THE Chemical Age

VOL. LXX 3 APRIL 1954 No. 1812

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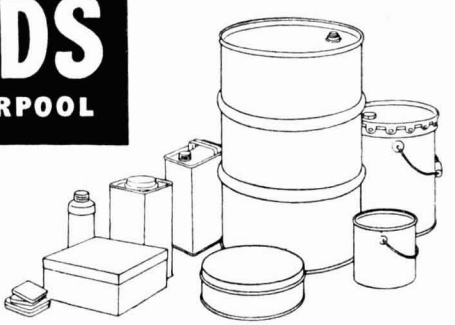

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Diet Supplements

AT ONE time it was man alone who indulged in diet supplementation, and anyone walking this pathway to health over-zealously was likely to develop giant-sized neuroses about food in general and eating in particular. Today, however, it is the turn of the animal to receive diet supplements. Any belief that the gross diet of the grosser beast achieves adequacy on broad 'Nature-knows-best' lines seems to be fading. There is no risk that the animals may develop complexes. Tiny phials of tablets are not arrayed at the sides of their feeding troughs; nor do they read morbid articles about what happens to them if they permit some alphabetical deficiency to persist. Their vitamin B_{12} or their antibiotics or both are given to them *table d'hôte*, a few milligrams per ton of mash.

The story of vitamin B_{12} is quite remarkable. It was not isolated until 1948 though its existence had long been suspected. It can be produced by fermentation processes closely resembling those for antibiotics. Vitamin B_{12} is at least a part of the active factor in raw liver that enables this not very palatable foodstuff to minimise the effects of pernicious anæmia. It will not cure pernicious anæmia but it appears to hold the worst effects at bay if small amounts are given each week. However, most of the market for vitamin B_{12} is found in its use as a feed supplement for pigs and poultry. According to a recent article on the production of vitamin B_{12} (*Industrial & Engineering Chemistry*, 1953, **46**, 238), total production in 1952 in the US was 94 pounds. The value of 1952 sales was $5,550.00; the year before, production was 84 pounds but this fetched $11,044,000. The fall in value would seem to reflect something more than increased competition; one would certainly not expect an output increase of only 10 per cent to reduce price by more than 50 per cent, especially with a substance whose use should be steadily expanding.

It is not yet known what vitamin B_{12} precisely is. It has 61 or 64 carbon atoms, 86 or 92 hydrogen atoms, 14 nitrogen and 13 oxygen atoms, a phosphorus atom and a cobalt atom. The presence of cobalt is particularly interesting for cobalt has long been one of those problem atoms in nutrition—apparently non-essential for plant-growth but indisputably vital for animal life. These anomalies of decision must always be cautiously accepted. Directly or indirectly the animal must derive its cobalt needs from cobalt in plants; yet plants do not need to take up cobalt from soils. The wise observer will perhaps not express total surprise if in 10 or 20 years' time he reads a communication announcing experimental proof that cobalt in a few parts per 1,000,000,000 is after all essential to plant existence. For animals, herbage must contain at least 0.08 parts per million of cobalt or such ailments as bush sickness, neck ail, and pining are likely to develop. The proof that cobalt is vital to animal life was one of the most fascinating achievements of Australian research, and it is regrettable that recounting it again here would be too obvious a diversion. Yet only recently we read a paper from New Zealand (*NZ Journal of Science & Technology*, 1953, **35**, [4], 301) describing the application of cobalt sulphate from aeroplanes on to pastureland otherwise difficulty accessible; 20 ounces of the salt per acre were given and the grazing animals have remained free from all cobalt-deficiency diseases for three years.

Perhaps, after all, it is not such a grievous diversion to talk about cobalt treatment for pastures. It has never been clear what the animal functions of this element are, though it has been known

that the cobalt tends to accumulate in the liver and plays an important part in rumen digestion processes. Perhaps the answer is simply vitamin B_{12}. No healthy animal can manufacture its own needs of this trace factor without enough cobalt in its diet, one atom for every molecule of the vitamin. We know, too, that vitamin B_{12} is produced in the fermentation processes of fæces, and one source now being studied on a pilot-scale in America is sewage sludge. Ruminant animals may well produce their own vitamin B_{12} in the bacterial processes that occur in the rumen; if so, that would also account for the long-recognised importance of cobalt for effective rumenal functioning.

To return, however, to vitamin B_{12}. It is now made by at least 10 US companies and various fermentation processes are used. They are *Streptomyces* fermentations so that variations in the organism used are variations of species and strain but not of family. As with antibiotics, production involves the magnification of laboratory methods of separation and refining, with considerable emphasis upon air sterilisation during the fermentation stages. For producing cattle-food supplements, final concentration of the broth by vacuum evaporation and drum drying rather than intensive purification is required. A finished product for this market may contain from 10 to 30 milligrams of vitamin B_{12} per pound.

For young chickens and young pigs, fed mainly on a vegetable diet, the value of vitamin B_{12} as a trace addition to diet seems to have plenty of supporting evidence. There is no doubt whether significant growth effects will be shown if the pigs before weaning have been adequately supplied with milk, and here it is not irrelevant to recall that the unknown 'animal protein factor' was in pre-vitamin-B_{12} days traced not only to liver extracts but to milk products as well. Also, vitamin B_{12} is microbially synthesised in dung, a new biochemical finding that may well explain why farmyard chickens and even some of our most domesticated animals so commonly elect to seek nutrition in manure heaps. Fundamental nature is rarely as purposeless as it looks!

Meanwhile, the antibiotic supplements for cattle food continue unfolding their somewhat separate story, and British tests now claim that more pigs per litter reach market weight and reach it earlier, that less food is needed per pound of bodyweight gained, and that such ailments as enteritis and scouring are much reduced in their occurrence. It would seem that whereas antibiotics have lengthened the span of human life they have shortened the span of pig life! The earlier marketing of good pigs is one effect, but the reduction of the mortality loss between birth and weaning, said to be as high as 25 per cent but brought down to 10 per cent with antibiotic supplementation, is an effect in the opposite statistical direction. Again the response is better and more consistent if the basic diet of the pigs is poor to moderate. In this country legislation controlling the sale of antibiotics and antibiotics-containing materials was modified to permit their use for pigs and poultry feeding only in 1953. Practical experience stands well behind American experience, therefore, but producers of penicillin and aureomycin materials are actively fostering the feeding-stuffs market. Whether there can be a similar boom to the US boom—with almost $17,000,000 paid for animal feed grade antibiotics in 1952—is doubtful. It may be necessary for the pig or poultry farmer here to reduce the protein standard of most diets before a genuinely economic response to antibiotic supplements can be shown. The farm market for antibiotics will be built up more slowly here.

By comparison with these modern offerings of biochemical engineering, the much older mineral feed supplements, ranging from materials like steamed bone flour to cattle licks and trace mineral mixtures, seem almost primitive. Science indeed showers diverse supplements upon the animal world and one is left wondering just what sort of animal would be finally grown if its daily diet was fortified by every one of them. One consequence needs little speculation, however. The modern feeding-stuffs industry must become more and more chemical, more and more dependent upon the skill and experience of chemists.

Notes & Comments

Fertiliser Legislation

LAST week's meeting of the Fertiliser Society was devoted to the law, and one of the largest attendances in the history of this vigorous organisation heard Mr. J. D. Westlake, a Government solicitor, deal with the legal aspects of the 1926 Fertiliser Act, and Dr. John Manning with effects of the Act upon manufacturing practice. The theme of the second speaker might perhaps be expressed inversely—as the effects of modern manufacturing practice upon the Act! For it was made clear that the 1926 requirements cannot be readily met if current mass-production methods are to be maintained.

Unusually Difficult

THE legislative problem is unusually difficult. It is essential for there to be some system of regulation. Without it materials of little nutrient value could be misrepresented and sold as fertilisers. Analysis declaration insofar as this affects plant-food contents is an obvious device. But complications pour in immediately the question is asked, by how much may the composition of a sample deviate from declared composition without illegality? Few fertilisers are based upon single chemical entities, and none as such are highly purified; most of them are mixtures. Modern continuous flow production must work to a specification, and the best that the fertiliser industry can do—without adopting extra processes of refinement that would add heavily to costs and prices—is to maintain an average composition from which random samples must inevitably deviate on either side, plus or minus, of the mean. Statistical studies have indisputably shown that even in the best circumstances when the utmost care has been devoted to controlling causes of variation, material that is more than 90 per cent in close agreement with specification may yet give the random sample in 750 or 1,000 with analysis dangerously outside the present permitted tolerances and perhaps still outside widened tolerances. It was significant that the only professional statistician who took part in the discussion regarded it as impossible to base a fair system of legislative control upon random sampling. Against this commendable and logical opinion, however, there must be placed the fact that an individual consumer may buy only one bag of the thousands of bags produced in a daily flow-line so that, commercially and legally, his purchase is in effect a random sample.

An Economic Problem

FUNDAMENTALLY the problem is economic. It could be easily solved but only at a cost that would discourage the use of fertilisers. The users of fertilisers, predominantly farmers, may well feel that industry should overcome these problems of variation in manufactured goods, but at the standard of purity set by the price level there must be a variation risk. It is not irrelevant to point out that farmers themselves are protected in milk composition legislation by 'an appeal to the cow' if a sample of milk is shown to contain less than the minimum legal standard of butterfat. The factors of variation in a mass-production low-cost flow-line are not appreciably different from the factors of variation that affect natural products.

Chemical Fibres

ACCORDING to the Commonwealth Economic Committee's latest survey, world capacity for synthetic fibres—excluding the semi-synthetics like rayon—will be 655,000,000 lb. a year at the end of 1954 as against 472,000,000 lb. at the end of 1953. Something approaching a 40 per cent rise in a single year is by no means a small change. However, the figures *in toto* are dominated by the US share, which accounts for nearly 5/6ths of the world output. The other dominant factor is the type of synthetic fibre, and here nylon by a wide margin continues to hold the leading place. British nylon production will rise to 30,000,000 lb. a year by the end of the

year, and 1955 should see a substantial upward jump with the expected operation of another new plant. No increase in Ardil production is estimated for 1954, but Terylene, whose present output is put at 1,000,000 lb. per annum, is estimated to rise to 11,000,000 lb. by the end of 1955 and to 22,000,000 lb. in 1956. These are production plans that should certainly fortify the hearts of those who talk gloomily about recession and depression.

Consumption Relatively Small

MANY people still tend to exaggerate the place of the chemical polymers in world fibre trade. Their total production at the end of 1953 was equal to 18 per cent of world wool consumption, or under 3 per cent of world cotton consumption. A more vivid comparison, perhaps, is that their 1953 production was only 12 per cent of the production of rayon. Their invasion is still marginal, and this is mainly a reflection of their higher price. A recent American article (*Chemical & Engineering News*, 1954, **32**, 924) emphasised the fact that almost 90 per cent of the US fibre consumption in 1953 was cellulose-based. In this generalisation cotton as well as rayon is classed as a cellulose fibre, but the total consumption taken for the calculation includes the usage of wool and silk as well as the usage of all the chemical polymer fibres. It seems unlikely that the world's wardrobes will ever be predominantly based upon simple chemical raw materials unless startling economies can be made.

Ministering Angel

WE are lucky in this country, with our temperate climate and our (moderately) high standard of living; and, paradoxically, it is a sign of our luck that we do not know so much as we should of the work of those organisations with the cumbrous titles of WHO, UNESCO, ILO and the rest. What British worker is aware, for instance, that next Wednesday, 7 April, is World Health Day? or that the International Labour Organisation and the World Health Organisation are this year saluting 'The Nurse—Pioneer of Health'? As David A. Morse, the Director-General of ILO, says in a message in *ILO News*, 'I could not permit the occasion to pass without special mention of the rapidly-increasing band of industrial nurses who are doing so much to make our mines and factories and other fields of industry healthier, safer and more comfortable. The modern industrial medical service relies on the factory nurse to keep the worker fit and to help protect his most valuable possession—his health. Without her calm and reassuring influence . . . the health, morale and earning capacity of industry today would be in a much sorrier state.' Our sentiments exactly—but we are a little doubtful what form the salute should take. Nurses in their hours of ease are not, we feel sure, 'fickle, coy and hard to please,' but what are we going to do next Wednesday?

ABCM & Work Study

THE complete proceedings of the Work Study Conference held under the auspices of the Association of British Chemical Manufacturers at Buxton last October have now been published, unexpected difficulties having delayed publication until now. Delegates have received their copies of the proceedings and further copies are available at 7s. 6d. each to ABCM members and 12s. 6d. to non-members.

To follow up the work begun at the conference, the council of the ABCM has appointed a Work Study Advisory Committee with the following terms of reference:—To stimulate and encourage the application of work study in the chemical industry; to advise on problems arising therefrom; and to report periodically to the council. The committee is constituted as follows: Dr. D. E. Wheeler (chairman), Burroughs Wellcome & Co., Mr. H. N. Dennis, The Distillers Co. Ltd., Dr. W. G. Hiscock, Imperial Smelting Corporation Ltd., Mr. J. Grange Moore, I.C.I. Ltd., and Mr. B. White, A. Boake, Roberts & Co. Ltd.

The committee is now actively engaged in determining its plans of campaign and would be glad to receive requests for advice on specific problems. Communications should be addressed to the director of the ABCM, Mr. J. Davidson Pratt, Cecil Chambers, 86 Strand, London, W.C.2.

Productivity— Some Practical Suggestions

Boake, Roberts' Director Addresses Conference

DURING the Second National Factory Exhibition which was held at The Horticultural Halls, London, 22-26 March, a programme of conferences was held under the auspices of the British Productivity Council. At one of these Mr. Bertram White, deputy managing director of Boake, Roberts & Co. Ltd., gave an address entitled 'Productivity —Some Practical Suggestions.'

Mr. White said that there had been too much talk and exhortation about why productivity in the country should be increased; what was needed was a much more thorough and active exchange of ideas about how to increase productivity. Industrialists were tired of being preached at but would very readily listen to practical suggestions for improving efficiency. There were innumerable things which management could do and to list them would be to make the talk sound like a catalogue. He wished to concentrate therefore on three important matters. They were work study, simplification and training.

Already in the discussion it had been made clear that the techniques of work study could improve almost every industrial operation. Work study could ensure more effective use of plant, materials, floor space and working capital. Work study, and in particular work measurement, could ensure that human effort was effectively applied and properly rewarded. Moreover, a management who used work study regularly would find that the systematic discipline of questioning everything would affect its own outlook and attitude.

Substantial Benefits Possible

There was a tendency to regard work study as something intricate and complex, particularly when it came to the detailed timing and rating of work, together with applications of incentive payment schemes. While it was true that many of the larger companies had carried work study to great lengths, nevertheless it was not difficult for smaller companies to begin from scratch. His own company had started work study just a year ago and were already experiencing substantial benefits. They had created a small specialist department with a technically trained staff who had also been through an intensive course of work study. Great care had been taken to explain to all levels in the business what was meant by work study and what it could do for the company. The interest of all had been engaged from the board to the shop floor.

Profitable First Attempt

As to results, on the first practical job tackled by the work study department it was found that by a reorganisation of lay-out in a plant which was being moved to a new location it would be possible to reduce costs at such a rate that the capital expenditure would be recouped in less than two years with a substantial addition to net profits annually thereafter. This had been brought about by the simplest method; studying techniques, using lay-out diagrams, string diagrams and so on.

