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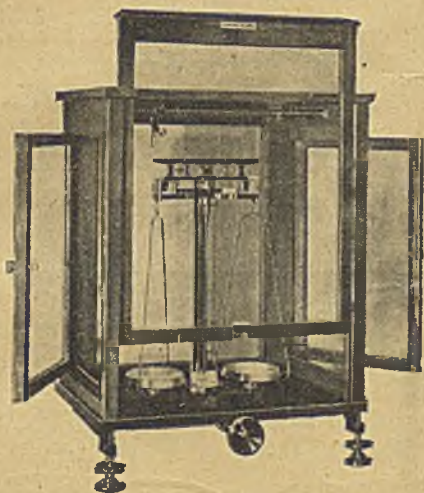
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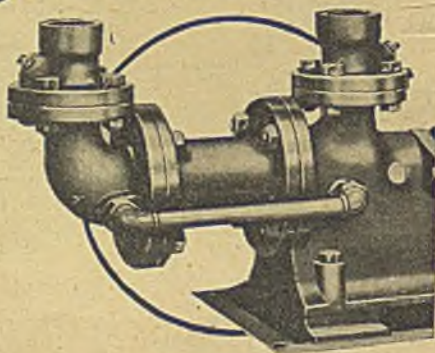
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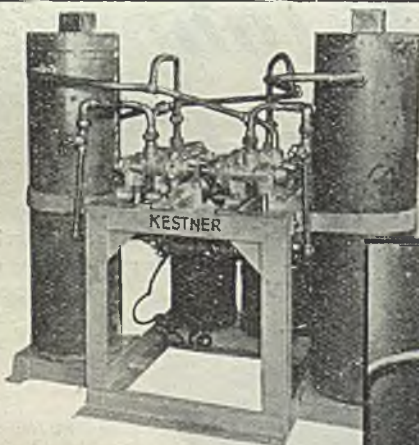
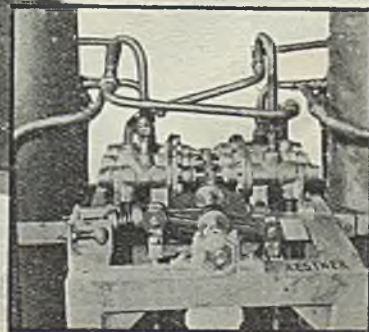


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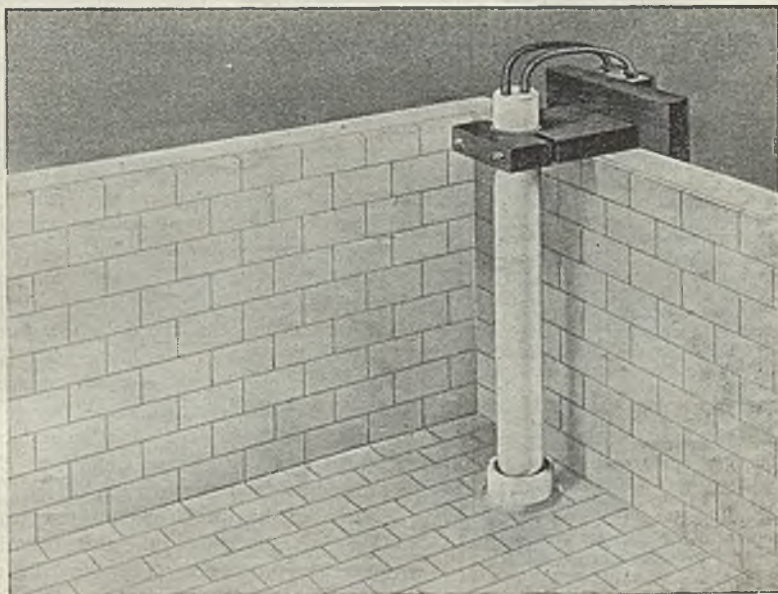
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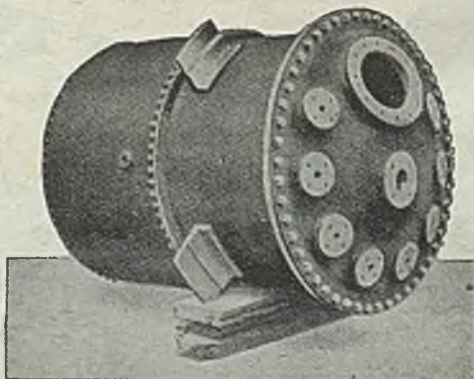
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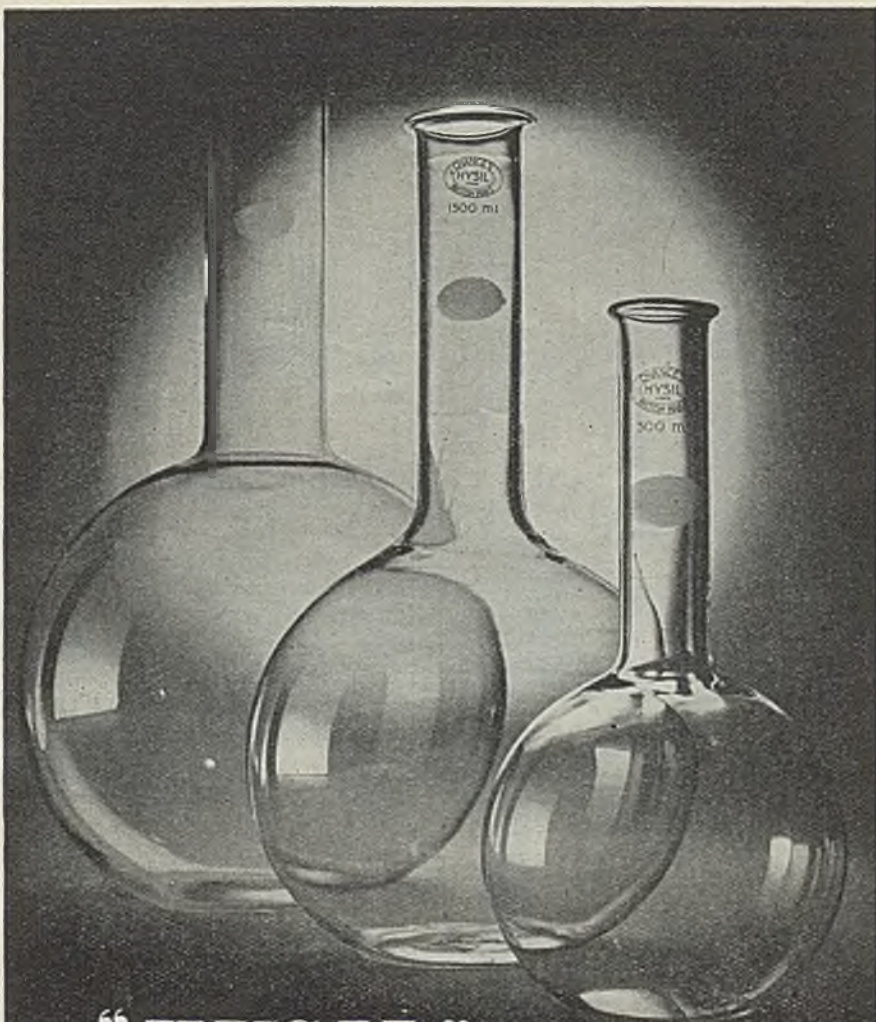
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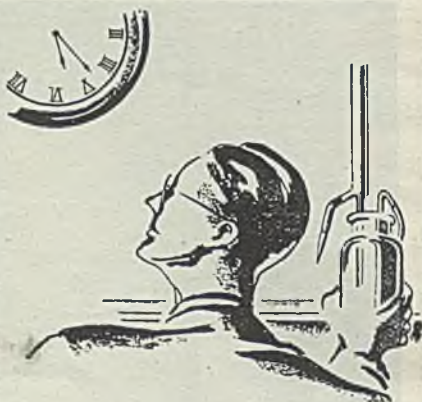
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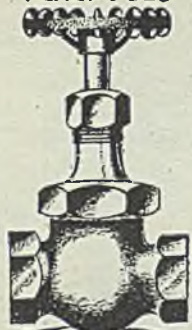
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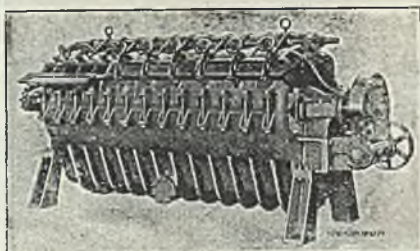
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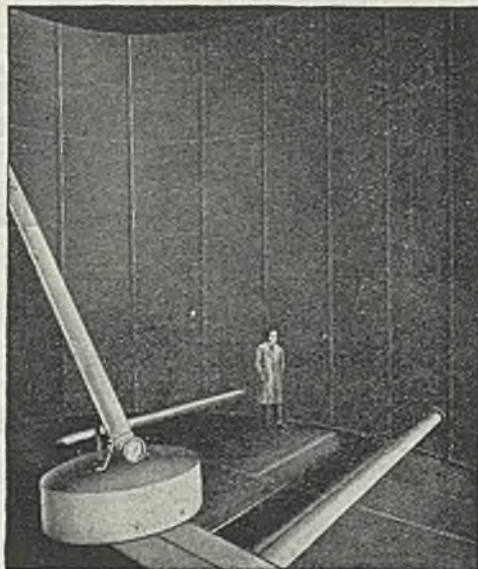


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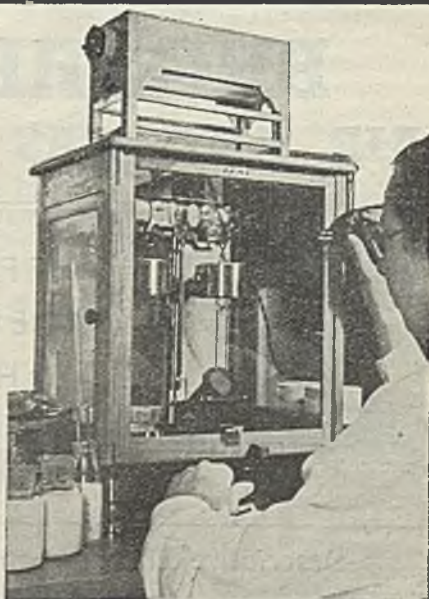
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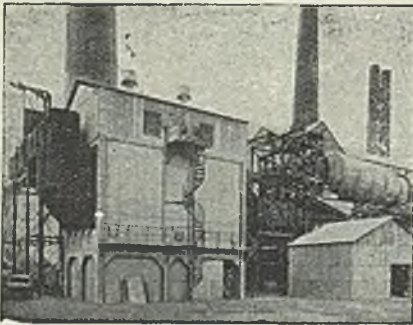


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The Lay-out of Works

NEW ground was broken by the Institution of Chemical Engineers with the paper by Messrs. H. W. Cremer and R. L. Fitt on the siting and lay-out of industrial works, an abridgment of which is included in the later columns of this issue. Those who are charged with the duty of production or of building new works will long be grateful to the authors for their recital of the pitfalls into which even the wary may fall. Constructional companies are continually dealing with this problem and it is not new to them; works engineers rarely meet it since they are usually appointed to an existing works. This problem is, of course, bread and butter (and jam) to the consultant. Some of the problems concern the supply of gas, electricity and coal, the provision of drainage and of means for disposal of effluents, and the transport facilities into and out of the works in relation to the nature of the product and the situation of the markets.

Those problems are common to all industries and to every works. Superimposed upon them are a number of legislative problems caused by local by-laws, and the rulings, orders and laws of the various Ministries who have to be consulted

in these matters. These difficulties change from time to time (we had almost said from hour to hour) by reason of the issue of new orders, so that, valuable as this portion of the paper is, it will need to be brought up to date annually, at least. The onus of knowing the law is on the citizen for whose guidance, protection, or regimentation the law was made; and an "order" is equal to a law in this respect. The Institution, having this paper and the excellent paper by J. Davidson Pratt and G. S. W. Marlow ("Legal Pitfalls for the Engineer") to draw on for their data, might well make it a practice to issue a guide to the law for chemical engineers each year.

