fixed to their lower ends below the base plate of system A. Thumbscrew nuts, *f*, are placed upon the upper ends of the bolts after they pass through the holes in the top plate of system A.

When the instrument is set up ready for use, these thumbscrews are turned up against fixed stops, *g*, so as to be well clear of the top plate of system A; but when the instrument is packed for carriage they are screwed down against the plate until the conical nuts mentioned above are drawn up into the conical holes in the top and bottom plates of system A; system B is thus raised off the glass pillars, and the two systems are securely locked together so as to prevent damage to the instrument.

A dust-tight cylindrical metal case, *h*, which can be easily taken off for inspection, covers the two systems, and fits on to a flange on system A. The whole instrument rests on three vulcanite legs attached to the brass plate on system A; and two terminals are provided, one, *i*, on the base of system A, and the other, *j*, on the end of one of the corner bolts of system B.

The air leyden which has been thus described is used as a standard of electrostatic capacity. In the instrument actually exhibited to the Society there are twenty-two plates of the system B, twenty-three of the system A, and therefore forty-four octagonal air spaces between the two sets of plates. The thickness of each of these air spaces is approximately 0·301 of a centimetre. The side of each square is 10·13 cm., and therefore the area of each octagonal air space is 85·1 sq. cm. The capacity of the whole leyden is therefore approximately $44 \times 85{\cdot}1/(4\pi \times {\cdot}287)$, or 1038 cm. in electrostatic measure. This is only an approximate estimate, founded on a not minutely accurate measurement of dimensions, and not corrected for the addition of capacity, due to the edges and projecting angles of the squares and the metal cover. I hope to have the capacity determined with great accuracy by comparison with Mr. Glazebrook's standards in Cambridge.

To explain its use in connection with an idiostatic electrometer for the direct measurement of the capacity of any insulated conductor, I shall suppose, for example, this insulated conductor to be the insulated wire of a short length of submarine cable core, or of telephone, or telegraph, or electric light cable, sunk under water, except a projecting portion to allow external connection to be made with the insulated wire.

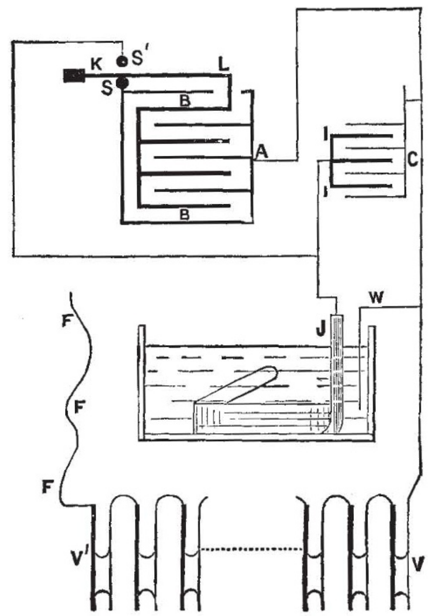
The electrometer which I find most convenient is my "multicellular voltmeter," rendered practically dead-beat by a vane under oil hung on the lower end of the long stem carrying the electric "needles" (or movable plates). In the multicellular voltmeter used in the experimental illustration before the Royal Society, the index shows its readings on a vertical cylindric surface, which for electric light stations is more convenient than the horizontal scale of the multicellular voltmeters hitherto in use; but for the measurement of electrostatic capacity the older horizontal scale instrument is as convenient as the new form.

To give a convenient primary electrification for the measurement, a voltaic battery, *vv′*, of about 150 or 200 elements, of each of which the liquid is a drop of water held up by the capillary attraction between a zinc and copper plate about 1 mm. asunder. An ordinary electric machine, or even a stick of rubbed sealing-wax, may, however, be used, but not with the same facility for giving the amount of electrification desired as the voltaic battery.

One end of the voltaic battery is kept joined metallically to a wire, W, dipping in the water in which the cable is submerged, and with the case C of the multicellular, and with the case and plates A of the Leyden, and with a fixed stud, S, forming part of the operating key to be described later. The other end of the voltaic battery is connected to a flexible insulated wire, FFF, used for giving the primary electrification to the insulated wire J of the cable, and the insulated cells, II, of the multicellular kept metallically connected with it. The insulated plates B of the leyden are connected to a spring, KL, of the operating key referred to above, which, when left to itself, presses down on the metal stud S, and which is very perfectly insulated when lifted from contact with S by a finger applied to the insulating handle H. A second well insulated stud, S′, is kept in metallic connection with J and I (the insulated wire of the cable and the insulated cells of the multicellular).

To make a measurement, the flexible wire F is brought by hand to touch momentarily on a wire connected with the stud S′, and immediately after that a reading of the electrometer is taken and watched for a minute or two to test either that there is no sensible loss by imperfect insulation of the cable and the insulated cells of the multicellular, or that the loss is not sufficiently rapid to vitiate the measurement. When the operator is satisfied with this, he records his reading of the electrometer, presses up the handle H of the key, and so disconnects the plates B of the leyden from S and A, and connects them with S′, J, I. Fifteen or twenty seconds of time suffices to take the thus diminished reading of the multicellular, and the measurement is complete.

The capacity of the cable is then found by the analogy:—As the second reading of the electrometer is to the excess of the



first above the second, so is the capacity of the leyden to the capacity of the cable.

A small correction is readily made with sufficient accuracy for the varying capacity of the electrometer, according to the different positions of the movable plates, corresponding to the different readings, by aid of a table of corrections determined by special measurements for capacity for the purpose on the multicellular.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Prof. Liveing announces a course of lectures in general chemistry, to be given during the Long Vacation by Mr. Fenton, beginning on July 7. Mr. Fenton will also give a series of demonstrations on the chemistry of photography.

At the Congregation on June 16, seven graduates in arts were admitted to the degree of Doctor in Medicine, and thirty-one to the degrees of Bachelor of Medicine and Bachelor of Surgery. These are the largest numbers hitherto admitted at one time.

Sir R. S. Ball, Lowndean Professor of Geometry and Astronomy, has been elected to a Professorial Fellowship at King's College.

At Christ's College the following awards have been made to students of natural science:—Scholarships: E. K. Jones (£50), G. A. Anden (£30), J. M. Woolley (£30), C. F. G. Masterman (£50), H. Pentecost (£50), A. M. Hale (£30). Exhibition: A. M. Barraclough (£30). At Emmanuel College:—Scholarship: A. Eichholz (£80). Exhibition: J. C. Muir (£30).

At the annual election of scholars in St. John's College, the following awards in Natural Science have been made:—Foundation Scholarships: W. L. Brown, T. L. Jackson, W. McDougall, S. S. F. Blackman. Exhibitions in Augmentation of Scholarships: Villy, Whipple (First Class Nat. Sci. Tripos, Part II.). Hughes Prize (highest in third year): Villy. Herschel Prize in Astronomy: Pocklington. Hutchinson Studentship for Research in Zoology: E. W. MacBride.