumers, at 1,947,824 tons, showed a reduction of more than 2 per cent. This more than offset the the slight increase in deliveries to dealers, retailing to the general public, which amounted to 3,492,728 tons last year. Consumption of diesel oil again increased.

The growing use of oil in agriculture is shown by the figures for kerosene—which is divided between burning oil (577,481 tons) and vaporising oil, for tractors (865,692 tons). There was a remarkable increase in the use in agricultural power units of diesel oil, which is duty free. The total, at 82,739 tons, was nearly 25 per cent higher than in 1951.

Consumption of industrial spirit (78,854 tons) and white spirit (137,394 tons) was less in both cases, this being due in part to the high tax and partly also to the general industrial recession. This is also reflected in the slight fall in consumption by industry of gas/diesel oil and fuel oil. Apart from use in the oil refineries, this amounted to 5,098,194 tons in 1952 against 5,129,597 tons in 1951. The check in industrial activity last year is also shown by the fall in the use of lubricating oil and greases.

Synthetic Detergents

Names of Committee of Investigation

AS briefly announced in THE CHEMICAL AGE last week (p. 802), the Minister of Housing and Local Government has appointed a committee 'to examine and report on the effects of the increasing use of synthetic detergents and to make any recommendations that seem desirable with particular reference to the functioning of the public health services.'

We are now able to give the full list of the committee, which is as follows:—

CHAIRMAN

Sir Harry Jephcott, M.Sc., Ph.C., F.R.I.C.

MEMBERS

Dr. N. R. Beattie, M.D., D.P.H., Principal Medical Officer, Ministry of Health (attached to Ministry of Housing and Local Government).

Mr. C. E. Boast, O.B.E., M.C., M.I.C.E., F.R.I.C.S., M.I.Inst.E., M.I.W.E., Borough Engineer and Surveyor, County Borough of Croydon.

Professor J. C. Cruickshank, M.D., D.T.M., Dip.Bact., Professor of Bacteriology as applied to Hygiene, London School of Hygiene and Tropical Medicine.

Mr. G. H. W. Cullinan, general manager, Shell Chemicals, Limited.

Lt.-Col. E. F. W. Mackenzie, O.B.E., M.C., M.B., Ch.B., D.P.H., Director of Water Examination, Metropolitan Water Board.

Mr. G. MacRobbie, Assistant Secretary, Department of Health for Scotland.

Mr. F. D. Morrell, director, Unilever, Limited, London.

Dr. J. R. Nicholls, C.B.E., D.Sc., F.R.I.C., Deputy Government Chemist.

Mr F. T. K. Pentelow, M.A., Chief Inspector of Salmon and Freshwater Fisheries, Ministry of Agriculture and Fisheries.

Dr. B. A. Southgate, D.Sc., Ph.D., F.R.I.C., Director, Water Pollution Research Laboratory, Department of Scientific and Industrial Research.

Mr. H. Symon, C.B., Under-Secretary, Ministry of Housing and Local Government.

Mr. W. L. Thomas, F.R.I.C., F.C.S., F.T.I., Chief Chemist and Technical Director, Woolcombers, Ltd., Bradford.

Mr. C. B. Townend, C.B.E., B.Sc., M.I.C.E., Chief Engineer, Main Drainage, Middlesex County Council.

Mr. R. Craig Wood, Managing Director, Thomas Hedley & Company, Ltd., Newcastle-upon-Tyne.

TECHNICAL OFFICERS

Dr. E. A. R. Birse, B.Sc., Ph.D., A.R.I.C., Chief Inspector of Alkali Works and Rivers Pollution, Department of Health for Scotland.

Lt.-Col F. G. Hill, C.B.E., M.C., M.I.C.E., Adviser on Sewerage and Sewage Disposal, Ministry of Housing and Local Government.

Dr. A. Key, D.Sc., Ph.D., Senior Chemical Inspector, Ministry of Housing and Local Government.

The secretary to the committee is Mr. A. R. Isserlis, Ministry of Housing and Local Government.

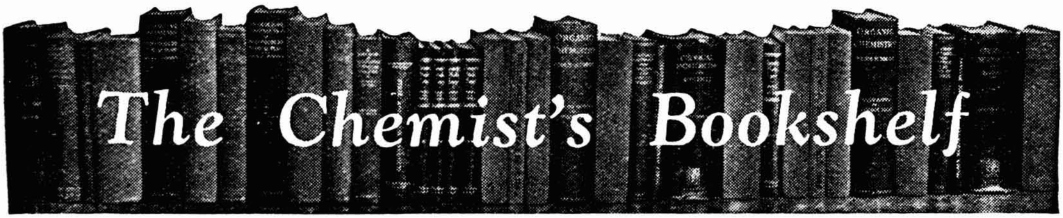
Analytical Symposium

ARISING from the success of the short symposium on analytical chemistry held in Birmingham in 1952, it is proposed to run a larger symposium from 25 August to 1 September, 1954. This will consist of original papers and recent advances in various analytical fields. An exhibition of new and special apparatus will be held simultaneously and visits to local places of interest will be organised. A ladies' committee has been formed to organise entertainment for non-scientific visitors. Further details will be made available at a later date.

The symposium is being organised by The Midlands Society for Analytical Chemistry and the secretary is Mr. J. W. Robinson, B.Sc., Ph.D., A.R.I.C., Post Office Engineering Department, Birmingham 9. The president of the symposium is Professor H. W. Melville, F.R.S.

Appointments Register

Latest statistics issued by the Ministry of Labour and National Service in connection with the work of its Appointments Services show that persons registered at Appointments Offices on 16 March last as seeking employment included 89 in chemical manufacture and analysis (19 of whom were unemployed) and 54 rubber, plastics and glass manufacture executives (15 of whom were unemployed).



ORGANIC CHEMISTRY. By L. J. Desha. Second edition. McGraw Hill Book Co., New York and London. 1952. Pp. xvi + 595. Price 55s. 6d.

The writing of a text-book is an exercise in selection. The embarrassing and ever-increasing wealth of organic chemistry makes it a particularly difficult field to survey in a text for a one-year course. Professor Desha has succeeded in giving a course in which he has balanced well the demands for the description of the reactions, properties, and uses of organic compounds. There is hot debate among chemists at the moment on the extent to which modern electronic theories, which have proved very successful in unifying a large number of the facts of organic chemistry, should be introduced at an elementary stage, since obviously much of the theory will be superseded by refinements in the future. Professor Desha has presented electronic interpretations sparingly, and for reactions which are well understood, so that his account should not prove unduly vulnerable to changes in chemical fashions.

The first hundred pages are devoted to saturated and unsaturated chain and ring hydrocarbons, so that terpenes and aromatic compounds enter at an earlier stage than usual. Thereafter, aliphatic and aromatic compounds are treated together in the usual order of mono- and then poly-functional compounds. This is done to abolish the old notion of a fundamental cleavage between aliphatic and aromatic chemistry, which apart from theoretical considerations is outmoded when the aliphatic hydrocarbons of petroleum have become a major source of toluene and styrene.

Adequate attention is given to special fields such as proteins, carbohydrates, alkaloids, biochemistry, dye-stuffs, etc. Many of the latest developments (penicillin, chloramphenicol, ACTH, cortisone, DDT, silicones, synthetic fibres, rubber, plastics, fluorocarbons) receive attention, with perhaps a slightly greater technological bias than a British author would give.

Altogether this would seem to be a good introductory text. Especially noteworthy are the very clear drawings of three-dimensional models of molecules used at the beginning of the book; they should foster the habit of visualising a three-dimensional molecule from its ordinary two-dimensional representation on the printed page. Unfortunately, the price is high for a book of this size.—J.T.E.

THE TECHNOLOGY OF ENGINEERING MATERIALS. By B. R. Hilton. Butterworths Scientific Publications. London. 1953. Pp. vi + 389. 36s. net.