It is not our task, in this article, to summarise the paper, but there are certain aspects of lay-out and siting upon

which comment will not be out of place. The paper is mainly directed to the lay-out and siting of new works. It seems to be assumed that it is proposed to build a works and that the engineer has been asked to select a site; having selected a site, he is to build the perfect works upon it. There is little criticism that can be made upon this very useful paper from that angle. The chief one that springs to our mind is that the

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perfect site hardly ever exists, and if it does someone else has probably taken it already. Mr. Fitt showed a number of lantern slides of sites, each one of which appeared perfect at first glance, but each of which was found on examination to have at least one defect that ruled it out. When the Government is looking for a site for a war factory, that procedure is justified; its consultants can go on looking for the perfect site until it is found, and then if the owner does not want to come to the Government's terms it can be commandeered. But in industrial practice, a site must be bought, and the more perfect the site, the larger the price. A site near a station, on a main road, not liable to flooding, served by a good bus service, near a town, with gas and electricity available—all of which are listed by the authors as essential—will command such a price for housing that industrial works are probably out of the question, and anyway it is probably scheduled by the local authority for housing under its town-planning arrangements. Consequently, the industrialist will almost certainly have to take the site which, being reasonably cheap, possesses the fewest drawbacks and make the best of it. The authors may, at some time in the future, tell us how they have fared with the imperfect sites that they are bound to meet.

In the section on detailed planning one misses any reference to fuel utilisation. There is no doubt that the efficient utilisation of fuel must occupy a high place in planning any works. One was disturbed to find no mention, for example, of the value of using pass-

out steam for process work, the live steam being used at higher pressures for the generation of electricity.

What is now wanted is a complementary paper on the lay-out of works extensions and renewals. Most works, as indeed the authors pointed out, have grown from smaller beginnings; changes in methods, in scale, and even in processes, have caused the lay-out to become bad; that is one of the handicaps of most older British industries. We were astonished to hear Mr. Donald say that many members of the Institution had objected to the teaching in the chemical engineering curriculum of those subjects which bear on lay-out. The object of chemical engineering is not only to produce the end product, but to produce it at the lowest cost; and lay-out is a fundamental factor in cost. There are many industrial operations in which we cannot produce at the same costs as other nations, because we have not laid out our works for the purpose. The Reid report on the coal industry, for example, has shown that lay-out is fundamental in the cost of coal. The same is true in the manufacture of welded plant. There must be a flow through the works with the least possible handling.

Let there be no mistake: the lay-out of works, and in particular the re-arrangement of older works to avoid unnecessary costs when improvements or additions are afoot, is a primary task for the chemical engineer. This paper is thus timely in calling attention to a neglected aspect of the subject, and its authors are to be congratulated thereon.

NOTES AND COMMENTS

Steel Development

NO less than £120 million is scheduled to be spent on the re-equipment of the British steel industry. The next five years, it is believed, will see the completion of the proposed programme, according to Sir John Duncanson, Commercial and Technical Director of the British Iron and Steel Federation, and this takes into account the prior claim of housing on the building industry. The allotted sum is to be divided up as follows: on coke ovens, £6.5 million; on 19 new blast furnaces,

£19 million; on new melting shops, £20 million; on replacement and reconstruction of rolling mills and new continuous hot strip mills in S. Wales, £33 million; and the remainder on miscellaneous processes. Work has already started on expansion of open-hearth capacity in the Midlands, on the rebuilding of blast furnaces and coke ovens in Scotland and the North-East, on the complete mechanisation of 28 iron foundries (more than half the total iron castings capacity), and on a new rolling plant at Darlington. The main result of the

modernisation, Sir John Duncanson said, will be that the country's total steel ingot capacity will be increased by 20 per cent. It is interesting to note that 90 per cent. of the new plant and equipment created during the war is of little permanent benefit, having been designed purely to increase the flow of armaments. Apart from the Thomas-Baldwins mill in South Wales, it is believed that new work will be undertaken by Dorman Long, with a big universal mill for structural steel, that Stewarts and Lloyds will expand their melting capacity at Corby, and that United Steel may lay down a continuous billet mill in the Sheffield area.

Gas in War-Time Industry

A RECORD of the achievements of the gas industry under the most stringent conditions of difficulties of supply and meticulous demands for the most exacting metallurgical (and other) results has been published by the Institute of Gas Engineers (Communication No. 280) in pamphlet form, under the authorship of Mr. H. R. Hems, chairman of the Industrial Gas Centres Committee. The work recorded therein is over and above the day-to-day routine of maintaining a vital supply of fuel to factories and homes—though this service also, as we all well know, was kept up with admirable persistency in the face of constant attack. We have had occasion to comment at intervals through the war on the assistance the gas industry has been able to give in various directions; but now full details are released, even to names and places. As might be expected, gas—ordinary town gas—played its most important industrial part in aiding the metallurgical industries, and Mr. Hems gives some fascinating details about light alloy production especially—in the heat-treatment department, in the heating of salt baths and air-circulation furnaces. One interesting application was in atmosphere plants used on two Birlec electrically-heated furnaces for brazing copper.

Cleanliness and Flexibility

GAS played an essential part in the production of guns, shot, warships, and jerricans; in bearings and forgings; and in the tempering of tools. More directly applicable to the war-time

chemical industry was the use of fully-automatic gas-fired boilers in the heating and sterilising processes needful in the production of penicillin. The flexibility, space-conserving qualities, and above all the cleanliness of this type of boiler gave it an outstanding advantage in work of this kind where strictness of control is all-essential. The same qualities came into play in sterilisation work for the Army Blood Transfusion Service. In short, the work done by town gas for war industry has been almost as varied as industry itself. The system of having Industrial Gas Centres in various localities throughout the country has had much to do with the flexibility of the service, since thereby the scope of the work done could be easily varied according to the nature of the industry in the neighbourhood.

On Documentation

THE chief concern of the *Journal of Documentation*, as the Editor, Mr. Besterman, points out in the first issue, will be the "preparation or use of documentary evidence and authorities." Anything that will make the task easier to the seeker after knowledge will come under the Journal's purview. Librarianship and the organisation of information services, bibliography and cataloguing, abstracting and indexing, classification and filing, the use of photographic and mechanical methods of reproduction—they all are means to help the inquirer. Developments in these subjects, which are of ever-growing importance in the life of a well-organised educated community, will receive attention in the new Journal, which is published by the Association of Special Libraries and Information Bureaux ("Aslib"). National boundaries or the "artificial segregation of the sciences and humanities" will form no obstacle to the Journal's sphere of work. As Sir William Beveridge, a past president of "Aslib," points out in a message, there is everywhere a great eagerness to have facts and not to accept slavishly the views of others, while libraries without full guides to using them are not fulfilling their educational responsibility. The birth of the Journal is a further milestone in the steady development of "Aslib."

The Siting and Lay-out of Industrial Works*

by H. W. CREMER, M.Sc., F.R.I.C., M.I.Chem.E. and
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THE vital importance of post-war industrial development in this country suggests that the time is opportune for a brief summary of some of the factors involved in the siting and lay-out of industrial works. It would be impossible within the limits of a single paper to deal with the process planning of all types of industry in detail, or even with those industries of most interest to the chemical engineer. Consequently, the scope of the paper is limited to a study of such factors as have general application and play a vital part in siting and planning.

Site selection will be subject to some degree of influence from the Government, such influence being principally effected through the medium of the Board of Trade, the Ministry of Labour, the Ministry of Health and the Ministry of Town and Country Planning; but it is not possible, as yet, to state specifically what the functions of these departments will be, nor to what extent they will be able to influence industrialists in locating their works.

Statutory obligations which relate to such matters as offensive trades, the emission of noxious gases, and the disposal of trade wastes should be clearly envisaged when selecting sites for industry. For instance, if it is proposed to erect a works near a high-class residential area, failure to appreciate the need for preventing the escape of noxious fumes may have disastrous results if it is later found impracticable to reduce the fumes to an amount which cannot be detected. An oversight of this kind may necessitate measures which render profitable operation of the works a matter of considerable difficulty or may even result in the closing of a factory altogether.

No opportunity should be lost, therefore, of discussing beforehand with the officials concerned the problems inherent in any enterprise. Technical advice of a most useful kind can, in many cases, be had for the asking, and, even though the Factories Act, etc., may not make provision for the enforcement of any of the conclusions to which Government officials may come, industrialists obviously have a greater measure of protection against a common law action for nuisance if they follow the advice so given. These matters have been admirably dealt with by J. Davidson Pratt and G. S. W. Marlow in their paper, "Legal Pitfalls for

the Chemical Engineer" (*Trans. Inst. Chem. Eng.*, 1934, 12, 21). Another source of valuable information is the index to Acts of Parliament, etc., prepared by the Association of British Chemical Manufacturers.

Trading Estates

Advantages of the trading estate are:—

1. The land has been prepared in advance for factory construction, and negotiations for purchase or lease are simplified.
2. Road and rail facilities will be available.
3. Main services will be provided and at favourable rates.
4. Steam and hot-water supplies are in some cases available from central boiler houses.
5. Labour training centres are usually available.
6. Community interests in regard to welfare and administration.

Disadvantages are:—

1. The industrialist will not have an entirely free hand in planning his works.
2. The trading estates are more suitable for light than for heavy industry.
3. There is not the same scope for future expansion.

Raw Materials and Markets

Viewed from modern economic stand-points there appear to be nowadays comparatively few cases in which proximity to the sources of raw materials need be the main factor which determines the site of a works. For, apart from coal, limestone, salt and clay, the bulk of the raw materials for our industries are now imported, and accessibility to navigable waterways therefore assumes special significance. Planning in relation to associated industries is another factor which has assumed much greater importance in view of the increasing interrelation of industry as a whole. A good example is afforded by the migration of industry to Greater London.

Labour Supply and Housing

For a small firm requiring no high degree of craftsmanship from its personnel, it is only necessary for the industrialist to satisfy himself by local inquiry that his modest labour demands will be met. If, on the other hand, the proposed works are large and the degree of craftsmanship required is high, then at first sight the obvious location is in a populated area specialising in in-

* Abridged from a paper read at the 23rd Annual Corporate Meeting of the Institution of Chemical Engineers, London, April 13, 1945

dusty employing similar labour to that required for the new venture. Such an arrangement, however, might clash with the Government's policy of diversification, and pressure might be brought to bear to select a site in a district where labour is available but without experience of the industrial processes envisaged in the new works. If such is the case, then key personnel must be moved into the area to start up the new works and to train local labour as skilled operatives. In such cases a gradual build up in production would be necessary.

Closely connected with labour supply are the questions of housing and transport. Most local authorities have prepared extensive schemes of housing development and these, it is hoped, will have been devised to locate industry in relation to housing in such a way as to minimise transport problems. Since local authority housing estate-cater essentially for the artisan, the need for housing the more senior personnel must not be overlooked.

Area of Site

Minimum space requirements can usually be estimated in the preliminary stage from a study of similar works with comparable production figures. What is not so easy to decide, however, is the additional area likely to be required for future extension. In all too many cases in the past, works lay-outs have gradually evolved, the original sites having been too small and the original buildings laid out with little regard to further extensions. Uneconomical working through double handling, unnecessary haulage, etc., are the result, and it is obvious that in modern factory lay-out plans for the future should play an important part. In fact, the original lay-out should be made with these extensions in mind. Any land not immediately required can often be utilised for such purposes as recreation, allotments and farming.

Traffic Handling

Road access is essential to every industrial site, but if rail access is also necessary this will obviously restrict the choice of location. Consultation with the railway companies at an early stage is advisable, for they will be able to suggest locations which will ensure the best service into and out of the works. It may be desired to handle goods by water or even by air, and such considerations will have an important bearing on location. Works constructed near navigable waterways possess the added advantage of an adequate supply of cooling water, and, in the case of fresh water, of process water as well.

