

explorer, are seldom to be found except in the service of a government with a wide range of selection. Still he would encourage all enterprise and every carefully planned expedition, on however small a scale. Without expressing any confidence in the correctness of Nansen's theories, he felt no doubt as to the great scientific results which must accompany his journey. With regard to Mr. Jackson's projected exploration in Franz-Josef Land, Mr. Markham did not favour Austria Sound as the best approach to Petermann Land, and he pointed out the drawback of the winter quarters of the expedition being so far south as Eira Harbour, between which and the point where really new ground can be broken, there intervenes a space of nearly 200 miles to be traversed each season; but with wise management and favourable conditions of ice and weather, a good measure of success appeared quite possible. In his scheme for retracing Parry's footsteps north of Spitzbergen, Mr. Wellman transgresses the best established canon of Arctic travel, which is never to enter the drifting pack away from land; but as he has started early, Mr. Wellman may possibly enough beat the record of the farthest north, a motive which was deprecated by the Austrian explorer, Weyprecht, as the bane of good Arctic work. Little service to geography is to be looked for from this expedition, unless there are islands north of Spitzbergen which may be explored. In speaking of Mr. Peary's journeys in the north of Greenland, Mr. Markham said: "For my own part, I look upon Peary as an ideal explorer. He chose one of the greatest and oldest of the geographical problems that remain to be solved, and he set to work as if he really intended to find the solution. Every detail of equipment was thoughtfully considered, gear was tried and tested before being used, a brilliant preliminary journey over the inland ice was made. All was done in the workmanlike style of a true discoverer. I therefore believe that Peary will succeed. I am sure that he deserves success." There is, in Mr. Markham's opinion, ground to hope that Björling and Kalstenius may be still alive; "the two Swedish lads are the stuff of which heroes are made, and every civilised people must be interested in their rescue." Want of funds has prevented a search expedition from being sent out, and the two Swedes who have left for Ellesmereland trust to be landed there by the good offices of whalers. No efforts on the part of the Council were spared to inaugurate a great Antarctic expedition, the promotion of which is now under consideration by the Royal Society.

In the evening the anniversary dinner of the Royal Geographical Society was held in the Whitehall rooms of the Hôtel Métropole.

THE MAGNETIC DEFLECTION OF CATHODE RAYS.

THE current number of the *Electrician* contains a translation of a very interesting paper by Herr P. Lenard, on the deflection of the cathode rays by a magnet. It is well known that when the cathode rays traverse a magnetic field they are deflected from their otherwise rectilinear path, and in the form of tube ordinarily employed this deflection increases with an increase in the pressure of the residual gas in the tube. In this particular the cathode rays behave just like a current of negatively charged particles projected from the cathode. The paths of such particles would be curved in a magnetic field, and the curvature would increase with a decrease in the speed with which the particles travel, *i.e.* they would be more curved in a denser and more resisting medium. The above explanation is not in accord with the results of the experiments the author has made, and which have led him to consider the cathode rays as phenomena in the ether. In fact, the author finds that when the observation tube and the tube in which the rays are generated, are separated by a gas-proof aluminium partition, so that the gaseous pressure can be varied in the two tubes independently, that the above explanation entirely fails, and that everything confirms his previous view that these rays are phenomena in the ether, and not electrically charged particles. For instance, if the pressure of the gas in the discharge-tube be kept constant, while that in the observing tube be lowered from 33 m.m. to 0.021 m.m. it is found that the deflection produced remains constant. Higher pressures than 33 m.m. could not be employed, as under these circumstances the medium became so turbid to these rays as to entirely destroy all definition in the phosphorescent spot. If, however, the pressure of the gas in

