This effect clearly pointed to the existence of cathode rays within the cylinder.

To verify this conclusion the induction coil was suddenly reversed while the electrode *C* was gaining its charge. This action at once stopped the effect and the electrometer needle came to rest and remained stationary. On again reversing the coil the charging immediately recommenced.

An electromagnet was then placed in position with the bulb of the tube between its pole pieces. On exciting this magnet the cathode rays coming from *A* were deflected and again the charging ceased and the electrode *C* maintained its charge.

When the electromagnet was cut off the cathode rays once more impinged upon the disc *d*, and the charging at once began again.

These experiments then showed that the charge gained by *C* was due to the cathode rays produced within the cylinder by the action of the pencil impinging on the outside.

From a consideration of the results obtained with all the tubes, it thus seems evident that a closed Faraday cylinder, placed within a vacuum tube in which a discharge is passing, will completely screen off all electrical action unless made of metal thin enough to permit the passage of cathode rays through it.

4. Influence of Bad Earth Connections.

In the experiments described in Section III, special care was taken with the earth connections. These were made by soldering an iron wire to a water main and then inserting the end of the wire in the mercury in the vessel *E*.

To test the influence of bad earth connections the cylinder was first capped at *d* with a thick disc to cut off the cathode rays, and then a wet string or a column of xylol was placed in the earth circuit between the iron wire and the mercury.

Under these conditions the passage of the discharge in the tube was almost invariably accompanied by marked induction effects.

With very high exhaustions for example, *A* and *B* being the terminals and neither connected to earth, there was no inductive action when the connection was made by the iron wire or the wet string, but when the column of xylol was inserted in circuit the electrometer showed a strong positive induction. This action, however, was not accompanied by any permanent charging as the insertion of the iron wire in the mercury was sufficient to at once bring the electrometer needle to rest in its initial position.