Works requiring large volumes of water are restricted in their possible siting. In many parts of the country local supplies are already taxed to capacity in dry seasons,

and this is a point which needs early checking with the authorities concerned. Not only the quantity but the quality required must be specified at the outset.

Water Supply

Consideration might be given to the possibility of sinking boreholes on the site for the purposes of obtaining a water supply for the works. As the law now stands, private individuals and firms may abstract as much water from under their own land as they wish and deplete the wells of any water authority with impunity, but following upon the recent White Paper (Cmd. 6515) a Water Bill has now been presented to Parliament, in which Part III deals with the conservation and protection of water resources and seeks to restrain a person from abstracting further underground water without a licence from the Ministry of Health.

In works in which large quantities of softened water are necessary, the problem of treating a very hard water may be a very real one, both as regards cost and, in some cases, disposal of the waste products from the water-treatment plant.

A great deal has been heard of the properties of certain water supplies which make them specially suited for process use in the brewing and paper industries, and in the steel industry for quenching purposes. With our present knowledge of water conditioning, and provided no undesirable constituents are present which cannot be removed economically, there are probably comparatively few cases in which the quality of natural supplies of process water can truly be said to be a determining factor in the location of a works. In the not too remote future we may see the coming of the water grid, and this, with more effective utilisation of the country's quite adequate surface and sub-surface resources, will help to reduce the importance of this factor in site selection.

Disposal of Waste

Solid waste products usually necessitate either spoil tips or haulage away from the works. Spoil tips disfigure the neighbourhood in which they are situated, and no planning authority is likely to allow these to spring up in areas where amenities are to be preserved. Provided the nature of the waste solids does not for any reason render such a method of disposal impracticable, it may be possible to utilise them for filling up old surface or underground workings or for raising the level of portions of the works site earmarked for subsequent development. If none of these things are possible in the immediate area of the works, then haulage costs have to be faced and the capacity of local tips investigated. It should be strongly emphasised that it is an offence under the Rivers Pollution Prevention Acts

to discharge solid refuse into streams. If either solid or liquid effluents are to be dumped from barges the consent of fishery and catchment board and harbour authorities has to be obtained.

Disposal of trade waste waters is not only a question of effluent treatment but also one of determining whether local sewers or watercourses are adequate in size and sufficiently near at hand to convey these away from the works. If expensive pumping is to be avoided, a careful check is necessary of relative levels of site and drainage channels.

In addition to the engineering aspects, the particular characteristics of the effluent itself must be fully considered. If due consideration is given to these matters in advance, provision can have been made at the outset and possibly some modification of the processes in the factory introduced, thus avoiding the considerable expense which sometimes has to be incurred in introducing remedial measures at a later date. It not infrequently happens that the requisite space for sedimentation ponds and the like cannot be found, with the result that the plant which is installed is consequently cramped in design and inefficient in operation.

Where all practicable measures have been taken to reduce the polluting character of the waste waters, the most usual methods of disposal are by percolation underground, by discharge into fresh-water streams, rivers, estuaries and the sea, or by discharge into sewers.

In general, percolation into the sub-soil is restricted by the obligation not to cause a public nuisance nor to interfere with the rights of other landowners. If a landowner puts filth on his own land, he must take care not to let it escape on to his neighbour's land and not to pollute the air which reaches that land.

Discharge into Streams

The disposal of wastes by discharge into fresh-water rivers and streams is subject to several restrictions. Every riparian owner has a right to receive the flow of a stream in a condition unaffected by the use made of the stream by other riparian owners. The practicability of disposing of waste waters in this manner without causing undue pollution will depend upon the volume and character of the waste waters involved, the volume of the stream, and the purposes for which the river water is used below the point of discharge. In general, the rivers of this country are not of sufficient size to permit of the discharge of large volumes of polluting waste.

Disposal into estuaries is regulated in certain tidal waters. It is an offence to allow to enter into any waters containing fish any liquid or solid matter to such an extent as to cause the waters to be poisonous

to fish, or to interfere with the food of fish. Within a fishery district it is also an offence to discharge any trade effluent into waters containing fish by means of any new work unless notice of the new work has been given to the appropriate authority. In addition to the above, there are certain private Acts which include provisions to prevent pollution of particular rivers.

Numerous manufacturers discharge the waste waters from their factories into the sewers of the local sanitary authorities for treatment in admixture with domestic sewage at the local disposal works. In many cases, preliminary treatment of the wastes at the works is required before the wastes are admitted to the sewers, and the discharge may be subject to other conditions, including payment. It is necessary in all cases for the local authority to be consulted, and a statement is usually required giving the composition and volume of waste waters to be discharged.

Private Sewage Works

In the case of large industrial works which are located in remote districts, it is sometimes necessary for these to have their own sewage disposal works. Under such circumstances, when the trade wastes are to be treated in admixture with domestic sewage, it is very necessary to ensure that the volume of process effluent is maintained in the correct ratio to the normal volume of domestic sewage passing to the disposal plant. Thus there is a definite relationship between the factory population and the process effluent, and this matter assumes vital importance where the number of operatives is comparatively small and the toxicity of the trade waste unduly high. Special pre-treatment may be essential in cases of this kind if the efficiency of the sewage disposal plant is to remain unimpaired. On the other hand, cases are known where the organisms responsible for the sewage treatment have become acclimatised to what would ordinarily be highly toxic conditions, destroying the undesirable chemical constituent of the particular waste concerned, with no harm to themselves and to the great satisfaction of all concerned.

Dr. A. Parker (*Trans. Inst. Chem. Eng.*, 1938, 16, 19) has referred in some detail to the industries in which polluting waste waters are produced, including the legal position, and the method of treatment. That the importance of this subject is fully realised by chemical engineers is fully borne out by the long list of papers presented to this Institution by other authors, which deal with the utilisation and disposal of various trade wastes (Subject Index; *Trans. Inst. Chem. Eng.*, 1940, 18, 142).

The Water Pollution Research Laboratory of the D.S.I.R. is of the greatest benefit

both in solving specific problems and advising how manufacturers may avoid the pitfalls which beset the unwary where the disposal of trade wastes is concerned. Under the Public Health Act it is an offence to establish an offensive trade within the district of an urban authority without its consent in writing, and this consent may be given only for a limited period specified in the consent. The Alkali, etc., Works Order, 1928, S. R. & O., 1928, No. 26, extends the list of noxious or offensive gases mentioned in Section 27 of the Alkali, etc., Works Regulation Act. In so far as the bearing which these enactments have upon the location of industrial works, it is important to consider the interpretation of the phrase "best practicable means . . . having regard to the cost and to local conditions and circumstances." Thus, not only is cost the criterion of practicability for preventing the escape of noxious or offensive gases, but apparently also the degree of efficiency which is called for by local conditions. In other words, as Pratt and Marlow have pointed out, "presumably what would be practicable in Widnes would not suffice for Westminster."

Fuels

Except in certain electro-metallurgical and electro-chemical industries, it is unlikely that electricity supply will determine, or even seriously affect, siting. Certain processes require the use of very high temperatures and these temperatures can only be attained in practice by means of electricity. In other processes, however, if the necessary temperatures can be produced by other means, such means could be adopted as alternatives.

As yet no gas grid exists, but this may be envisaged in the future. Gas requirements are therefore important from the point of view of siting, and, if substantial, will limit the choice of site if heavy expenditure on supply mains is to be avoided. Tariffs of both gas and electricity vary over a wide range.

Unless required in very large quantities, or in special grades, coal and coke supplies will not normally control siting, although it goes without saying that transport charges should be borne in mind. Direct access to the site by rail or navigable waterway is, however, necessary.

Administration

There are a number of considerations under this heading which may have an important effect on siting. The promoters may have existing works carrying out similar operations, and economy in senior personnel might be achieved if the new works are sited in the same neighbourhood. If it is intended to go further afield, it is not a good thing to make it difficult for research and design staff to obtain ready access to reference libraries and to attend technical discussions.

nor for apprentices and other junior staff to get to technical schools. Isolation is bound also to lead to works personnel finding themselves unable to keep abreast of rapidly advancing technical knowledge, resulting possibly in loss of keenness.

A Works Questionnaire

Before finally selecting a site, it is advisable to prepare a questionnaire, which should include not only matters affecting siting, but those necessary for detailed planning as well. Such facts as are available should be collected together, and an estimate made covering the following items:

(i) Gross area of site, including area for later extensions—with a note added as to whether importance is attached to frontages on road or rail for publicity purposes.

(ii) Area of site likely to be covered by buildings.

(iii) Maximum height of buildings and/or any chimneys.

(iv) Details of any deep pits requiring drainage.

(v) Details of any concentrated load-likely to require special foundation conditions.

(vi) Whether freedom from possible subsidence is essential.

(vii) Tonnage of goods "in" and "out" by rail, road or water.

(viii) From what districts are raw materials drawn?

(ix) To what districts are finished products despatched?

(x) Individual weights and sizes of any goods handled likely to require special facilities.

(xi) Number of personnel, according to sex, shifts, and categories, including a note as to whether it is intended to transfer key personnel from existing works.

(xii) Estimate of trade water, softened water and domestic water in gallons per day.

(xiii) Estimate of electrical requirements in kW of maximum demand and annual consumption in kWh, with a note on any fluctuations in load, and an expression of opinion as to whether it will be possible to adjust the electrical load in such a way as to preclude the maximum demand occurring during peak load periods on the main distributing system of the area.

(xiv) Estimate of town gas requirements in cubic feet per hour maximum and average.

(xv) A note of any sections of the works in which alternative services can be used, e.g., electricity or gas for annealing stoves, with a rough estimate of the modifications to be made to the figures in (xiii) and (xiv).

(xvi) Nature and estimated quantity of trade wastes to be discharged into local drainage systems or waterways.

Provided with such information, it should be possible to locate a number of alterna-

tive sites and to enter into discussions with local authorities, supply undertakings and railway companies, in order to discover whether, and at what rates, the required services can be made available.

Completion of the questionnaire will require the combined efforts of members of the company's staff and of any technical advisers called in to assist. A satisfactory method of ensuring close collaboration is for the promoting company and the consultants each to appoint liaison officers who will be jointly responsible for the drawing up and completion of the questionnaire, assisted by technical experts from the company's and consultant's staffs to whom they find it necessary to refer.

During the process of collecting information, major points of principle may arise, and to clear such points regular meetings should be held, attended by representatives of the promoting company and their consultants, empowered to reach agreement on points at issue and to make final decisions. The records of such meetings should be circulated for the guidance of all interested parties on both staffs.

Approving the Site

Preliminary investigations having shown that suitable facilities and services can be provided and that the area under consideration is zoned for industrial development, and access to the land having been obtained, a site survey must then be carried out, and a number of borings put down to determine subsoil conditions. If there is any danger of subsidence, it may be considered desirable to obtain the advice of a mining consultant or geologist. If footpaths cross the site, permission must be obtained from the local authority for these to be diverted or closed entirely.

Having prepared a general lay-out plan for the site, an estimate can be made of the cost of such building and civil engineering works as are peculiar to the site under consideration. At this stage a final decision may be made as to the suitability of the site and negotiations entered into with the landowners.

Process Routing

In these enlightened times there must surely be few industrial concerns which fail to appreciate the importance of process routing in the lay-out of their works. There are many boards of directors who would welcome the opportunity to start *de novo*, but considerations such as finance, abandonment of a site which is ideal in all respects save space, local associations, and the conservatism of their personnel, all tend to delay or to prevent departure to wider and more open spaces. With the best will in the world, however, even when it is coupled with the best advice obtainable, in view of

the extremely rapid developments in technology which render some process operations and plants obsolescent with bewildering rapidity, the chances are that a factory which is perfectly routed on the most modern lines to-day, will leave much to be desired two or three years hence. In such cases it is no easy matter to combine what is best for the present with that which is likely to be suitable for the future. Nevertheless, a good deal can be done in the way of intelligent anticipation; particularly where trends in development make it appear unlikely that drastic changes in process requirements will become necessary.