the observing tube be kept constant, while that in the discharge tube is varied, a marked influence on the position of the deflected spot is at once observable. Thus, if the pressure is altered so that the sparking distance in the discharge tube changes from 2 cm. to 4 cm. there is an alteration in the deflection of from 12.2 m.m. to 8.5 m.m. Thus it would appear that the difference in the deflection observed with varying gas pressures in the ordinary form of tube is not caused by difference of the medium in which the deflection is observed, but in the difference of the rays themselves, which are produced with varying pressures of gas. A curious deformation in the shape of the deflected phosphorescent spot was observed, for while the undeflected spot was always circular in form, the distribution of light being dependent on the turbidity (*i.e.* density) of the gas in the tube, in very turbid gases the edge of the spot is undefined. If the gas becomes rarer there appears in the centre of the spot a more or less sharply defined kernel, surrounded by a less bright penumbra. After deflection the spots become elliptical in shape, which may be due to the fact that the rays no longer met the screen at right angles, but when the gas was so rarefied that there was a central bright spot and a penumbra, the appearance of the spot was subject to sudden changes. While the position and shape of the central spot remained constant, the penumbra changed both in shape and position, sometimes even being quite separate from the bright spot. The penumbra was in every case more deflected than the bright spot, thus showing that the penumbra contains rays of greater deflectibility than the core, but never of less. This is borne out by previous experiments, which had shown that it is the rays that are most easily diffused that are most deflected.

SOME LONDON POLYTECHNIC INSTITUTES.¹

II.

ON account of a mistaken idea as to the true end of education, the object of technical instruction is often defeated. Many young operatives take up courses of study in order that they may become clerks in manufactories where technical knowledge is desirable. This notion causes the ranks of the mechanic class to lose many of their brightest men, while the supply of clerks increases. What has to be impressed upon the minds of students in trade classes is that the object of the instruction is to enable them to perform their duties in a more efficient manner, not to remove them from one sphere of life to another. This point was very well expressed by Sir Benjamin Baker at the beginning of this year, in presenting the prizes and certificates to students at the People's Palace. "It is necessary," he said, "for teachers and students alike to remember that a certain amount of scientific or theoretical knowledge in the future, still more than in the present, must be considered as an indispensable element of success in the great battle of life, but not as a thing having necessarily any more market value in itself than a knowledge of reading and writing, nor must the facilities in acquiring knowledge now enjoyed by students be carried to such an extent as to incapacitate them from acting in an emergency promptly and reliably without help from books or professors, or the benefits of scientific and technical education would be too dearly bought, and the self-education system of our predecessors would turn out the better men."

The People's Palace owes its existence almost entirely to the Drapers' Company. In the year 1890 this company took the entire management of the educational work, which was carried on under the supervision of Mr. William Phillips Sawyer, the clerk to the Company. Two years later, on the Drapers' Company having offered an annual contribution of £7000 to the Palace, a new scheme was drawn up by the Charity Commissioners, which provided for an annual grant of £3500 from the City and Parochial Charities' Funds, in addition to the Drapers' Company's contribution, and a new body of Governors was formed, of which the Master of the Drapers' Company acts as chairman. This body, besides representatives of the Drapers' Company, consists of members appointed by the London University, the London County Council, the London School Board, the Trustees of the City and Parochial Charities' Funds, and the Lord President of the Council.

The educational work consists of (1) the day technical

¹ Continued from p. 90.

school, under the management of Mr. D. A. Low, head master, which is largely recruited from the public elementary schools, and to which the Drapers' Company have contributed yearly £1000 to be expended in scholarships. (2) The evening classes, under the management of Mr. J. L. S. Hatton, Director of Evening Classes.

The evening classes are conducted with a view to giving students a practical and theoretical knowledge of the arts and sciences, and to prepare them for the examinations of the Department of Science and Art, the City and Guilds of London Institute, and of the Society of Arts. It will be concluded, therefore, that instruction is given in a large number of subjects; in fact, the time-table includes more than fifty classes in pure and applied sciences, and further, the Governors offer to consider the formation of classes in any similar subjects provided a sufficient number of students offer themselves for admission. Thus the subjects taught at the institution are those for which there is a demand. It would hardly be expected that purely scientific subjects would be in favour in the East End of London. The object of the majority of the students in such a district must be a desire to command better wages as workmen rather than the simple pursuit of knowledge. Some, however, are actuated by a higher spirit. Among the classes conducted by Mr. Hatton is one on the differential and integral calculus, another on analytical conic sections, and a third on the theory of determinants. And many, if not most, of the students of these subjects are not pupil teachers merely aiming at the obtaining of a certificate and nothing more, but young men who after passing their days in grimy workshops find recreation in mathematical exercises of no mean order. It is such ardent spirits as these that bring credit upon the institutions assisting in their development, not the mercenary "pot-hunter."