This book has been written to provide a textbook in the technology of engineering materials for engineering students. The subject matter is presented in eight chapters which are carefully sub-divided and adequately indexed to enable the book to serve as a reference text to the practising engineer. The first two chapters deal with patterns, pattern making and moulding operations. These are followed by three chapters on the production, mechanical treatment and heat treatment of ferrous metals and alloys. The final three chapters deal with the production and treatment of non-ferrous metals and alloys. The number of chapters has been kept to a minimum to avoid discontinuity which may occur when a subject is split up into small units incomplete in themselves. The result is admirable, for despite the considerable amount of technical detail given in each chapter there is a continuity in the story which should greatly enhance the value of the book to a student. At the same time the extremely detailed sub-headings enable a particular subject to be picked out for immediate reading.

It is unfortunate, from the view point of the chemist and chemical engineer, that the book deals only with the technology of producing metals for engineering purposes.

Additional data on the corrosion resistant properties of the various metals and alloys with some indication of the conditions of service for which they are particularly suited would have been of great value. Although this is not normally included in lectures on the technology of engineering materials it is desirable that engineers should understand the chemistry of corrosion the better to choose the correct materials of construction.

This is, however, a minor criticism of a book which contains a great deal of information on all matters relating to the production and treatment of metals. The book is excellently produced and profusely illustrated and contains a glossary of over 700 terms in common usage in industry. The addition of a series of questions at the end of each chapter make it particularly useful to the student working on his own.—F.M.

IDENTIFICATION AND QUALITATIVE CHEMICAL ANALYSIS OF MINERALS. New second edition. By O. C. Smith. D. van Nostrand Co., New York and Toronto. MacMillan & Co., London. 1953. Pp. ix + 385. 56s.

This is the first revision of the book which originally appeared in 1946. The new edition contains an enlarged section on the use of the blowpipe in chemical analysis, including many new illustrations and a condensed history of the blowpipe and the art of blowpiping. In addition many new up-to-date qualitative tests have been included. The text is divided into eight chapters:—Physical properties of minerals (28 pages), history and uses of blowpiping (11 pages), blowpipe reactions (37 pages), ultra-violet light and fluorochemistry (17 pages), mineral chemistry (23 pages), tables of chemical reactions (24 pages), qualitative chemical tests (57 pages), mineral identification tables (161 pages). There are 38 figures and 28 colour plates.

This is an outstanding book and quite beyond criticism. The main properties of all the minerals ever recorded are classified, and a glance at the tables indicates the hardness and specific gravity, fusibility, fracture, reaction towards hydrochloric acid, colour, streak, lustre, cleavage, system, and name and composition of any mineral. Of particular interest are the author's precise remarks on each mineral.

In the blowpipe chapter there is an extremely valuable section detailing the reactions of many minerals with bromide, chromate and iodine fluxes, and six colour plates give 120 photographs showing the products of the various flux reactions. In addition, there are 40 well-defined colour photographs of different borax and phosphate beads giving an unequivocal identification of 14 commonly occurring elements. There are also 270 colour photographs of the more important minerals which should be of considerable help in their identification, and 11 plates illustrate the effect of ultra-violet rays on certain minerals.

The reviewer was particularly impressed by the qualitative chemical tests which have been so carefully and correctly selected that it is obvious that the author has had intimate contact with the practical aspects of his subject. It is refreshing to find detailed qualitative tests for elements which are not normally encountered in everyday chemical practice.

Geiger counter methods are described in detail for the location of radioactive minerals in the field, as well as all the standard methods for the qualitative analysis of uranium and other radioactive elements in ores.

As with most American texts, the book is attractively bound; it is worth double the price and is thus thoroughly to be recommended.—A. J. NUTTEN.

CIVILIAN ASSIGNMENT. By Sir Cecil M. Weir. Methuen & Co., Ltd., London. 1953. Pp. 182. 21s.

The title of this book should really be in the plural for the author has chosen to describe in chronological order a number of projects with which he was personally associated during the last 15 years. The chapters have tended to become essays in administration, and as such give an interesting picture of the organisation of such schemes as Civil Defence, and the concentration of industry during the war.

The section which will have most appeal to the practising chemist is that describing the supply and manufacture of pharmaceuticals to the Services and civilian population. The story of the development and manufacture of mepacrine and penicillin is told in a somewhat superficial and casual manner, and there is a mention of the preparation on a large scale of the innoculation serum for scrub typhus. The price of one guinea seems rather high for so short a book.—J.R.M.

Natural Gas

Search Begun for British Reserves

SPEAKING at a meeting of the Institution of Gas Engineers on 21 May, Sir Harold Smith, chairman of the Gas Council, said that in view of the decreasing supplies of good gas-making coal, it was necessary to consider every possibility (i) of developing methods of using low-grade coals not normally considered suitable for orthodox carbonisation, (ii) of increasing the efficiency of present methods, and (iii) of discovering new sources of gas. In this last connection the recently published productivity team report 'Gas' (THE CHEMICAL AGE, **68**, 733) had stated that 'although there are no appreciable known reserves of natural gas in Great Britain, a discovery of any magnitude would be of immense value to our national economy, and it is suggested that prospecting, where there is any possible hope of success, should continue to receive vigorous support.'

The council had been fortunate in engaging the assistance of Dr. G. M. Lees, F.R.S., chief geologist of the Anglo-Iranian Oil Company, whose advice had sufficiently encouraged the council to embark on a large-scale exploration for natural gas in Great Britain, in collaboration with the oil company. There was, of course, no guarantee that gas would be found in any commercial quantity, but it was important to remember that all borings hitherto had been made in the search for oil, and no serious attempts had been made to find gas separately from oil. It was anticipated that the exploration would take about five years, and if the search were successful, the benefit accruing to consumers of gas might well be considerable.

A further reason pointing to the importance of this decision was the rapidly rising cost of coal. In December, 1951, the price of coal had been increased so as to add approximately £9,000,000 to the gas industry's annual coal bill. In March, 1953, a further increase had added another £8,000,000 and the rise in rail charges in December, 1952, had meant a further £1,000,000 per year added to the coal bill.

Changes in Prices of Oils

THE Minister of Food, Major the Rt. Hon. Gwilym Lloyd-George, has announced the following alterations in the prices of the undernoted oils allocated to primary wholesalers and large trade users as from 17 May. It is intended that future alterations in the prices of these oils shall reflect changes in market values more closely than hitherto.

Coconut oil	Crude and crude oleine	from £111	to £132	Per ton naked ex-works
Palm kernel oil	Crude and crude oleine	„ £110	„ £130	
Cottonseed oil	Crude	„ £125	„ £137	
	Washed	„ £130	„ £145	
Groundnut oil	Crude	„ £130	„ £148	
Sunflower oil; Sesame/Benniseed oil; Maize oil; Soya bean oil	Crude	„ £128	„ £145	
Herring oil	Crude	„ £105	„ £75	Per ton naked ex-store
Seal oil	Crude	„ £105	„ £75	
Whale oil	Crude—No. 1	„ £105	„ £80	
	No. 2	„ £100	„ £75	
Whale/herring/seal oil	Crude hardened—up to 42°	„ £115	„ £92	Per ton naked ex-works
	46°/48°	„ £116	„ £93	
	50°/52°	„ £117	„ £94	
	54°	„ £117	„ £94	
	Iodine value 3/5	„ £117/10	„ £94/10	
Coconut oil	Refined deordorised	„ £120	„ £143	
	Refined hardened deodorised	„ £125	„ £150	
Palm kernel oil	Refined deodorised	„ £120	„ £140	
	Refined hardened deodorised	„ £125	„ £147	
Cottonseed oil; Sunflower oil; Sesame/Benniseed oil; Soya bean oil; Maize oil	Refined deodorised	„ £138	„ £159	
Groundnut oil	Refined deodorised	„ £140	„ £164	
	Refined hardened deodorised—to 40°	„ £145	„ £177	
	50°/52°	„ £146	„ £178	
Palm oil	Refined deodorised	„ £120	„ £95	
	Refined hardened deodorised	„ £125	„ £104	
Whale oil	Refined hardened deodorised—up to 42°	„ £125	„ £97	
	46°/48°	„ £126	„ £98	

HOME

Cement Costs More

The Cement Makers' Federation has announced that, because of increases in the industry's costs, the price of ordinary and rapid-hardening Portland cement was advanced by 2s. a ton from 20 May.