In another department where there was considerable pressure for more output, method study had in less than six months added fifty per cent to the output at negligible additional cost.

His company was now sending foremen, junior managers, and some design staff, to short appreciation courses on work study.

Mr. White referred to his earlier experience with a special mission sent to the United States by the Anglo-American Council on Productivity to study simplification in industry. This meant deliberate and systematic reduction of variety of product in any one firm. Simplification was a very powerful tool for raising productivity. It could increase the length of runs on manufacturing plant and reduce time and material lost in changing over. It was easier to train workers to become highly skilled when the number of products was reduced. Simplification also assisted in releasing working capital tied up in idle plant, tools, components, raw materials and work in process. Administrative and clerical control of a business was greatly facilitated, while the research and technical effort could be concentrated more effectively.

Mr. White sketched out various ways in which management could establish the facts in a business on which a programme of sim-

plification could be based. Often the turnover was concentrated largely into a few items, while many items were selling at negligible volume, and in all likelihood at a net loss. Charts were shown demonstrating how to analyse gross profit in order to establish which sections of the products were unprofitable.

In his own company a large proportion of the product range had been dropped in recent months and already benefits were evident.

While the volume of production was higher than six months ago the number of orders handled had fallen by about one-third.. Simplification was one of the main ways in which managements could improve the efficiency of their businesses.

There was an increasing realisation that training was a matter affecting all levels of management from the top to the shop floor in addition to the operatives themselves. While many large companies had substantial training departments the smaller firms were often chary of undertaking systematic training, thinking they had not sufficient resources. There were, however, many facilities offered by outside bodies, such as the technical colleges and various specialist establishments in different parts of the country. His company had recently established systematic training of foremen. This consisted of technical courses on process chemistry conducted within the works by an experienced chemical engineer, together with short management training courses at a specialist outside establishment. In addition, foremen, and others, were sent from time to time on particular courses such as work study.

As regards middle and senior management, his company was now beginning to make use of various outside facilities such as the Administrative Staff College, Ashridge and Pendley Manor.

Training in management should be regarded as a long term investment designed to produce in the future a management more competent, better informed and thoroughly alive. There were signs in his company that what was being done, recent though it was, would lead to this desirable result.

Titanium & Zirconium

Former 'Chemical Curiosities'

ALTHOUGH titanium and zirconium were previously regarded as chemical curiosities, they are now very abundant, their manufacture on a commercial scale having been developed since the end of the war, said Dr. N. P. Allen, superintendent, Metallurgy Division, National Physical Laboratory, Teddington, when giving the first Keith lecture on 'New Metals' at the Heriot Watt College, Edinburgh, last week, under the auspices of the Royal Scottish Society of Arts.

Dr. Allen said titanium was the fourth most abundant of the metals useable in engineering, only iron, aluminium and magnesium being more abundant. Its ores were plentiful, and hundreds of millions of tons could be made available if necessary. Zirconium was less abundant, but was nevertheless nearly as common as chromium, and more common than copper.

Both metals when pure had excellent properties. They resisted corrosion very well, had melting points higher than that of iron, and when pure were tough and ductile. Pure titanium had much the same strength as pure iron, and zirconium was somewhat weaker, resembling copper. In addition, titanium was light: it was about one and a half times heavier than aluminium, but only two-thirds as heavy as steel.

Zirconium might be used in chemical plant, but its most interesting possibility lay in the field of atomic energy. Its nuclear properties were such as were required in thermal neutron reactors, and, in addition, it had good resistance to corrosion, and better mechanical properties at high temperature than other metals having equally good nuclear properties.

Its use might prove to be essential in atomic reactors designed to produce a high output of electrical energy, and in this case it would assume great technical importance.

Obituary

SIR STEPHENSON KENT, K.C.B., died in London on Saturday, 27 March, aged 81. After leaving school he entered the coal trade, in which he rose to a prominent position, being chairman of Stephenson Clarke & Associated Companies Ltd., and holding directorships in the Powell Duffryn group.

Scientific Instruments & Apparatus

Physical Society's Exhibition Opens Next Week

LATEST developments in scientific instruments and apparatus—many of interest to the chemical and allied industries—will be on view at the 38th exhibition of the Physical Society, which is to be held at Imperial College, Imperial Institute Road, South Kensington, London, S.W.7, from next Thursday, 8 April, until the following Tuesday, 13 April.

Professor R. Whiddington, president of the Physical Society, will open the exhibition on Thursday, but the period until 2 p.m. that day will be reserved for Fellows of the society and Press representatives. For others the exhibition will be open from 2-8 p.m. that day and on subsequent days as follows:—Friday, 10 a.m.-8 p.m.; Saturday, 10 a.m.-5 p.m.; Monday, 10 a.m.-8 p.m.; Tuesday, 10 a.m.-5 p.m. Admission will be by ticket only.

More Than 100 Stands

Because of space restrictions, the society has been obliged to limit severely the number of firms and establishments whom it could invite to exhibit. Even so there will be more than 100 exhibitors, but in order to compensate in some measure for the limitation a new section of the comprehensive exhibition handbook has been instituted in which firms describe items which could have been exhibited had there been space.

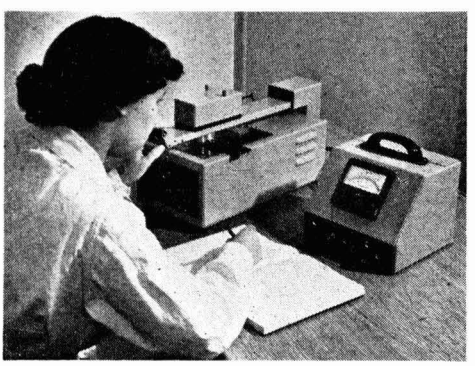
In addition to the exhibition, discourses or demonstration-lectures of approximately 45 minutes' duration will be delivered in the large physics lecture theatre as follows:—Thursday, 6.15 p.m., 'The Electrical Contact,' by Professor F. Llewellyn Jones (Department of Physics, University College of Swansea, University of Wales); Friday, 6.15 p.m., 'An Artificial Talking Device,' by Walter Lawrence (Signals Research & Development Establishment); Monday, 6.15 p.m., 'The Study of Surface Microtopography by Optical Methods,' by Professor S. Tolansky (Royal Holloway College, University of London).

The prizegiving in connection with the Craftsmanship & Draughtsmanship Competition will take place in the large physics lecture theatre at 4 p.m. on Thursday. Attention is also drawn to the fact that from 2 p.m. until 8.15 p.m. on Monday, 12 April, a symposium on 'Analysis, Synthesis & Recognition of Speech' will be held in the City & Guilds College (Imperial College) under the auspices of the Acoustics Group of the Physical Society, with Dr. Colin Cherry (City & Guilds College) in the chair.

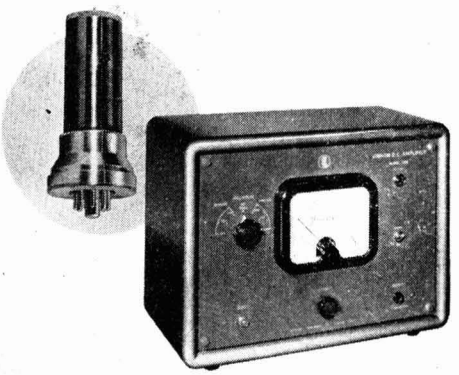
Brief descriptions of some of the exhibits follow:

Of particular interest among the exhibits of Baldwin Instrument Co. Ltd. (Stand No. 29) will be a densitometer and an absorptiometer. The use of the former for accurate colour density measurement has been made possible by the addition of special filters and the use of a specially selected photocell. In the absorptiometer eight spectrum filters and an interference wedge are used which reduce the bandwidth and increase the linear range well beyond that obtainable with spectrum filters alone.

Among exhibits by the research laboratory of the British Thomson-Houston Co. Ltd. (Stand No. 94) will be samples of new ceramic materials with unusually low loss at centimetre wavelengths, and new glasses with unusually low bulk resistivity. The ceramics have a dielectric constant around 6 and tan δ in the range 0.0001-0.0005 at 10 cm wavelength. The glasses make use of a new glass-forming oxide which imparts semiconducting properties to the glasses; the resistivity can be around 10^4 at room temperature.



Seen here in use is a densitometer produced by Baldwin Instrument Co. Ltd.



Left: The new EIL vibrating condenser D.C. amplifier with (inset) the Vibron unit. This amplifier has been developed by Electronic Instruments Ltd. Right: Ferranti portable viscometer with extended cylinder

A signal level meter which is a new dual purpose instrument for use as a general laboratory amplifier or sensitive valve voltmeter with internal calibration will be among equipment shown by Cinema-Television Ltd. (Stand No. 38). Also on view will be a flying-spot microscope, which is the first production model ensuing from last year's prototype; it has both an improved specification and performance.

Outstanding among a number of items to be shown by Dawe Instruments Ltd. (Stand No. 39) will be a new version of the standard Type 1101 ultrasonic thickness gauge, capable of measuring wall thickness where only one side of the wall is accessible. As the new instrument employs a higher range of ultrasonic frequencies, measurements can be made on thinner wall thicknesses than was previously possible with the standard model. The new range extends from 4 in. down to 0.02 in. thick (previously 0.06 in.) with improved accuracy over the standard model when measuring thin material in the overlapping range from 0.06 to about 0.02 in.

The Department of Atomic Energy (Stand No. 89) will show, among other exhibits, a very small scale working model of one type of electromagnetic pump which can be used for pumping any liquid metals such as mercury, sodium, etc. The model is claimed to be the perfect demonstration of the left hand, three finger rule used to determine the direction of motion of a conductor carrying a current in a magnetic field. Liquid metal can be pumped at a high temperature since all parts can be metallic, and as no parts are moving maintenance is negligible.

The availability of Merton-NPL replica diffraction gratings has made it possible to produce relatively inexpensive infra-red monochromators for chemical process control. One of these will be included in the wide range of exhibits of the Department of Scientific & Industrial Research (Stand No. 103). The monochromators may be adjusted to the wavelength of a particular absorption band, or a scanning device may be fitted to allow a limited portion of the infra-red spectrum of a material to be investigated.

A number of interesting developments covering both vacuum equipment and applications of vacuum technique will be shown by W. Edwards & Co. (London) Ltd. (Stand No. 51). The new vapour pumps which have been on field trial for some time are claimed to have proved their value to industrial vacuum pump users and are now in quantity production. Unique in Europe, their highest pumping speed is available in the vital industrial high vacuum region of 10^{-1} to 10^{-2} mm. of mercury. An unprecedented vacuum performance enables gas flow to be handled by a smaller backing pump and line, while baffle valves, demountable vacuum joints and other valuable features of the Speedivac vapour pump range are retained.

The most important development to be seen among the exhibits of Electronic Instruments Ltd. (Stand No. 18) will be the new vibrating condenser DC amplifier for the measurement of small currents and voltages derived from a high impedance source. The heart of the amplifier is the Vibron condenser unit, which the firm has been perfecting

for some years. This unit has a standard octal base and can be handled as simply as a conventional valve. The incoming DC signal is converted by the Vibron unit to AC and, after amplification, is reconverted to DC by means of a phase-sensitive rectifier. The Vibron amplifier will be shown in three forms—as a general purpose laboratory instrument, as an industrial *p*H meter and as a nucleonic weight gauge.

Equipment to be shown by Elliott Brothers (London) Ltd. (Stand No. 41) will include a high speed temperature indicator which has been developed for use in temperature measurement applications where rapid response to temperature changes is of importance. It is particularly applicable in multipoint installations where many variables need to be logged at a central control station, with the aid of a single instrument and switch. Another exhibit of interest will be an automatic temperature controller, which, although of a conventional galvanometric type of temperature indicator, has a newly designed sensing device.

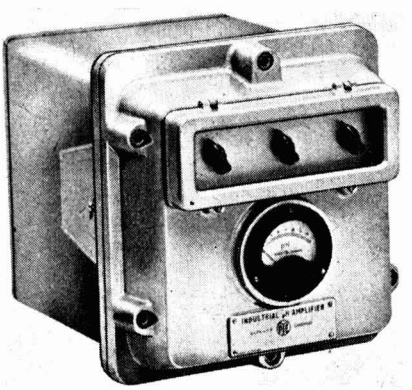
To be seen among instruments displayed by Evershed & Vignoles Ltd. (Stand No. 45) will be the Tinsley thickness gauge (dual scale), designed to meet the demand for a simple and inexpensive gauge which can measure the thickness of non-magnetic coatings such as paints or platings on ferrous bases. It consists of a specially light magnet attached to a spring and contained within a pencil-like tube. Other exhibits will include a Tinsley polarograph, with an ink-recording mechanism developed by Evershed & Vignoles, and a disappearing filament pyrometer.

A Ferranti portable viscometer which will be included in the exhibits of Ferranti Ltd. (Stand No. 95) has been modified to allow a continuous flow of liquid through the measuring annulus. A DC signal proportional to the viscosity is provided, capable of actuating standard recording and control gear. Features of the instrument include the ability to match the shear rate conditions obtaining in a process and zero step-up compensation giving expanded scale operation. Capable of being fitted to the standard portable viscometer are extended cylinders for measurements in deep tanks or low liquid levels, and thermally insulated cylinders for high temperature operation. Both types of cylinder will be shown.

Labgear (Cambridge) Ltd. (Stand No. 77) will, in association with Pye, exhibit instrumentation for nuclear physics applications and industrial counting. A typical installation embodying a fast-scaling unit, a stabilised EHT unit and a pulse amplifier/discriminator unit controlled by a Dekatron automatic timer, will demonstrate Labgear's new scintillation counter. The design of the counter head, with its detachable collimator, provides for use of the device either as a directive clinical or general assay detector. It permits of easy access to the 11-stage photomultiplier and cathode follower tubes and also to the thallium activated sodium iodide crystal normally employed for gamma analysis.

A wide range of scientific and industrial equipment shown by Mullard Ltd. (Stand No. 44) will include a selection of Geiger-Muller counter tubes, representative of recent advances in constructional design. Special argon and krypton filled tubes will be of particular interest for X-ray crystallography, and for the measurement of X-ray emitting isotopes such as chromium 51. There will also be a beryllium-window tube, and a gas or liquid flow counter of novel construction, intended for insertion in pipelines containing chemicals 'tagged' with a radioactive element.

The display by L. Oertling Ltd. (Stand No. 70) will feature their Model 125 Releas-o-matic Balance. This is an aperiodic projection reading balance with Multiweight device introduced during 1952 and incorporating the Releas-o-matic mechanism developed from the findings arising from the Oertling research laboratory investiga-



Industrial pH amplifier (W. G. Pye & Co. Ltd.)

tion into balance bearing materials and causes of wear. Model 124 of the same instrument is an analytical balance designed for rapid and accurate weighing to the third place and giving reliable and repeatable estimations in the fourth place.

An industrial *p*H amplifier intended for use by the chemical industry for indicating, recording and controlling *p*H values will be among the instruments shown by W. G. Pye & Co. Ltd. (Stand No. 71). The amplifier is mounted in a case, flameproofed to BSS. 229/1946. The circuit is basically that of the same company's direct-reading *p*H meter and full temperature compensation is provided. Particular attention has been paid to ease of maintenance and operating controls are fitted under a glass door, which may be locked. Any of the three ranges 0-8 *p*H, 3-11 *p*H and 6-14 *p*H may be selected by an internal switch. Controllers, recorders, indicators and alarms may be operated.