Flow-Sheets

So far as the lay-out of new process buildings is concerned, it is essential that flow-sheets for materials, energy and time relating to the respective manufacturing process shall be available at the outset. Even if this information has already been taken into account in determining the nature and sequence of the factory operations, the flow-sheets are also of great importance to those responsible for the lay-out of the several units of plant which comprise the works as a whole. The details on the flow-sheets, in conjunction with those obtained from the questionnaire, will enable planning to be done in such a way that buildings requiring special ventilation or dust-free conditions, for instance, are segregated from process operations which are likely to prejudice these conditions or make them more difficult to attain. In the same way, special provision can be made for buildings in which operations are conducted which involve special hazards. For, whereas from the structural standpoint it may be an advantage to house a series of operations in one large building, it not infrequently happens that some of these operations create conditions which adversely affect the conditions in other parts of the building. It is true that modern building design readily permits of the internal partitioning of large constructional units, but, nevertheless, it is not always convenient or even practicable for a section or sections of the one building to be used under conditions which differ materially from those in the other sections.

In cases where the nature of the industry permits, there is much to be said for arranging for the production to be divided between a number of self-contained units, each identical or easily interchangeable. Such a type of process lay-out readily allows for a "progressive completion" construction programme which will enable (a) production to commence in stages, and (b) a nucleus of operatives to be engaged in the first place from which the complete factory personnel can be continuously and systematically developed, thus permitting non-process requirements also to

develop from a small beginning. Such a system possesses the additional advantage of allowing improvements or modifications in process operations to take place with the minimum of disturbance, for the necessary plant alterations can be effected one unit at a time without affecting the rest. Moreover, if sufficient overall production capacity is provided to permit of the periodical shut-down of units in turn, thorough maintenance can be carried out without the need to effect the maximum of repairs in the minimum of time. Even if the entire factory production cannot be divided up into units, it is sometimes practicable to divide up certain stages of a series of operations, and thus to ensure, at any rate, a considerable proportion of the benefits already enumerated.

The value of attractive appearance, obtainable at little or no additional capital cost, is now fully appreciated, and there are few industrial lay-outs which do not lend themselves to improvement by judicious architectural treatment. Perspective drawings are valuable in giving an indication of the appearance of the finished job in relation to its environment.

Detailed Planning

Detailed planning is likely to evolve from an ideal lay-out adjusted to suit a particular site.

Research laboratories might well be incorporated with the administration buildings. Particularly in metallurgical processes, the works laboratory is sited as near as possible to the process operation, and the carrying out of routine tests provides a type of activity in the laboratory which is not always appreciated by the research worker. It is hardly likely that, by separating the two laboratories, the advantages of close contact between research and its application will have been lost.

Where process effluents require special floor finishes and particularly special acid-resisting drainage channels and pipes, the units from which these effluents are discharged should be so placed as to reduce to a minimum the special flooring and drainage work required without upsetting the proper sequence of operations. Similarly, lavatories should be grouped as far as possible.

A ring main system for all services is advisable wherever practicable, resulting in flexibility and allowing for repair or for adding new connections without impeding operations elsewhere. Provision should be made for changes in lay-out in sections of the works. Occasional blanked-off tees and valves, spare capacity on distribution boards, etc., are well worth providing.

If the process permits, consideration should be given to fluorescent instead of tungsten filament lighting in both shops and offices. Additional prime cost is offset by

reduced power costs. Technical advance in this type of lighting has been rapid.

Adequate space should be allocated for rail sidings, for the manœuvring of road vehicles and for provision of weighbridges. Rail/road crossings should be avoided as far as is practicable. Storage space for raw materials, including fuel, should be of ample capacity.

In providing for the temporary utilisation of portions of the site destined for future development, it has sometimes been found that playing fields are not always popular. Personnel may prefer to spend their leisure hours away from their place of work.

During the preparation of this paper, the authors have become increasingly conscious of the difficulty of compressing into a single paper the many aspects of this very broad topic. They fully realise that they have touched only the fringe of matters which, to do justice to their importance, could well form the subject of separate papers. They know that many relevant matters have had to be omitted altogether. Nevertheless, with all its shortcomings, it is hoped that what has been written may have made some contribution to a subject of such vital interest to the chemical engineer.

Protein Hydrolysate

Supply Now Generally Available

A PALATABLE form of enzymic protein hydrolysate has been produced by the joint enterprise of Genatosan, Ltd., and Bengers, Ltd. Until recently, the bulk of this has been used for famine treatment, but now ample supplies are available for the purposes for which it was originally designed. These include all conditions of amino-acid deficiency, whether due to lack of protein, metabolic disturbance or failure, such as the abnormal loss of protein through the kidneys, or extensive burns.

The use of protein hydrolysate offers a method of alimentation which avoids the use of solid food. Normally, it is administered orally in solution, with three times its weight of glucose, specially reinforced with vitamins B and C. The glucose-hydrolysate solution forms a complete food and is almost instantaneously absorbed.

The preparation is obtained from casein and meat protein by enzymic hydrolysis, obtaining a split rather more than 60 per cent. The issuing firms have produced a brochure dealing with the indications and methods of application for protein hydrolysates.

An important magnesite deposit, discovered in the Arctic region of Sweden 10 years ago, is being worked as an emergency measure because of the lack of imports. The deposit is located 120 kilometres north of the Arctic Circle in the Sarek National Park.

Fertiliser Developments in the U.S.S.R.

Exploitation of Rich Deposits in Western Asia

THE phosphorite deposits in the Kara-Tau area in Kazakhstan in Central Soviet Asia are the richest so far found in the Soviet Union and rank with the best of the world's known deposits. With reserves estimated at 1,000,000,000 tons, these resources are of especial significance to the agriculture of the U.S.S.R. and of great importance economically and politically, states an article by Virginia Kinnard, published in *The Foreign Courier and Weekly*.

Before the war of 1914-18, some mining of phosphate rock was done in Podolia (Ukraine) and in Bessarabia. This output was small, however, and rock from North Africa was used principally for the manufacture of superphosphates. Later, domestic raw materials were utilised to a greater extent, but they were not of high grade.

Discovery of New Deposits

The discovery of the rich apatite deposits at Khibiny, on the Kola Peninsula in the extreme north-western part of the U.S.S.R., opened up vast resources, and the Peninsula became a leading source of fertiliser. From these Khibiny reserves, fertiliser industries have used large quantities of rock and treated apatite concentrates, necessitating the shipment of vast quantities of both raw materials and finished products over long hauls. Ranking first in reserves of raw phosphorites, Russia has, nevertheless, spent huge sums in hauling millions of tons of fertiliser thousands of miles over an always heavily burdened transport system. Phosphate fertilisers have had to be shipped from the extreme north-western part of the U.S.S.R. to Central Asia, a distance of 3000 to 3700 miles. This difficulty furnished the stimulus for prospecting for phosphorite deposits in Central Asia. This work became especially important after the beginning of the war, when economies in transport became essential. War-time demands on Russia's railway system have made it difficult to transport to Central Asia the former large volume of fertilisers, and agriculture in that region was hampered by a shortage of fertilisers.

Accessibility of Kara-Tau

However, the accessibility of the Kara-Tau resources relieved the principal rail lines of much of this traffic load. The Turkestan-Siberian Railway, for instance, is only 125 miles from the reserves, and the construction of a short connecting line will reduce distances to a fraction of the former

haul. These deposits occur in the Kara-Tau range in the Dzhambul Oblast in southern Kazakhstan, a republic six times as large as the Ukraine, though its population is only one-fifth as great. The people are chiefly Kazakhs, whose principal occupation for centuries has been cattle raising.

Until geological explorations focussed attention on its unused potentialities, Kazakhstan was an isolated, almost roadless region, whose huge mineral resources were untapped. Except for two railway lines which crossed the fringes of the Republic, only camel caravans traversed its vast expanse. But already much has been accomplished in opening up its great wealth, including the completion of 3000 miles of railway to form the nucleus of a transport system. Kazakhstan is rapidly becoming one of the Soviet Union's most important centres of non-ferrous mining. In addition to phosphates, it contains some of Russia's largest deposits of lead and copper, and important occurrences of coal and petroleum.

The phosphate-rock deposits in southern Kazakhstan were discovered in 1936. They are 55 miles north-west of Dzhambul, extending in a narrow line for more than 60 miles. The material does not appear in isolated veins, but in thick, continuous seams with an average thickness of from 33 to 38 feet.

Prospecting Encouraged

In 1937, extensive deposits of high-quality stratified phosphorites were located in the north-western part of the Kara-Tau range in the basin of the Kok-Su and Ueli-Bas Rivers. A preliminary report in 1937 by the director of the Scientific Research Institute for Fertilisers revealed the phosphoric anhydride content as 28 to 32 per cent., or 61 to 70 per cent. bone phosphate of lime. A prospecting base was established in 1938, and further exploration uncovered other deposits, chiefly in the south-eastern part of the range as well as in the north-west. More than 350 deposits are now known to exist.

During this preliminary work, samples were sent to Moscow for scientific analysis. Ores from Kok-Su, one of the most promising parts of the deposit have an average content of P_2O_5 of 28 per cent. The ores are easily treated, having a very low proportion of iron and aluminium—not more than 2 to 2.5 per cent. After extensive prospecting and exploratory work, the Kara-Tau region has been divided into 45 separate mining

sections. Estimated reserves of these sections total more than 1,000,000,000 tons at accessible depths.

Since 1940 prospecting has been concentrated on the Chulak-Tau deposit, nearest to the railway. The Kara-Tau mining and chemical combine carried out large-scale development of this section in 1942 and 1943. Phosphorites in the Chulak-Tau deposit must be mined from underground; open-pit methods can be used on the upper seams to a depth of 110 to 130 feet. Favourable mining conditions make it possible to dispense with mining timbers, a rare occurrence in phosphorite mines.

Increased Fertiliser Demand

The reorganisation of Soviet agriculture on a mechanised basis has increased the demand for chemical fertilisers—their application being one of the most important elements in this programme of scientific farming. Crop areas had increased to 338,000,000 acres in 1938 from 232,500,000 in 1928, and the acreage planted with grain and technical crops has been vastly extended since the war.

But even though Russia has ranked first in the world in planted area, crop yields were formerly the lowest in Europe, owing, in the main, to the lack of chemical fertilisers (before 1918, only approximately 1.10 lb. per acre were used). In 1928 consumption of chemical fertilisers in the Soviet Union totalled 300,300 tons, but by 1930 it had more than doubled to 676,800 tons. By 1932 the increase was almost fourfold—to 1,139,300 tons. Soviet consumption of phosphate rock increased from 7000 tons in 1925 to more than 1,000,000 tons in 1938. Tests have shown that the use of phosphatic fertilisers has multiplied cotton yields—before 1914 the average yield of cotton was about 200 lb. per acre, but in 1940 it had risen to 712 lb., an increase of more than 350 per cent. Grain yields, too, have been substantially higher, increasing from 50 to as high as 70 per cent. The increase in the use of chemical fertilisers is shown in the following table:—

Russia's Fertiliser Consumption 1913 and 1936.

	1913	1936*
	Metric tons	
Nitrates	20,000	477,000
Superphosphates	230,000	1,481,000
Ground phosphate rock	9,000	577,000
Potash salts	25,000	445,000

* Estimated.

As a result of this increased consumption, the U.S.S.R. has advanced from the thirteenth to first place in Europe in production of superphosphates, and most of this increased output has been used domestically. Formerly as much as 55 per cent. of Russia's superphosphate materials were imported. The Soviet Union has now added phosphatic

and potash fertilisers, previously in the import group, to its list of export commodities.

Future Industrial Development

Not only will the development of a fertiliser and chemical industry at Kara-Tau follow the principle of locating factories near the source of their supplies, but it also will promote another phase of the general plan for industrial growth—progress in production of chemicals. In the Kara-Tau district, conditions are favourable for the establishment of a chemical industry, which could utilise (in addition to phosphorites and pyrites) sodium chloride, sodium and magnesium sulphate, limestone, gypsum, and celestine. In this same region where phosphorite seams have been prospected are also found deposits of Jurassic and anthracite coals, some of considerable value. Sodium sulphide, arsenic insecticides, gypsum and lime for use in construction, glass, pigments, and strontium preparations are among materials that could be produced in the region. Also, various types of fertilisers might be manufactured—sodium tetraphosphate, for example, since the Tuz-Kul Lake near the celestine deposit in the Chulak-Tau region has a high content of the needed sodium sulphate and sodium chloride.

