

IX.—*Electric Screening in Vacuum Tubes.*

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In his work entitled "Discharge of Electricity through Gases," page 170, Professor J. J. Thomson describes an effect which he observed in a series of experiments with Faraday cylinders inserted in vacuum tubes for the protection of exploring electrodes.

In these experiments tubes similar in form to that shown in Fig. I were used. An exploring electrode *C* was sealed into the tube and surrounded by a metal cylinder *D*. The end of this cylinder facing the bulb of the discharge tube was closed by a plate of some selected metal such as aluminium or brass. A small opening *e* served to equalize the air pressures inside and outside the cylinder, and an ebonite plug closed the lower end and acted as a support to hold the cylinder in position.

On passing an electric discharge through these tubes no unusual action was observed at high pressures; but when a pressure of about one millimetre of mercury was reached the gas within the cylinder became conducting, and electric charges given to the inclosed electrodes were gradually dissipated.

With pressures low enough to allow the cathode rays to fall upon the end of the cylinder, the protected electrode gained a negative charge. With still higher exhaustions the same effect was obtained, but the rate at which the negative charge was gained rapidly increased as the pressure was lowered.

The effect was obtained when the ends of the cylinders were closed by plates ranging all the way from thin aluminium foil up to brass 1.5 mms. in thickness, but the rate at which the charge was acquired by the electrode decreased with the thickness of the plate selected.

In discussing this effect Professor Thomson brought forward the hypothesis that cathode rays were in some manner produced in the gas surrounding the electrode *C*.

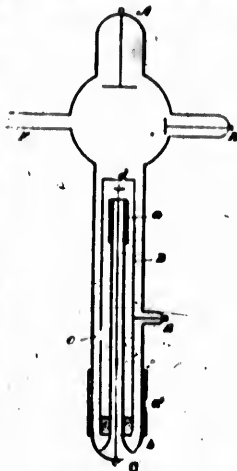


FIG. I.