Strange as it may appear, there are numbers of young men in London who are unable to pay the small entrance fees to classes at these institutes. While at the People's Palace a short time ago, the writer had pointed out to him a young mechanic who, though he had been a student, found himself in circumstances so low that he could not pay the entrance fees for the classes in which he desired to continue his studies. He pleaded with the Director of studies for free admission, and, it need hardly be said, his request was granted. That young man is now in his seventh heaven of delight, for he attends classes six nights a week, and revels in the privilege that has been extended to him. To all who are desirous of democratising knowledge, this case—and it is not an isolated one—must appeal very strongly. The man who wishes to work but finds his labour unwanted is an object of everyone's sympathy. But his claims for assistance are no stronger than those of the man who craves for knowledge and has not the means of attaining his desire. The London Polytechnics are doing an excellent work by reducing the tolls that for many years barred the ways of wisdom. But though the fees to classes represent only a small part of the income of these institutions, it is doubtful whether any very great educational advantages would accrue from their abolition. "That which is easily gained is lightly prized," is an old saying and a true one, and if all students were admitted free to Polytechnic classes, they would possibly not appreciate the instruction so highly as they do at present. Perhaps the best way to meet the case of poor students would be for private benefactors to bestow a small sum upon Polytechnics for the purpose of paying their fees. It is not suggested that these free studentships should be competed for, but that they should be obtainable by any who desired to join classes, and were prevented by the inability to pay the fees; provided only that the Director of studies satisfied himself as to the poor circumstances of the applicant.

The engineering department at the People's Palace is under the control of Mr. Robert Holt. Students are permitted to enter any of the classes in engineering subjects, but are always strongly advised to take up theoretical courses at the same time. For the first year the subjects thus recommended are mathematics, geometry, and machine construction; for the second year, more advanced mathematics, geometry, and machine construction, with theoretical and applied mechanics and steam; while third-year students take still higher developments of mathematics, machine construction, steam, and applied mechanics, and also mechanical engineering. It will be seen, therefore, that by following this line of study a theoretical training is obtained which must be of the greatest advantage in the engineering workshop. Only when a know-

ledge of theoretical principles is regarded as an essential qualification for entrance into the workshop, can the teaching be sound, and when this is more generally recognised among engineering students we may expect to see some results of technical education.

For some time Prof. Holt had in his mind a scheme for the erection of a machine shop, a pattern-making shop, a smithy, and an experimental workshop, but the necessary funds were not available. It has just been announced, however, that the Drapers' Company, supplementing their former benefactions, have voted the sum of £4000 for the erection of a new engineering laboratory with workshops.

The creation and extension of workshops such as exist at the People's Palace for various trades will do much to bring the workmen to a higher degree of efficiency. But in order to discover if the teaching is suitable for the students, and whether they make satisfactory progress, it is necessary from time to time to hold examinations which completely cover the work done. At present, however, there is only one general examination in technical subjects, namely, that of the City and Guilds of London Institute, which covers only a small range of the subjects usually taught, classes of such importance as those in practical engineering and practical carpentry finding no place in this examination. To remedy this defect, the educational committee of the People's Palace have taken steps to form a joint examination board of the London Technical Institutes. It is proposed that the examination consist of three parts:—(1) An inspection of practical work certified to be the unaided work of

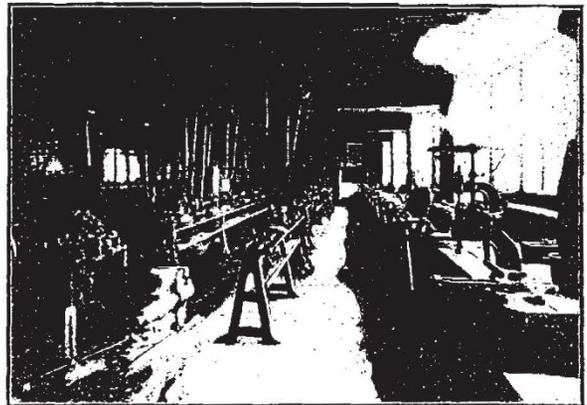


FIG. 3.—Engineering Workshop of the People's Palace.