Sulphuric Acid

Sulphuric acid plants are a necessary link in this project, and the problem of supplying the Kara-Tau group with the means for manufacturing large amounts of acid has not yet been solved. However, the utilisation of the substantial reserves of sulphur-bearing minerals, such as polymetallic sulphide ores, and copper sulphides, as well as the deposits of pyrites and gypsum, which lie within the Central Asian republics and bordering regions, would provide potential supplies of sulphur.

Collaboration of sulphuric acid factories with non-ferrous metallurgical plants, which has been successful in other parts of the U.S.S.R., could provide additional quantities of acid. Eight per cent. of Russia's sulphuric acid output in 1937 was obtained from gases of metallurgical plants. Sulphuric acid might be produced, for instance, from the waste gas of the pyrometallurgical section to be operated as part of the copper combine at the porphyry-copper deposit in the Uzbek Republic. Consideration also has been given to a plan to convert the lead plant in Kazakhstan to operation on sulphur ores in order to obtain the gases. The new fertiliser works at first must rely on sulphur-containing materials shipped from outside, since these nearby resources are not sufficiently developed for immediate use. It is expected, however, that eventually these adjacent plants will be able to furnish all the sulphur required.

Despite numerous delays, progress has

been made in establishing the enterprise, which may be said to have passed the preliminary stage. A portion of the connecting line on the Dzhabul-Chulak-Tau railway has been laid, but considerable work remains to be done. The power plant under construction represents another step; additional plants are needed, however, since utilisation of existing facilities is not possible because of their remoteness and limited capacity. Several buildings have been erected for the settlement, and work has started on the grinding and crushing plants. The superphosphate factories being built in several towns near the region will use as their raw material phosphate rock crushed and ground at the mines, and it is planned to construct other fertiliser factories in a number of Central Asian cities, all to be supplied with material from Kara-Tau.

Importance to Central Asia

Central Asia, the region bordering on Iran, Afghanistan, and China's western Province of Sinkiang, embraces four republics—Uzbek, Turkmenia, Tadzhik, and Kirghizia. It is here that agriculture by irrigation has reached its greatest development in the U.S.S.R. Since this region is the Soviet Union's leading consumer of fertilisers (25 per cent. of all phosphate fertilisers produced in the U.S.S.R. in 1939 were shipped to Central Asia), the establishment of a fertiliser industry to serve the area is of outstanding importance. Districts accessible to the Kara-Tau deposits provide a considerable part of Russia's total production of cotton, sugar beets, tobacco, and fruit: large cotton and sugar-beet plantations in the area require thousands of tons of superphosphate. Fertiliser plants in the Kara-Tau region would also serve the adjacent areas of South Kazakhstan and Western Siberia, while Eastern Siberia and other Far Eastern districts are potential markets for Kara-Tau phosphates.

SCIENTISTS HONOURED

A tablet to commemorate the work of the late Sir William Bragg, O.M., and of his son, Professor Sir Lawrence Bragg, presented by Mrs. Smithells, widow of Professor Arthur Smithells, was unveiled by Professor R. Whiddington, F.R.S., at Leeds University recently. The tablet states: "Near this place in the old Physics Laboratory in the year 1913 William Henry Bragg, Cavendish Professor of Physics in this University from 1909 to 1915, and his son William Lawrence Bragg, began their joint researches and established with the first X-ray spectrometer the nature of X-ray spectra and the principles of crystal analysis for which they were awarded the Nobel Prize in 1915."

Filter Manufacturers

First Council Elected

At an inaugural meeting, which was held on July 6, as announced in our issue of June 23, the British Society of Associated Filter Manufacturers was formed. It will be noted that there has been a slight change in the name of the society since the previous announcement was made. The draft constitution was adopted at the meeting and members of the Council were elected as follows: *President*, Mr. C. G. Vokes (Vokes, Ltd.); *vice-president*, Mr. R. F. Brooker (Tcalemit, Ltd.); *members*, Capt. C. C. Barker (Auto-Klean Strainers, Ltd.), Mr. W. B. Bentley (Aerox Filters, Ltd.), Mr. R. R. Houston (Fibreglass, Ltd.), Mr. E. L. Joseph (Ozonair, Ltd.), and Mr. S. C. Toye (Amal, Ltd.).

Certain places on the Council have been left open to meet the needs of incoming members interested in particular sections. The following five sections of the society were formed, with provision for such further sections as might prove desirable: (1) Air Conditioning; (2) Filtration of Air and other Gases; (3) Filtration of Oil and Fuel; (4) Filtration and Purification of Liquids other than Water; (5) Filtration and Purification of Water.

Messrs. Peat, Marwick, Mitchell & Co., 94/98 Petty France, London, S.W.1, were elected secretaries.

EIRE'S CHEMICALS

The gross output of the chemical and drug industry in Eire in 1944 was valued at £622,498, compared with £561,874 in the preceding year, according to a census of industrial production report just issued by the Eire Department of Industry and Commerce and published in the official *Irish Trade Journal*. The number of establishments in the industry declined by one to 60 in the year under review. The following are comparative statistics:

	Net selling value	
	1943	1944
	£	£
Sodium carbonate...	30,971	28,223
Acetylene gas	19,885	18,889
Oxygen	12,721	10,905
Foodstuff chemicals ...	21,410	45,320
Disinfectants	23,136	40,473
Weedkillers and insecticides	11,804	11,664
Sheep and cattle dressings	7,594	11,325
Ointments	8,843	8,312
Proprietary medicines ...	54,394	54,791
Galencials... ..	50,097	51,003
Veterinary materials ...	54,686	54,575
Toilet preparations ...	175,781	196,154
Other chemicals	64,865	80,128

The reconstruction of the Idria mercury mines is reported, from Italy, to be progressing. The Trifail mines, partly flooded by the Germans, have resumed production, and have now reached half their pre-war output.

American Synthetic Fuels

Active Development Programme

BOTH the U.S. Department of Agriculture and the Bureau of Mines are going ahead vigorously with the enlarged Federal synthetic fuels programme, as a result of legislative action by Congress in the past year, and experimental and development work is now in progress.

A plant has been erected at Peoria, Ill., to establish the technical feasibility and cost factors of a continuous process for saccharifying agricultural residues to products from which liquid fuels can be made by a process developed by the Agricultural Department on a laboratory scale through the Bureau of Agricultural and Industrial Chemistry.

Similar activity has emanated from the Bureau of Mines, which has long been interested in this field of research. The Bureau has established an office of Synthetic Liquid Fuels at Bruceton, Pa., near Pittsburgh, and its staff includes "several of the best liquid fuel experts in the country."

Demonstration Plants

For the past six months, it is stated, the major effort has been the design and construction of demonstration plants. Pilot plants, which are intended to furnish, among other things, special test fuels for the Navy, as well as data concerning production of aviation spirit, are also being rapidly completed.

The Office of Synthetic Liquid Fuels includes five divisions: oil shale, synthesis gas production, gas synthesis demonstration plant, development and pilot plant, and hydrogenation demonstration plant. The first will engage in research, pilot plant and demonstration plant work; the second, production of carbon monoxide and hydrogen; the third, construction and operation of demonstration plants; and the other two, respectively, hydrogenation and gas synthesis processes, and construction and operation of demonstration plants. The first three divisions are complete, and the last two are in process of formation.

Hydrogenation studies will be conducted in a battery of small converters to determine the most economical methods of hydrogenating American coals and to develop improved processes that are said to hold promise of halving the cost and the size of the equipment needed for the process. This laboratory also will contain the equipment for production of up to 10 barrels of motor spirit daily by coal hydrogenation. This will be used for special engine tests by the Bureau of Mines and the air services of the Army and Navy.

The research and development part of the oil-shale programme has for a main purpose

the determination of fundamental data, and development of processes that may be used in the design, construction, and operation of large pilot or demonstration plants for mining oil-shale, producing oil from shale, and refining this oil into marketable products.

Oil-Shale Developments

The oil-shale research and development laboratory will be erected on Bureau of Mines property at Laramie, Wyoming. Production of shale oil from individual retorts at a rate of above 100 barrels daily is expected to be under way by autumn. This will be sufficient to provide material for refining and engine test programmes.

The Bureau of Mines has selected a site in Western Colorado for a \$1,500,000 oil-shale demonstration plant, one of the major installations authorised by Congress. This will serve as a proving ground for processes being developed to convert the nation's large reserves of oil shale into an auxiliary source of fuels and lubricants. It will be operated in conjunction with the Laramie oil shale laboratory. There remains the selection of a site for a demonstration plant to make liquid fuels from coal. An extensive survey of such possible sites is going forward, but final decision will not be made for some time.

To produce oil from oil shale, the shale is mined by methods similar to those used in coal mining, crushed, and charged into an oven where heat is applied. This breaks down the organic material and liberates the oil. A ton of high quality shale will yield 45 or more gallons of oil. Products closely resembling those commonly produced from petroleum, such as petrol, diesel fuel and waxes, can be made by distilling and refining shale oil.

The Air Liquide Company, which exploits the patents of M. Georges Claude, the famous French scientist (recently condemned to life imprisonment as a collaborator), made a loss in 1944 of 40,337,000 fr. (±201,685), compared with a profit of 35,013,000 fr. for 1943, when a dividend of 8.79 fr. was paid. Several factories in France were damaged and production interrupted, but at the end of the year 54 factories were again working. The results of the Canadian, U.S., Argentine, North African, Egyptian, Syrian and Palestinian affiliates are known to be satisfactory. In Spain and Portugal, some progress was made, while the position of the Belgian company is uncertain. An issue has been made of 50,000,000 fr. of 3½ per cent. debentures.

Indian Research Fellowships

I.C.I.'s Munificent Offer

LORD MCGOWAN has addressed a letter to Professor Wadia, President of the National Institute of Sciences of India, in which he explains the reasons and hopes which have prompted I.C.I. to offer a number of Research Fellowships to that Institute. They believe that the Institute is destined to play in India a part similar to that which the Royal Society has performed in leading the scientific progress of this country; and they have noted the fact that the Royal Society until recent years was hampered by lack of funds, a difficulty which was eventually overcome by the generosity of various benefactors, including industrialists such as Mond and Messel. They 'heretofore thought that there could be no better way of encouraging the advance of science in India and with it the general prosperity of the country than by the offer of the Fellowships, some details about which are appended.

I.C.I. (India) are offering to the National Institute of Sciences the sum of Rs.336,000 for research Fellowships in chemistry, physics and biology, to be held at Indian universities or institutions approved by the Council of the National Institute of Sciences, over a period of five to seven years.

1. Each Fellowship to be worth Rs.400 per month and to be tenable in the first instance for two years, with a possibility of extension up to a total of three years.

2. In addition there will be a grant for research expenses to be made to the Fellowship holders according to their needs of special apparatus and materials. For this purpose the National Institute will dispose of an average of Rs.600 per annum for each Fellowship.

3. There will be a grant of Rs.13,200 per annum to the National Institute for five years to enable them to pay for administration and the travelling expenses of such Fellows of the Institute as may be selected to visit the Fellowship holders.

As the scheme is planned, four new Fellows may be appointed yearly in 1945-1949.

Administration

The principles suggested for the administration of the Fellowships are as follows:

1. Appointment to the Fellowships to be made by the Council of the National Institute, acting on the advice of a special Research Fellowships Committee.

2. This Committee will represent various scientific fields and be drawn from various parts of India, so as to include any community, the over-riding consideration for membership being scientific fitness.

3. The Fellowships will be open to per-

sous, irrespective of sex, race or religion, resident or domiciled in India (British India or the States) and under 35 years old.

