

no definite limit can yet be set upon the reduction of iron losses by improved material. The recently discovered "Perm-Alloy," which magnetically saturates even in the earth's field alone, points the way to improvements in instruments, and raises questions as to the possible discovery of other alloys with equally surprising magnetic qualities. It is not to be expected that any real substitute for copper as a conductor can be found, although aluminium can sometimes be substituted for transmission lines, and its higher resistance is even an advantage in certain cases of rotors of induction motors. In the matter of insulation, however, there will always remain room for further advances. The difficulties in the design of large generators are now mechanical rather than electrical.

Applications of electric transmission of power of another kind were mentioned in electric ship propulsion now applied to the largest battleships, to transmit power from the high-speed turbines to the low-speed propellers with advantages of efficiency and facility of control, and in other craft in connexion with Diesel and other oil engines as well as on land in Diesel locomotives, "petrol electric" automobiles, etc. The still unsolved problem of continuous or alternating current motors for railway traction was also dealt with, and other points in connexion with electric traction referred to included modern methods for suppressing flashing over at the commutators of rotary converters, and improved forms of control, including automatic control of sub-stations. In connexion with the beginnings of so-called "super-power" systems, an important problem is the control of power factor, and there is room for improved construction of static condensers for this purpose.

Passing on to the application of electricity for the production of heat, the lecturer indicated that it is more in localised heating for special purposes, or in the production of very high temperatures, that the field of electricity lies, than for the general warming of buildings. He dealt at some length with the possibilities of electric resistance welding of the "flash" and "spot" welding varieties, which is fast superseding riveting in a great variety of work. Arc welding has also considerable application. In electric furnace work a recent development is the Northrup high-frequency induction furnace in which iron cores are dispensed with and currents induced in the crucible at a frequency of the order of 10,000 cycles per sec. It is possible that currents of the necessary high frequency may be provided by valve or arc generators instead of special high-frequency alternators. The great advantage of electric heating in furnaces is the excellent control of temperatures and exclusion of gases. Electric heating can be carried out in vacuo, or, on the other hand, high pressures may be used with suitable furnace design.

Dealing with electric lighting, the lecturer traced the progress from the open carbon arc to modern magnetite and other arc lamps considerably used in America, and often in conjunction with mercury vapour rectifiers, and in the incandescent lamp, from the carbon filament lamp of forty years ago to the gas-filled tungsten lamp of to-day. It would seem, he said, that but little further advance in this field is to be expected. There is, however, much room for improvement in the application of the lighting units in illumination.

Reviewing the situation regarding storage batteries, Prof. Thomson expressed the view that the ideal has not yet been reached either in the lead battery or in the nickel-iron cell, both of which have serious disadvantages, especially for electric vehicle work. Even the latter, useful as it may be in certain circumstances, does not provide a true solution of the storage

battery problem; "perhaps," he continued, "there is no solution possible."

There are many directions in which it is impossible to predict the developments of the future. "Who is there," Prof. Thomson said, "to tell us of the momentous issues and events which may arise out of the studies in pure science, of atomic and molecular structure, and the energy relations involved, which have become in large measure the chief study in physical science of our day? Perhaps our comparatively feeble beginnings in thermionic emission and the manipulation, so to speak, of electric ions, infinitesimally small though they be, coupled with the knowledge of the electric structure of matter in all its forms, may be the foundation of a greater super-science of electricity of enormous importance to the future achievements."

### University and Educational Intelligence.

ABERDEEN.—At the Summer Graduation on July 10 the honorary degree of LL.D. was conferred on Dr. Michael Comport Grabham. Dr. Grabham delivered a lecture on July 9 on the "Natural History of Madeira."

The degree of D.Sc. was conferred on Mr. H. E. Magee, for a thesis on "The Influence of Food on the Respiratory Exchange of the Ruminant."

EDINBURGH.—The following are among the changes announced recently in the staff of the University: Prof. J. C. Meakins, professor of therapeutics, is leaving in September to take up his duties as professor of medicine, McGill University, and physician-in-chief in the Royal Victoria Hospital, Montreal; Dr. Bevan B. Baker, lecturer in mathematics, is resigning on being appointed to the chair of mathematics in the Royal Holloway College; Dr. O. S. Gibbs, lecturer in materia medica, has left to take up duties as professor of this subject in Dalhousie University, Halifax.

Dr. Frederick Walker, research student in the Geological Department of the University, has been awarded a Rockefeller Travelling Fellowship by the International Education Board. Dr. Walker will undertake petrological research in the Geophysical Laboratory of the Carnegie Institution of Washington.

LONDON.—The hundredth anniversary of the foundation of University College will be celebrated in 1926, and Sir Gregory Foster asks members and friends of the College to send records, reminiscences, pictures, photographs, etc., which are being collected with a view to the production of a history of the College as a part of the Centenary Celebrations. All documents will, in due course, be returned unless the owners desire to present them for the College archives. Communications and parcels (marked "Centenary") should be sent to Sir Gregory Foster at the College.

The Sharpey Physiological Scholarship, of the annual value of 160*l.*, founded in memory of Prof. William Sharpey, will shortly be filled, on the recommendation of the Faculty of Medical Sciences of University College, London. The Scholar has opportunities for research, and takes a small share in teaching and demonstrating to students. Applications should be sent to the Secretary of University College, London (Gower Street, London, W.C.1), not later than Saturday, July 26.

ST. ANDREWS.—Applications are invited for the post of lecturer in chemistry in University College, Dundee. Preference will be given to candidates who have specialised in physical chemistry. Applications should be received (in triplicate) by the Secretary of the University by, at latest, August 31.