Smoke Abatement

The Minister of Fuel and Power, Mr. Geoffrey Lloyd, speaking at a luncheon of The Institution of Gas Engineers in London last week, said the gas industry had a very good record from the point of view of smoke abatement. They all knew that smoke was a sign of inefficient combustion. Even when there was perfect combustion, however, there were still the products of combustion and there still remained a considerable amount of sulphur in most solid fuels.

Damages for Pollution

In the Court of Session recently Glasgow Corporation were awarded £27,000 damages against Dixon's Iron Works Ltd., in respect of loss and damage resulting from the discharge of tarry matter into public sewers. Defendants maintained that they took all reasonable precautions and alleged that the Corporation was partly to blame for not taking reasonable steps to protect pumping machinery by intercepting matter which they should have anticipated would enter the sewers.

Exports to Hongkong

In a Parliamentary written reply recently, Mr. H. L. d'A. Hopkinson, Minister of State for Colonial Affairs, stated that he would like to correct any misapprehension regarding Hongkong's imports of rubber, explosives, chemicals, fuel oil and machinery. Any suggestion that strategic goods in these categories were re-exported to China was without foundation. Of imports classified as explosives and chemicals valued at £2,625,000, £62,500 only represented explosives used mainly in local manufacture of fireworks. Of the re-exports of chemicals, valued at £2,000,000, nearly £1,562,500 represented chemicals of a non-strategic nature, of which China received some £687,500 worth.

Penicillin Pork

In the House of Commons recently an unopposed reading was given to the Therapeutic Substances (Prevention of Misuse) Bill, which extends the Penicillin Act, 1947, to allow the feeding of penicillin to pigs and poultry for fattening purposes.

Acid 'Rain' made Bluebells Red

An explosion in the chemical works of Genatosan Ltd., Loughborough—due to an electric fault—caused surprising results. Sulphuric acid blown through the roof was carried by wind to gardens 100 yards away and turned bluebells and lilac a bright red, crimson tulips purple, and lawns and trees a dull brown.

Oil Equipment Orders

Statistics compiled by the Oil Companies Materials Secretariat and just released by the Council of British Manufacturers of Petroleum Equipment show that British manufacturers received orders for oil equipment and materials valued at £20,115,600 during the first quarter of this year. A high proportion of it was for overseas.

State Control ?

It is understood that the National Executive of the Labour Party, at its latest meeting, decided to include in the party election programme a scheme for State financial control of leading firms in the chemical industry. TUC leaders opposed this and asked for an enquiry before such control was the subject of legislation by a future Labour Government. This enquiry, it is understood, is likely to be conceded.

Bread 'Poisoned'

An allegation that bread was being 'poisoned' by the addition of chemicals, and that the wheat germ and vitamins were being removed from it, was made by Dr. Franklin Bicknell, vice-chairman of the Food Education Society, when addressing a women's conference in London. Delegates urged the Government to make funds available for more research into the long-term effects of processing and adding chemicals to food.

OVERSEAS

Sulphur in Venezuela

A sulphur refining plant to produce 250,000 tons annually of 95 per cent pure sulphur is to be set up in Venezuela, according to the president of the Venezuelan Sulphur Corporation. The cost of the installations will be about 15,000,000 bolívares ($4,500,000). The Corporation is doing advanced exploratory work in the region of El Pilar, Sucre State, where high grade sulphur deposits have been located. It is planned to transport the sulphur from the mines to the plant, a distance of 10½ miles, by means of an aerial cable system.

Australian H_2SO_4 Plants

Claimed to be the biggest single plant of its kind in the world, a sulphuric acid plant is now being constructed in Adelaide, costing about £A2,000,000. The plant will have a daily production of 300 tons of acid, sufficient to make 900 tons of superphosphate. Work has also been started on the building of a £A1,000,000 sulphuric acid plant at Cockle Creek, near Newcastle, New South Wales. Local pyrites will be used for making the acid and output is planned to be 100 tons of sulphuric acid a day, enough to make 300 tons of superphosphate.

Balkan Natural Gas

A large chemical plant is being built in North-east Hungary in the region of the Tiszalök power project which will process natural gas piped into Hungary from Rumania, the Hungarian Press announces. The pipeline will be laid by a combined Hungarian-Rumanian company, which will also be responsible for building a chemical plant at the Rumanian end. The Hungarian chemical plant, foundations for which were laid last June, is being built by Hungary alone.

Canadian I.C.I. Factory

A contract to build a $20,000,000 synthetic fibre factory at Millhaven, Ontario, for Imperial Chemical Industries of Canada has been awarded to the H. K. Ferguson Company, of Cleveland and New York, one of the largest engineering contracting firms in the USA.

Chemicals Overseas

Exports of chemicals, drugs, dyes and colours from the United Kingdom in April were valued at £10,659,920 compared with £11,503,502 in the same period of 1952 and £11,457,872 in 1951. For the first four months of this year the value of exports in this group at £42,119,119 was about £10,000,000 less than 1952, but £657,005 better than 1951.

Canadian Petroleum Additive Plant

Monsanto Canada, Ltd., has broken ground for the erection of a $400,000 petroleum additive plant at Ville La Salle, near Montreal. Several types of detergents and inhibitor additives, used in modern high performance engine oils, are scheduled for initial production. Certain special compounds for gear lubricants will also be manufactured.

Oil Prospecting in Israel

Licences for oil prospecting and development in Israel have been secured by a group of Canadian oil men. The licences cover 316,000 acres and an option on a further 100,000 acres will be taken up immediately. Mr. Arie Ben-Tovim, a chemical engineer, who was formerly Consul of Israel in Canada and later in New York, has been appointed manager of the syndicate.

Polyethylene in USA

The Eastman Kodak Company announced in New York last week that it has signed agreements with Imperial Chemical Industries, Ltd., licensing Kodak to manufacture and sell polyethylene.

'Monoplast' from Codfish Waste

The Norwegian Government is expected to give financial aid to the amount of £108,300 to the fish firm of Wm. A. Mohn & Son A/S, of Bergen, so that it can carry on with its production of plastic from codfish waste. At its plant in the Lofoten Islands, N. Norway, Mohn & Son A/S has for some time been producing 'Monoplast' experimentally, and the intention is to establish full commercial production at the rate of about 2,000 tons a year.

· PERSONAL ·

The Ministry of Supply have announced that PROFESSOR SIR ERIC RIDEAL, F.R.S., is to be chairman of the Minister's Advisory Council on Scientific Research and Technical Development, in succession to PROFESSOR SIR JOHN LENNARD-JONES, F.R.S., who was recently appointed Principal of the University College of North Staffordshire. Sir Eric is professor of physical chemistry at the University of London, Kings College, and a director of Monsanto Chemicals, Ltd. He is a past-president of the Faraday Society, the Chemical Society and the Society of Chemical Industry, and past-chairman of the Chemical Council.

After having served as honorary secretary of the Textile Institute for the past nine years, MR. WILFRED KERSHAW, F.T.I., a vice-president of the Institute and Director of Bleachers' Association, Ltd., has resigned from the position, and the Council of the Institute has recorded its warm appreciation.