4. The Fellowships will be tenable at any university or institution in India, approved by the Council.

5. Fellows will be permitted to do a limited amount of approved teaching or demonstrating—up to six hours per week—and it should be a condition that they are paid for this work by the institution or university at its normal rates.

6. The aim of the Fellowships is to strengthen research in Indian universities and institutions, and it is hoped that the National Institute of Sciences will spread the research Fellowships over them in accordance with this aim, but with the over-riding consideration of their scientific suitability.

Synthetic Ammonia for India

Power-Gas Process to be Used

SOME time ago the Indian State of Travancore contracted with an American company for the supply of a plant to make synthetic ammonia fertiliser. Travancore is deficient in coal and coke, though ample supplies of timber can be made available.

The basis of all ammonia fertilisers, ammonia itself, is synthesised from a mixture of three parts hydrogen and one part nitrogen. In the great majority of ammonia plants, the hydrogen is obtained from coke or coal, by the water-gas/CO conversion process starting with coke, or by refrigerative gas separation from coke-oven gas.

After considerable investigation in the U.S.A., the American engineers acting for the State of Travancore have selected processes of The Power-Gas Corporation, Ltd., Stockton-on-Tees, to produce the required mixture of hydrogen and nitrogen. The system of making hydrogen will be entirely original to the ammonia industry, starting with the cheaply available wood, and embodying a substantial development of the processes adopted and devised by the company in serving the balloon barrage in this country during the war. It will be recalled that The Power-Gas Corporation, Ltd., designed and constructed the first shaft-type generator installation for balloon barrage use, operating by the steam-iron process. The capacity of hydrogen in this one Travancore plant will approach very near to the sum total of all the many balloon barrage plants throughout Great Britain. Nitrogen will be conveniently obtained from the waste gases, and the mixture will be purified at pressures up to 2000 lb./sq. in., to the extremely fine limits (less than 5 p.p.m. of carbon monoxide, for instance) which are required before the two gases, hydrogen and nitrogen, are suitable to combine in producing ammonia.

The Distillers Company

Annual Meeting : The Chairman's Address

THE 68th annual general meeting of the Distillers Company, Ltd., was held in the North British Station Hotel, Edinburgh, on July 20, when the chairman, Lord Forteviot, O.B.E., M.C., D.L., presided.

The following is an excerpt from his address to stockholders:—

The consolidated profit and loss account shows the total profit and revenue earned by the group after charge for excess profits tax and overseas taxation as £7,582,362, and after making necessary provisions, etc., full allowance for income tax on these profits, for dividends to outside shareholders of subsidiary companies, and directors' fees, there remains £2,157,663 as the sum available to the Distillers Company, Ltd. This compares with the figure of £2,086,501 for the previous year. The board have agreed to appropriate and to apply to general reserve £500,000 (making it £4,000,000), and investment reserve £69,582 (making £1,600,000), leaving available, with the amount brought forward and after deducting the interim dividends, the sum of £1,621,842 as against last year's figure of £1,502,950.

The Balance Sheet

It is proposed to pay a final dividend on the ordinary stock and shares of 1½ per cent., less income tax (making 17½ per cent., less income tax, for the year), and a bonus on ordinary stock and shares of 2½ per cent., less income tax, thus leaving to be carried forward £555,815 as against £534,491 brought in.

With regard to the legal balance sheet, I have to make reference to the following matters of interest:—

(1) The ordinary capital has been increased during the year by £58,500—representing the allotment of 58,500 shares of £1 each in exchange for the remaining 52 per cent. of the issued share capital of F. A. Hughes & Co., Ltd., making the company a 100 per cent. subsidiary.

(2) During the year under review the company invested a further £1,275,000 in National War Bonds and Exchequer Bonds, so that at May 15, 1945, the company's holdings in gilt-edged securities, mainly short term, amounted to over £16,500,000. In respect of this very large holding, and certain other investments, the company has an investment reserve which now totals £1,600,000.

(3) At the previous meeting I referred to the fusion between Gyproc Products, Ltd., one of our subsidiary companies, engaged in the manufacture of plasterboard, and the British Plaster Board, Ltd., and I may now report that the company received 660,000

ordinary shares of 5s. each in the British Plaster Board, Ltd., in exchange for (a) the shares in Gyproc Products, Ltd., and (b) £34,414 in cash.

(4) Land and buildings, plant and utensils stand in the balance sheet at £496,425, a very low figure for a valuation on a "going concern" basis.

Distilling

At the outbreak of war the company was notified by the Ministry of Food that production of whisky would cease at the end of the year. The company had at that time six months' stocks of cereals for full-scale production, and these were requisitioned. Since then, three short distilling periods were allowed and in the year under review limited supplies of home-grown cereals were released to the industry for the manufacture of whisky. Now that hostilities in Europe are over we look forward to being permitted to commence the rebuilding of stocks to the level necessary to meet the demand for our brands of quality.

Yeast

Again I have to report that the company's yeast factories have been fully employed, and our yeast products are becoming more and more popular. The company is the largest manufacturer of bakers' yeast in Europe and the factories were called upon during the war for ever-increasing outputs. I am glad to say that by the adoption of improved processes and technique we were able to meet all these demands. The Forces were supplied with vitamin B1 yeast tablets as well as wet and dry bakers' yeast, while substantial quantities of the tablets were presented to the Red Cross for distribution at certain prisoner-of-war camps. To assist the Minister of Transport, a scheme was arranged with the Ministry of Food for zoning deliveries of yeast.

Industrial Group : Chemicals

Our subsidiary companies have been engaged throughout the war in the production of a range of vital chemicals, principal among which are acetone, acetic acid, acetic anhydride and butyl alcohol. Although the operation of lease-lend supplies from the United States eventually eased the position, our plants were taxed to the utmost during the first two critical years. A number of new products have been developed at the request of Government departments.

In 1941, in collaboration with the Shawinigan Company of Canada, we designed and erected in South Wales for the Ministry of

Supply a large factory for making calcium carbide from indigenous raw materials, the first of its kind to be erected in this country, and the Ministry entrusted to us the management of the factory. The vital importance of carbide in the war effort cannot be over-emphasising.

Through our subsidiaries and our associated company, B. X. Plastics, Ltd., we have been engaged in the manufacture and processing of large supplies of thermoplastic and thermo-setting materials, prominent among which are celluloid, cellulose acetate, photographic film base, polyvinyl chloride, and polystyrene. Development work in many interesting plastic materials has proceeded and, although war-time restrictions have prevented normal progress, we look forward to embarking on full-scale production as soon as conditions permit.

In view of the publicity given to the valuable properties of this new product of British science, the stockholders will be interested to learn that, at the request of and on behalf of the Ministry of Supply the company is now engaged, in conjunction with Commercial Solvents Corporation of U.S.A., in the design and erection of the largest unit in this country.

Industrial Alcohol

The company's position in the industrial alcohol industry, with plants located at various points throughout Britain, enabled it to meet the maximum demands at all times.

In 1943, Sir Kingsley Wood, Chancellor of the Exchequer, appointed a committee, under Lord May's chairmanship, "to review the question of the grant of the allowance from the Exchequer in respect of industrial alcohol." This committee recommended that the whole of the 5d. allowance should be withdrawn, but that sections of the alcohol-using industry could put forward, if they so desired, a claim for some measure of assistance from the State.

In presenting his recent Budget statement, the Chancellor of the Exchequer announced that the Finance Bill would include provisions covering the modernisation of the system of control by the revenue at distilleries and also abolishing as from January 1, 1946, the allowance of 5d. per proof gallon paid by the Exchequer under Section 15(2) of the Finance Act, 1921. Although this Finance Bill has been withdrawn and the appropriate clauses were not included in the shortened Act, there is no reason to look for a change in the Government's policy.

The policy of successive Governments over a number of years has been to provide the chemical industry with industrial alcohol as a raw material at a low cost, so as to enable chemical manufacturers to establish and maintain production of the newer chemicals in face of competition from highly organised

industries abroad. The soundness of this policy in the past is demonstrated in the case of our subsidiary company, British Industrial Solvents, Ltd. This company, formed in 1930, was enabled to initiate in this country the large-scale production of acetone, acetic acid and butyl alcohol based on industrial alcohol, which, as I have indicated, materially contributed to the immediate needs of the Government on the outbreak of war.

F. A. Hughes & Co.

I have already referred to the purchase of the remaining 52 per cent. of the share capital in F. A. Hughes & Co., Ltd., and it will be of interest if I explain that that company, since its conversion to a limited company in 1920, has specialised in the introduction and development of sales in new products in the plastics and metallurgical fields. For this purpose the company has built up a highly qualified technical sales organisation, and has financed, designed and erected plants to manufacture those special products, which are operated by its main subsidiary and associated companies.

(a) Cellomold, Ltd.: thermo-setting resins and other plastic materials, and

(b)—Magnesium Elektron, Ltd.: magnesium alloys produced in Britain from indigenous raw materials.

Research

The board is very conscious of the importance of research and constant attention is being given to the maintenance of the company's research facilities on the highest level of efficiency. In past years large sums have been expended for this purpose, and indications are that even heavier expenditure will be called for in the future.

It may now be stated that substantial damage was done by enemy action to several of our buildings and plants. Some have been repaired, others have not yet been replaced. I should like to refer here to the gallant way in which our workers faced up to these incidents, and the excellent work done in getting essential plants back into operation without delay. Several employees were killed and many others injured, but all gave of their best.

With regard to the future, I think stockholders may look forward with reasonable confidence, not minimising the difficulties that obviously lie ahead with the change over from war conditions, but taking into account the strong financial position, the ample reserves and the varied interests of the company. I have pleasure in announcing that the court has confirmed the alteration of the provisions of the company's Memorandum of Association, with respect to its objects, set forth in the special resolution of the company passed on May 17 last.

The report was adopted.

Personal Notes

DR. B. H. NICOLET has received the Borden award of the A.C.S. for fundamental investigations in the chemistry of milk proteins.

MR. H. W. J. INSHAW has relinquished his post on the technical staff of United Ebonite and Lorival, Ltd., and has taken up an appointment as assistant controller, Rubber and Plastics Products, on the Control Commission for Germany.

MR. A. E. SYLVESTER, governor of the Gas Light and Coke Co., chairman of the British Gas Council, and of the Ministry of Fuel's Power Gas Advisory Committee, has been invited to serve as a member of the industrial advisory panel of the Finance Corporation for Industry, Ltd.

DR. D. H. HEY, M.Sc. (Wales), D.Sc. (Manch.), Ph.D. (Lond.), has been appointed to the University Chair of Chemistry tenable at the Imperial College of Science and Technology. Since 1941 he has been Director of Research at the British Schering Research Institute.

The marriage took place on July 19, at St. Peter's, Tandridge, Surrey, of MR. ALBERT EDWARD LOUIS MASH, of The Weald, Betchworth, and MISS JULIA WEDGWOOD BENN, younger daughter of Sir Ernest Benn (chief proprietor of THE CHEMICAL AGE).

MR. W. C. DEVEREUX has arranged to relinquish his position as chairman and managing director of High Duty Alloys, Ltd., in order to devote himself to the scientific development and application of aluminium alloys over a wider commercial field. He will retain the chairmanship of International Alloys, Ltd., and expects to be in a position to announce his plans in more detail in the near future.

I.C.I. Research Fellowships, tenable at Cambridge University for three years at £600 a year, have been awarded as follows: DR. J. N. AGAR, Sidney Sussex College; DR. J. BADDILEY, Manchester University; DR. K. BAILEY, Trinity College; DR. C. J. BIRKETT CLEWS, London University; MR. A. H. A. HOGG, Sidney Sussex College; DR. M. F. FERUTZ, Peterhouse; and MR. M. RYLE, Oxford University.

DR. and MRS. ARCHIBALD CLOW have been awarded the Senior Hume Brown Prize in Scottish History by the University of Edinburgh. It is unusual for two scientists to gain these awards, but Dr. and Mrs. Clow have written a book "The Chemical Revolution" on the contribution of science and chemistry to human endeavour during the industrial revolution; and it is for this work that the award has been made.