Experience in the manufacture of thermostatic water baths has convinced Techne (Cambridge) Ltd. (Stand No. 80) that while an electronic relay can give excellent temperature control, the life of the thermionic valve is comparatively short. In a new model bath (a prototype of which will be exhibited for the first time) the company has employed pneumatic amplification in place of 'electronics,' with a gain in sensitivity and reliability. Air control is the preferred means of amplification in the chemical processing industries, but never, it is thought, has it previously been employed in a self-contained water bath, due to the lack of a suitable miniature compressor. Tecne has round it possible to use the suction provided by the stirrer as a source of power, so succeeding in making a compact and reliable unit producing an operating force of about 8 oz. (225 grams), which is ample to operate a micro switch reliably.

Among exhibits shown by Unicam Instruments Ltd. (Stand No. 68) will be the pilot production model of a double-beam recording infra-red spectrometer shown last year in prototype. This model includes some optical modifications which do not, however, change the basic design of the spectrometer. The position of the source has been moved slightly, a second star-wheel has been added in the sample beam to improve beam equalisation and changes in the upper casting have been made to improve the vacuum characteristics. Advanced design features which have been maintained include automatic prism changes, star-wheel beam attenuation, magnetic slits and the Golay detector.

Kid Exemptions

THE Treasury have made an order exempting the following articles from Key Industry Duty, for the period 1 April to 18 August.

Tubing of neutral glass, not being coloured or borosilicate glass, in straight lengths, having an external diameter of not less than 8 mm. and not more than 35 mm. and a wall thickness of not less than 0.3 mm. and not more than 1.5 mm., and being capable of passing a test corresponding with the test for limit of alkalinity of glass prescribed by British Pharmacopœia, 1953.

*tert.*Amyl alcohol; 3-*tert.*butyl-2,6-dinitro-4-*iso*propyltoluene; 2,6-diaminopyridine; diethyl 4-methyl-2-*iso*propyl-6-pyrimidyl thionophosphate; ethylene glycol monobutyl ether; monofluorobenzene; lithium carbonate; phosphorus pentasulphide containing not more than 0.06 per cent by weight of material insoluble in 6N ammonia solution; and sodium 2,4,5-trichlorophenoxide.

Setting an Example

Speaking at a works managers' conference at Southport last week-end, Mr. R. A. Banks, personnel director, I.C.I., commented that some managers were very lax about their time-keeping, which acted unfavourably on those who worked beneath them. Honesty in the simple things of life should be watched. There was an enormous amount of petty pilfering in factories and works, and very often the man on the factory floor had a higher sense of morality than those above him.

Rhodesian Cement Project

Costing £1,500,000, a factory capable of producing about 100,000 tons of cement a year is planned for erection near Salisbury, Rhodesia. A limestone deposit which has been proved in the neighbourhood is considered sufficient to operate one cement kiln for 40 years. A second kiln will probably be built if further deposits can be proved.

A Buoyant & Progressive Industry

ABCM Survey Shows Strides Made Since 1949

A PICTURE of 'a buoyant and progressive industry which, although once again meeting strong competition from the USA, Germany and Japan, continues to expand and confidently to plan still further expansion, steadily extending its range of products to meet the ever-changing needs of the economies of the world,' is presented in 'Report on the Chemical Industry, 1953,' published this week by the Association of British Chemical Manufacturers.

The report, which is intended to be regarded as a supplement to 'Report on the Chemical Industry, 1949,' is based on replies to a questionnaire sent to member-firms of the association, the firms concerned representing a total employed capital of £406,800,000. On the basis of numbers employed, the industry as defined in the report represents about one-third of the activities covered by the wider definition of 'chemicals and allied trades' used by the Ministry of Labour and National Service for its statistics.

All Rising Figures

Salient facts and figures reflecting the vitality of the industry are given as follow: capital employed has risen since 1948 from £230,000,000 to £406,000,000; total employment has increased from 141,817 to 151,349 and scientific staff from 6,176 to about 7,406; employed capital per employee was nearly £2,700 in 1952, compared with £1,600 in 1948; production has increased by 29 per cent in volume (compared with 15 per cent for all manufacturing industries), with an estimated increase in value of some 60 per cent; productivity has shown a marked increase — 21 per cent on a volume basis and 51 per cent on a value basis; annual expenditure on research and development increased from £8,500,000 in 1948 to £11,200,000 in 1952.

Although the first duty of the chemical industry is to cater for the needs of other manufacturing industries at home, it contrived to raise exports from £88,250,000 in 1948 to £151,700,000 in 1952. At the end of 1948 the total cost of all expansion schemes in view for the next five years was just over £190,000,000, whereas the comparable figure in 1952 was about £230,000,000.

When the 1949 report was compiled the industry was experiencing delays in the execution of its plans because of the strict control exercised over capital investment, the requirements of the Town & Country Planning Act, the shortage of steel and the slow deliveries of plant and equipment of most kinds. The present report points out that although these difficulties still exist, they are not now so serious. In particular, it is now much easier to get the necessary authorisation to proceed with a new project.

There has also been a considerable improvement in the availability of raw materials. In particular, the sulphur position, although still difficult, has been eased by the more extensive use of pyrites and of anhydrite and other home sources of sulphur-containing materials, together with greater economy in the use of sulphuric acid.

The report stresses the scarcity of scientifically and technically trained personnel of all kinds. This, it says, hampers the industry in its development and in the drive it is making for increased productivity. Perhaps pessimistically, the report adds: 'This problem is not likely to be solved quickly.' Attention is also directed to the rising costs of fuel and transport which are seriously affecting the competitive position of all branches of British industry.

Nevertheless, the report concludes on this optimistic note: 'In invention and discovery the British chemical industry is second to none. Its future progress will spring from the discoveries now being made, in the laboratories of the many firms who have contributed to this report, and will be determined by the courage, imagination and enterprise of their managements.'

Sunvic Controls Ltd. have announced that consequent upon increased sales and improvements in design and manufacturing technique, they have been able to reduce substantially the prices of their high speed potentiometric recorders. The new prices are: single point model, £225; multi-point model (2, 4, 8 or 16 points), £325.

The Export Situation

Organic Synthetic Compounds the Backbone of Business

IT is impossible to compare February with other months in matters of business or output, as the smaller number of trading or working days will seriously affect the monthly total. Comparing British chemical exports with those a year ago, however, it is possible to claim a certain improvement, as the accompanying tables show. The increases in trade with Australia and New Zealand are very welcome, and the continuing increases in exports to Scandinavian countries. Business with the US continues to decline.

The commodity break-down shows that business in alkalis continues more steadily than last year, and calcium compounds are still rising. Demand for ethyl and methyl alcohols remains considerable, but there is a marked falling-off in benzol and creosote oil. Exports of fertilisers are still well below last year's figures, and the main causes of the overall increase in exports are medicinal products and plastics materials.

TABLE 1
VALUE OF CHEMICAL EXPORTS IN £ : PRINCIPAL COMMODITIES

	Feb. 1954	Feb. 1953
Acids, inorganic	37,076	25,522
Copper sulphate	191,468	355,469
Sodium hydroxide	359,105	115,825
Sodium carbonate	113,936	97,053
Aluminium sulphate	18,885	17,289
Bismuth compounds	24,896	26,417
Calcium compounds, inorganic	66,402	47,624
Magnesium compounds	50,723	46,408
Nickel salts	51,386	63,667
Potassium compounds, ex. fertilisers, bromides and iodides	25,700	33,099
Glycerine	38,179	107,350
Ethyl, methyl, etc., alcohols	134,012	105,074
Acetone	51,779	62,213
Lead tetraethyl	243,848	366,340
Total for chemical elements and compounds	**3,944,343**	**3,540,336**
Coal tar	60,676	31,779
Cresylic acid	30,199	32,087
Benzol	44,180	366,106
Creosote oil	14,540	100,523
Total from coal tar, etc.	**177,642**	**453,385**
Indigo, synthetic	108,570	100,331
Total for synthetic dyestuffs	**710,785**	**739,889**
Medicinal and pharmaceutical products, total	**2,432,393**	**2,195,880**
Essential oils—		
Natural	32,176	30,591
Synthetic	35,982	30,056
Flavouring essences, etc.	64,109	79,105
Total for essential oils and perfumes	**1,430,945**	**1,313,068**
Ammonium nitrate	39,254	63,053
Ammonium sulphate	148,383	717,560
Total for all fertilisers	**249,873**	**850,318**
Plastics materials, total	**4,764,053**	**1,198,052**

TABLE 2
VALUE OF CHEMICAL EXPORTS IN £ : PRINCIPAL CUSTOMERS

	Feb. 1954	Feb. 1953
Gold Coast	289,321	319,638
Nigeria	263,664	247,020
South Africa	769,079	690,033
India	953,200	889,512
Pakistan	166,421	35,307
Singapore	223,421	273,455
Malaya	172,383	110,815
Ceylon	130,253	213,095
Hong Kong	245,339	489,846
Australia	1,377,113	601,734
New Zealand	364,280	202,905
Canada	409,435	436,823
Eire	536,571	538,302
Finland	147,815	66,819
Sweden	420,657	310,830
Norway	240,869	193,439
Denmark	328,712	374,768
Western Germany	281,948	313,403
Netherlands	546,455	579,287
Belgium	325,873	277,192
France	477,516	415,119
Switzerland	164,893	83,988
Italy	282,747	309,528
Greece	71,483	53,850
Egypt	191,420	26,920
US	442,064	898,801
Argentine	173,556	16,767
Total value of chemical exports	**13,664,799**	**12,960,803**

Forth Chemicals Expands

FOLLOWING the announcement last week (THE CHEMICAL AGE, 1954, **70**, 726) that three British companies are to manufacture styrene-butadiene resins, Forth Chemicals Ltd. have announced that they are proceeding actively with the expansion of their styrene monomer plant at Grangemouth. Capacity is to be doubled owing to the increasing demands for styrene monomer, notably for the preparation of polystyrene but also for the production of styrene copolymers and other plastic materials.

Forth Chemicals Ltd. was formed in 1950 by British Petroleum Chemicals Ltd. and Monsanto Chemicals Ltd. British Petroleum Chemicals is jointly owned by the Anglo-Iranian Oil Co. Ltd. and the Distillers Co.

Indian Newsletter

FROM OUR OWN CORRESPONDENT

IT is learnt that five leading industrial concerns in Bombay are interested in setting up new chemical plants for the manufacture of chemicals required in the textile and other industries. Efforts are being made to secure technical aid for this purpose from the United Kingdom and failing that from Japan. The Bombay Dyeing and Manufacturing Company will, it is understood, soon float a company for the manufacture of hydrogen peroxide, for use as a bleaching medium in the cotton textile industry, in place of bleaching powder and chlorine. The new hydrogen peroxide plant is designed to have an initial capacity of 720 tons per annum. Plans are being finalised in respect of three other chemical plants.

* * *

The Indian Tariff Commission is now inquiring, for the third time since 1945, into the need for protection and assistance to the caustic soda, liquid chlorine and bleaching powder industry in India. There are eight units manufacturing caustic soda by the electrolytic process with an estimated annual installed capacity of about 30,600 tons, while the actual production has only been 12,944 tons for 1952 and 7,221 tons for six months of 1953. The annual demand is estimated at about 58,000 tons; the actual imports have been 25,552 tons for April 1952-March 1953 and 17,041 tons for the six months April-September 1953. The installed capacity of liquid chlorine is estimated at about 15,100 tons whereas actual production has been 6,124 tons in 1952 and 3,348 tons for six months of 1953. There was no import of liquid chlorine. As regards bleaching powder there are only two units who manufactured 791 tons in 1952 and 735 tons for six months of 1953, though their full capacities amount to 8,170 tons. There were imports of 2,749 and 2,114 tons for the same periods respectively. The Indian industry complains of rising costs of production and inability to compete with imported products and requests various forms of assistance. The Tariff Commission will study all aspects and decide whether protection or assistance is needed. The Commission will also inquire into the defects in the quality of the products brought to its notice by major consumers. These relate to colour in caustic soda coming from the containers, a lower NaOH content of 93 per cent as against 98 per cent guaranteed by importers, diminishing strength of bleaching powder on storage and its non-uniform packing, and also impurities in raw materials.

* * *

A new heavy-media separation plant, erected at a cost of Rs. 2,500,000 (£187,500) by the British concern, the Central Provinces Manganese Ore Co. at Dongri Budrug, 80 miles from Nagpur, was commissioned into production by the Secretary of the Ministry of Natural Resources and Scientific Research of the Government of India. Madhya Pradesh contributes nearly 50 per cent to the entire manganese ore production in India. While the high grade ore is exported, it is estimated that more than 4,000,000 tons of low grade ore are lying in dumps. The new plant will upgrade the lean ore. It is expected that a second plant will shortly be set up in another mine of that State.

* * *

The Government of Mysore have entrusted the work of examining the Bellora Gold Mines to John Taylor & Sons, the proprietors of the Kolar Gold Fields in Mysore. The Government started working the Bellara mine, which is an ancient one, in 1944 and installed a locally fabricated stamp battery. Owing to insufficient liberation, the recovery has been only about 50 per cent. Low grade ore carrying 3 dwt. of gold has only been struck till now and it is felt that in the absence of modern machinery, crushing and recovery could not be efficient. The Government are planning an expenditure of about Rs. 1,700,000 (£127,500) for modernisation of the mill.

* * *

The Ministry of Production, Government of India is actively considering measures to raise the operational efficiency of the Sindri Fertiliser Factory, with a view to achieve the rated capacity of 1,000 tons of ammonium sulphate per day as against the present production of about 800 tons per day. The present price of the fertiliser is Rs. 290 per

ton ex factory and it is believed that additional production and the starting of subsidiary industries at Sindri will considerably bring down the cost of the fertiliser.

The Indian Standards Institution has issued a standard prescribing the requirements and methods of test for potassium metabisulphite (pharmaceutical and photographic grade) whose production was started in India recently. The Standards Institution has issued a glossary of terms relating to bitumen and tar and these products have been finding increasing use in the chemical and engineering fields. The Institution has also circulated draft standards for comments on the copper strip test for the determination of sulphur, the specifications for ferric chloride (technical) used in water purification and photographic work and anhydrous ammonia required in refrigeration and in manufacture of nitric acid and liquid ammonia.

* * *

In a symposium on 'Non Ferrous Metal Industry in India' held in Jamshedpur, papers were presented describing work on new complex chemical compounds of tantalum and niobium, complexing of metal ions for analytical procedures, chemical treatment of molten non-ferrous metals, thermodynamic aspects of chemical reactions, refining of aluminium and other subjects. At the 7th annual meeting of the Indian Institute of Metals, at Calcutta, the President (Mr. G. C. Mitter) discussed the rôle of metals in the mint and their refining techniques.

Instrumental Analysis

TWO special summer programmes in Instrumental Chemical Analysis, to enable chemists in USA industry and government laboratories to study the application of new instrumental techniques and methods in the field of applied analytical chemistry, are being arranged at the Massachusetts Institute of Technology.

The first, from 16-20 August, will be devoted to Electrical Methods of Instrumental Chemical Analysis; the second, from 23-27 August, will deal with Optical Methods of Instrumental Chemical Analysis. Both will be under the direction of Dr. David N. Hume and Dr. Lockhart B. Rogers, associate professors of chemistry at MIT, who are in charge of the Institute's instrumental analysis laboratory. They jointly direct an MIT research programme on instrumental analysis applied to elements formed in uranium fission and to functional group determinations of organic compounds.