DR. GEOFFREY GEE, M.Sc., Sc.D., F.R.S., has been appointed Professor of Physical Chemistry at Manchester University and will take up his duties in the early autumn. Entering the University of Manchester as a William Simpson Exhibitioner in 1928, Dr. Gee graduated with First Class Honours in Chemistry in 1931. He was awarded the Mercer Scholarship and, later, the Dalton Chemical Scholarship. In 1932 he received the degree of M.Sc. and a year later was appointed to the research staff of the I.C.I. Dyestuffs Group, from which he was seconded to the Colloid Science Department of the University of Cambridge, where he worked on surface chemistry under Professor (now Sir) Eric Rideal and graduated as a Doctor of Philosophy in 1936. In 1938 Dr. Gee joined the staff of the newly established British Rubber Producers' Research Association as head of the physical chemistry section. He became Director of Research at their Welwyn laboratories in 1947 and in the same year was awarded the Cambridge Sc.D. degree. In 1951 he was elected a Fellow of the Royal Society and in 1952 was awarded the Colwyn Medal by the Institution of the Rubber Industry.

The board of the Institute of Physics has awarded Bowen Prizes of 15 guineas each to the following for papers published in the Journal of Scientific Instruments: MR. G. T. WRIGHT, B.Sc., University of Birmingham; MR. G. D. DEW, NPL; and MR. H. ASPDEN, B.Sc., Trinity College, Cambridge. These prizes are awarded to authors who are not more than 35 years of age whose papers are judged to be the best in respect of originality, scientific value, practical utility to instrument makers and users, and presentation. Money for them is provided by the Scientific Instrument Manufacturers' Association of Great Britain, Ltd., from the Bowen Trust Fund established by the late Mr. William Bowen.

MR. GEORGE BREARLEY, formerly managing director of Brotherton & Co., Ltd., has joined Mr. H. W. Cremer as a partner in his consulting engineering practice, which will now be known as Cremer and Brearley.

At a meeting of the council prior to the meeting of the Leeds University Court several new appointments were made, including that of DR. F. S. TRIPPET as Lecturer in the Department of Organic Chemistry from October; DR. T. J. HARDWICK as J. W. Wootton Research Fellow in the Department of Inorganic and Physical Chemistry for one year in the first instance from October; and MR. T. J. BOWEN, at present Research Fellow in Biochemistry and Medicine, as Lecturer in Biochemistry. The gift of £100 from British Celanese, Ltd., London, for the Department of Colour Chemistry and Dyeing was acknowledged.

Obituary

A.C.M. Sir Wilfrid Rhodes Freeman

The death has occurred of AIR CHIEF MARSHAL SIR WILFRID RHODES FREEMAN, a deputy-chairman of Courtaulds, Ltd. Sir Wilfrid, who was also a director of Babcock & Wilcox, Ltd., was Vice-Chief of Air Staff in 1940 and from 1942 to 1945 served as chief executive of the Ministry of Aircraft Production.

Publications & Announcements

DESCRIPTIONS, illustrations, dimensions and output tables for the range of Newman drip proof slip ring and squirrel cage motors up to 200 h.p. are given in a brochure published by Newman Industries Ltd., Yate, Bristol. This range of motors is of modern design, full advantage having been taken of the latest types of insulation, cooling devices and modern manufacturing processes. The latest addition to the Newman range—described in a separate brochure—is a totally-enclosed fan-cooled squirrel cage foot-mounted motor with outputs ½ h.p. to 25 h.p.

* * *

POWDERED or granulated materials can now be handled by a new unit (D.M.12) added to its range of pumps by Mono Pumps, Ltd., Clerkenwell Road, London. The principle of the Mono pump system, employing a stator of natural or synthetic rubber and a rotor of hard corrosion-resisting metal, has been adapted to this new application by modification of its internal construction. Flow of powder through the pump is aided by a stream of compressed air to prevent impacting. Application of the Mono pump to this duty is still in its early stages and research is being continued to widen its scope in this field.

* * *

SERIOUS problems of corrosive attack have been created as a result of the widespread and increasing use of chemicals in modern industrial processes. The repair and upkeep of buildings exposed to the corroding action of liquids and vapours costs industry generally large sums of money every year. Every engineer knows to his cost the effects of corrosion, but its underlying causes are sometimes understood only by the expert. Only by careful selection of the appropriate materials and by their correct usage can adequate protection against corrosion be secured. Some of the modern materials available in the fight against corrosion are described in a new booklet, 'New Defences Against Corrosive Attack', which has been published by Semtex Limited (a Dunlop subsidiary company), 11 Fold Street, Bolton, Lancs. The booklet also provides architects and engineers with a guide to the conditions the new materials are designed to meet under recommended methods of application.

THE principal raw material used by Thorium Ltd., who specialise in rare earth chemicals, is monazite, a phosphate of thorium and lanthanons. In this material light lanthanons predominate, the heavy group forming only about 2 per cent of the total. As usual, yttrium predominates in the heavy group, while in the light or ceria group, europium is present in traces and promethium not at all. The oxides thus produced in largest quantity are described in a new catalogue published by the company, which also gives details of those compounds made from the oxides and in greatest demand. The company's Research Department will be happy to advise on the properties and uses of all the firm's products. Enquiries should be addressed to the head office at 10 Storey's Gate, London, S.W.1.

* * *

FOR a number of years chemical-resistant cements have been available for such applications as the lining of stacks, towers, storage tanks, reaction vessels and pickling tanks, and the laying of floors and drains, but hitherto it has been necessary to employ specialist labour for the installation of these cements. A new company—Corrosion Proof Products Ltd., a subsidiary of Albert Moore (Pty) Ltd., Cape Town—not only manufacture a wide range of resistant cements but provide a free service of technical advice for factories or general contractors who wish to carry out chemical-resistant construction work for themselves. Among the range of anti-corrosive products manufactured by the company are 'Corro-Proof' SD cement, the standard silica cement for bonding acid-resisting bricks; SK cement, formulated for use with concentrated sulphuric acid; FR cement, a resinous cement resistant to an exceptionally wide range of acids, alkalis, oils and solvents up to 200°; and PF cement, a phenol-formaldehyde resin. The '"Corro-Proof" Service' will provide detailed specifications, recommendations of the most suitable brick or tile and details of preparation and application, free of charge; and craftsmen can be hired from the Contracts Department on normal daywork terms. Full details of the company and its service may be obtained from the London offices, 37 Portman Square, W.1.

British Chemical Prices

LONDON.—The only important price changes of the week have been the increase in the convention quotations for red lead and white lead, the prices ruling on 21 May being red lead and litharge £118 5s. per ton and white lead £134 10s. Values elsewhere remain steady on an improving demand from the chief consuming industries. The flow of inquiry for export has remained at about recent levels. There has been no change in prices or conditions in the coal tar products market.

MANCHESTER.—Chemical trade conditions in the Manchester area during the past week have been noticeably under the influence of the holidays. Deliveries against contracts to home users have been on a smaller scale and there has certainly been less activity in the market from the point of view of new bookings. An early return to the former scale of operations is anticipated. On the export side, there appears to be room for improvement in the call for several of the leading lines. The seasonal lull in the demand for fertilisers is becoming increasingly in evidence.

GLASGOW.—There is very little change to report in general trading conditions during last week. The demand for basic general chemicals has remained steady, but trade on the whole has been slightly quieter.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £88. 80% pure, 10 tons, £92 ; commercial glacial 10 tons, £94 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £138 per ton.

Acetone.—Small lots : 5 gal. drums, £143 per ton ; 10 gal. drums, £125 per ton. In 40/50 gal. drums less than 1 ton, £105 per ton ; 1 to 9 tons, £104 per ton ; 10 to 49 tons, to £103 per ton ; 50 tons and over, £102 per ton.