In addition to her eminence as a public analyst (as recorded in our issue of July 7, p. 4), MRS. SEAN T. O'KELLY, wife of the newly-elected President of Eire, collaborated with the late Professor Hugh Ryan in a number of investigations at University College, Dublin, including one on the action of nitrous and nitric acids on diphenylamine, carried out with the co-operation of Nobels, Ltd. Later, she set up practice as a consulting chemist in Dublin, all the members of her laboratory staff being women graduate chemists. It is less good news, from the chemical point of view, that her new sphere of activity will prevent her from continuing to take an active part in the work of her profession.

PROFESSOR F. L. WARREN, B.Sc., Ph.D., who has been seconded by the Natal University College, to act as Government adviser on industrial chemical research for 12 months, came to South Africa in 1940 to take up the appointment of professor of chemistry at the college. Born in London, he took his B.Sc. degree at the Royal College of Science, where he subsequently worked in Professor Sir Jocelyn Thorpe's research school. He was employed on micro-organic chemistry under Professor Hans Lieb at Graz, and started his teaching career at the Royal College of Science and at Birkbeck College. In 1931 he went to the Fuad I University, Cairo, as senior lecturer in organic chemistry. Since his arrival in South Africa he has been directing chemical research on the extraction of rubber and resin from the euphorbia and has been active in war-time research projects.

Obituary

MR. ERNEST GABRIEL-JONES, M.Sc., F.R.I.C., who died on July 14, was deputy analyst for the City of Liverpool. He was elected Fellow of the Royal Institute of Chemistry in 1907, and was for many years the active secretary of the Liverpool branch of the Society of Chemical Industry.

ALUMINIUM CONTROL RELAXED

To permit a return to free competition and normal commercial relations between consumer and producer in some of the light metal industries, the Government is relaxing some controls as from August 1. The metals concerned are aluminium, magnesium, and silicon, both raw and prefabricated. The orders controlling aluminium and magnesium will remain in force, but licences will be granted so that users of raw aluminium will be free to purchase and use it in any desired amount, for any purpose, and from any domestic supplier. Virgin aluminium will continue to be controlled by the M.A.P. as the sole trader.

General News

From Week to Week

The Library of the Chemical Society will be closed for revision and cleaning from Monday, August 6 to Saturday, August 18 inclusive.

A Review of Commercial Conditions in New Zealand, prepared by Mr. Boulter, Senior Trade Commissioner in New Zealand, has now been published (H.M.S.O., 6d.).

The Royal Technical College, Glasgow, is to appoint a Professor of Chemistry at a commencing salary of £1000 per annum. August 31 is the latest date for application.

In view of an early cessation of the imports of Lend-Lease fertilisers, the industry has been requested by the Government to make plans for a considerable expansion.

The address of the Institute of Physics and of its *Journal of Scientific Instruments* will be 19 Albemarle Street, London, W.1 (Telephone: Regent 3541—two lines), as from July 31.

British United Aid to China has lately been able to send a supply of halibut liver oil, which is especially rich in vitamins A and D, to Chengtu, where there was an especially urgent need among the war-exhausted population.

In response to an appeal from the Greek Society of Mathematics, Sir Richard Gregory, president of the British Association, has promised, on behalf of the Association, to assist in the recovery of Greece by all means at his disposal.

The Control of Engine, etc., Anti-Freeze (No. 3) (Revocation) Order, 1945 (S.R. & O. 1945, No. 841), effective from July 16, revokes all Orders regulating the production, disposal, and acquisition of engine anti-freeze material.

There are more than 450,000,000 tons of shale still unworked in Scotland, estimates Mr. Walter Nellies, general secretary of the Shale Miners' and Oil Workers' Union, in a booklet he has written on the industry. Mr. Nellies says the industry is capable of great expansion.

An additional grant of £10,000 has been made to the British Colliery Owners' Research Association to enable it to make a start with an urgent scheme of coal research (planned by the Mining Association) under the heads of production, safety and health, and the preparation of coal for the market. The cost is to be defrayed by a levy on the industry, though a grant may be made also by the D.S.I.R. The pits themselves will be the "laboratories" and there will be district research committees; research work undertaken by individual companies will be assisted.

Approval has been given by the Council of the Royal Institute of Chemistry to a recommendation of the Chemical Council "That the constituent bodies approve the co-option of two representatives of the Faraday Society as members of the Chemical Council under similar conditions to the other bodies."

The Vice-Chancellor of Cambridge University has received an offer from Mr. Arthur Sims, of East Hoathly, Sussex, on behalf of Mrs. A. M. Sims, to establish a trust fund which, in seven years, will amount to about £10,000. The income is to be used to endow a Sims Empire Scholarship to promote study or research in physics, chemistry, mathematics or medicine.

The National Union of Dyers, Bleachers, and Textile Workers has applied for increases in the wages of operatives in the dyeing and finishing industry—about 5s. per week for adult male time-workers, 5s. 6d. for female time-workers, and proportionate increases for piece-workers. A meeting is to be held in Manchester on August 3 to discuss the matter.

The recently-appointed Census of Distribution Committee have decided to invite interested national trade associations to offer written evidence on the possible uses of a census. All the distributive trade associations who were originally approached by the Board of Trade last September are being invited to give a more detailed expression of opinion. Local associations, firms, or individuals should express their views through their national organisations and not direct to the committee, whose secretary is Mr. R. P. Hicklin, Board of Trade, Romney House East, Tufton Street, London, S.W.1.

Foreign News

A Metal Treating Institute, a national association of qualified heat-treating companies, has been formed in Detroit, Mich.

Cellulose yeast is being produced in Finland in the form of a gravy powder which is distributed to works canteens and lumber-jacks' camps.

In the course of geological research, M. Gordel, professor at the Modern College of Lyons, has discovered an important deposit of manganese in the commune of Châtillon-sur-Chalaronne (Ain).

A group of Indian industrialists is promoting, with the co-operation of American manufacturers, an Indian rayon industry which will begin production in Bombay with a capital of three crores of rupees (£2,250,000).

The shale-oil plants at Kohla and Kivieli, Estonia, were completely destroyed by the Germans, states the Soviet Press. All equipment was removed from the Sillamayä plant, and part of the building demolished.

An American firm mining copper at Macuchi, Ecuador, has announced that it expects to cease operations in 1946 owing to exhaustion of ore. Exploration for new ore bodies had not met with success.

The Iraq Petroleum Company is building eight new oil storage tanks at Haifa to replace those destroyed by enemy air attacks in 1940-41. In all, there will be 29 tanks on the company's premises, with a total capacity of 300,000 tons.

Refractory magnesia bricks capable of withstanding temperatures of more than 2000° C. are being made by the Chinese Research Institute of Mining and Metallurgy. Crystalline magnesia extracted from dolomite is used with a cementing material and a cement efflorescent salt.

There was a one-hour strike at the Italian chemical firm of Montecatini to protest against the release of Donegani, its managing director, who had been arrested as a collaborator. The Milan police commissioner is said to have decided that the evidence against Donegani was negative.

The fertiliser factory at Chorzow in Poland is expected to produce 30,000-35,000 tons of nitrogenous fertilisers before the autumn sowing. Since the Moscice plant has been destroyed, the Chorzow works are the main source of chemical fertilisers for Polish agriculture.

The Soviet apatite combine at Kirovsk is reported to be in full-scale production since the superphosphate plant has been put in operation. The Molotovskiy and Voskresensky plants are also working to capacity, and further plants are soon to be opened at Odessa and Konstantinovka. A new superphosphate factory is being built in Central Asia.

Hypochlorites have been found, by J. Weijland, of Merck & Co., to be efficient and economical oxidising agents, in place of permanganates, in the oxidation of aromatic sulphides to sulphones, of nicotine and nicotine-like compounds to nicotinic acid, and of diacetone sorbose to diacetone-2-keto-levo-gulonic acid in the vitamin-C synthesis (*J. Amer. Chem. Soc.*, 1945, 67, 1031).

In Switzerland, a further ammonia plant, as well as a nitric acid plant, were erected at Sins, Canton Aargau, in 1940, the annual report of the Lonza A.G. reveals. In the following year, production of various polymers was taken up, supplies of which were used on an increasing scale by Switzerland's rubber as well as by other industries. Last year, production of ammonium nitrate and of urea was inaugurated.

It is reported from New York by Reuter that Federal Judge Rifkind has ruled that E. I. du Pont de Nemours and Co., the National Lead Co., and the Titan Co., Inc., a subsidiary of National Lead, have formed a "combination and conspiracy in restraint of trade" in titanium. The U.S. Government has stated that I. G. Farben was a member of the combination, though it was not named as a defendant.

Company News

Sudan Salt, Ltd., reports a net profit, for 1944, of £10,913 (£9562). The ordinary dividend is maintained at 3½ per cent.

Fisons, Ltd., have made a net profit, for the year ended September 30, of £99,047 (£100,541). A final ordinary dividend makes a total distribution of 10 per cent. (same).

U.S. Industrial Chemicals Inc. report net sales, for the year to March 31, of \$40,536,741 (\$37,486,342). Net operating income totals \$2,804,140 (\$2,548,946), and net income is \$1,690,795 (\$1,680,279). A dividend of \$2.25 (\$2.00) is being paid.

The Lonza Elektrizitaetswerke und Chemische Fabriks A.G., Basle, has made a trading profit, for last year, of fr. 13,322,652 (fr. 12,849,096). Net profit totals fr. 4,542,582 (fr. 4,589,411). The gross dividend is again 6 per cent.

The reduction in the capital of **Crystalate, Ltd.**, from £375,000 to £221,250 has been confirmed by the Court. It will be effected by writing 1s. 6d. off each of the 300,000 preference shares of 10s. each and 7d. off each of the 4,500,000 ordinary shares of 1s. each.

The Metal Box Co., Ltd., reports a trading profit, for the year to March 31, of £643,011 (£604,441). Net profit totals £242,428 (£229,579). A final ordinary of 10 per cent. (same) and a cash bonus of 2½ per cent. make an unchanged total distribution of 17½ per cent.

The directors of **Benn Brothers, Limited**, have declared the following final dividends, less tax, for the year ended June 30: 3 per cent. on preference shares, making 6 per cent. for the year; 12½ per cent. on ordinary shares, making 17½ per cent. for the year (same); and 3s. 6d. on the deferred shares (same).

Timothy Whites and Taylors, Ltd., report a trading profit, for the 53 weeks to December 30, of £566,178 (£538,500). Taxation absorbs £302,000 (£237,500). The net profit amounts to £140,010 (£138,312). The dividend was announced in *THE CHEMICAL AGE* of June 2.

The results of the subsidiary companies for the same period are as follows: Taylors

(Cash Chemists) London, Ltd., trading profit £166,965 (£125,837), preferred ordinary dividend 4.8 per cent. (same), deferred ordinary dividend 5.333 per cent. (same); Taylors (Cash Chemists) Midland, Ltd., trading profit £133,667 (£119,525), ordinary dividend 12½ per cent. (same), tax free, deferred ordinary dividend 32½ per cent. (same), tax free; Taylors (Cash Chemists) Trust, Ltd., revenue £85,834 (£81,826), preferred ordinary dividend 9.886 per cent. (same), deferred ordinary 12.083 per cent. (same); Taylors Drug, Ltd., trading profit £239,210 (£219,499), ordinary dividend 8½ per cent. (same), tax free.

Commercial Intelligence

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

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, 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 and 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.)

DAVEY, PAXMAN & CO., LTD. (formerly DAVEY, PAXMAN & CO. (COLCHESTER), LTD.), Colchester, engineers. (M., 28/7/45.) June 25, £380 mortgage to Colchester Permanent Benefit Building Society; charged on 32, 71 and 72 Hythe Hill, 1, 2 and 3 Foundry Yard, 15 to 23 (inclusive) St. Leonards Road and 9 Stanwell Terrace, all Colchester. *£54,080. August 17, 1944.

Satisfaction

COXETER & SON, LTD., London, W., scientific instrument manufacturers. (M.S., 28/7/45.) Satisfaction July 5, of debentures registered October 8, 1935, to the extent of £9000.

