Institute of Physics

THE annual general meeting of the Institute of Physics was held on Tuesday, May 19. After election of the officers and completion of the panel of the Board, it was announced that the following would take office on October 1, 1936: *President*, Prof. A. Fowler; *Vice-President*, Mr. F. Twyman; *Honorary Treasurer*, Major C. E. S. Phillips; *Honorary Secretary*, Prof. J. A. Crowther; *New Members of the Board*, Colonel K. W. E. Edgcumbe and Prof. R. Whiddington. The annual Report for the year 1935 which was adopted at the meeting shows that membership has continued to increase and that the high standard required for corporate membership has been maintained. The total membership at the end of the year was 822. The first Industrial Physics Conference to be held in Great Britain took place in Manchester in March 1935, and the attendance was nearly 550. The subject of the Conference was "Vacuum Devices in Research and Industry", and an exhibition of instruments, apparatus and books cognate to the subject was arranged and was open to the public. Some 3,500 people visited the exhibition. A Midland Local Section was inaugurated in November, the towns covered being Birmingham, Leicester, Nottingham and Rugby. The Report shows that the scheme for the training and certificating of laboratory assistants has developed satisfactorily and 21 certificates were issued during the year. The Institute's services in placing employers in touch with physicists seeking permanent posts and with consultants were in constant demand throughout the year. The circulation of the *Journal of Scientific Instruments* increased during the year, both on account of the commencement of its distribution to 'associates' without extra payment and on account of sales to non-members.

The Education of Naval Architects

AT the recent meeting of the Institution of Naval Architects, Mr. L. Woollard gave an account of the methods of training naval architects in Great Britain to-day in Admiralty establishments, at the universities and at the various technical colleges. As is well known, the Admiralty more than a century ago took the lead in technical education, and the work of the schools in the dockyards, at South Kensington and Greenwich, has been reviewed at various times by Sir William White, Sir William Smith and Sir Arthur Johns. To-day, however, there are courses for degrees in naval architecture at the Universities of Glasgow, Durham and Liverpool, while there are no fewer than seventeen technical schools or colleges in England and Scotland where courses can be followed for the National Certificates in Naval Architecture. These certificates are awarded by a Joint Committee of the Institution of Naval Architects and the Worshipful Company of Shipwrights, in conjunction with the Board of Education or Scottish Education Department. Mr. Woollard gives particulars of the courses followed at the R.N. College, Greenwich, and elsewhere, the scholarships open to students and a list of papers and articles in the education of naval architects. When referring to Admiralty training, he says that experience has shown that candidates have more difficulty in satisfying the examiners in mathematics than in the other subjects, and students weak in mathematics find great difficulty in keeping pace with the courses at Greenwich.

Uniformity as the Gauge of Quality

IN a paper read to the Institution of Electrical Engineers on May 1, Mr. C. C. Paterson pointed out that there is always a tendency to judge a manufactured product by its showing one desirable feature rather than from its uniformity. He said that with certain exceptions, such as the laws of gravity, there is a remarkable absence of uniformity throughout Nature. There is a tendency to admire extremes, such as the tallest mountain or the longest river. This explains why there is a certain distrust in the pursuit of uniformity. The engineer is rather apt to take it for granted. Much attention is paid to class-testing, but the same effort is not made to ensure that every product is up to the level of the class tested. In the case of electric boiling plates, for example, if the supply voltage is 6 per cent low the consumption of energy compared with the heat developed is increased 14 per cent. Variations such as these are superimposed on the manufacturers' permissible limits of variation now called 'tolerances'. Fifteen years ago, the manufacture of glass was largely a matter of rule of thumb methods, with the result that in making lamps about 150 bulbs were used for every 100 lamps. When an effort was made to obtain glass of uniform quality with the desired characteristics, only 104 bulbs were used for each 100 lamps produced. In the early days of dry battery manufacture, great stress was laid on individual output. With the growing use of multicellular batteries, where failure of any unit meant failure of the whole battery, attention was concentrated on securing uniformity, with the result that the failures now are of the order of five in a million. In conclusion, Mr. Paterson dwelt on the importance of using frequency curves when assessing the deviation of products from the standard. Instead of using tolerances, it would be much better to adopt the coefficient of variation or the standard variation from the frequency curve by the method used by statisticians.