Alcohol BSS, Butyl.—£161 per ton in 10-ton lots.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £162 per ton ; 10 gal. drums, £172 per ton. In 40/45 gal. drums ; less than 1 ton, £142 per ton ; 1 to 9 tons, £141 per ton ; 10 to 50 tons, £140 per ton ; 50 to 100 tons, £139 per ton ; 100 tons and over, £138 per ton.

Alcohol, Ethyl.—300,000 gal. lots, d/d., 2s. 11d. per proof gallon ; 100,000 and less than 200,000 gal. lots, d/d, 3s. per proof gallon.

Allyl Alcohol.—Less than 40 gals., 3s. 10½d. per lb. ; 40 gal., 3s. 6½d. per lb. ; 2 to 5 40 gal. drums, 3s. 4½d. per lb. ; 1 ton and over, 3s. 2½d. per lb.

Alum.—Ground, £25 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £12 per ton d/d. MANCHESTER : £15.

Ammonia. Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising, £31 5s. per ton, in casks, ex wharf. Fine white 98%, £25 to £27 per ton. See also Salammoniac.

Ammoniun Nitrate.—D/d, £18 10s. to £20 10s. per ton.

Ammonium Persulphate. — MANCHESTER : £6 2s. 6d. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £93 and £91 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 3¼d. to 3s. 1½d. per lb. Crimson, 3s. 4¼d. to 4s. 5¼d. per lb.

Arsenic.—Per ton, £59 5s. nominal, ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £35 5s. per ton, bag packing.

Barium Chloride.—£42 15s. per ton in 2-ton lots.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £38 per ton d/d ; 2-ton lots, £38 5s. per ton d/d.

Bleaching Powder.—£21 per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £59 10s.; in 1-cwt. bags; commercial, granular, £39 10s.; crystal, £42; powder, £43; extra fine powder, £44; B.P., granular, £48 10s.; crystal, £51; powder, £52; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £68; crystal, £76; powder, £73 10s.; extra fine powder, £75 10s.; B.P., granular, £81; crystal, £88; powder, £85 10s.; extra fine powder, £87 10s.

Butyl Acetate BSS.—£173 per ton, in 20-ton lots.

***sec.*-Butyl Alcohol.**—5 gal. drums £159; 40 gal. drums: less than 1 ton £124 per ton; 1 to 10 tons £123 per ton; 10 tons and over £122 per ton; 100 tons and over £120 per ton.

***tert.*-Butyl Alcohol.**—5 gal. drums £195 10s. per ton; 40/45 gal. drums: less than 1 ton £175 10s. per ton; 1 to 5 tons £174 10s. per ton; 5 to 10 tons, £173 10s.; 10 tons and over £172 10s.

Calcium Chloride.—70/72% solid £12 10s. per ton.

Chlorine, Liquid.—£32 per ton d/d in 16/17-cwt. drums (3-drum lots).

Chromic Acid.—2s. 0¼d. to 2s. 0¾d. per lb., less 2½%, d/d U.K.

Citric Acid.—1 cwt. lots, 201s. cwt.; 5 cwt. lots, 196s. cwt.

Cobalt Oxide.—Black, delivered, 13s. per lb.

Copper Carbonate.—MANCHESTER: 2s. 7d. per lb.

Copper Sulphate.—£84 2s. 6d. per ton f.o.b., less 2% in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £10 2s.

Ethyl Acetate.—20 tons and upwards, d/d, £151 per ton.

Formaldehyde.—£35 to £36 per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £84 10s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1.260 S.G. £14 19s. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, 11s. to 15s. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £124 10s. per ton. 35% wt. £153 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 19s. 10d. per lb. in 28 lb. lots.

Iodoform.—30s. per lb. in 28 lb. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton; dark tech., 44 per cent by weight £67 per ton ex works one ton lots; dark chemical quality 44 per cent by weight £102 per ton, ex works; usual container terms.

Lead Acetate.—White: About £137 10s. per ton.

Lead Nitrate.—About £110 10s. per ton.

Lead, Red.—Basis prices per ton. Genuine dry red lead, £118 5s.; orange lead, £130 5s. Ground in oil: red, £145 5s.; orange, £157 5s.

Lead, White.—Basis prices: Dry English, in 5-cwt. casks, £134 10s. per ton. Ground in oil: English, under 2 tons, £156.

Lime Acetate.—Brown, ton lots, d/d, £30 to £34 per ton; grey, 80-82%, ton lots, d/d, £34 to £39 per ton.

Litharge.—£118 5s. per ton, in 5-ton lots.

Magnesite.—Calcined, in bags, ex works, £22 to £24.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s.; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £16 per ton.

Magnesium Oxide.—Light, commercial, d/d, £240; cwt. lots £250 per ton d/d.

Magnesium Sulphate.—£15 to £16 per ton.

Mercuric Chloride.—19s. 3d. per lb. in 28 lb. lots; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 5s. 4½d. per gal.; pyridinised 64° O.P. 100 gal., 5s. 6½d. per gal.

Methyl Ethyl Ketone.—5-gal. drums, £173 per ton; in 40-45-gal. drums, less than 1 ton, £143 per ton; 50 to 100 tons, £160 per ton; 100 tons and over, £139 per ton.

Methyl *iso*Butyl Ketone.—5 gal. drums, £203 per ton in 40-45 gal. drums, less than 1 ton, £173 per ton; 1 to 10 tons, £172 per ton; 10 to 50 tons, £171 per ton; 50 to 100 tons, £170 per ton; 100 tons and over, £169 per ton.

Nickel Sulphate.—D/d. buyers U.K. £140 10s. per ton. Nominal.

Nitric Acid.—£35 10s. to £40 10s. per ton, ex-works.

Oxalic Acid.—Home manufacture, in 5-cwt. casks, £139 per ton, carriage paid.

Phosphoric Acid.—Technical (S.G. 1.700) ton lots, carriage paid, £87 per ton; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

Potash, Caustic.—Solid, £98 per ton for 1-ton lots; Liquid, £37 15s.

Potassium Bichromate.—Crystals and granular, 11⅝d. per lb.; ground, 1s. ⅝d. per lb., standard quantities.

Potassium Carbonate.—Calcined, 96/98%, £96 per ton for 1-ton lots, ex store.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £20 to £22 per ton.

Potassium Iodide.—B.P., 17s. 10d. per lb. in 28 lb. lots; 17s. 4d. in cwt. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 9½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8½d. per lb.; technical, £8 11s. 6d. per cwt.; for 5 cwt. lots.

***iso*Propyl Alcohol.**—Small lots: 5 gal. drums, £118 per ton; 10-gal. drums, £108 per ton; in 40-45 gal. drums; less than 1 ton, £83 per ton; 1 to 9 tons £81 per ton; 10 to 50 tons, £80 10s. per ton; 50 tons and over, £80 per ton.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton; medium, £67 10s. per ton; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER: Technical 2s. 7d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £9 10s. to £14 10s. per ton.

Soda, Caustic.—Solid 76/77%; spot, £25 to £27 per ton d/d. (4 ton lots).

Sodium Acetate.—£85 to £91 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £13 10s. to £15 10s. per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9⅞d. per lb.; anhydrous, 11¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£87 to £95 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 19s. 4d. per lb. in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £123 ton.

Sodium Metasilicate.—£22 15s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £29 15s. per ton.

Sodium Nitrite.—£32 per ton (4-ton lots).

Sodium Percarbonate.—12½% available oxygen, £8 2s. 10½d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots: Di-sodium, crystalline, £37 10s., anhydrous, £78 10s.; tri-sodium, crystalline, £39 10s., anhydrous, £75 10s.