the student; (2) a *viva voce* examination; (3) a written examination. The intention of the committee is to make the examination more a mechanical qualifying one than one of general technical theoretical character, as will be gathered from the subjoined extract:—

"It is proposed to lay more stress on the *viva voce* part of the examination than is usually done, for the following reasons. It has been found that one of the great difficulties in conducting an examination on the above basis is to place the workman—unaccustomed to express himself in writing—on an equality with the clerk, who has not the same practical knowledge and experience. On paper, the workman frequently finds himself defeated by the clerk, and consequently looks with suspicion on such examinations as the City and Guilds, the results of which he, with justice, considers to be no just criterion of the merits of the candidates. In our Universities, in olden days, *viva voce* and written examinations were held concurrently, so as to afford those who had no facility for expressing themselves in writing an opportunity of showing the extent of their knowledge. With the advance of learning and the ever-increasing opportunity for expressing oneself in writing, the need of the *viva voce* examination at the University has died away, and it is at present little more than a useless formality. In the case of the workman, however, who has the greatest difficulty in expressing himself on paper, it is eminently desirable to revive the old system."

Examinations conducted in this manner have already been car-

ried out at the People's Palace with some success, and it certainly seems desirable to extend them. After all, the majority of the students in Polytechnics desire certificates which guarantee that the holder, when applying for work, is a thoroughly competent workman. By enlisting employers of labour, and representatives of various trades, as examiners, the work done is truly tested from a practical point of view, and the certificates awarded by them is of use in obtaining employment. In all probability there will be a difficulty in arranging a joint examination board on the lines suggested by the People's Palace committee, but however this may be, it seems desirable that some provision should be made for determining the amount of directly useful knowledge obtained in the Polytechnic workshops.

Before passing to another Polytechnic, a few words must be said with regard to the extent of the work carried on at the People's Palace. The number of class tickets issued for the current session is 7408. Such subjects as light, sound, physiology, botany, and physiography attract comparatively few students, the reason evidently being that they do not directly bear upon industries. Though we cannot but regret this lack of interest in subjects

be raised to £2500 when the sum of £60,000 has been collected. As only £2200 is now wanted to complete this figure, the Institute will probably soon be in possession of the further endowment. The London County Council will also eventually contribute to the Institute an annual sum estimated to amount to about £1500. The Institute contains workshops for various trades, physical and chemical laboratories, and numerous rooms for classes and lectures. Instruction is provided in technological subjects, in general science; art, including wood-carving and metal chasing; music; and in commercial and general education. The principal is Mr. Sidney H. Wells, and Dr. W. E. Sumpner is the head of the electrical engineering department. Mr. S. H. Davies has charge of the chemistry department, and Mr. W. E. Walker carries on the engineering work in conjunction with Mr. Wells.

For the first time in the history of London Polytechnics, the Governors appointed a Principal, and by selecting for the post a man in whom theoretical and practical knowledge are happily combined, they did their best to secure a well-balanced scheme of instruction. Without expressing an opinion upon the advi-