SHEFFIELD.—The following appointments have been made: Dr. G. A. Clark, to a lectureship in

physiology; Mr. E. F. Baxter, to an assistant lectureship in mathematics.

THE Technical College, Bradford, invites applications for the headship of its newly established department of commerce and banking. Particulars of the post and forms of application may be obtained from the principal, to whom the completed forms must be returned by, at latest, July 28.

THE British Research Association for the Woollen and Worsted Industries is inviting applications, to be received not later than July 31, for research fellowships and advanced scholarships. The fellowships will each be of the maximum annual value of 200*l.*, and are tenable, in the first place, for one year, at an educational institution or elsewhere if suitable resources are available. The advanced scholarships are open to students and others, and are designed to enable the scholar to specialise. Courses of training in research work should generally be included in a candidate's proposed curriculum. Applications, with particulars of past records, proposed course of work, and so on, should be addressed to the Secretary, British Research Association for the Woollen and Worsted Industries, Tarrington, Headingley, Leeds.

EDUCATIONAL RESEARCH appears to have been pursued during the past two or three years with extraordinary enthusiasm in the United States. According to the Biennial Survey, 1920-22, of the Bureau of Education (Bulletin, 1923, No. 42) no less than 80 city, state, and university bureaus for educational research have been maintained, experiments were extensively carried on in all phases of school administration and instruction in numerous institutions, including 22 college and university laboratory schools and about 50 experimental schools for "progressive education," while from numerous presses issued an abundant stream of articles, monograph series, reports, and books. Among the national educational organisations which play a prominent part in promoting educational research are the American Council on Education (now closely associated with the American University Union in Europe), which studies the larger questions of educational policy, the Educational Research Association, the National Society for the Study of Education, the National Society of College Teachers of Education, the Carnegie Foundation for the Advancement of Teaching, and many others. The Bibliography appended to the Bulletin comprises 543 items. Those classified under organisation and administration deal largely with plans for classification in ability groups to the end that America may have no mute inglorious Miltons.

THE following awards, tenable at the Imperial College of Science and Technology, South Kensington, during the year 1924-25, have been made by the Governing Body of the College: (a) The Henry George Plimmer Fellowship in pathology to Mr. H. R. Hewer, for a continuation of his research on "The Rôle of Stimuli received by the Eye in the Colour Changes of Amphibia and Nerve Supply of the Pituitary"; value about 300*l.* (renewal). (b) The Gas Light and Coke Company's Research Fellowship, established by the Company for the purpose of encouraging experimental research in relation to carbonisation, gaseous fuels and combustion, to Mr. F. R. Weston, for a continuation of his research on "The Spectroscopic Investigation of the Flames of Carbon Monoxide and Hydrogen and matters cognate thereto"; value 200*l.* (renewal). By the Trustees

of the Beit Fellowships for Scientific Research Research Fellowships of the value of 250*l.* each to Mr. O. M. B. Bulman, for a continuation of his work on "Stratigraphical Geology; The Fauna of the Shineton Shales" (renewal); Dr. W. E. Downey, for research on "Photochemical Problems"; Mr. L. A. Harvey, for research on "The Nature and Function of the Cytoplasmic Inclusions (Mitochondria and Golgi Bodies) in the Cells of Vertebrates"; Mr. R. Quarendon, for research on "The Combustion of Gases in Nitrous Oxide."

THE *University Bulletin* issued by the Association of University Teachers has until recently been confined mainly to recording the activities of the Association. The June number includes several articles of a more general nature. Among these is one by Dr. Brodetsky, reader in mathematics in the University of Leeds, on the anti-Jewish policy said to be prevalent in certain universities in Poland and Austria. The admission of Jews to these universities is severely restricted by applying what is known as the "Numerus clausus" principle, which consists in limiting the proportion of students belonging to a particular race to the ratio between the total number of persons of that race in the country and the total population of the country. Many Jews have in consequence gone from Austria to Italian universities, where they are welcomed. In an article on "A new residential university," Principal Childs, of University College, Reading, describes the circumstances in which his college is renewing its application for the grant of a university charter. Faculty organisation is discussed by Mr. C. B. Fawcett, reader in geography in the University of Leeds, who advocates reversion on the part of the newer universities to the medieval plan of a general faculty for all non-professional studies and the discontinuance of the practice of awarding several different first degrees—B.A., B.Sc., B.Com., a practice which makes for confusion and misunderstanding, and obscures the essential unity of knowledge.

THE progress of engineering education in India in recent years cannot be said to have kept pace with industrial developments. The official quinquennial Report on Education in India, 1917-22, shows that although during this period expenditure on colleges of engineering and other technical and industrial schools increased by 80 per cent., the number of students in the four Government engineering colleges decreased from 1319 to 1236, and in the other institutions increased only from 13,202 to 15,000. Doubtless there is in India a considerable amount of education in engineering which does not figure in the official returns, but in view of the extent and importance of industrial enterprises already established and the boundless field open to development, these figures must be regarded as astonishingly small, and suggest the question: What would have been the condition of India to-day if the Government's expenditure during the past fifty years on education had been directed by a policy aiming primarily at the development of the material resources of the country instead of being devoted almost exclusively to the dubious benefits of literary curricula on the lines of those of western schools. In Western India, there are signs of a growing appreciation of the benefits of engineering and other technical education, there being keen competition for admission to such institutions as the N.E.D. Civil Engineering College at Karachi, the Victoria Jubilee Technical Institute of Bombay, and the Poona Engineering College, notwithstanding that comparatively high fees are charged.