New Australian Refinery

THE Shell Oil Company's new £A10,000,000 refinery at Geelong was officially opened on 18 March by the Governor-General of Australia, Field-Marshal Sir William Slim, who, by pressing a button, started petroleum flowing along a 36-miles pipeline to Melbourne.

Mr. J. W. Platt, a managing director of the Shell-Royal Dutch group of oil companies, said the opening of the plant marked the first concrete step in the plan of petroleum interests to spend £A,100,000,000 in Australia in the next 20 years.

The refinery has taken two years to build and a catalytic cracking plant is to be added. Scheduled for completion about the middle of next year, the plant will have a capacity of about 650,000 tons a year. The refinery's present output of 400,000,000 gal. a year will be stepped up to refine one-third of Australia's petroleum needs.

International Nickel Company of Canada Ltd.

Net earnings of the International Nickel Company of Canada Ltd. and its subsidiaries for the year ended 31 December last were $53,694,526, the third highest in the company's history according to the annual report. Nevertheless, they were lower than the previous year's earnings, which totalled $58,891,282. The decrease, despite a new sales record, is stated in the report to be due principally to the generally higher cost of labour and materials, and also to an increased provision for depreciation. The company mined 13,667,095 tons of ore during the year, the highest ore production in its history, compared with 13,248,593 tons in the previous year. On the subject of research, the report states that successful development of the pyrrhotite process represented another major advance in the treatment of nickel ores. The new plant now being built to treat pyrrhotite ores would initially treat 1,000 tons of nickel-bearing pyrrhotite daily. The plant is the first unit of an operation which will ultimately recover 1,000,000 tons of iron ore a year in addition to nickel.

Psychromatics for Safety & Efficiency

by K. R. GIBBINS (Holland & Hannen and Cubitts Ltd.)

PSYCHROMATICS is the study of the effects of colour and light in a building on the people who work there. Its application to colour and lighting schemes in industrial and commercial premises, schools and hospitals, creates an environment in which greater mental and physical comfort is enjoyed and thus it stimulates productivity, efficiency, safety and good industrial relations.

This definition summarises a technique which has developed to a high degree of efficiency during the past twelve years or so and is fast becoming an essential element in modern factory planning.

The increasing interest shown in this technique is not difficult to understand, for experience has clearly emphasised the undeniable fact that, if people are made mentally and physically comfortable they naturally do better work more willingly and, incidentally, with less conscious effort; while it is indisputable that improvements in industrial working conditions bring direct benefits to employees and management alike.

Although man has always been accustomed to the ideal conditions outdoors of a luminous sky and colourful surrounding brightness, it is unfortunate that all too often in the past he has created building interiors where the visual environment has been wholly unnatural. The combined technique of colour and lighting takes this theme of surrounding brightness indoors, giving a carefully graded brightness pattern on walls and ceiling and, as compensation for nature's colouring, machines and equipment coloured in light and balanced colours. This ensures good vision and the best pschological environment for the interior and the nature of the work going on in it.

A building so treated and furnished with an artificial lighting installation of efficient yet moderate size does not appear appreciably less bright at night than in the daytime. This demonstrates the axiom that illumination values alone can be meaningless where the appearance of the room and therefore the visual comfort is concerned, but that surrounding brightness means a great deal.

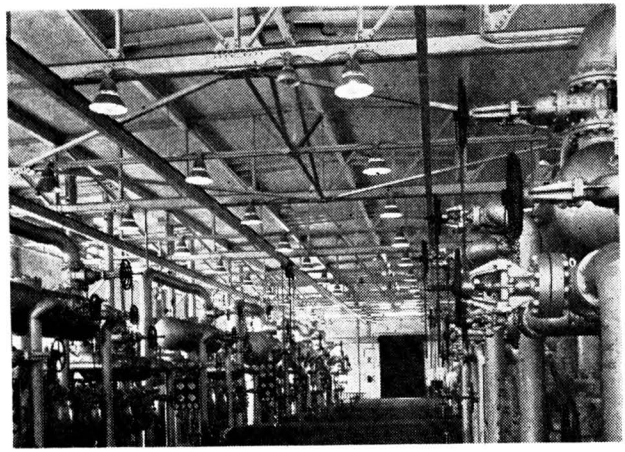
These fundamental principles are the key to good working conditions and while psychromatics was applied initially to the treatment of factories and workshops the technique is now finding a much wider field of application.

Light & Work

Although our eyes are often called upon to function under enormous variations of light intensity it will be readily appreciated that good vision is only possible under adequate lighting conditions. The amount of illumination necessary to perform a given task without eye strain is assessed in relation to the brightness of the visual field.

The critical area within this field may be the operating point of a machine, numerous kinds of manipulative tasks or the study of written or printed matter, and it is the size

Courtesy of Crompton Parkinson, Ltd.



General lighting by incandescent filament lamps in a petrochemical plant where the safety conditions are met by the use of flameproof dispersive fittings. This is an excellent example of safe overall lighting and illustrates the value of light-coloured surrounds and equipment for easy vision and light utilisation

Industrial Safety

and brightness of this object detail which are the deciding factors. The light and shade present in the object detail also influences its effective brightness, and therefore the ease of seeing, and this contrast may be one of colour or brightness or both.

Colour & Light

Another factor which exerts a considerable influence is the brightness of the surrounding areas, which include desk and bench tops, machine bodies, floors, walls and ceilings within the room. The most comfortable seeing conditions occur when the level to which the eye is adapted when concentrating on the work is not sensibly altered when looking up from the task and viewing any point in the normal field of view.

This obviously implies that the brightness contrasts must be carefully balanced and all traces of glare eliminated. The technique of psychromatics is to create these conditions by producing the correct distribution of brightness and colour on lighted surfaces by good lighting design and the selective colour treatment of machinery, equipment and surrounding areas. This scientific treatment of colour does not render obsolete the human attribute of colour sense, but it does eliminate guesswork by providing accurate data from which a satisfactory scheme can be evolved. The criterion is that the functional requirements must come first.

One example of this method of approach may suffice to emphasise the need for care. The use of complementary colours, taken from one of the standard colour wheels or circles, is well known, and of course the method is applied widely in decorative schemes. The exacting visual problems found in industry, however, demand a more scientific system of colour planning and use is often made of the 'after-image' retained by the eye when the retina has been saturated by a particular colour. When the immediate surround to the critical work area is matched to this in hue and tone it completely absorbs the after-image when the eye is brought to rest on it. Thus a common form of eye strain caused by colour saturation is minimised. At the same time the materials and objects being handled are clearly defined against this background by the difference in colour.

We should not forget also that the correct value of complementary colours in juxtaposition is a vital factor in industrial colouring and must be watched not only on the machines and critical work spaces but on the more distant surfaces of walls and ceilings, etc. Not infrequently this effect is deliberately exploited to direct attention to work areas of special concentration.

Colour Rendering

When colour and light are brought together in planning for visual comfort the problem is not only one of matching intensities with tone and colour; we have also to contend with the colour rendering properties of the light sources used. Daylight is not as a rule any problem by itself, but since almost all interiors need artificial lighting for at least a part of the working day a colour scheme has to be balanced for both forms of illumination and the difficulties encountered are invariably caused by the artificial lighting used.

Where extremely accurate colour rendering is called for in a factory or laboratory it is generally required only over a limited area in which case the work space is specially lighted and decorated accordingly.

When we come to consider the more common types of electric lamps widely used in industry we can summarise their characteristics in relation to colour schemes as follows:

Incandescent Filament Lamps.—Still the most widely used form of light source for all kinds of commercial and industrial premises and suitable for low to moderate lighting intensities, these lamps give an essentially 'warm' light which is somewhat distorting to very cool colours while enriching colours towards the red end of the spectrum. The light spectrum is however continuous and therefore does not give rise to violent distortion of any particular hue. Furthermore, the type of colour distortion introduced is one to which most people are accustomed by usage and find quite acceptable psychologically. These lamps are much used in chemical engineering works, for which purpose their enclosure in vapour and flame proof enclosures is a relatively simple matter.

It is not usually a difficult matter to plan a psychromatics scheme to be satisfactory under both daylight and incandescent lighting except perhaps where a very cool psychological atmosphere is aimed at.

Fluorescent Lamps.—These lamps are

becoming increasingly popular on account of their high luminous efficiency, long life, relatively low intrinsic brightness and self diffusing qualities. Their characteristics render them eminently suitable for medium to high intensity installations. They are available in several shades of white from the very warm 'mellow' to the cold 'northlight' colour match. The three most used colours for industrial and commercial interior lighting are warm white, natural and daylight, increasing in coolness in that order.

Warm white is much favoured for office lighting, and where the female element predominates, while natural and daylight tubes meet practically all requirements of factory use. A new colour recently introduced and known as the 'Deluxe' warm white has been designed to have the appearance of incandescent filament light while retaining the advantages of fluorescent lamp efficiency.

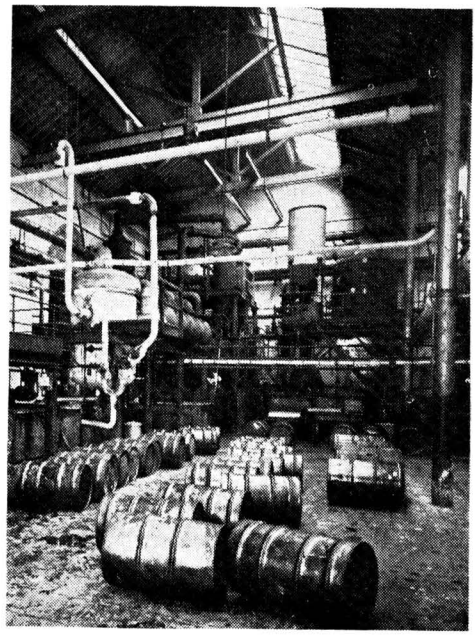
Colour rendering is generally good and it is on the whole easier to balance colour schemes with these lamps for day and night use with the proviso that some care is necessary when selecting certain hues in blue, yellow and deep red range when using the cooler lamp colours. Modern fluorescent fittings include types to suit all locations including dust-, vapour-, and flame-proof units.

Electric Discharge Lamps.—Mercury and sodium vapour lamps come in this group and both are line spectrum sources, i.e., they emit light energy at selected wave lengths only and not over a continuous band of colour as does the incandescent lamp. They both cause serious colour distortion but are, on the other hand, highly efficient sources and therefore a useful means of lighting very large areas in the most economical manner.

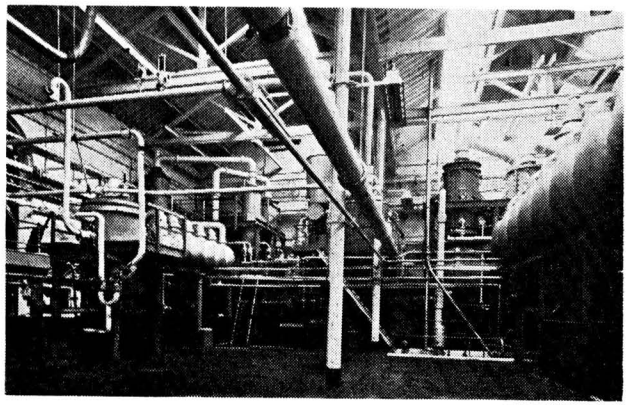
Industrial Safety

Using mercury lamps it is just possible to employ a colour scheme but only where a very cool effect is desired, such as for example in a foundry or other 'hot' interior. Then the greenish-blue light from these lamps combined with a limited scheme of cool colours can be turned to good account. Warm colours must be avoided, since red, for instance, is rendered as a chocolate brown.

If sodium lighting is used a colour scheme is virtually impossible except a yellow one



Courtesy of Lever Bros., Port Sunlight, Ltd.



Before and after the application of psychromatics: the interior of a refinery building at Port Sunlight

Industrial Safety

—for the light from this lamp is, to all intents and purpose, monochromatic. It is possible to obtain a form of semi-fluorescent paint for the treatment of fire equipment so that a near-red colour is just distinguishable in the sodium light, but otherwise little can be done. The sodium lamp is the most efficient light source commercially available and when employed for industrial lighting is chosen solely for this feature.

Mixed Sources.—Leaving aside the question of mixed light sources for commercial display work we are likely to meet several combinations of lamps in industrial installations.

(i) Mixed fluorescent, e.g. general lighting by, say, natural fluorescent with colour-matching lamps over machines or work benches for accurate colour discrimination.

(ii) Fluorescent and incandescent. The filament lamps may be used as ballast lamps in the same fittings as the fluorescent tubes or they may appear in bench lamps or as local lights on machines.

(iii) Mercury and incandescent. This combination is frequently to be found in high-bay shops and the filament lamps are either mounted in the mercury lamp fittings or in fittings adjacent to them. The object here is, of course, to improve colour rendering and when sufficient incandescent component is incorporated the effect can be very good. Such installations usualy employ high-wattage sources but where less powerful lamp units are feasible the new form of fluorescent-corrected mercury discharge lamp is worthy of attention. Often additional incandescent light is not then required, but when used a much smaller component suffices.

While on the subject of colour rendering it is well to bear in mind that a light source should not be judged solely on its appearance, since its self-colour is no reliable guide to its colour rendering properties. For example, a yellow filtered incandescent lamp can be made to look like a sodium lamp but colours viewed under them would look quite different.

Reflection Factors

Particular attention is paid to the upper walls and ceilings to procure the maximum degree of light utilisation and, having achieved a light ceiling, every effort must be made to ensure that an ample quantity of both daylight and artificial light is allowed to reach it to keep it bright. Features in the immediate lower field of view are generally satisfactory with a lower degree of reflectivity and, since these include machines, desk and bench tops which are subject to much handling, economy dictates somewhat darker colours. Even so, the reflection factor is not allowed to fall much below 25 per cent compared with 75 per cent for the ceiling, or the brightness balance is likely to be upset.

Colouring of Machinery

In most industrial plants machines occupy a large part of the interior and must be brought into the scheme for the colour treatment to be complete. Since they often form the major part of the field of view they may assume greater importance than the more distant walls and must be treated accordingly. This is especially true in chemical plants and oil refineries, etc., where large vessels frequently fill the greater part of the building.

It is recognised that such equipment must be preserved against rust and corrosion and will therefore be painted in most cases. It is only logical to paint in colours that will satisfy the visual and psychological requirements of the locale.

Prevention of Accidents

Many industrial processes by their nature create hazards for the people working on them, but in the chemical industry as in others every precaution will have been taken in the design and safeguarding of dangerous equipment. Accidents which do occur are often caused by a slackening off of energy and concentration brought about by fatigue particularly towards the end of the working period.

While it is not suggested that colour and lighting can cure this tendency it is nevertheless true that its principles do establish conditions for reducing the likelihood of accidents happening. The elimination of dark corners and heavy shadows improves visibility and lessens the chance of people falling—a frequent cause of injury—while the general tidying up of the factory space inseparable from a good scheme still further decreases the risk. The fact that personnel are more alert throughout the working period

contributes a further important safeguard.

The question of indicating hazards on equipment and elsewhere by means of colour is a controversial one but can be clarified by assigning to colour its proper place in the framework of safety measures. Machinery should be, as indeed it invariably is, rendered as safe as possible consistent with its proper performance by sensible design and the provision of physical safeguards. To paint in bright insistant colours large areas of properly guarded equipment is meaningless and confusing. Warning colours should be used with great discretion on such critically dangerous parts as cannot be physically safeguarded and on the inner parts of machines normally fitted with guards so that if the latter are opened or displaced the fact is strikingly obvious.