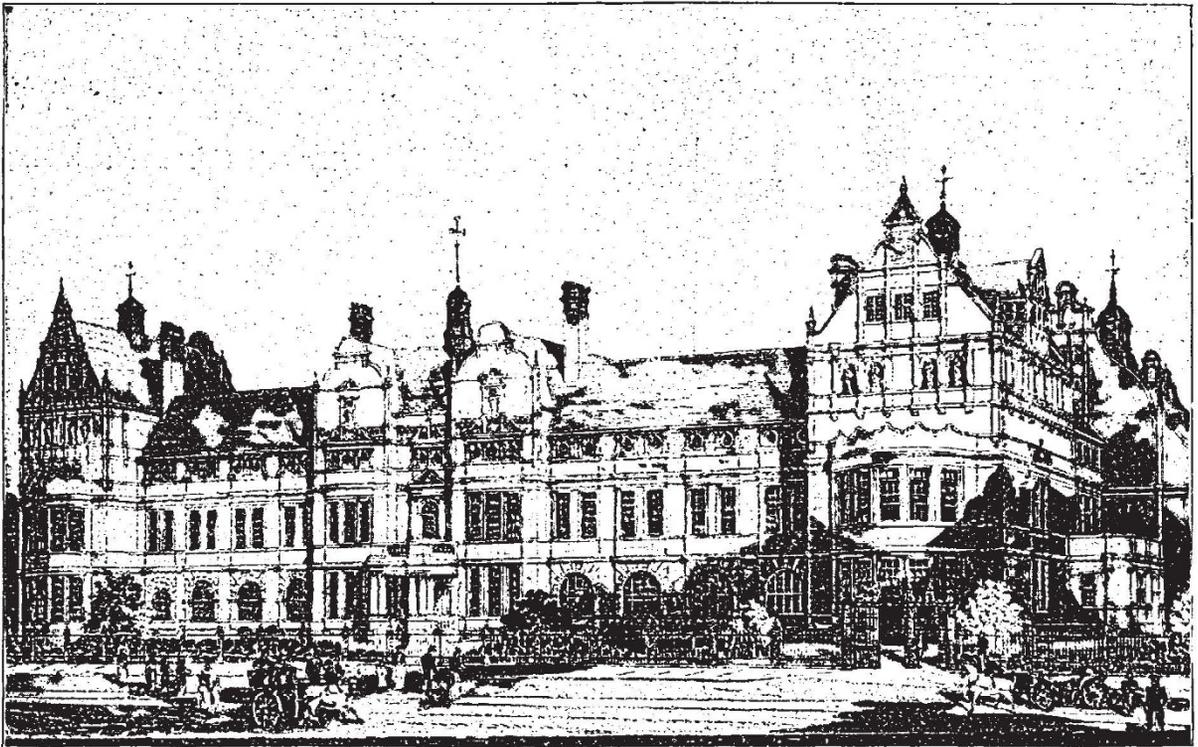


FIG. 4.—The Battersea Polytechnic Institute.

most of which are necessary for a proper scientific education, it is not strange that in the East End, where the battle of life is so keen, people should only be interested in matters which they think may assist them to earn a living. Engineering subjects are greatly favoured, as many as 300 students attending the class in machine construction and drawing. The average attendance each evening at classes in all subjects is about nine hundred.

Dr. Macnair, who until recently was the head of the chemistry department, made that branch of science very popular among students, and Dr. Hewitt, who has succeeded him, will doubtless sustain the character of the work. The research laboratory, which it is proposed to arrange, will help to this end.

We come now to the Battersea Polytechnic Institute, formally opened last February. The Institute has been built and equipped at a cost of nearly £53,000, the greater part of which was raised by voluntary subscriptions. It is at present in possession of a fixed endowment of £1500 per year, but this will

ability of putting each Polytechnic under the control of a Principal, we would point out that an educational head who teaches is bound to be prejudiced in the direction of his special branch of study to the detriment of other branches. By placing at the head of affairs a man who is not a specialist, and properly arranging each department of the educational work under a competent head, each branch is sure of its right share of attention. At the Goldsmiths' Institute there are ten departments, each under a head who, with Mr. Redmayne, arranges the details of work. The system has been proved to work well, and there is no friction between the departmental heads and the head of the Institute, owing doubtless to the fact that they feel that he is not unduly prejudiced in favour of any one department. The system of putting the whole Institute under a Principal is being tried at Battersea. Time will show whether this manner of control, or that adopted at New Cross, best furthers the interests of all branches of an Institute's work.

