

If the electrode *C* were given either a positive or a negative charge it sometimes happened that no leak occurred. This result was chiefly noticeable when the terminals *D* and *A* were connected by a wire and both acted simultaneously as cathodes with *B* as the anode. Also throughout the experiments, sudden and violent deflections were frequently obtained which seemed to indicate strong inductive action accompanied by sparking within the cylinder.

With this form of tube the results were exceedingly unsatisfactory. Owing to gas being given off by the metal it was difficult to maintain the same degree of exhaustion for any length of time. The character of the discharge also seemed to be affected by the state of the electrodes, and it was consequently almost impossible to reproduce all the conditions necessary to make a proper comparison of results obtained at different times.

Besides, the Faraday cylinder *D* was not free from defects. Schuster¹ has shown that when a vigorous discharge is passed through one compartment of a vacuum tube the gas in an adjoining one is also thrown into a sensitive state. It was just possible then that, though the opening *C* served to equalize the pressures, it also afforded, by diffusion, a means of communicating to the gas inside the cylinder the conductivity impressed upon that outside by the discharge from the induction coil.

Again, in this form of tube the electrode necessarily passed through the glass and could not therefore be completely surrounded by the cylinder.

In order to overcome any disturbing influence arising from these defects, and to localise more definitely the effect investigated, a new form of tube was devised which could readily be taken apart and which did not require even a small opening in the Faraday cylinder.

3. ELECTRIC CONDUCTION ALONG THE SURFACE OF GLASS.

This form of tube which is shown in Fig. II, was divided into two compartments which could be separately exhausted. The metal cylinder *D* in this case formed part of a metal socket *H* into which the glass parts of the tube were fastened. Air tight joints were made by inserting rubber washers *b* between two bevelled brass ones, and then compressing the whole by a threaded brass piece which slid over the glass and could be screwed into the socket.

The upper end of the cylinder was made air tight by placing lead washers above and below the plate *d* and then screwing a brass cap

¹ Schuster, Proc. Roy. Soc., 42, p. 371, 1887.