Sodium Prussiate.—10d. to 10½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

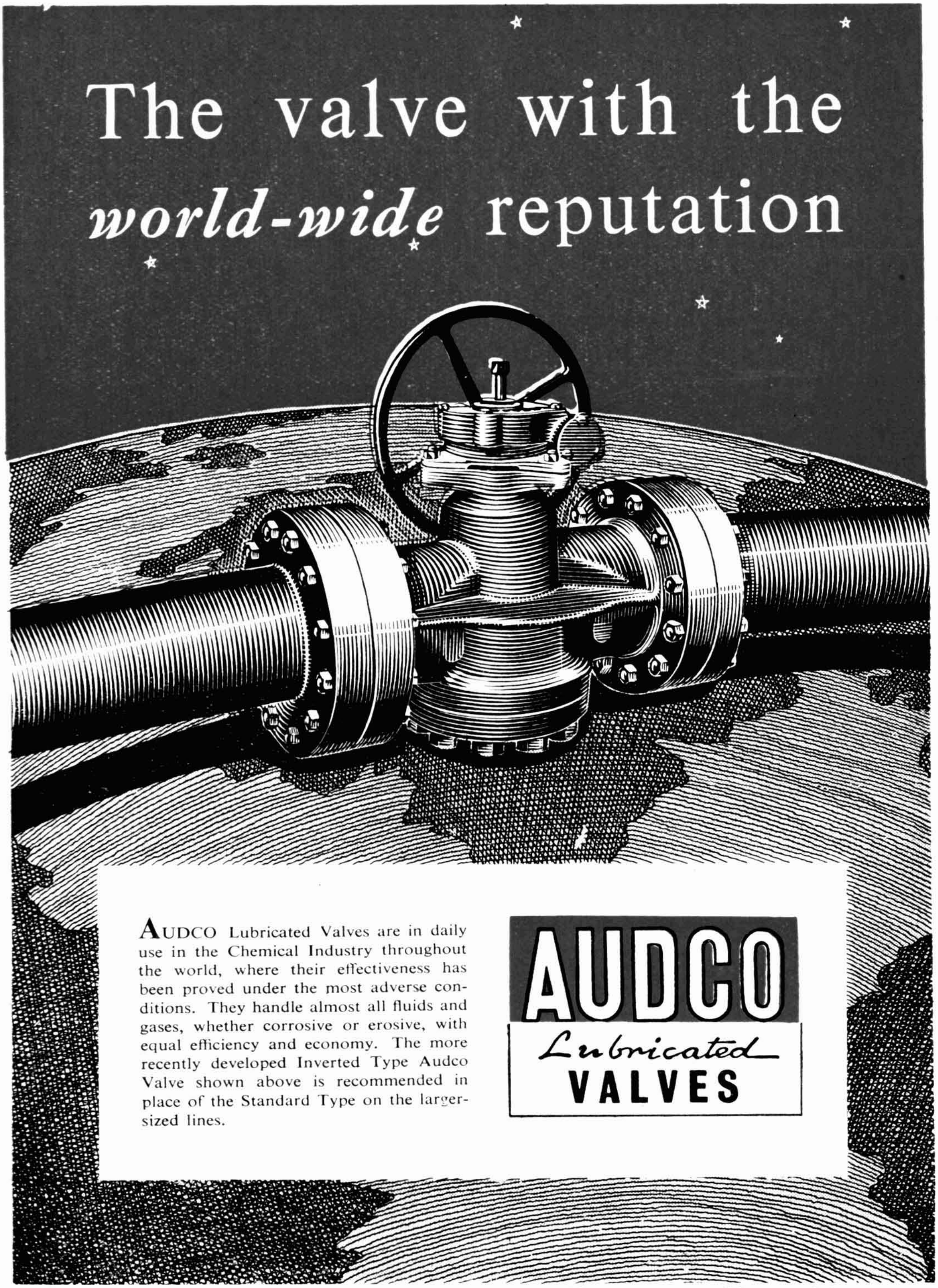
Sodium Sulphate (Glauber's Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £7 per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot, £30 2s. 6d. per ton, d/d, in drums; broken, £31 12s. 6d. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £59 per ton, pea crystals, £37 12s. 6d. per ton d/d station in kegs; commercial, £23 7s. 6d. per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £22 16s. 6d. to £25 6s. according to fineness.



Audley Engineering Co. Ltd., Newport, Shropshire

M-W7

Tartaric Acid.—Per cwt. : 10 cwt. or more, £10. 10s.

Titanium Oxide.—Standard grade comm., with rutile structure £143 per ton ; standard grade comm., £130 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d : white seal, £101 ; green seal, £100 10s. ; red seal, £99.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 3¼d. to 3s. 1½d. per lb. Crimson, 3s. 4¼d. to 4s. 5¼d. per lb.

Carbon Bisulphide.—£64 2s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£74 10s. per ton.

India-rubber Substitutes.—White, 1s. 6¾d. to 1s. 10¼d. per lb. ; dark, 1s. 4½d. to 1s. 8½d. per lb.

Lithopone.—30%, £50 per ton.

Mineral Black.—£7 10s. to £10 per ton.

Sulphur Chloride.—British, £55 per ton.

Vegetable Lamp Black.—£64 8s. per ton in 2-ton lots.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £16 18s.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1 £27 9s.

'Nitro-Chalk.'—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots, d/d nearest station, £29 per ton.

Coal-Tar Products

Benzole.—Per gal, ex works : 90's, 3s. 8¼d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 6d. to 1s. 8d. per lb., d/d crude, 8s. naked, at works.

Creosote.—Home trade, 1s. to 1s. 4d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 1s. to 1s. 8d. per gal.

Cresylic Acid.—Pale 99%, 5s. 8d. per gal. ; 99.5/100%, 5s. 10d. American, duty free, for export, 5s. to 5s. 8d. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 10½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 4s. 3½d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £16 5s. to £26 10s. per ton, according to m.p. ; hot-pressed, £34 10s. per ton, in bulk ex-works : purified crystals, about £60 per ton.

Pitch.—Medium, soft, home trade, 130s. per ton f.o.r. suppliers' works ; export trade, 200s. per ton f.o.b. suppliers' port. MANCHESTER : £8 f.o.r.

Pyridine.—90/160°, 42s. 6d. per gal. MANCHESTER : 42s. 6d. to 45s. per gal.

Toluol.—Nitration grade, 5s. 3d. per gal. MANCHESTER : Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 6d. per gal., according to grade, d/d.

Intermediate and Dyes (Prices Nominal)

***m*-Cresol** 98/100%.—3s. 9d. per lb. d/d.

***o*-Cresol** 30/31° C.—1s. 4d. per lb. d/d.

***p*-Cresol** 34/35° C.—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—88/89°C., 1s. 11d. per lb.

Dinitrotoluene.—S.P. 15° C., 1s. 11½d. per lb. ; S.P. 26° C., 1s. 3d. per lb. S.P. 33°C., 1s. 1½d. per lb. ; S.P. 66/68°C., 1s. 9d. per lb.

***p*-Nitraniline.**—4s. 5½d. per lb.

Nitrobenzene.—Spot, 9¼d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—2s. per lb.

***o*-Toluidine.**—1s. 7d. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—5s. 6d. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 5d. per lb., 100%.

Chemical & Allied Stocks & Shares

THERE has not been a great deal of business passing in stock markets, and main investment attention has continued to centre on British Funds, chiefly because of talk that a reduction in the bank rate may occur later in the year. Industrial shares experienced a further reaction, but later strengthened because buyers were attracted by the good yields at the lower prices, and by the assumption that, in the majority of cases, dividends should be maintained.

Nevertheless, it is realised that competition is now very keen both in export and home markets, and that profit margins are narrowing. It seems likely, therefore, that many companies may be unable to keep earnings at the 1952 levels. On the other hand, it is recognised that generally dividends are likely to be maintained, and on this basis yields are attractive.