Although no internationally recognised safety colour code is in use and in this country the British Standards Institution has not found it possible yet to devise one, that issued by the British Colour Council is a useful guide and covers most requirements.

Much the same care is necessary in the application of a pipe identification code, the appropriate colour being best applied at essential points or intervals rather than along the entire length of a pipe or conduit. The codes published by BSI and BCC cover the needs of most industries, but on chemical plant a more extensive range of colours is often called for in order to identify the numerous services of complex equipment. If this is found necessary care must be taken to ensure that the code does not become too cumbersome to be readily understoood. It may well be preferable to use a simpler colour code with the addition of letters or numbers to extend its range when dealing with special piping.

The use of red calls for special care if its primary message, i.e., the location of fire-fighting equipment, is to be fully effective; it ought not to be used on equipment to indicate, for example, oiling points as is so often done. One questions also the advisability of painting red containers and cupboards housing inflammable materials; they might so easily be opened at the wrong moment. If this colour were confined to the marking of fire-fighting equipment only no confusion should arise.

While few managements are in the happy position of being able completely to replan their premises they can do much to improve existing buildings by the application of psychromatics. In the hands of specialists experienced in this work an economical scheme can be designed to suit almost any industrial location; it can be installed without upsetting the normal production programme in the factory, and it can be assured of a satisfactory life in service.

*Fire & Explosive Hazards—Part II**

by R. LONG, Ph.D. (Chemical Engineering Dept., University of Birmingham)

DISPERSIONS of oil in air can constitute a serious explosion hazard although the oil itself may be a high boiling point liquid such as lubricating oil. Such a hazard may possibly arise in machine shops and heat treatment shops, but particularly striking illustrations of the hazard are provided by experiences with large marine diesel engines. A number of crankcase explosions have occurred in motor vessels, perhaps the most serious being that which occurred on 11 September, 1947, in the motor vessel 'Reina del Pacifico,' a quadruple screw passenger vessel of 17,700 gross tons. This disastrous explosion resulted in the loss of twenty-eight lives and many were injured.

The vessel was undergoing sea trials after a complete refit and machinery overhaul when the explosion occurred. It appears that overheating of the piston of one cyinder led to ignition of the oil mist-air mixture present in the crankcase of one engine. The resulting explosion caused ignition of the contents of the crankcases of the other three engines and these exploded almost simultaneously. Many of the other crankcase explosions which have occurred aboard diesel vessels have been caused by hot pistons or bearings.

At the Court of Inquiry into the 'Reina del Pacifico' disaster, suggestions were made with a view to preventing a recurrence[21]. These included redesign of crankcase explosion discs, provision of a CO_2 gas system

* Part I appeared in THE CHEMICAL AGE, 1954, 70, 567, on 6 March.

Industrial Safety

for blanketing crankcases if overheating were observed, and remote recording of cylinder liner temperatures, together with a suggestion to increase the diametral working clearance of pistons in order to reduce the risk of overheating.

Although lubricating oils and similar materials such as hydraulic fluids would not normally be regarded as dangerous from the point of view of fire or explosion, there is now no doubt that they constitute a serious hazard when dispersed in air as fine mist or aerosol. H. Bara[22] carried out experiments upon oil mists in a large iron box designed to simulate an actual engine crankcase. It was shown that an atmosphere laden with oil droplets is capable of propagating flame and a red hot body introduced into such a chamber can cause ignition.

Burgoyne and Richardson[23] have determined the lower limits of inflammability for condensed oil mists in air and have found them to be within the range 42-56 mg./l. These figures are similar to those for the lower limits of higher hydrocarbon vapours in air, when these are expressed in the same way. (A number of these have lower limits of approximately 57 mg./l.).

Electrostatic precipitation is widely used in industry for removing incombustible dusts from gases and from time to time suggestions are made that the same method could be used for removing undesirable oil mists. (Equipment for this purpose is advertised in the USA.) The idea has, however, been discouraged in this country because of the difficulty which the user would have in ensuring that the oil would never be present in air in explosive concentrations[1].

The electrostatic precipitation of tar fog (fine particles of coal-tar) is standard practice in the gas industry, but in the removal of this from coal-gas air should be completely absent. Even under these conditions explosions have occurred in gas works due to accidental entry of air into the gas stream prior to the electro-detarrer.

Dust Explosions

Many operations in the process industries give rise to finely divided particles, and nearly all combustible solids when dispersed in the air as dust clouds are potentially explosive. Disastrous explosions have resulted from the accidental ignition of dust-air mixtures in many industrial operations.

Dangerous dusts include practically all carbon compounds, for example such miscellaneous materials as coal, flour, starch, cork, wood, sugar, cocoa, coffee, paper, rubber, and plastics. Metal dusts such as those of magnesium and aluminium and certain inorganic materials such as sulphur are also extremely dangerous.

Flames and sparks may act as igniting sources and static electricity either on some other body or on the dust particles themselves may lead to a discharge which can cause ignition. Cyclone separators, bag-type collectors and grinding equipment are particularly liable to dust explosions and the danger of coal dust explosions in mines is well known.

Principles Involved in Dust Explosions

Less is known about the mechanism of dust explosions than about gas explosions. One of the reasons for this is that it is difficult to obtain a uniform and reproducible dispersion of fine particles in air whereas gases readily form homogeneous mixtures. However, it is well-established that the concentration of dust in air must lie within certain limits in order for an explosion to be possible. Measurement of the lower limit of inflammability of dusts thus becomes of considerable importance.

Large scale experiments in galleries several hundred feet long have been carried out in order to study coal dust explosions. These have demonstrated the violence of such explosions and have enabled the effects of mixing stone-dusts with the coal dust to be studied. Small scale tests are, however, necessary as the large scale experiments demand special facilities and equipment.

Different investigators[24,25] have used different types of laboratory apparatus and there is nowhere near the same degree of standardisation as has been achieved in studying the limits of gaseous mixtures. The results are, however, of value for comparative purposes when different dusts are studied in the same apparatus.

In considering limits of inflammability it must be remembered that the heat of combustion per molecule of lower limit mixture is practically constant for many different gases and vapours. (The significant fact underlying Le Chatelier's rule for limit mixtures.)

The amount of heat generated during combustion determines the flame temperature

and although it is, as yet, impossible to decide whether flame propagation is controlled by heat conduction or by diffusion of active radicals into the unburnt mixture, flame temperature seems to be the critical factor. Egerton and Powling[26] have, in fact, shown that in the case of gaseous mixtures, flame is only propagated if a certain minimum temperature can be maintained in the flame boundary. Jones and White[27] also believe flame temperature to be the essential factor and have applied this concept to the case of dust explosions, and have assumed that normally dispersible dusts might be expected to be completely consumed when flame propagation occurs.

An interesting feature which they have pointed out is that the calorific values at the lower limits of some dust-air mixtures are exceptionally low. It certainly appears that propagation of flame in such cases does not involve the raising of both dust and air to the ignition temperature. According to Jones and White it occurs by virtue of local centres or 'hot spots' caused by the combustion of individual particles, the flame being communicated from one particle to another apparently without raising the main body of air to the temperature of the flame. Although volatility plays a part in dust explosions the idea that they are due to the production of a homogeneous vapour-air mixture is discounted. Burgoyne has suggested that radiation from the flame front to the unburnt particles might play an important part in dust explosions.

Some Features of Dust Explosions

It has already been pointed out that, for an explosion to develop, the concentration of dust must be within certain limits. It would, of course, be desirable to maintain the concentration of dust below the lower limit in any operation producing dust, but this is not always possible.

Moisture content of the dust and air humidity are both important factors, and if these are high, dust explosions are much less likely to occur. Particle size is important and fine dusts with greater surface area are far more liable to explosion than coarse dusts.

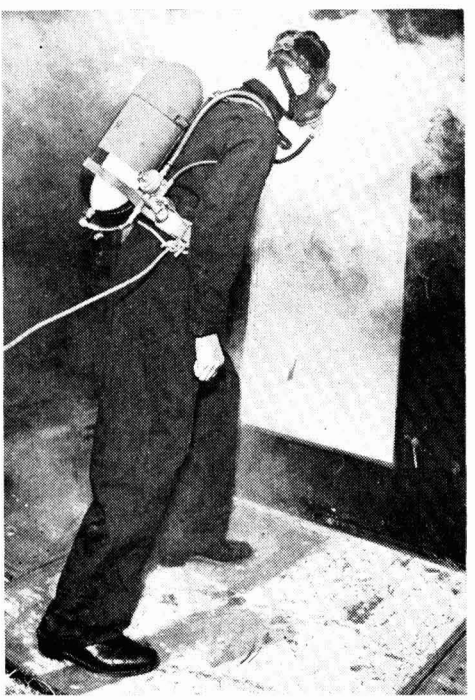
A particularly dangerous feature of dust explosions is that they can feed themselves by raising fresh dusts from ledges, rafters and so on. Thus dust explosions have been classified as (1) primary, confined to the locality of the original ignition; and (2) secondary, extending over a considerable area due to flame travel as the explosion feeds itself.

Industrial Safety

Coal dust explosions are a potential danger not only underground in mine galleries but also on the surface in coal cleaning plants and in pulverised coal-fired boiler plant. An extensive study of the problem has been made both in Europe and the US. and the main precaution adopted underground is the maintenance of a high incombustible content in the dust prevalent on the roads. This is achieved by the use of stone dust, usually ground shale, gypsum or limestone, and it has led to a marked reduction in the number of explosions.

Limestone and gypsum dusts are much more effective than shale and have the advantage of being free from silica (dusts of silica or siliceous materials cause fibrosis of the lungs and silicosis).

Underground mechanisation is increasing



A self-contained compressed air breathing apparatus, Mk. II, exhibited by Siebe, Gorman & Co. Ltd., at the recent Factory Equipment Exhibition

Industrial Safety

rapidly and this is leading to more rapid accumulation of coal dust. Continued investigation of such techniques as wet cutting and spraying with water or wetting agents is necessary. One of the difficulties of stone dusting is to secure complete mixing of coal and stone dust.

A cloud of coal dust can be ignited by a small flame, by electric sparks or by contact with a heated surface, and each has been the cause of explosion. In mines the most usual igniting source is a firedamp (methane/air) explosion which may be the cause of dispersing the dust in the air.

Danger exists in the handling or production of magnesium powder or dust and aluminium powder, and also in processes which involve the sawing, grinding or machining of castings or stampings made from magnesium or its alloys. One factor which makes the danger worse is that the powder of these metals becomes almost a non-conductor very soon after grinding, owing to a surface film of oxide. Finely divided magnesium is easily ignited by a spark or flame and such fires are not easily extinguished (cf. incendiary mixtures).

Flour milling, grain drying, starch manufacture and the fabrication of plastics are all industries in which dust explosions might occur unless precautions are taken. The detailed precautions to be taken in such cases are fully discussed in references given at the end of this chapter[25,28,29,30].

General Precautions

Certain general precautions apply to all plants in which there is a risk of dust explosions. These are briefly as follows:—

1. Design of buildings.

(a) Buildings should wherever possible be constructed as detached units.

(b) Beams, ledges or other members where dust may settle should be avoided.

2. Cleanliness.

(a) Storage bins should be used to prevent dusty materials from acting as a source of secondary explosions.

(b) Frequent cleaning, preferably by washing or vacuum cleaning methods, should be carried out.

3. Equipment.

(a) All equipment in which dusty material is produced or handled should be of dust tight construction; this includes such items as grinders, conveyors, and dust collectors.

(b) Some form of explosion relief must be provided on plant (for example on dust collectors and on ducting). One way of reducing the violence of an explosion in a dust conveying plant is to have release devices at intervals along the ducting. Such relief devices have been described by D. Matheson[31] and the Institution of Chemical Engineers have held a symposium on the subject of 'Bursting Discs'[32]. (See also THE CHEMICAL AGE, 1953, **68**, 167; **69**, 957.)

At the Safety in Mines Research Establishment at Buxton experiments have been carried out to study the effectiveness of hinged-doors. The door has an area of about one sq. yd., and carried on strap hinges it is supported against a vent in the gallery, where dust explosions are arranged. It has been found that with explosions of moderate violence, the hinged-door has been as effective in providing release as a fully open vent of the same area[33].

4. Sources of Ignition.

(a) All naked lights must be prohibited.

(b) All machinery must be earthed to avoid static electricity.

5. Use of inert gases.

A continuous flow of inert gas such as flue gas or carbon dioxide may be passed through such plant as grinding equipment, and pulverisers and other equipment where the hazard is serious.

Finally, the attention of readers is drawn to the 'Safety Rules for Use in Chemical Works' and the ABCM's Proceedings of the Conferences on Chemical Works Safety.

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Safety Notebook

STATUTORY regulations are in force covering the transport and storage of petroleum-spirit under the Petroleum (Consolidation) Act, 1928. A number of chemicals which are not derived from natural petroleum are covered by the definition of 'petroleum' in the Act, and those with flash points below 73° F., such as benzene and naphtha from coal tar, must be treated as petroleum-spirit.

Recent developments in petroleum chemistry have resulted in the production on a commercial scale of products, such as acetone, previously obtained from other sources, but the intervening chain of complicated chemical reactions places them outside the definition of 'other products of petroleum,' which covers only the primary distillation products.

The ABCM recognised some time ago that a number of these substances required precautions in handling and use. The position was different, however, as compared with petroleum-spirit because the storage and transport regulations for the latter are intended for places such as garages, etc., where the primary object is the protection of the public. The majority of the chemical products considered are used for further processing in factories where access by the public does not arise, and the technical problems involved are obviously very specialised.

The Association, therefore, suggested to the Explosives Department of the Home Office and to the Factory Department of the Ministry of Labour and National Service that it should draw up a voluntary Code of Precautions for the 'Storage and Use of Highly Inflammable Liquids' which are not subject to the Petroleum Act. This offer was in accordance with the general policy of the Association in such cases and was welcomed by the departments concerned.

Representatives of both large and small companies with special experience in this field have co-operated over a period of two years in drafting the Code and close contact has been maintained with the Government Departments concerned and the Institute of Petroleum. The Code has been examined by HM Chief Inspector of Explosives and HM Chief Inspector of Factories who agree that it forms a sound basis for precautionary measures in the use and storage of highly inflammable liquids.

Copies of the Code, Safety Circular No. 97, can be obtained from the office of the Association, price 2s., post free, cash with order. Orders should be sent to the new office of the Association, Cecil Chambers, 86 Strand, London, W.C.2.

* * *

SIR George P. Barnett, HM Chief Inspector of Factories, is addressing the Institution of Works Managers at 7 p.m. on Thursday, 8 April, on 'Factory Safety and the Works Manager's Responsibility in that Field,' at the Waldorf Hotel, London, W.C.2. The meeting will again be an open one, giving an opportunity to all interested in safety in the works to hear the subject discussed at high level. No tickets are required.

* * *

THREE men were killed and four injured in an explosion at the I.C.I. explosives factory at Ardeer, Stevenston, Ayrshire. In an official statement later I.C.I. (Nobel Division) described the explosion as 'serious' and said that it occurred during a denitration operation. A building was destroyed and others were showered with debris. Huts are isolated and set partially underground to minimise the blast in the event of an explosion.