Influence Lines

IN the analysis of beams and girders it is possible by the method of influence lines to simplify the process of determination of the stresses due to the passage of a system of rolling loads. In such cases the preparation of diagrams of maximum bending moment and shear force is usually a laborious matter; whereas it is eminently simple to construct a bending moment influence diagram which, for a particular section, will show the bending moment at that section due to a load of one ton placed at any point in the beam. For the given section the one diagram serves each and every load, but while the use of influence lines is generally referred to in structural engineering text-books, the special technique required in their applica-

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tion to a given problem and their interpretation receives little or no attention. There is now available, however, a handbook ("The Application of Influence Lines to the Stress Analysis of Beams and Lattice Girders." By R. McCrae. Part 1. Pp. 42. (London : The *Draughtsman* Publishing Co., Ltd.) 2*s*.) which discusses fully their practical uses as they might be of advantage to a designer. The first part, which is now issued, deals with beams only. The author's primary object in Part 1 has been to provide the reader with a knowledge of the fundamental principles underlying the conception of influence lines. He shows how simple it is to construct the diagram for all cases and how the maximum effects due to rolling and distributed loads can be deduced. In the matter of units, it would have been an advantage to have described the ordinate of the bending moment influence line as representing ton-foot units per ton, so that when multiplied by the appropriate load the result is rational. Those who have been in the habit of using the bending moment diagram will at first find the influence line somewhat unorthodox but, once masters of the system, will doubtless agree as to its advantages, particularly in saving time and eliminating errors, and will appreciate the detailed treatment given in this publication.

A Clarity Tester for Gelatine

THE introduction of the various forms of rectifier photo-electric cell has certainly simplified many problems in the use of instruments such as colorimeters (chemical type), densitometers and the like, since currents of the order of 100 microamperes can be attained without very intense light, the cell acting, when suitably illuminated, as a primary source of direct current without the use of batteries. Many such applications have now been developed. A convenient instrument of this type has been recently designed by Messrs. Imperial Chemical Industries, Ltd., and put on the market by Messrs. Baird and Tatlock (London), Ltd., for the testing of the clarity of gelatine and other aqueous solutions. It is well made and easy to operate, and should be found of great assistance in saving time in such tests as well as in giving much better accuracy than visual comparisons. No doubt more or less empirical scales would have to be established for particular types of product, and in instruments of this kind (as indeed in visual photometry) it will be important to avoid confusion between scattering and direct absorption of light.

Butane Gas Supply in Rural Areas

IN an article in *Engineering* of May 8, Mr. Theodore Rich gives an account of the development of the use of bottled butane gas in rural areas with no gas or electricity supply in France, the United States and Great Britain. Butane (C_4H_{10}) can be obtained from natural gas, crude oil or coal ; it liquefies under a pressure of 23 lb. per sq. in. at 60° F. At a temperature of 104° F. the pressure of liquefaction is only 62 lb. per sq. in., and it can therefore be delivered to customers in comparatively light steel bottles. In France the bottles contain 28·6 lb. of liquefied gas, which has a heat content of 21·590 B.Th.U. per lb. The cost works out at about 3*s*. a therm. It is distributed by several thousand agents, and the gas is used particularly for cooking, one bottle containing sufficient gas to cook for a family of three persons for six or seven weeks. At the Paris Fair of May 1935, practically every maker of gas stoves showed apparatus for the use of butane. The manufacture of butane and isobutane in Great Britain has been undertaken by Imperial Chemical Industries, Ltd., at Birmingham, and the gas is being marketed as 'Calor' gas. Butane can be used for gas fires, geysers and for house lighting, and in the villages of Smalldole in Sussex, Stokesley near Middlesbrough and Hay in Brecknockshire, it has been applied to street lighting.

Solid *v*. Liquid Fuels

IT is one of the characteristics of our times that science and technical effort make us largely independent of geographical circumstances. Products not occurring naturally may be synthesised, and under the plea of national self-sufficiency much may be done, even although entirely uneconomic when judged by former standards. Many things can be done with liquid fuel which are difficult or impossible with solid, and the natural result has been the development of the oil industry. The latest phase is the synthesis of liquids from coal by hydrogenation, and the technical merit of this achievement is apt to obscure the economic aspect. There are, however, still those who insist on the reversion to old standards, and a pamphlet issued by the Liberty Restoration League, 24 Essex Street, London, W.C.2, makes a plea for the return to coal and its products in place of oil for all purposes. It is claimed that the use of liquid fuels on land, sea and air is largely maintained by subsidy, open or concealed, which should be recognised and even curtailed. Much of the plea cannot be gainsaid, but neither the State nor the individual is likely to forgo powers conferred by liquid fuels. There is much to be said for greater efforts to transfer coal into products now in demand, but it is wholesome that the cost should be clearly understood.

Institute of Wireless Technology

THE annual general meeting of the Institute of Wireless Technology took place on April 30. Mr. James Nelson was elected president for the ensuing year and Mr. B. Tunbridge Hogben was re-elected hon. treasurer. The annual report showed a further increase of membership, and in particular it was noted that the student membership had increased to a greater extent in 1935 than in any previous year. The number of candidates for the associateship and associate membership examinations also showed an increase for the year under review. It should be mentioned that the subject of television has been included as a special subject for several years past, and this is believed to be the only examination for television engineers to be held by any professional institution in the country. The presidential address was entitled "The Value of the Institute to the Profession and Industry".

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