Chemical and kindred shares have moved fairly closely with the trend of markets, and are generally lower on balance for the month, though prices are tending to strengthen at the time of writing. Imperial Chemical, which after easing, firmed up to 43s. 1½d., yield 6 per cent on the basis of the unchanged 13 per cent dividend, and the latter remains a conservative payment despite the reduced profits. Laporte 5s. shares were 10s., Monsanto 5s. shares 20s. 4½d., British Chrome Chemicals 5s. shares 16s. 10½d., and Reichhold Chemicals 5s. shares at 5s. 6d. have regained part of the decline which followed news of the profit set-back and absence of a dividend on the ordinary shares. Albright & Wilson 5s. shares were 15s. 3d., Fisons 32s. 3d. and Fisons Chemical preference 15s. L. B. Holliday preference were 15s. 6d. J. H. Dennis 5s. shares were 8s. 6d.xd, Pest Control changed hands around their par value of 5s. following publication of the results. Boake Roberts 5s. shares were 10s. 9d., and Brotherton 10s. shares 22s. 6d.

In other directions, W. J. Bush were 41s. 6d., and William Blythe 3s. shares firm at 9s. 6d. F. W. Berk 2s. 6d. shares were 4s. 9d. and Amber Chemical 2s. shares 1s. 6d. Coalite & Chemical 2s. shares kept around par. British Glues 4s. shares were 7s. 6d., and Borax Consolidated deferred units 33s. 6d. Associated Cement have been active around 110s., British Plaster Board 5s. shares were 14s. 1½d., Turner & Newall 48s. 9d., and the 4s. units of the Distillers Co. changed hands around 16s. 1½d. United Molasses rallied to 28s. 6d.xd on the chairman's statement that though profits must be expected to be lower for the current year, they should continue to show favourable cover for a dividend at the same rate as last year's.

Elsewhere, Boots Drug 5s. units at 19s. 9d.xd have been helped by the higher profits. Unilever (47s. 6d.) have kept firm since publication of the past year's financial results. Oils were more active with Anglo-Iranian at 118s. 1½d., on the higher distribution, while Shell have risen to 84s. 4½d.

Fisons' Experimental Farm

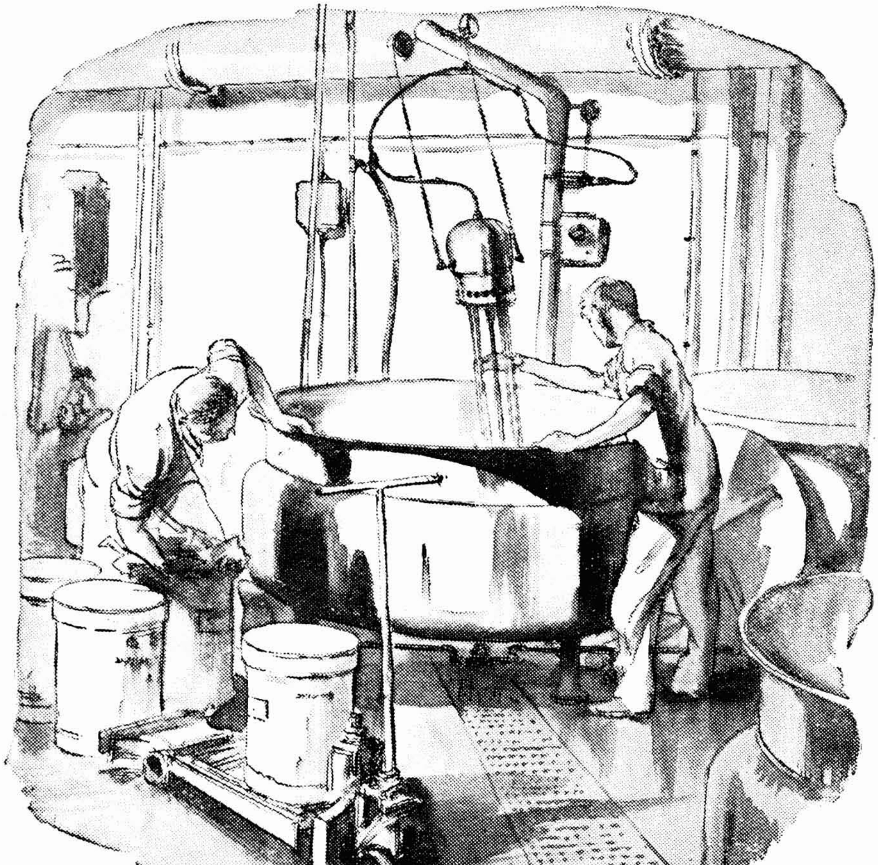
THE fertiliser manufacturers, Fisons Limited, have acquired Red House Farm and Walk Farm at Levington, near Ipswich, for experimental purposes. They total about 350 acres and will be converted to agricultural research laboratories under the direction of Dr. R. Stewart, chief agricultural adviser to the company. It is expected that about seventy scientists and technicians will be employed there.

The farms will be used for research purposes and for testing new fertilisers or other agricultural chemicals developed in the company's own laboratories. It is intended that these will form the nucleus of a series of experimental farms to be set up in other parts of the country.

The other research establishments of the Fisons group, engaged on medical and general chemical work, will not be affected.

Will Use "Amfix"

All the London evening newspapers which will be working at high pressure will be using ultra-rapid 'Amfix' made by May & Baker, Ltd., for their Coronation pictures. This company has also invited a party of 50 young students from Sweden to be its guests during the celebrations. The annual staff family and sports day will this year have a special 'Coronation look' with stallholders in costumes representative of various ages.



CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

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

ASSISTANT ENGINEERS required by **CHEMICAL ENGINEERING FIRM** in London. Qualifications required are : age up to 30 ; B.Sc., or equivalent ; good knowledge of Physics and Heat Transfer essential ; good Mathematics ; understanding of Chemistry desirable ; understanding of general office procedure and technical sales an advantage. These positions offer excellent opportunities to men having these qualifications, coupled with a keen business outlook. Write, stating age, qualifications, salary required, to **BOX No. C.A. 3221, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

CHEMIST required by Ministry of Supply Research Establishment, near Sevenoaks, Kent, for Inorganic Analysis. Quals. : Minimum of Higher School Certificate (Science), or equivalent, but Degree in Chemistry may be an advantage. Knowledge of Modern Analytical Chemistry, with experience in Inorganic Analysis, required. Experience in Metallurgical Analysis, and Physico-Chemical Methods using Polarograph, Spectrophotometer, *p*H Meter, etc., desirable. Salary within range, £264 (age 18) to £555. Women somewhat less. Post unestablished. Application forms from **M.L.N.S., TECHNICAL AND SCIENTIFIC REGISTER (K), 26, KING STREET, LONDON, S.W.1,** quoting F.228/53A.

JOHNSON, MATTHEY & CO., LIMITED, require **PROCESS CHEMISTS, ANALYTICAL CHEMISTS** and **PROCESS METALLURGISTS,** of B.Sc. or equivalent standard, for their non-ferrous extraction works at Enfield. Both junior and senior positions are available, but candidates for the senior positions and those over 26 years of age should have experience to offer in this field. Salary according to experience. Appointments are to the permanent staff and carry superannuation, marriage and family allowances. Applications should be addressed to **THE SECRETARY, 78, HATTON GARDEN, LONDON, E.C.1.**

PUBLIC COMPANY in **MANCHESTER** area, manufacturing supplies including chemicals for Rubber and Allied Industries, invites applications from suitably qualified men for **SALES DEVELOPMENT** involving liaison between customers and the Company's technical departments.

This is a new appointment and the successful candidate having the necessary background, experience and drive will be given interesting work, good commencing salary and prospects, participation in Company's Pension Scheme and opportunities of travel in U.K. and Europe.

QUALIFICATIONS are : Age not over 35 ; University Degree or equivalent ; personality and ability to deal with customers on matters of a technical nature.