New Companies Registered

Tarbrax, Ltd. (306,950).—Private company. Capital, £100 in 100 £1 shares. Manufacturers of and dealers in chemicals, disinfectants, fertilisers, plastics, etc. Subscribers: L. M. Baillieu, E. B. Allan. Solicitors: Temple & Co., 9 Golden Square, London, W.1.

Joshua Rea & Sons, Ltd. (397,056).—Private company. Capital, £7500 in 5500 ordinary and 2000 preference shares of £1 each. Objects: To acquire the business of oil, paint and varnish manufacturers and general merchants carried on by a company of the same name (in liquidation) at Collingwood Street, Liverpool. First directors: T.

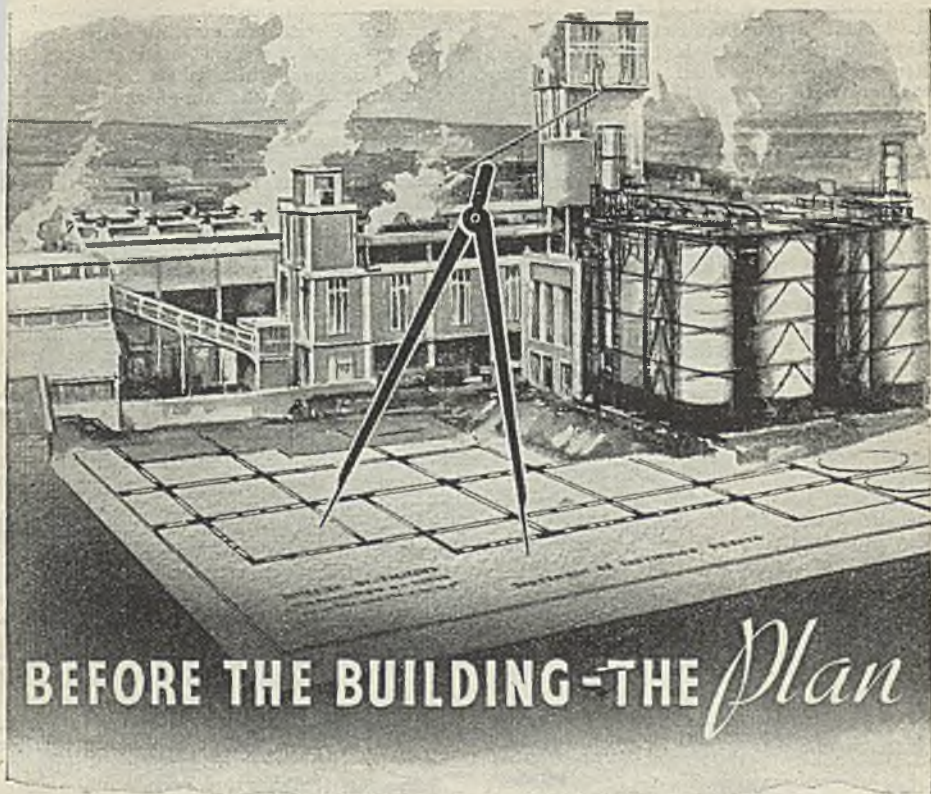
Bullivant; H. Gardener; E. C. Glazebrook. Registered office: 33-35 Collingwood Street, Liverpool.

Pharmaceutical and Allied Chemicals Disposals Association, Ltd. (397,034).—Company limited by guarantee without share capital, with 100 members. To co-ordinate and regulate the activities of members with regard to the disposal of goods obtained by the Association or its members under the direction of the Ministry of Supply; to purchase, control the sale of and distribute under the direction of the Ministry, any surplus, second-hand, reconditioned or salvaged pharmaceutical or allied chemicals, etc. Subscribers (and first members of the committee): Ayrton Saunders & Co., Ltd., Liverpool; T. A. Ward & Co., Ltd., Birmingham; Howard & Sons, Ltd., Ilford; W. J. Bush & Co., Ltd., Hackney; Potter & Clarke, Ltd., London, E.1; Thos. Morson & Sons, Ltd., London, W.C.1; W. & R. Hatrick, Ltd., Glasgow; British Drug Houses, Ltd., London, N.1; Whifen & Sons, Ltd., Fulham; Evans, Sons, Lescher & Webb, Ltd., Liverpool. The Ministry of Supply may appoint a committee member. Solicitors: Stephenson, Harwood & Tatham, E.C.

Chemical and Allied Stocks and Shares

EARLIER in the week business in stock markets remained restricted, pending the election results, but the undertone was still firm. With very little selling in evidence, prices continued to respond strongly to moderate improvement in demand. British Funds showed firmness with a number of moderate gains. Home Rails in the early part of the week were better again, and Industrials kept firm with good features in evidence, particularly in Iron and Steels, which responded to the £120,000,000 scheme for post-war development of the industry.

Shares of chemical and kindred companies reflected the firm tone of markets, and small gains predominated. Imperial Chemical strengthened further to 40s. 4½d. on the not unattractive yield and on the assumption that, when E.P.T. is abolished, there may be prospects of the dividend exceeding the 8 per cent. basis of recent years. The market remains hopeful that the supplementary Budget later in the year may bring some reduction in the burden of taxation, which during the war years has in many cases weighed so heavily as to prevent the building up of adequate resources to meet post-war problems. Lever & Unilever were higher at 50s. 6d., the general belief being that sooner or later the dividend will at least return to the 10 per cent. level of pre-war years. Dunlop Rubber,



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after easing to 51s., rallied to 51s. 7½d. on the scheme for rehabilitating the rubber estate industry in Malaya. United Molasses, after easing, also rallied to 42s. 6d., and Distillers were firm at 119s. on further consideration of the results.

The confidence indicated by the big plan for post-war development of the industry centred attention on iron and steel shares. In many cases yields are attractive, and the prevailing view is that dividends generally seem likely to be maintained; there may also be scope for higher payments when E.P.T. is abolished, although it is likely in most instances that allocations to reserve funds will continue on a generous scale. Guest Keen, which also continued under the influence of the higher dividend recently announced, were prominent with a further rise to 43s. 3d. Consett Iron 6s. 8d. units, which benefited from the full results, were higher at 9s. 9d. Staveley moved up to 50s., United Steel to 27s. 9d., Stewarts & Lloyds to 56s. 9d., Ruston & Hornsby to 54s. 6d., Colvilles to 25s., and Tube Investments to £5½, while Allied Ironfounders were 53s. 3d., and, awaiting the results, Davy & United moved up to 34s.

Textiles were also better on post-war hopes, although it is recognised that in many cases there can be only very limited scope for higher dividends unless E.P.T. is abolished or materially reduced. Bradford Dyers jumped to 26s. 7½d., Fine Spinners were 25s. 9d., Calico Printers 19s. 9d. and Bleachers 14s. 6d. Elsewhere, B. Laporte remained at 87s. 6d., and Greff-Chemicals Holdings 5s. shares held their rise to 9s. 9d. Monsanto Chemicals 5½ per cent. preference were again 23s., Burt Boulton 27s. 6d., and Cellon 5s. ordinary 26s. British Oxygen were steady at 86s. 6d., also British Aluminium at 43s. 6d. and Borax Consolidated deferred at 43s. 6d. Imperial Smelting were better at 15s. 9d., and General Refractories held their improvement to 16s. 10½d. Barry & Staines moved up to 55s., Triplex Glass to 43s. 3d., and British Plaster Board to 39s. In other directions, Boots Drug 5s. ordinary showed firmness at 57s. 6d., and Timothy Whites moved higher to 42s. on the results. Sangers were 31s. 6d. xd, and Beechams deferred 19s. 10½d. The main feature in oil shares was further buying of Anglo-Iranian, which rose to £5½.

British Chemical Prices Market Reports

A STEADY tone is maintained in the London general industrial chemicals market and prices generally remain firm. Fresh buying for home requirements and inquiries for export business have been on a fair scale, while deliveries against con-

tracts are proceeding on steady lines. Among the soda products, an active inquiry is circulating for bicarbonate of soda and nitrate of soda, while values for chlorate of soda and yellow prussiate of soda are strong, with supplies scarce. In the acid section, oxalic, tartaric and citric acids continue to be absorbed in good quantities and a steady movement is reported in acetic acid. With regard to the potash chemicals, supplies of yellow prussiate of potash remain scarce, while a good demand is reported for permanganate of potash, caustic potash and carbonate of potash. Acid phosphate of potash is steady. Elsewhere, formaldehyde is active, and there is a moderate inquiry for alum lump and aluminium sulphate. White powdered arsenic and sulphur are good markets. The chief activity in the coal-tar products market is concerned with deliveries against contracts, although a fair amount of fresh business has been recorded.

MANCHESTER.—Allowing for the "Wakes" stoppages in Lancashire industrial centres, which continue to affect the movement of supplies against contracts and also new business, fairly active trading conditions have been reported on the Manchester market for heavy chemicals during the past week. A wide range of textile chemicals is being taken up in fair quantities and new inquiry has been circulating. Prices generally are on a steady to firm basis. Between-seasons quietness continues in evidence in most sections of the fertiliser trade. In coal-tar products a tightness of supplies is reported in the naphthalenes and certain other materials, while taking the market as a whole, a reasonably steady trade is being done.

GLASGOW.—In the Scottish heavy chemical trade, home business has remained quiet during the past week owing to the number of works being closed for the annual holidays. Export inquiries are numerous but supplies limited. Prices remain stationary.

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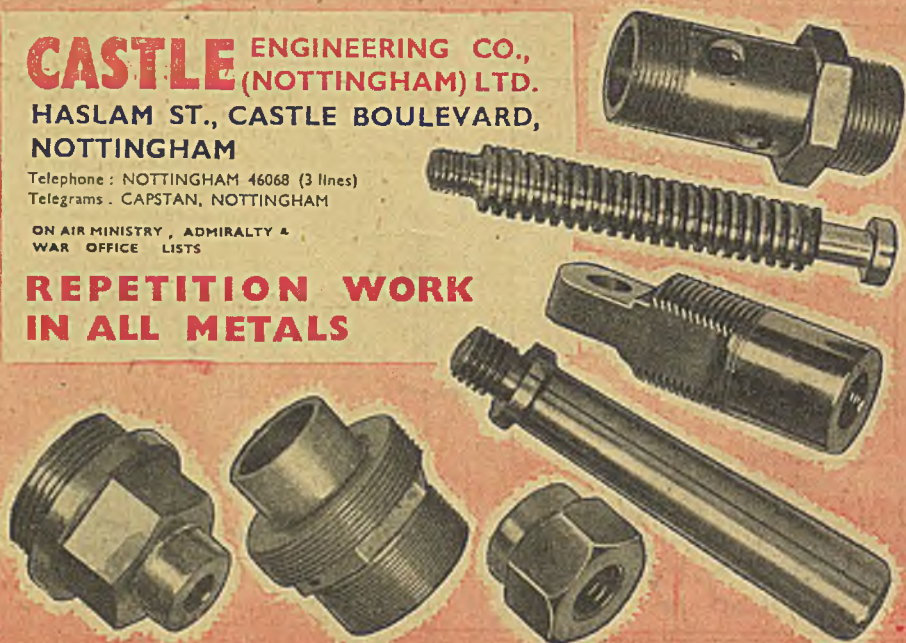
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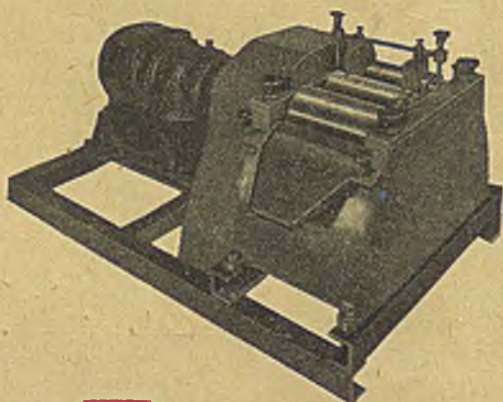
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