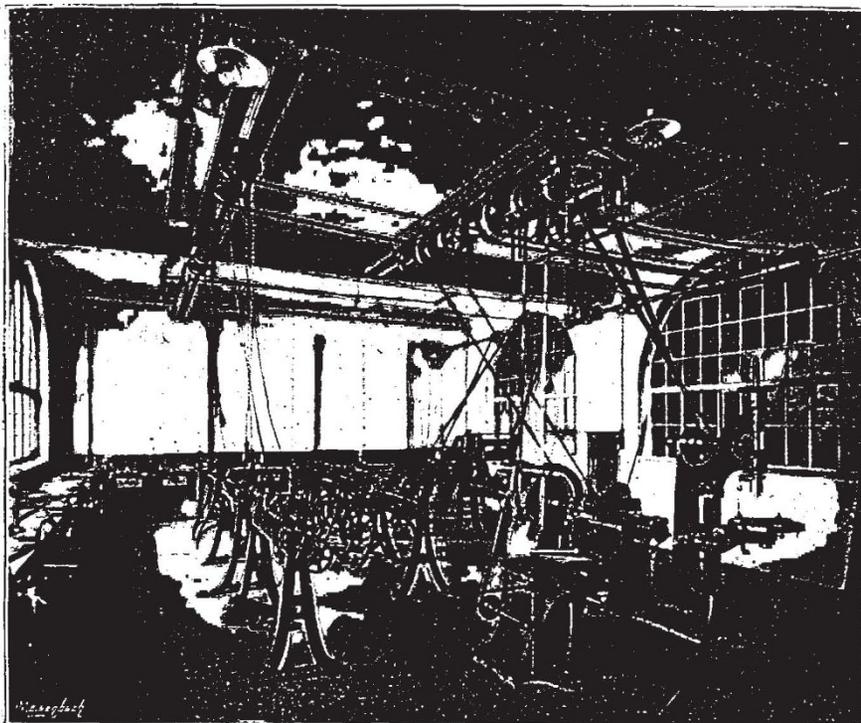
A few remarks with regard to the lines adopted at Battersea should be of interest. The Battersea Institute is open to persons

of either sex, without limit of age, who are students of any class in it. Persons who wish to join a trade class are required to satisfy certain conditions before permission is granted them. There is a reason for this stipulation. By attending a course in a trade subject, it is possible for men to become dexterous enough to do jobbing work without serving an apprenticeship in that trade. This is not only detrimental to the interests of the skilled workman, but it also encourages inefficient labour, for though the way to do a thing may be picked up in a workshop course, the way to do it well can only come by practice. In order to prevent this rapid manufacture of workmen, many Polytechnics in the provinces make each trade class a close preserve for the instruction of apprentices and workmen belonging to that trade. Thus, a carpenter would not be permitted to join a class in bookbinding. Something can be said both for and against this preservation. There is the possibility that the smattering of knowledge obtained in a Polytechnic workshop may be thought by some sufficient to qualify as a workman, but this is very doubtful. On the other hand, if a person wishes to learn it seems a pity to place any barrier in his way. Many young men are apprenticed to trades for which they have no taste whatever, and an institute which enables them to follow their inclination is doing a good work.

Membership of the Institute is open to any student between sixteen and twenty-five years of age, upon the payment of a nominal fee. Among the privileges to which members are entitled are: admission to ordinary evening classes, lectures, and entertainments at reduced fees, use of reading-room, and facilities for joining clubs and societies. This system of membership is calculated to develop an *esprit de corps* among the students, which will do much to make the Institute a success. Only by such means can a Polytechnic earn the title of a People's University. The establishment of these institutes has certainly put an end to many small science classes, and objections have been raised to this concentration of work. Teachers who for years have shown the "young idea" how to pass South Kensington examinations, have found their occupation gone when such an educational and social centre as now exists at Battersea has been started. But while everyone condoles with the teachers upon their misfortune, we must point out that the mode in which most sporadic classes under the Department of Science and Art are carried on is capable of improvement. Usually a teacher rushes to his class-room, gives an hour's instruction, and then leaves the students until the following week. A Polytechnic Institute, however, is looked upon by the students in it as their *alma mater*. The teachers are generally in the building ready and willing to help the inquiring mind, instead of being merely periodic visitors.

The classes at the Battersea Institute are chiefly intended for persons engaged in earning their own livelihood. Special courses at reduced fees are arranged applicable to various trades and industries, and students are strongly urged to take these courses in preference to single classes; indeed, everything is done to give the students a thorough and scientific education. In order to encourage students to take up mathematics, the fees in that subject are lower than for any other science or trade class. Some inducement of this kind is necessary, for very few workmen recognise that mathematics is

a subject of immense importance, and forms the groundwork of all applied sciences. An excellent departure from stock subjects is the formation of a class in technical mensuration, in which the needs of students attending the trade classes are met, and engineers, builders, plumbers, bricklayers, masons, carpenters, joiners, and other operatives are taught the application of mensuration to the practical problems which occur in their work. Another class worthy of special mention is one in graphic statics, designed to teach the application of graphics to architectural, building, and engineering construction. A course of experimental work is carried on in a fine mechanical laboratory, only those who possess a knowledge of elementary mathematics, mechanics, and drawing being admitted to it. The electrical department, under Dr. Sumpner, is provided with a well-equipped laboratory, and the electric lighting plant of the Institute is available for experimental purposes. The chemical laboratory is also well-equipped and arranged. Altogether, we are of opinion that the Battersea Institute has started well. Its sphere of usefulness is limited for want of a larger endowment than it at present possesses, but doubtless further funds will be received



From a Photograph by Russell & Sons, 17, Baker Street, W.