* * *

CHEMICAL Safety Data Sheet SD-56, published by the Manufacturing Chemists' Association Inc., 1625 Eye Street, NW, Washington 6, D.C., gives properties and essential information for the handling, storage, use and waste disposal of vinyl chloride. There is a section on health hazards and their control. It is stated that vinyl chloride is not a serious industrial hazard provided precautions are taken to avoid leaks or spills. Employees should be repeatedly warned of the anæsthetic properties of the gas and instructed what to do if anæsthetic effects are detected.

* * *

AT a recent dinner at Gourock, Mr. Guy Chipperfield, chairman of the British and Oil Cake Mills Ltd., presented

Safety Notebook

to the Greenock mill the W. W. Cooper Accident Prevention Trophy, awarded annually to the oil mill in the group with the lowest accident frequency rate. The Greenock mill in 1953 had the remarkable achievement of going through the year without a single accident. Mr. C. A. C. de Boinville, Scottish area manager, who presided, said that a great deal of their success had been due to Mr. W. Smith, mill manager, and his committee 'getting across' to every member of the staff the whole aspect of accident prevention. In addition to the Cooper trophy the Greenock mill secured the firm's accident prevention improvement plaque which goes to the mill achieving the greatest reduction in accident frequency compared with its average over the three previous years or the rate with which it had previously won the plaque.

* * *

FIREMEN and chemical engineers have been seeking the cause of an explosion which damaged a sulphur-processing plant at Hardman and Holden's Chemical Works in Colliery Street, Bradford, Manchester. Six night-shift men who were working there staggered out unhurt. The explosion was heard half a mile away. Some blast damage was done to an adjoining shed in the works. Manchester fire brigade was called to deal with small fires that broke out.

* * *

A NEW British Standard, 'Canister Respirators ("Gas Masks") and Dust Respirators ("Dust Masks")' (BS. 2091:1954) applies to canister respirators and dust respirators which give protection against only a limited range of hazards. It is intended that this standard shall be amplified from time to time as further knowledge becomes available. In its present form it covers hazards, encountered principally in the petroleum industry, but many of the hazards listed are encountered in other industries. The standard specifies construction, marking and test requirements for canister respirators ('gas masks') affording protection against the limited concentration of the gases listed, against each of which is listed the respirator canister which will give protection or, alternatively, the recommendation to use breathing apparatus; it also specifies requirements for respirators ('dust masks') giving protection against dusts. It embodies recommendations in an appendix for dealing with other hazards beyond the scope of canister and dust respirators and describes suitable equipment. Copies of this Standard (4s.) may be obtained from the British Standards Institution, 2 Park Street, London, W.1.

* * *

SINCE the war there has been a great increase in the use of building boards as internal linings for walls and ceilings. These boards have many advantages but when used in certain ways some can contribute to the rapid growth of fire, particularly during the early stages. In view of the importance of these materials to the building industry, it is essential to know where they may be used with safety. Experiments have been carried out at the Fire Research Station to assess the fire hazard of different types of board and the efficiency of various flame-retardant treatments. The results have now been published in 'Fire Hazards of Internal Linings' (obtainable from H.M. Stationery Office at 1s. 4½d., post paid). It was found that the most important effect of fire retardant paints lies in preventing the ignition of boards by small sources of ignition and by retarding the development of fire in the early stages, when every moment is precious. Many are less effective in stopping the spread of fire once some of the furniture is alight.

* * *

IN the interests of safety, W. & J. Becker Ltd., the laboratory furnishers, have issued a warning notice for display in chemical laboratories in which students or other young persons have access to the chemicals cupboard. As well as laying down a few safety rules the notice also gives one or two very brief first aid instructions.

* * *

WITH the increasing use of radioactive isotopes by industry, the medical profession, and research laboratories, it is essential that certain minimum precautions should be taken to protect both users and the public. A new handbook, No. 53, 'Recommendations for the Disposal of Carbon-14 Wastes,' has been published by the US National Bureau of Standards, Washington, and its contents represent what are believed to be the best available opinions on the subject at present. One of the greatest difficulties, says the preface, lay in the uncertainty regarding permissible radiation exposure levels, parti-

cularly for ingested materials, and if the figures given in the report can subsequently be improved upon, appropriate corrections will be issued.

* * *

A NUMBER of pamphlets of interest to those in the chemical industry are obtainable from the Fire Protection Association, 84 Queen Street, E.C.4. Recently received at this office were a booklet describing the work carried out by the Joint Fire Research Organisation at Boreham Wood; a reprint of a paper by Dr. D. J. Rasbash on 'The Problem of Smoke in Fire Fighting'; a reprint of 'Protection of Flammable Liquid in Open Tanks' by A. Bailey and R. J. French, which deals with foam generation; and another reprint by Dr. Rasbash on 'The Production of Water Spray of Uniform Drop Size by a Battery of Hypodermic Needles.'

* * *

THE motto of Siebe, Gorman & Co. Ltd. is 'Everything for Safety Everywhere.' On first acquaintance this might appear to be a sweeping and somewhat rash statement, but one has only to study the firm's new catalogue to think differently. Within its 180 pages the industrial safety officer will find a full description of a very wide range of equipment. Section 1, for instance, contains illustrations and details of self-contained breathing apparatus (both oxygen and compressed air types), cylinder-charging pumps, oxygen testing apparatus, flow meters, etc. Section 2 deals wih smoke helmets and masks, short distance breathing apparatus and compressed air line respirators. The third section contains particulars

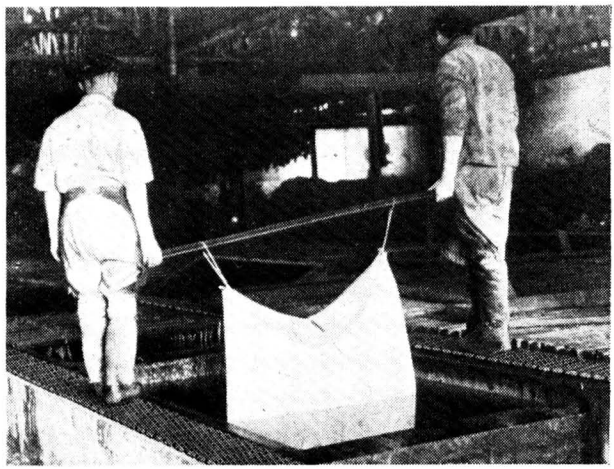
Safety Notebook

of numerous dust and gas respirators and fume masks. There is a choice of 15 canisters with the Puretha Mark IV gas respirator and one of these gives protection against no fewer than 24 dangerous gases and vapours. Seven other sections are taken up by descriptions of protective clothing, fire extinguishers and fire fighting equipment, first aid outfits, resuscitation apparatus, and miscellaneous equipment. Twenty pages are devoted to head and eye protection, 10 pages to hand and arm protection, eight to foot and leg and 14 to body protection. The catalogue also contains useful notes on factory legislation for protective requirements and notes on use and selection of breathing appliances.

* * *

AT a conference to be held by the British Occupational Hygiene Society at the London School of Hygiene and Tropical Medicine on 6 April beginning at 11 a.m., the following papers are to be presented:—'The Investigation of Atmospheric Contaminants in Factories,' by M. W. Goldblatt, M.D., Ph.D., D.I.H., head of industrial hygiene laboratories, I.C.I. Ltd.; 'The Measurement of Dust Exposure,' by B. M. Wright, M.A., M.B., of the Pneumoconiosis Research Unit, Medical Research Council; and 'Permissible Levels of Exposure to Ionising Radiations and Radioactive Materials,' by W. G. Marley, M.Sc., Ph.D., head of the division of health physics at AERE.

[*Courtesy of Northern Tanning Co., Ltd.*



'Nuway' industrial matting, made by the Nuway Manufacturing Co., Ltd., Coalport, Shropshire, makes for surefootedness on narrow slippery alleways. The photograph shows its use in a tanning pit

Cheaper Sulphuric Acid?

US Engineer's Suggested Economies

THE conclusion that the USA sulphuric acid industry, which consumes between 70 and 80 per cent of all sulphur produced in the country, could save an average of 60 cents per ton of acid by improving its sulphur handling methods, has been reached by Mr. Seymour Schwartz, president of a New York company of consulting engineers, after making a 7,000 miles tour of the principal US sulphur producing and consuming plants.

He admits that such a saving seems small when compared with a selling price of about $22 per ton of 98 per cent acid, but points out that when it is remembered that in 1953, for example, approximately 13,000,000 tons of acid were produced from sulphur in the US, the saving is of the order of $6,500,000 a year.

Among the ways in which substantial economies could be effected, Mr. Schwartz suggests the following:—

Substitution of heavy equipment for dynamite in breaking up sulphur piles before shipment.

Pumping liquid sulphur over the top of sulphur stockpiles and allowing it to run down and harden, thereby forming a protective skin over the surface and eliminating much of the loss normally due to the effects of wind, rain and dust.

Transport and storage of sulphur as a liquid instead of a solid, thus eliminating both the previous losses and saving industry an estimated $3,000,000 dollars on material alone and double that amount on labour.

Improvements in processing techniques, such as by installation of flue recovery units, special filters and spray eliminators, and chromium-aluminium plating of the insides of flues, all of which would together save about $2,000,000 a year.

Substitution of larger particle-size catalysts—thus reducing power costs—and substitution of catalyst beds in plants having hot gas filters.

Mr. Schwartz's suggestions have aroused considerable interest in the US.

Challenge to US Industry

A CHALLENGE to American scientists to convert surplus farm products into items useful in homes and factories was issued by Mr. Walter Williams, Under Secretary of Commerce, at the national meeting of the American Institute of Chemical Engineers in Washington recently. Enough natural gas was wasted each year, he said, to heat 11,000,000 homes, and industry lost more sulphur up its smokestacks than it used. Devising means to cut down these losses and thus conserve limited supplies could greatly benefit the nation.

Many of the country's future needs could be met by extracting nitrogen from the air to make fertiliser, magnesium from the sea and aluminium from the soil to make the light-weight metals so vital to aircraft production, and silica from the earth to make glass fibres.

Mr. Williams also noted that the chemical industry was pouring huge sums into plant expansion and research projects. In 1953 alone the industry invested $1,600,000,000 in new plants and equipment and spent $370,000,000 on research.

Poisons List & Rules

A NOTICE issued by the Home Office draws attention to the Poisons List Order, 1954 (SI. 1954 No. 266) and the Poisons Rules, 1954 (SI. 1954 No. 267) which were made on 8 March, and were brought into operation on 1 April. These Statutory Instruments amend the Poisons List and Rules as follows: *The Poisons List*: To Part I of the Poisons List Order 1953 (SI. 1953 No. 1300) after the item 'Tribromomethyl alcohol,' there is added 'Tri-2(-chloroethyl) amine; its salts'. *The Poisons Rules* (SI. 1952 No. 2086): (i) To provide recognition for the National Formulary, amendments are made in Rules 2 (1), and 18 (1), (2) and (4); (ii) 'Tri-2(chloroethyl) amine; its salts', is added to the first and fourth schedules; (iii) the entry for sodium nitrite in Group II of the Third Schedule is amended to provide exemption for preparations containing not more than 0.1 per cent of sodium nitrite for the destruction of rats or mice. Copies of the Poisons List Order 1954 (2d. net) and of the Poisons Rules 1954 (2d. net) may be obtained from HM Stationery Office or through any bookseller.

No Cause for Alarm

Interim Report on Synthetic Detergents

AVAILABLE evidence about the effects of the growing use of synthetic detergents does not justify any immediate alarm in users or the public health services. There is definitely nuisance at some sewage works, however, and there are other and more serious possibilities in relation to the efficiency of sewage treatment, the condition of rivers, and the purity of water supplies. These are the conclusions of the Interim Report of the Committee on Synthetic Detergents, appointed by the Minister of Housing and Local Government on 12 May last year. (THE CHEMICAL AGE, 1953, **68**, 768; 828.)

Extensive Consultations

The committee has drawn directly on the information and experience of the Water Pollution Research Laboratory, the Ministries of Agriculture, Housing and Health, the Scottish Department of Health, the Government Chemist, the Metropolitan Water Board, two of the larger sewage disposal authorities, and firms producing and using detergents on a large scale. Many other users and experts have been consulted, and the report says that investigations will be lengthy.

It was thought advisable, however, to publish the interim findings, in view of the public interest in the matter.

The committee's information is that washing products based on synthetic detergents may, like those based on soaps, lead to dermatitis on the hands of some users. Some physicians think that, in a few instances, the degree and type of dermatitis so caused are more acute than any known to be due to, for example, soap powders, but experiments indicate that irritation of the skin under normal conditions of use is relatively slight. Although it is possible that long-term effects of daily exposure may be more serious, the evidence so far shows that, despite the widespread use of synthetic detergents throughout the country, the incidence of dermatitis is not significantly greater than it was when soaps and alkalis were the only common washing products.

It is possible that minute traces of detergents remaining on crockery, etc., after washing up might get into food or drink; there is no evidence so far for ascribing any ill effects to it.

Complaints have been made about corrosion of domestic plumbing systems and the metal of various household appliances. The excellent cleansing properties of the synthetic detergents may, by removing films of grease or curd, either open up the possibility of corrosion where it did not exist before, or expose to view corrosion previously hidden.

Probably the most serious of the problems before the committee, the report states, are in respect of sewage treatment and the disposal of the resulting effluents. Foam is today being produced at many sewage works—sometimes to a height of several feet—during the stages of purification at which aeration occurs, and it is most marked at works where the activated sludge method is used.

At some works this foam causes not merely serious inconvenience, but danger to the operators, and constitutes a nuisance to the neighbourhood. In districts where a special process has been adopted to deal with particular industrial wastes, the presence of detergents may have important and peculiar implications; but fortunately there are few such districts. However, if the presence of these compounds in the sewage is causing a worsening in the quality of effluent at any works, there is cause for serious concern, particularly since many works effluents are discharged to rivers. The committee are giving special attention to this question.

Interim Report of the Committee on Synthetic Detergents, HMSO, 4d.

Chemical Exports

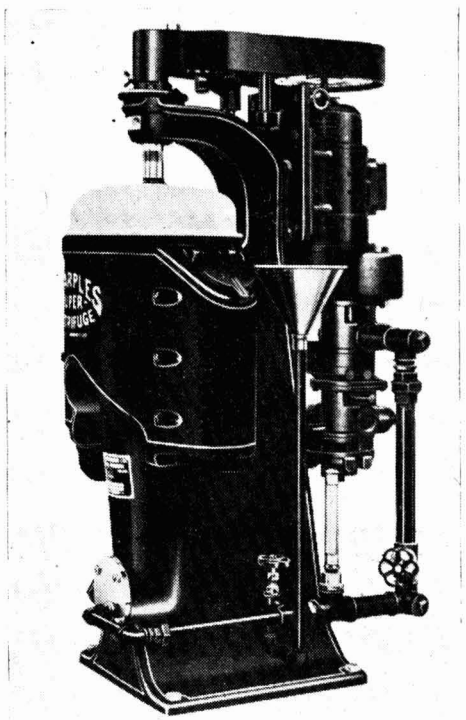
The *Board of Trade Journal* for 27 March contains an article on the trend of UK exports during 1953. In the course of this it is stated that apart from an increase in the first half of 1952, when the remainder of the sterling area was importing at an exceptionally high rate, the UK's share of world trade in chemicals (by value) has remained constant since 1951 at a little above the pre-war proportion. Over the same period the Germans have won back more ground from the US, which since the war has replaced Germany as much the largest world exporter. Western Germany is in fact the only major exporter which increased the value of its exports between 1951 and the first half of 1953.