Full details should be given of age, education, experience and salary required. Our present staff is aware of the vacancy. **BOX No. C.A. 3225, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

SITUATION VACANT

NORTH WESTERN GAS BOARD
LIVERPOOL GROUP
PRINCIPAL CHEMIST—GARSTON WORKS, LIVERPOOL

APPLICATIONS are invited from qualified persons for the above pensionable appointment at a salary within Grade A.P.T. II (£690-£815 per annum), according to qualifications and experience.

Applicants should be members of an appropriate professional body, or possess a University Degree, together with experience in the fuel industries.

Detailed applications, giving the names of two referees, should reach the **CHIEF PERSONNEL OFFICER, NORTH WESTERN GAS BOARD (LIVERPOOL GROUP), RADIANT HOUSE, BOLD STREET, LIVERPOOL, 1,** within fourteen days.

BUSINESS OPPORTUNITY

AN EXCEPTIONAL OPPORTUNITY. For disposal through client's ill-health, the whole of the Issued Share Capital in young Company recently making highest-class English Graded Hard Wood Charcoal. There are no debentures or charges on the Company, but considerable trading losses are available for taxation purposes. Large stocks of wood are assured and complete plant includes Steel Kilns, Graders, etc. **BOX No. C.A. 3223, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating ; also lumps ground and granulated ; established 1830 ; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS : "HILL-JONES, BOCHURCH LONDON," TELEPHONE 3285 EAST.

FOR SALE

100

CYLINDRICAL TANKS

(250 to 850 Gallons)

OPEN or CLOSED

¼ in. PLATE

STRONGLY CONSTRUCTED.

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

FRESH emptied **HEAVY ROLLER SPIRIT DRUMS,** 60 gal. capacity. 300 available at £2 each, ex-works London. Apply **BOX No. C.A. 3224, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

PATENTS & TRADE MARKS

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

SPECIALIST ENGINEERS TO THE CHEMICAL AND ALLIED TRADES

WOODEN VATS, DRUMS and PADDLES
PUMPS of various types
DRYING MACHINERY
CHOPPING and CRUSHING MACHINES
AGITATING and DISSOLVING VATS
STAINLESS STEEL DRYING TRAYS
HANGING CLIPS for skins and leather board
SPECIAL PURPOSE MACHINERY

EDWARD WILSON & SON LTD.
Aintree Road, Bootle, Liverpool, 20

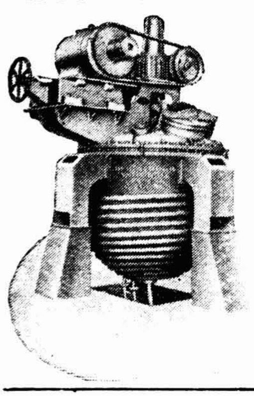
Telephone : Bootle 2291/2
Telegraphic Address : Motion, Liverpool 20

Empty Barrels & Drums

GENERAL AND EXPORT COOPERS AND DRUM RE-CONDITIONERS

T. H. FIELDING & SONS LTD.
KNOSTROP LANE, LEEDS 9
Phone : 22675 & 26394 Branch Works at Hull

For service and satisfaction



Let us quote for COMPLETE TAR PLANTS, NEW STILLS, RIVETED OR WELDED, Benzol Stills, Tanks, Jacketed Pans and all types of

STEEL PLATE WORK
for chemical processes

LEEDS & BRADFORD, BOILER CO., LTD
STANNINGLEY, near LEEDS

CAUSTIC POTASH, SELENIUM, FRENCH ROSIN

BEFORE COVERING YOUR NEEDS
CONSULT

ENGLISH EXPORTERS (LONDON) LTD.
9/10, Marble Arch, London, W.1.

COTTON BAGS

AND

LINERS for SACKS, BARRELS and BOXES

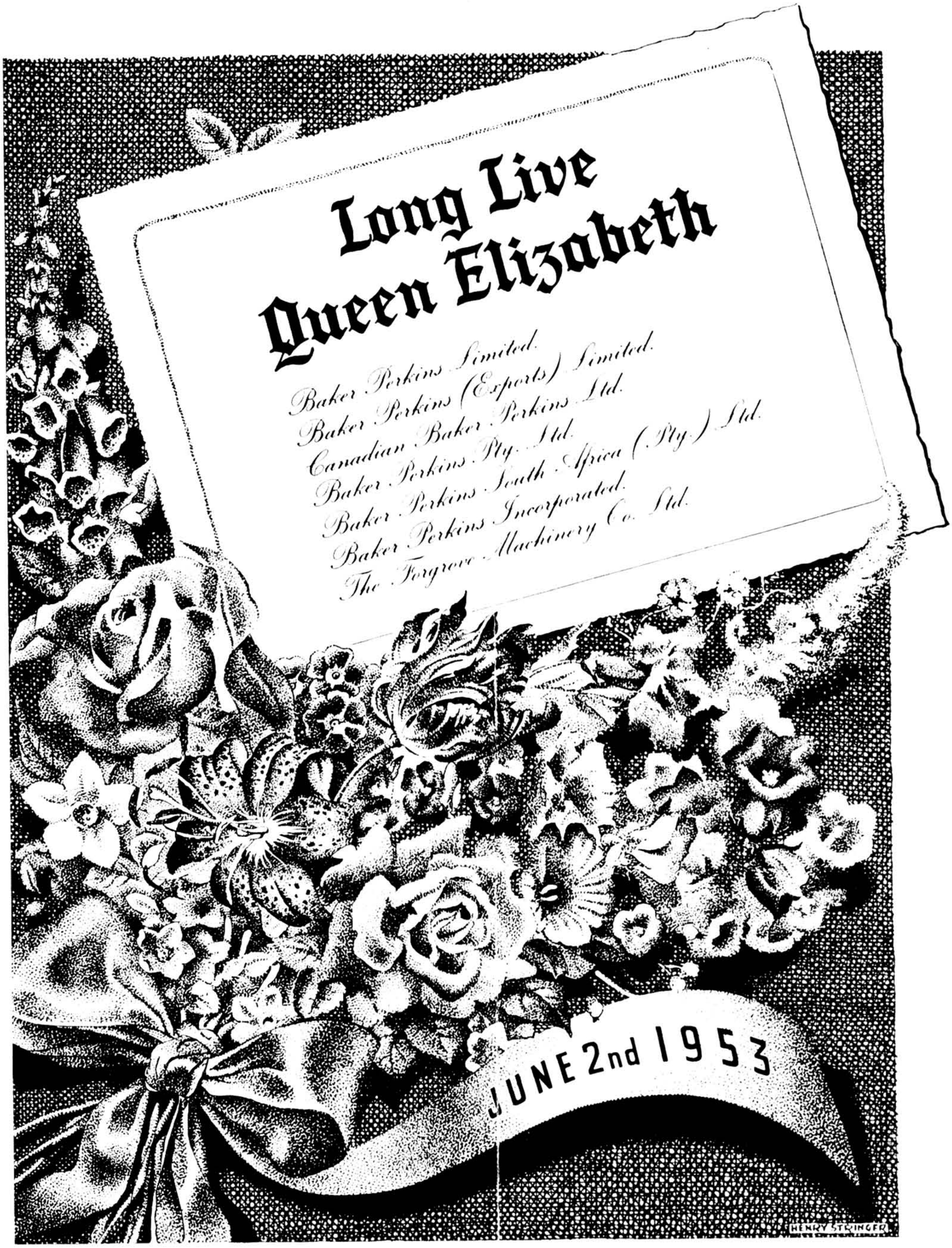
WALTER H. FELTHAM & SON., LTD.
Imperial Works, Tower Bridge Road, London, S.E.1

VATS
VATS
TANKS
TANKS

WOODEN

MAKERS :—

ROBERT AIREY & SON LTD.
" Kuvo " Works,
Kingsbridge Rd., Huddersfield.



Printed in Great Britain by THE PRESS AT COOMBELANDS Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 30 May, 1953. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.