FIG. 5.—Engineering Workshop of the Battersea Polytechnic Institute.

when the important work it is doing for the quarter of a million inhabitants of south-west London is more widely known.

This survey would not be complete without a few words on the admirable day schools in connection with these institutes. Until recent years there were no facilities for the education of boys who had passed through public elementary schools, and desired further training in preparation for the workshop and manufactory. Continuation schools, such as those at Battersea Polytechnic, the People's Palace, and the Goldsmiths' Institute, supply the needful knowledge of science and technology, and, at the same time, carry on the subjects of general education. They represent a most important rung in the educational ladder, and every encouragement should be given to them.

At Battersea the same teachers conduct the day and the evening classes. The Institute thus possesses a permanent staff, all the members of which give the whole of their time to the work. There can be no doubt that this system of organisation is far preferable to that in which visiting masters are employed.

It may be well to briefly state the conclusions to be drawn

from an examination of the work of London Polytechnics. In the first place, the funds at the disposal of the Institutes are usually not sufficient to permit the educational needs to be properly supplied. In order to supplement the sum arising from endowment, grant-earning classes have to be held, which means that subjects come to be considered for what they will bring to the Institute's exchequer rather than for what they are worth. The Technical Education Board of the London County Council have taken steps to remedy this evil by contributing maintenance grants, and capital grants for equipment, apparatus, &c., the former being allotted according to a scale calculated to promote educational efficiency, and regularity of attendance. The Department of Science and Art, and other Examining Bodies, should consider the advisability of treating Polytechnic Institutes in a similar manner, instead of regarding them as mere collections of classes. The less an institute of this kind depends upon payment by results, the more likely is it to develop in the proper direction.

Very little provision is made in the institutes for really advanced work or research, but this will probably come, for in London, technical education is only in its experimental stage. Many years of work will have to be done before any London institute will be able to find students for instruction of such an advanced character as that given in continental Polytechnics. Mr. L. Smith recommended, in his report to the London County Council, that a grant should be made "towards the maintenance of an advanced department of applied science, bearing on some local industry, under the control of a well-qualified instructor who gives all his time to the work of the institute." The Technical Education Board have promised a contribution for this purpose when a Polytechnic desiring it shall have drawn up a detailed scheme of work, and the Board is satisfied that the proposed class will be of value to the industries of the district.

As to the recreative side of the institutes, little need be said. The desire for physical exercise is so much stronger than that for mental development, that there is a possibility of recreation swamping education in one or two cases. Generally, however, the two sides are very well balanced, and admirably assist one another in the development of men of thought as well as men of muscle.

For the rest, Polytechnic Institutes have aroused the interest of the working class, and men now realise the necessity of a scientific grounding for every trade. To have done this in so short a time promises well. In a few years, perhaps, London Polytechnics will be able to compare favourably with those in other European capitals, and when that day arrives a generation of workmen will have sprung up which, for aptitude and efficiency, should be able to hold its own against the world.

R. A. GREGORY.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. V. H. Velej and Mr. G. C. Bourne have been appointed Examiners for the Burdett-Coutts Scholarship.

The sixth annual report of the Curators of the Botanic Garden shows a deficit of nearly £200 on the close of the financial year. This is due principally to the decrease of income derived from rents and profits of estates. The Curators report that the existing endowment is inadequate to maintain the Garden, and that it will be necessary to call on the University at no distant date, to consider whether a moderate annual subvention should not be made to place the Garden on a satisfactory basis. The deficit would have been greater but that the Professor of Botany has made, *proprio motu*, a contribution of £50 towards the funds of the Garden. The new range of glass-houses, including the palm house and the succulent house, has been completed and proves satisfactory.

