

each heat. The welder makes a complete circuit of the back of the flange, and fills it up sufficiently to make a fillet of about  $1\frac{1}{2}$  inches radius. In this way the flange is solidly welded to the tube at the back, and about three-fourths of the way through its thickness; but the front or outer side is not yet welded. The tube is then up-ended, and the outer side of the flange is welded to the tube, the only difference being that the heat of the arc is used to burn out a cavity all round the junction of the pipe and the flange, until the depth is reached at which the two have already been united; this cavity is then welded up in the same way as the back of the flange, thus ensuring that the flange is welded solid to the pipe right through."

One point in connection with electric work, to which the author called special attention, was the length and size of the arc which is used in the welding of various kinds of work. With a short arc, the carbon point is brought down too close to the steel, and the result is inferior work, not only from the presence of the carbon, but also because the heat is concentrated upon so small a surface that the strains set up in cooling are considerable. The longer the arc, the softer and more defined is the heat; and any slight strain which may be set up can be got rid of by careful annealing. A long arc is therefore indispensable to the proper working of the system.

The reading of this paper was followed by an animated discussion in which trade interests were not altogether neglected. One manufacturer from Sheffield expressed a preference for flanges forged solid from the end of the pipe, rather than for those electrically welded on in the manner described. No doubt the electrical welding gives a very trustworthy attachment between the flange and pipe—experience has proved this; and, equally without doubt, the solid forged flange is an excellent device. The merits of the two systems are reduced to commercial considerations. The same speaker, whilst bearing testimony to the very fine junctions, bends and T-pieces shown by the author, said that recourse to electrical methods for producing these was not necessary, as they could be made equally well, and at a cheaper rate, in the shape of crucible steel castings. That, however, is also a commercial point upon which we need not enter. The question as to whether electrical welding is really welding or fusing, was also discussed by several speakers at the meeting. The problem appears very much to be one simply of names. No doubt electrical welding, as described by the author, is not welding in accordance with the forgerman's old vocabulary; but whether it be welding or fusing, so long as it gives a good and trustworthy junction of the two metals, is a matter of small importance. There is no doubt that electrical fusing, if engineering purists insist on the term, enables work to be done which could not be attempted in any other way, and it will surely take its place in times to come as an engineer's workshop process. The methods of making the longitudinal seams in steam pipes by welding were described by the author in his paper. These methods are well known now, and have been in use for some years, so we need not refer to this part of the paper, further than to state that it gave rise to a discussion on the respective merits of solid drawn tubes made from the ingot (which of course have no longitudinal weld) and lap-welded tubes. On this point Mr. Mark Robinson gave some instructive data. He had made tests with lap-welded steel tubes and solid drawn steel tubes. We will not quote the details, as they were rather voluminous, but we will simply say that the lap-welded tube showed considerable superiority. It may be stated, however, that at the present time seamless steel tubes are being made by one firm in 12 ft. lengths, the diameter being 1 ft.; this is rather a remarkable development of the industry.

The meeting was brought to a close by the discussion on this paper.

The Summer Meeting of the Institution will be held this year in Belfast, and will commence on Tuesday, July 28.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Prof. Sir G. G. Stokes, Prof. A. R. Forsyth, and Prof. J. J. Thomson are to represent the University at the celebration in Glasgow of Lord Kelvin's jubilee next month. Prof. Thomson will also represent the University at the Sesqui-centennial celebration of the founding of the College of New

Jersey and the inauguration of Princeton University, to be held next October.

In view of the extreme financial depression which has befallen the Colleges, the Chancellor has diminished by £3000 a year the contribution payable by them to the University in 1896-98.

The Council of the Senate has reported in favour of the affiliation of the University of Toronto and the University of Bombay.

Prof. T. W. Bridge and Mr. Charles Davison have been admitted to the degree of Doctor of Science.

OWING to the efforts of the Chairman of the District Council, it will not be long before the town of Bilston is provided with an efficient technical and art school. No less than £2400 has been locally subscribed, and it is confidently expected to bring the amount up to £2500 at least, when it will be possible to claim £1000 from the Science and Art Department, and £500 from the County Council, making a total of £4000. A Committee has been formed in connection with the workmen of the district for raising £250 towards the expenses of furnishing.

SCIENTIFIC study is given a little encouragement by the London Chamber of Commerce. Among the prizes offered for competition in the Chamber's seventh examination for junior commercial education certificates, to be held in the Hall of the Institute of Chartered Accountants, Moorgate-street, E.C., on July 6, are:—Prizes of £5 and £2 for proficiency in commercial history and geography; prize of £5 for proficiency in algebra, Euclid, mechanics, and hydrostatics; prizes of £3 and £2 for proficiency in chemistry; prizes of £3 and £2 for proficiency in electricity and magnetism; prizes of £3 and £2 for proficiency in sound, light and heat; and prizes of £3 and £2 for proficiency in natural history. There will also be awarded the "Princess Louise" prize of £35 for general proficiency, and the "Textile Section" prize of £36 15s. (conditions undetermined); while the Aberdeen Chamber of Commerce offer a prize of £2 2s. for proficiency in mathematics.

At a meeting of the Technical Instruction Committee of the Cornwall County Council, held at Truro last week, the Agricultural Sub-Committee recommended "That in view of the Government proposals, affecting secondary education, as set out in the Education Bill now before the House, it is desirable to defer taking immediate steps to secure land and premises for the purpose of establishing a farm school in this county." The recommendation, which was proposed by the Chairman, was eventually adopted. During the discussion which took place upon the matter, it was made clear that the original intention had been to found a central institute because the only suitable efficient schools in the county were of a proprietary character, and from the provisions of the Technical Instruction Act, 1889, it was impossible to assist these. The object of deferring the question was to enable the Committee to see if, by the terms of the new Act, schools of only a semi-public character could be assisted, and also to first become acquainted with the powers of the new Educational Committee before they committed themselves to any policy.

A SHORT time ago attention was called in these columns to the low financial condition of the University College, Bristol. We now learn from the *Lancet* that the Council of the College issued last week an urgent appeal for pecuniary assistance to the inhabitants of Bristol and the West of England. The Council earnestly appeal for a capital sum of £10,000 to clear the college from debt, and for an addition to the annual sustentation fund of £700, which would restore the fund to the £1200 subscribed in 1882, not less than which is required to meet the annual expenditure and to secure the Government grant. The Council also emphasise the need of a permanent endowment, and suggest that wealthy citizens of Bristol and the West should associate their names, as in other colleges, with the endowment of professorships. The donations already promised for the capital fund amount to £5334, and to the sustentation fund about £100. We note with pleasure that, at a recent meeting of the Technical Education Committee of the Bristol Corporation, it was decided to recommend the Council to make a grant of £2000 to the funds now being raised on behalf of the college, to be conditional upon the £10,000 being obtained, and on the acceptance of two representatives of the Town Council upon the Governing Body.