Improved Centrifuge

A New Sharples Model

SHARPLES Centrifuges Ltd., Tower House, Woodchester, Stroud, Gloucestershire, announce a new addition to their range. This is the Sharples 18V centrifuge which is designed to operate at high liquid throughput capacities, and finds its application in the purification of a wide range of oils and other industrial fluids. The machine is completely enclosed to minimise the escape of vapours during centrifuging, and is capable of throughput capacities in excess of 1,000 gal. per hr.

Large collecting pockets are provided on either side of the frame, with an inspection port in the top of each. An aluminium cover prevents fumes of the material being treated escaping from the centrifuge during operation. Where pumps are required these are direct-driven from the centrifuge motor through a reduction gear, thus making a neat and compact unit. For the 18V machine a 3 HP or 4 HP motor is supplied depending on the centrifuge duty.



The same vertical motor drives centrifuge and feed, and delivery pumps

This new model incorporates the familiar and well-tried tubular bowl type of rotor, which is noted for its high efficiency, simplicity of construction, and ease of cleaning. It consists essentially of a hollow cylinder containing a 'three-wing' impeller; the bowl rotates at 15,000 rpm., and impurities in the fluid being treated are subjected to an accelerated settling force in excess of 13,000 G. Due to its design the bowl can be stopped, cleaned, and put back into service in less than 15 minutes.

The centrifuge can be supplied with two basic types of bowl depending on the purification duty. The 'separator bowl' is employed for separating two immiscible liquids and removing any solids contained in them; this type has two sets of outlet ports at the top for discharging the separated liquids, while the solids are retained in the bowl. The 'clarifier bowl' is employed where it is desired to remove solid impurities from a single liquid.

The centrifuge is particularly suited to the regeneration of insulating oil, the purification of all types of fuel oil, lubricating oil and cutting oil, and the treatment of such materials as rolling mill oil, wire drawing lubricant, etc. The basic design, however, is such that the machine is sufficiently versatile to be applied to almost any problem where it is desired to separate two immiscible liquids, or to remove particles of contaminating solids from a liquid or mixture of liquids.

The machine is available in stationary or portable form, and may be supplied with one or two pumps and with direct or indirect feed heaters where necessary.

G. Waddington & Son Ltd., of Newland, Hull, have announced the demand for their industrial gloves has grown to such proportions that production records are being broken almost weekly. The firm hope shortly to extend their factory so that additional machines can be installed.

• HOME •

Salt Works Closed

The salt works at Haverton Hill-on-Tees owned by Imperial Chemical Industries, Ltd., has been closed down. For more than 60 years the works produced salt by the open-pan method.

New Plating Alloy

In the course of a recent lecture at Rugby, Dr. J. W. Cuthbertson, assistant director of research, the Tin Research Institute, referred to the growing use of tin-zinc alloy, the new plating process which is being widely adopted by manufacturers for coating steel parts for protection against corrosion and rust.

Brewers' Exhibition

The Brewers' & Allied Traders' Exhibition will take place at Olympia, London, 4-8 October 1954. A comprehensive display of plant, equipment, and materials is planned. Once again, the national beer competitions will be an important feature. There will be competitions for draught and bottled beer.

Directorate of Non-Ferrous Metals

A Ministry of Materials announcement states that as from 23 April the remaining duties of the Directorate of Non-Ferrous Metals at Rugby will be taken over by the headquarters of the Ministry of Materials, Horse Guards Avenue, London, S.W.1, and correspondence should be addressed accordingly. Mr. R. F. Rucker, the present director, will retire from the public service at the end of April.

Employment Statistics

The latest issue of the *Monthly Digest of Statistics* gives the estimated number of employees in the coke oven, chemicals and dyes, and explosive and fireworks trades at the end of December last as 282,600, which is 100 more than at the end of the previous month. In the pharmaceutical and toilet preparations, perfumery, soap, etc., trades, the estimated figure was 105,800 (as against 107,300 at the end of November). For the paint and varnish industry the estimated figure was 39,600—the same as for November—while in the mineral oil refining, other oils, greases, glue, etc., trades the figure was 11,900—also the same as previously.

Petrol Prices Cut

Reductions in the prices of petrol and diesel oil were announced this week by all the major oil companies. The petrol price cuts apply only to second grades, which have been reduced by 1d. a gallon to 4s. 0½d. Diesel fuel for road vehicles (Derv) has been reduced by ⅛d. a gallon.

Atomic Energy Expenditure

Civil estimates published last week show that expenditure of the Atomic Energy Department in the coming financial year, estimated at £53,675,000, will include: salaries, wages, etc., £11,715,000; lands, buildings and works services, £14,351,000; plant and machinery, £13,114,000; and loans for the production of uranium, £5,180,000. New works to be started during the financial year are estimated to cost £17,698,000.

Tungsten Ore Dearer

The Ministry of Materials has announced that its selling prices for tungsten ores of standard 65 per cent grade and ordinary quality have been increased (from 26 March) from 120s. to 130s. per unit for wolfram and from 115s. to 125s. for scheelite. These prices are per long ton unit delivered at consumers' works.

Ehrlich Centenary Exhibition

As a British contribution to the world-wide celebrations of the centenary of the birth of Paul Ehrlich, Sir Henry Dale, O.M., F.R.S., last Thursday opened an exhibition of original apparatus and manuscripts at the Wellcome Research Institution. Many of the exhibits are from the Wellcome Historical Museum, while others were smuggled out of Germany by Ehrlich's widow and lodged with the museum.

Science & Manufacture

The view that applied science and manufacture should be brought under the single command of a combined operation was expressed by Sir Ben Lockspeiser, secretary to the DSIR, in the second of three special bicentenary lectures at the Royal Society of Arts in London. Some people, said Sir Ben, thought it cheaper to buy patents from abroad than to run research laboratories, but that was 'the lazy road to decay.'

• OVERSEAS •

Cement From Canada

Portland cement shipments from Canada have steadily increased since the war. Last year's all time peak figure of 22,224,314 barrels was 20 per cent higher than the 1952 figure.

Calcium Carbide Imports

The Government of India has decided to grant licences to established importers for imports of calcium carbide from soft currency and dollar currency areas on quota of 75 per cent of half their best year's imports from such areas.

New Hungarian Instrument

The research instrument factory of the Hungarian Academy of Sciences has produced a five-scale gas compressor, never before made in the country. The machine will be used in mining and mineral oil research.

Shares for Factory Employees

The Bayer Dye Works at Leverkusen are offering company shares for sale to their employees. The shares, which are to enable the employees to become joint owners, are to be bought chiefly with funds paid to workers and salaried employees as premiums or annual bonuses. These shares will be dividend-bearing as from 1953. They will be administered by a trust company.

Titanium Expansion in USA

A message from Washington states that the USA is to spend millions of dollars to finance expanded production of titanium. This was made known by publication of evidence given by Mr. A. Flemming, of the Office of Defence Mobilisation, to a House Appropriations sub-committee on the stockpiling of strategic materials. He said most of the $199,000,000 allocated for stockpile purchases in the 1955 fiscal year would be used for the purpose stated.

Canadian Cobalt Smelter

Costing $2,500,000, a cobalt smelter has just been opened by Cobalt Chemicals at Cobalt, Ontario. When the smelter is operating at capacity it can handle 15 tons of concentrates daily, which it is hoped will produce 1,200,000 lb. of cobalt, 3,000,000 oz. of silver, 600,000 lb. of nickel and numerous other by-products annually.

New Insecticides Venture

A private limited company, Hindustan Insecticides Ltd., has been registered with an authorised capital of Rs.10,000,000. It will take over the state-owned DDT factory in Delhi.

Canada Uses More Petrol

Petrol consumption in Canada is on the increase. Recently released statistics show that total consumption in 1952 was 2,925,600,000 gal., compared with 2,640,500,000 gal. in 1951.

Radio-active Isotopes in Industry

It has been estimated that more than 1,200 USA manufacturing firms are using radioactive isotopes for peacetime industrial purposes, including measurement of the thickness of papers and plastics with greater accuracy and the detection of flaws inside metal castings and metal products.

Italian Plastics

Production of plastic materials in Italy during 1953 totalled 30,000 tons, as compared with 1,400,000 tons in the US and 250,000 tons in Great Britain. The Uniplast—a private institution—is endeavouring to promote the study and utilisation of plastics to a greater degree than hitherto.

Paint Companies Prosperous in Australia

Paint - manufacturing companies in Australia have recently experienced good trading conditions, due to renewed activity on house building, and to other factors on the property market. One of the leading companies, Glazebrooks Paints and Chemicals Ltd., of Melbourne, recently had a record turnover, despite increased competition. Their profits rose from £A72,313 to £A83,617.

Manganese Beneficiation Plant

Manganese ore is India's most important export mineral and because of the limited reserves of high grade manganese ores in the country the Government has been advocating the beneficiation of low grade ores so as to conserve the high grade ores. At a cost of Rs.2,500,000, a beneficiation plant has been erected by the Central Provinces Manganese Ore Co., Nagpur, at the Dongri manganese mine, about 40 miles from Nagpur.

· PERSONAL ·

SIR RODERIC HILL, Rector of the Imperial College of Science and Technology, has been re-elected Vice-Chancellor of the University of London for the university year 1954-5.

MR. H. C. WESSON, M.A., B.Sc., F.R.I.C., has been appointed to the staff of the Lead Development Association with effect from 1 April.

At the recent annual meeting of the Evans Scientific Society, MR. R. H. DALY was elected president and MR. G. E. SHAW vice-president.

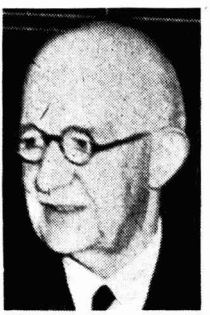
At the annual meeting of the West Riding section of the Society of Dyers and Colourists, held in Bradford, on Thursday, 25 March, the following officers and committee were elected:—*Chairman*, MR. G. B. ANGUS; *vice-chairman*, DR. T. A. FORSTER; *secretary*, MR. G. F. STYAN; *committee*, R. K. FOURNESS, R. HULLAH, J. SCHOFIELD, E. A. SWIFT, and J. RANKIN.

MR. H. P. WHITE, B.Sc., has recently been appointed head of the Data and Publications Section of the Mullard Technical Service Department (TSD). Under the direction of MR. T. H. JONES, head of TSD, one of Mr. White's principal responsibilities will be compiling and publishing technical data and information on the applications of Mullard valves and tubes.

At a meeting of the Royal Society in London on 18 March, 25 new fellows were elected, including the following:—

PROFESSOR D. H. R. BARTON, Professor of Organic Chemistry at Birkbeck College, London; PROFESSOR E. G. COX, Professor of Inorganic and Physical Chemistry in the University of Leeds; DR. F. C. FRANK, Reader in Physics in the University of Bristol; SIR CHRISTOPHER HINTON, managing director of the Industrial Group of the Department of Atomic Energy; PROFESSOR F. E. KING, Professor of Chemistry in the University of Nottingham; DR. M. F. PERUTZ, lecturer in biophysics in the University of Cambridge; DR. R. V. PITT-RIVERS, of the National Institute for Medical Research; PROFESSOR C. RIMINGTON, Professor of Chemical Pathology at University College Hospital Medical School; DR. F. SANGER, of the Medical Research Council, Cambridge; DR. H. G. THODE, Head of the Chemistry Department of McMaster University, Ontario; and DR. W. A. WATERS, lecturer in organic chemistry in the University of Oxford.

To mark his retirement from the position of managing director of Scottish Oils Ltd., after 58 years in the Scottish oil industry, MR. ROBERT CRICHTON was recently presented with gifts as tokens of esteem from his colleagues. MR. J. SPITTAL, the company's senior works manager, made the presentation in the presence of about 200 employees of Scottish Oils Ltd. and Grangemouth Petroleum Refinery Ltd., together with representatives of the Anglo-Iranian Oil Co. (parent company of the group). MR. J. M. CALDWELL, who has succeeded Mr. Crichton as managing director, presided and spoke of the many services Mr. Crichton has rendered to the shale oil and petroleum industry, and his public services. He entered the oil industry as an apprentice in 1896 and became a mining engineer with James Ross & Co., then a well-known crude-oil producing company. When the Scottish shale-oil companies were amalgamated into Scottish Oils Ltd. in 1919 he became general mining manager. In 1930 he was appointed general manager and in 1941 managing director. Mr. Crichton, who is also a director of British Petroleum Chemicals, Ltd., is a Fellow of the Institute of Petroleum (chairman of the Scottish branch), a member of the Mining Institute of Scotland and of the Association of Mining Electrical & Mechanical Engineers, and a governor of the Royal Technical College, Glasgow.



Law & Company News

Commercial Intelligence

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

Mortgages & Charges

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

MANIPLASTICS LTD., London, S.E. 24 February, debenture, to J. R. Gillum, London, securing all moneys and liabilities now or hereafter due from the company to the holder; general charge.

Satisfaction

LANCASHIRE CHEMICAL WORKS LTD., Manchester. Satisfaction, 22 February, that property (certain land and buildings, at Dinting, Glossop), comprised in a debenture registered 8 November, 1943, has been released from the charge.

Increases of Capital

The following increases of capital have been announced:—KINGSTON MEDICAL GASES LTD., from £15,000 to £17,500; COLIN STEWART LTD., from £35,000 to £50,000.

New Registrations

Vac Fit Products Ltd.

Private company. (530,246.) Capital £1,000. Manufacturers of and dealers in laboratory equipment, glass blowers, etc. Directors: Wm. J. Linskey and Mrs. Rose Linsky. Reg. office: 12 Rochester Mews, Camden Town, London, N.W.1.

Lamtra Ltd.

Private company. (530,549.) Capital £100. Dealers in minerals and ores, chemicals, pharmaceutical products, drugs, fertilisers, metals, etc. First directors to be appointed by the subscribers. Solicitors: Herbert Oppenheimer & Co., 20 Copthall Avenue, London, E.C.2.

British Petroleum Chemicals Trustees Ltd.

Private company. (530,518.) Capital £100. Directors to be appointed by British Petroleum Chemicals Ltd. Solicitors: Linklaters & Paines, 6 Austin Friars, London.

Tretol Associated Products Ltd.

Private company. (529,915). Capital £100. Manufacturers of and dealers in chemicals, gases, drugs, medicines, etc. Directors: Alfred Kaiser, Sally Trisk and Allan Smethurst. Reg. office: 12 North End Road, London, N.W.11.

Company News

Cheshire United Salt Co. Ltd.

The directors of Cheshire United Salt Co. Ltd. have decided to pay an interim ordinary dividend of 4 per cent per annum, less tax, for the year ending 30 June next. The dividend, which is the same as last year, will be payable on 1 May.

Alexander Duckham & Co. Ltd.

Net profit made by Alexander Duckham & Co. Ltd. during 1953 came to £79,470 before tax of £48,986. This compares with the 1952 figure of £35,531 before tax of £24,686. The final dividend of 22½ per cent is an increase of 5 per cent over the previous year and makes a total of 30 per cent for 1953, which is also an increase of 5 per cent compared with the previous year.

Dorman Long & Co. Ltd.