Elections to Scholarships in Natural Science will be held at the following Colleges:—Balliol College, examination to begin on November 20, a scholarship in Natural Science worth £80 a year, on the foundation of Miss Hannah Brakenbury. Balliol, Christ Church and Trinity College. At Balliol two Scholarships of the value of £80 a year and one Exhibition of the value of £40 a year. Christ Church, one Scholarship of the value of £80 a year and one Exhibition of the value of £85 a year. Trinity College, one Scholarship of the value of £80 a year. The examinations for these Scholarships will begin on Tuesday, November 20.

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CAMBRIDGE.—Dr. Bradbury, the Downing Professor of Medicine, has appointed as his assistant in Pharmacology Mr. C. R. Marshall, Research Fellow of Owens College, Manchester.

The Rede Lecture will be given in the Anatomy School by Mr. J. W. Clark, Registrar, on June 13 at noon. The subject is "Libraries during the Middle Ages and the Renaissance."

A considerable number of courses in scientific subjects, including Chemistry, Mineralogy, Geology, Anatomy, and Pathology are announced for the ensuing Long Vacation, which is more and more assuming the character of a regular term.

No less than twenty-three women are announced as having "deserved Mathematical Honours" in Part I. of the Mathematical Tripos.

By the election of Dr. Hickson to the Professorship of Zoology at Owens College, Manchester, a vacancy is created for a University Lecturer in Invertebrate Morphology.

SCIENTIFIC SERIALS.

Wiedemann's Annalen der Physik und Chemie, No. 5.—On the measurement of surface tension of water and mercury in capillary tubes, by G. Quincke. In accurate measurements of the surface tension of water by elevation in capillary tubes the marginal angle must be taken into account. It is different from zero, and generally increases with the age of the tubes. For the same kind of glass the surface tension of water at 18° is generally found to increase with the diameter of the capillary tube. For wide tubes of normal Jena glass or English flint glass the surface tension at 18° was 7.846 and 7.776 mgr.—On the magnetic deflection of cathode rays, by Philipp Lenard. The magnetic deflection is not affected by the medium in which the rays are observed, but remains the same for a given species of cathode rays, whatever may be the gas, the intensity, and the pressure. But at different pressures within the generating apparatus different cathode rays are produced, showing varying amounts of deflection.—On a sodium-nitrogen compound, by L. Zehnder. Sodium mirrors deposited electrolytically in vacuum tubes gave rise to strong absorption and rapid fall of pressure, accompanied by the formation of a brown mirror during the glow discharge. A detailed investigation showed that this action takes place as soon as metallic sodium has been transferred to the cathode. The compound formed, probably NNa_3 , is not deposited on the cathode, but on the glass walls near the anode.—On the elliptic polarisation of reflected light, by K. E. F. Schmidt. In the case of glasses of equal refractive indices and different dispersive powers the glass with the higher dispersion shows the wider range of angle at which ellipticity is observed.—On the spectra of tin, lead, arsenic, antimony and bismuth, by H. Kayser and C. Runge. The authors have continued their efforts to find uniformities in the structure of the metallic line spectra through the periodic series of the elements. The above metals were taken as convenient representatives of the fourth and fifth rows. The spectrum of tin may be reconstructed by superimposing three equal spectra differing by a constant oscillation frequency. The same law applies to the spectra of lead and arsenic. In the case of antimony, six such spectra are superposed, and in bismuth four.—Line spectra, by J. R. Rydberg. This is a comparison of the spectra of calcium and strontium.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 10.—"Preliminary Report on the Results obtained with the Prismatic Camera during the Total Eclipse of the Sun, April 16, 1893." By J. Norman Lockyer, C.B., F.R.S.

During the total eclipse of 1871 observations were made by Respighi and the author with a spectroscope deprived of its collimator, and a series of rings was seen corresponding to the different rays emitted by the corona and prominences. A similar instrument, arranged for photography, was employed during several succeeding eclipses, but the photographs were on so small a scale that none of the results came up to the expectations raised by the observations of 1871. As the Solar Physics Committee is now in possession of a prismatic camera of 6 inches aperture, the prism having a refracting angle of 45°, it was determined to employ it during the eclipse of 1893. The instrument was placed at the disposal of the Eclipse