

angles to the axes of the magnetic needles, and therefore the needles are not in a position to have their magnetism much altered by the passage of a current, unless that current be very strong, the suspended magnet of the Rosenthal galvanometer will tend to have its magnetism diminished by every current sent through the instrument in such a direction as to push the poles of the suspended magnet out of the coil, since the lines of force of the two coils will pass along the axis of the suspended magnet. Care not having been taken to send the current round the Rosenthal galvanometer, so as to always suck the ends of the magnet into the coils, is probably the explanation of the weakening of its suspended magnets during four years in the ratio of 5 to 1. Whereas the falling-off in the sensibility of the first of the four galvanometers in the preceding list in the ratio of 4·3 to 1 during a shorter time is probably due to inferior steel having been used in the construction of its magnetic needles.

In view of the great difference which exists between various specimens of magnet-steel, it is most important that only the very best magnet-steel should be employed in the construction of galvanometers which are intended to have a high sensibility, since the factor of merit of the instrument depends largely on the goodness of the magnetic needles.

VII. *Note on Boltzmann's Kinetic Theory of Gases, and on Sir W. Thomson's Address to Section A, British Association, 1884. By E. P. CULVERWELL, M.A., Fellow of Trinity College, Dublin\*.*

**B**OLTZMANN has shown that, whatever be the law of force between the particles of a gas, the configuration of the gas will remain unchanged provided the number of particles moving in a particular way be proportional to  $e^{-MI}$ , where  $I$  is the total energy of a particle moving in that way. This may be termed a permanent configuration. Mr. Watson has extended this to a system of molecules with any number of degrees of freedom.

But, so far as I know, no one has attempted to show that a set of particles having any given initial conditions will, as time goes on, approximate more and more to this permanent configuration. Sir William Thomson indeed has stated (see Montreal Presidential Address, Section A) that he believes it "to be rigorously demonstrable that the whole translational energy [of a perfectly elastic molecule] must ultimately

\* Communicated by the Author.