In a statement accompanying the report and accounts of Dorman Long & Co. Ltd. for the 53 weeks ended 3 October last, the chairman and managing director, Sir Ellis Hunter, says that improved raw material supplies contributed towards increased production. Output of ingots at 1,759,079 tons for the period under review was a record for the company, representing almost exactly 10 per cent of the national output. Production of rolled steel at 1,470,607 tons was also a record. The group profit on trading at £7,863,972, before depreciation, was a record, reflecting not only increased output and exports of rolled steel, but also further improvements in the results of constructional and engineering activities of the parent company and its subsidiaries. The total of the interim dividend already paid and the final dividend proposed is equivalent to 7.976 per cent (less tax) on the issued share capital.

[continued on page 800

Evans Medical Supplies Ltd.

The preliminary consolidated figures of the Evans Medical group for the year ended 31 December last show trading and manufacturing profit of £233,426, as compared with £182,010 for the previous year. Net profit is given as £57,904 (£64,592). The proposed final ordinary dividend is 4½d. per 5s. S.U., making 6d. per 5s. S.U. for the year.

Hilger & Watts Ltd.

Speaking at the annual meeting of Hilger & Watts Ltd., the chairman, Mr. G. A. Whipple, said the net profit at £28,634 was approximately the same as that for 1952, notwithstanding a fall in the trading surplus by £10,539 to £153,498. This was almost wholly attributable to the removal of the production of the company's Camberwell establishment to the new factory at Debden. The report and accounts were adopted and a dividend of 7½ per cent, less tax, was approved.

Imperial Chemical Industries Ltd.

It has been announced by Imperial Chemical Industries Ltd. that applications for the £30,000,000 4½ per cent Unsecured Loan Stock 1972/74 at par were received from 52,821 applicants for a total amount of £304,582,800. Applicants for less than £1,000,000 of stock will be allotted 10 per cent of the amounts applied for, with a minimum of £50. Applicants for £1,000,000 and upwards will be allotted approximately 8½ per cent. There were 30,092 applicants for amounts of from £50 to £500 of stock, who thus will receive the minimum allotment of £50. It was expected that allotment letters would be posted on 31 March.

British Oxygen Co. Ltd.

An unchanged final ordinary dividend of 9 per cent is recommended by the directors of British Oxygen Co. Ltd., making a total of 15 per cent for 1953, less tax. A preliminary statement shows that the group trading profit has increased from £3,975,092 to £4,324,975 after depreciation of £2,007,312 as against £1,602,284 for 1952.

Viscose Development Co. Ltd.

In addition to a final dividend of 7 per cent, making 10 per cent for 1953, the board of Viscose Development Co. Ltd. are recommending a cash bonus of 6d. per £1 of stock. A similar dividend and cash bonus are recommended on the 6 per cent non-cumulative participating preference stock. The net profit, before UK tax, is £63,307, as against £36,168 for 1952. After taxation the net profit is £28,648, compared with £13,870.

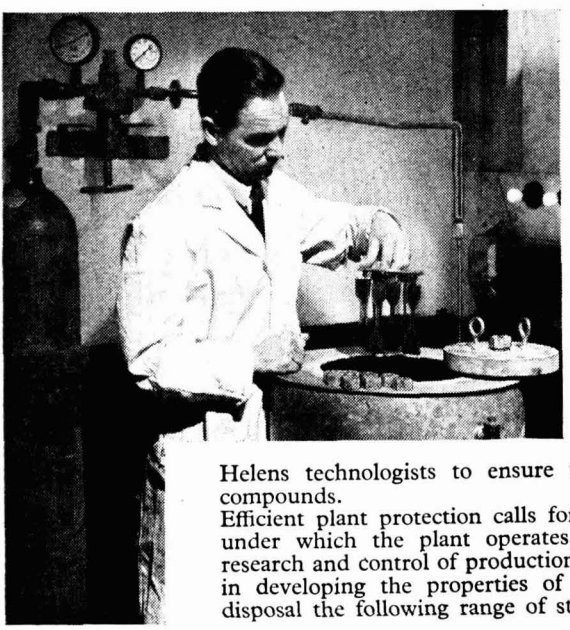
Market Reports

LONDON.—The movement on the industrial chemicals market continues to be fairly substantial and most sections of the market report a good demand on home account for spot or nearby delivery. Export trade in chemicals appears to be about maintained at recent levels. There is a good call for routine potash and soda chemicals against contracts and a steady demand continues for hydrogen peroxide and formaldehyde. The seasonal demand for fertiliser materials is now well under way. White lead, red lead and litharge prices were advanced on 29 March, the new basis prices being as follows: dry red lead £121 per ton; litharge £123 per ton; dry white lead £127 10s. per ton. There has been no change either as regards prices or conditions in the coal tar products market, and the main feature is a persistent demand for the light distillates.

MANCHESTER.—Home-trade inquiries, covering a wide range of heavy chemical products, have been fairly numerous on the Manchester market during the past week, with users in the textile and allied industries prominent in this respect. A moderate number of shippers' inquiries relating to overseas business have also been reported. The actual movement of supplies on both home and export accounts against orders already on the books has been about up to the level of recent weeks. A steady demand for most descriptions of fertilisers has been experienced, while in the tar products market with few exceptions a ready outlet is being found for the light and heavy materials.

GLASGOW.—Another brisk week's trading has been reported from most sections of the chemical trade. Certain shortages are still evident but in the majority of cases manufacturers have been able to keep their customers going. There has been little change either way in prices with the demand from the textile trade still being maintained. The demand for the agricultural side is still brisk and on the whole the position is very sound.

COMBATING CORROSION



The C.I.D. at work

(Corrosion Investigation Department)

OXYGEN 'BOMB' TESTING

Artificial ageing, in a heated 'bomb' under pressure of oxygen, is one of the many tests applied by St. Helens technologists to ensure the utmost service from anti-corrosive compounds.

Efficient plant protection calls for a full understanding of the conditions under which the plant operates, and adequate resources for scientific research and control of production. St. Helens have unrivalled experience in developing the properties of rubber compounds, and have at their disposal the following range of standard grades :

NATURAL RUBBER

A number of anti-corrosive grades for general application for temperature conditions up to 160° F. (70° C.).

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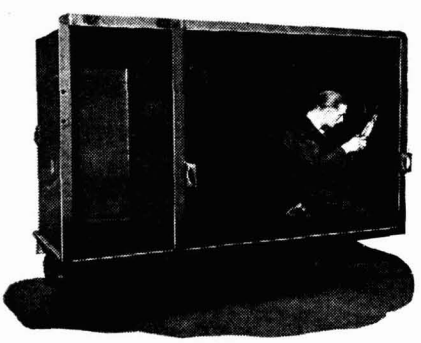
Especially for general application and where elevated temperature conditions exist—up to 212° F. (100° C.).

ABRASION-RESISTING NATURAL RUBBER

A resilient lining designed to give maximum resistance to abrasive conditions.



EBONITE (HARD RUBBER)

To give protection against very severe corrosive conditions.

FLEXIBLE EBONITE

A special grade of ebonite for use on equipment subjected in operation to physical shock and impact.

POLYCHLOROPRENE NEOPRENE

Suitable for conditions which involve elevated temperatures and/or oils, solvents and greases.

POLYVINYL CHLORIDE (P.V.C.)

Particularly suitable for the storage of Nitric and Chromic Acids at normal temperatures and up to 140° F. (60° C.).

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ANTI-CORROSIVE SERVICE

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Next Week's Events

MONDAY 5 APRIL

Institution of Chemical Engineers

Birmingham: The University, Edgbaston, 2.30 p.m. First session of Symposium on Gas Absorption.

Chemical Society

Belfast: Queen's University (Chemistry Lecture Theatre), 7.45 p.m. Professor Dr. V. Prelog: 'The Steric Course of Asymmetric Synthesis.'

Incorporated Plant Engineers

Dundee: Mathers Hotel, 7.30 p.m. T. G. Hawker: 'Industrial Uses of Magnetic Power.'

TUESDAY 6 APRIL

Institution of Chemical Engineers

Birmingham: The University, Edgbaston, 10 a.m. and 2.30 p.m. Second and third sessions of Symposium on Gas Absorption.

Society of Chemical Industry

Birmingham: Birmingham & Midland Institute, Paradise Street, 6.30 p.m. Birmingham & Midland Section annual general meeting, followed by film show.

Society of Analytical Chemistry

London: Chemical Society's Rooms, Burlington House, Piccadilly, 6.30 p.m. Physical Methods Group meeting. Papers on 'Mass Spectrometry.'

Incorporated Plant Engineers

London: Royal Society of Arts, John Adam Street, Adelphi, Strand, 7 p.m. C. J. Atkins: 'Fans & Fan Equipment.'

Edinburgh: 25 Charlotte Street, 7 p.m. Film display by Chaseside Engineering Co.

Occupational Hygiene Society

London: London School of Hygiene & Tropical Medicine, 11 a.m. Conference on 'Maximum Allowable Concentrations of Harmful Materials in Industrial Atmospheres.'

WEDNESDAY 7 APRIL

Institution of Chemical Engineers

Birmingham: The University, Edgbaston, 10 a.m. Final session of Symposium on Gas Absorption.

Chemical Society

Dublin: University College (Chemistry Department), 7.45 p.m. Joint meeting with Institute of Chemistry of Ireland, RIC and SCI. Professor Dr. V. Prelog: 'The Steric Course of Asymmetric Synthesis.'

Society of Chemical Industry

Brentford: Pyrene Co. Ltd., Great West Road, 2.30 p.m. Corrosion Group works visit.

Society for Analytical Chemistry

London: Wellcome Research Institution, Euston Road, 2.30 p.m. Meeting organised by Biological Methods Group. Symposium: 'The Comparison of Chemical & Biological Estimation of Drugs in Quantitative Pharmacology.'

Incorporated Plant Engineers

Southampton: Polygon Hotel, 7.30 p.m. Paper on 'Feed Water Treatment.'

THURSDAY 8 APRIL

Society of Chemical Industry

London: Medical Society of London, 11 Chandos Street, Cavendish Square, W.1, 6 p.m. Microbiology Group annual general meeting, followed by general meeting. Sir Ian Heilbron: 'Research at the Brewing Industry Research Foundation.'

Institute of Fuel

London: Institution of Mechanical Engineers, Storey's Gate, 4.30 p.m. Annual corporate meeting, followed by presidential address by Dr. W. Idris Jones.

Institute of Welding

London: 2 Savoy Hill, W.C.2, 6.30 p.m. South London Branch annual general meeting, followed by paper by J. S. Blair: 'Some Aspects of Non-destructive Testing.'

FRIDAY 9 APRIL

Oil & Colour Chemists' Association

Manchester: Engineers' Club, Albert Square, 6.30 p.m. Annual general meeting.

Institute of Fuel

Glasgow: Royal Technical College, 7 p.m. Scottish Section annual general meeting followed by paper on 'High-temperature Heating Fluids,' by C. M. Auty.

Institution of Chemical Engineers

Manchester: College of Technology (Reynolds Hall), 3 p.m. S. J. Green: 'Agitation in Process Design.'

Society for Analytical Chemistry

Liverpool: City Laboratories, Mount Pleasant, 2.15 p.m. North of England Section discussion on 'The Food & Drugs (Amendment) Bill.'

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

THE INSTITUTION OF CHEMICAL ENGINEERS

30TH (1954) ASSOCIATE MEMBERSHIP EXAMINATION

APPLICATION forms (returnable 1st June, 1954) and particulars of the 30th Associate Membership Examination, may be obtained from the Secretary, **INSTITUTION OF CHEMICAL ENGINEERS, 56, VICTORIA STREET, LONDON, S.W.1.**

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.

JOHNSON MATTHEY & CO., LIMITED, refiners of precious and rare metals, invite applications for the following appointments at their extraction works in the **NORTH LONDON** area.

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(2) **PRODUCTION AND PROCESS CONTROL CHEMISTS,** aged 25/35, with Degrees in chemistry, chemical engineering or metallurgy, and preferably with some works experience.

(3) **ANALYTICAL CHEMISTS,** of B.Sc. or equivalent standard, and preferably some experience of metallurgical analysis.

(4) **JUNIOR ANALYSTS,** of Inter B.Sc. or equivalent standard.

Write, giving full particulars of age, qualifications and experience, and salary required, to the **SECRETARY,** at **78 HATTON GARDEN, LONDON, E.C.1.**

NORTH WESTERN GAS BOARD
LIVERPOOL GROUP
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SITUATIONS VACANT

ASSISTANT WORKS CHEMIST required in connection with the production of industrial alcohol and allied products. The post is tenable near London and will involve control of raw materials and finished products. Age up to 26 years. Applicants should have a Degree in Chemistry or equivalent. Salary will depend on qualifications and experience. Apply **STAFF DEPT., THE DISTILLERS CO., LTD., 21, ST. JAMES'S SQUARE, S.W.1.** Quote 1A.154.

DRAUGHTSMEN. LARGE CHEMICAL COMPANY on the **EAST COAST** require **SECTION LEADERS** for **DRAWING OFFICE** engaged on new Chemical Engineering projects. Assistance given with moving expenses and house purchase. Comprehensive pension schemes and welfare arrangements. Employees of the Company have already been notified of this vacancy. Apply with details of past experience and qualifications to **BOX No. T.3852/5, c/o FOSTER TURNER & EVERETTS LTD., 11, OLD JEWRY, LONDON, E.C.2.**

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600

3 steam heated **WATER STILLS** by Manesty, type 4, cap. 50 g.p.h. each. Steam consumption 667 lb. hr. at 20/45 lb. sq. in. 450 gals. cooling water required per hr.

SOLVENT RECOVERY PLANT by British Carbo Union, comprising 2 horiz. carbon charged M.S. Absorbers, each 6 ft. diam. by 3 ft. with 18 in. bolted manhole, four 8 in. diam. inspection covers, brass tube condenser, separator and distillate collection tank, 20 in. input fan and all connecting pipework. Recovery rate for naphtha 10 galls. per hr.

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Scott triple effect **EVAPORATOR** unit, comprising 3 pans, each 4 ft. 7 in. diam. by 13 ft. deep on straight with calandriad of 300 M.S. tubes 2 in. diam. by five 4 in. diam. tubes. 6 ft. long between tubeplates, 1 vert. M.S. condenser, 3 ft. 9 in. diam. by 11 ft. deep with 250 M.S. tubes 2 in. diam. by 9 ft. 1 horiz. steam driven wet vacuum pump. Including pipework, valves, thermometers, etc.

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Offers are invited for any or all of these materials, and should be made in writing to the **MINISTRY OF MATERIALS** at the above address not later than 30th April, 1954, in a sealed envelope endorsed in the top left-hand corner "Tender for Chemicals."

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THE Proprietors of Patent No. 598602 for **METHOD OF PRODUCING COPOLYMER RESINS AND PRODUCTS DERIVED THEREFROM,** desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.2.**

THE Proprietor of British Patent No. 614,006 for **A METHOD AND MEANS FOR PRODUCING LIQUID OXYGEN OR LIQUID AIR RICH IN OXYGEN,** desires to enter into negotiations with a firm or firms for the sale of the patent, or for the grant of licences thereunder. Further particulars may be obtained from **MARKS & CLERK, 57 & 58, LINCOLN'S INN FIELDS, LONDON, W.C.2.**

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INDEX TO ADVERTISERS IN THIS ISSUE

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