25.

ON A GENERALIZATION OF PONCELET'S THEOREMS FOR THE LINEAR REPRESENTATION OF QUADRATIC RADICALS.

[*Oxford British Association Report*, Pt. II. (1860), p. 7.]

THE author explained the application of Poncelet's theorems to practical questions of mechanics in the case of forces acting in a single plane as in the theory of bridges.

He next referred to the mode of extension of this theorem, suggested by Poncelet, applicable to the case of forces in space, and pointed out its insufficiency, and, in a certain sense, its incorrectness.

The essential preliminary question to be resolved in the first instance (after which the matter became one of easy calculation), was shown to be that of cutting off by a plane the smallest possible segment of a sphere that should contain the whole of a given set of points lying on the sphere's surface. Some years ago Prof. Sylvester had proposed in the *Quarterly Mathematical Journal*, without any suspicion of its having any practical applications, the following question:—"Given a set of points in a plane, to draw the smallest possible circle that should contain them all." By a singular coincidence, Professor Peirce, of Cambridge University, U.S., had studied this question and obtained a complete solution of it, which he had communicated to the author during the present meeting of the British Association. A slight consideration served to show that precisely the same solution as Professor Peirce had found for the problem of points in a plane was applicable with a merely nominal change to the sphere also; and thus the solution of a question set almost in sport was found to supply an essential link for the complete development of a method of considerable importance in practical mechanics. The author stated that it would be easy to draw up tables of the values of the constants appearing in the linear function, representing the resultant of three forces at right angles to one another, for the principal cases likely to occur in practice, the values of these constants depending solely upon the condition of relative magnitude to which the component forces are supposed to be subjected.