water-resistance between the induction coil and oscillator. The results of varying these conditions were studied. A ratio between the fundamental maximum and minimum equal to 125 to 1 was experimentally obtained and it was thought that this ratio could be materially increased by observing the best conditions for controlling the various factors that enter into the problem.

The ratio between Lecher wire length and wave length was found to be 2.07 and the difference between this value and the theoretical value 2.00 was shown to be due to an "end correction" which is necessarily always present.

PHYSICS LABORATORY,
OHIO STATE UNIVERSITY,
November 3, 1910.

THE PRODUCTION OF LIGHT BY CANAL RAYS.¹

BY GORDON SCOTT FULCHER.

A COMPARISON of the results of the simultaneous electrostatic and magnetic deflection of the canal rays with the details of the Stark effect leads to the conclusion that the canal rays cannot be the sources of the light showing this effect. An alternative hypothesis was suggested by the author two years ago, that the light in question is emitted by gas molecules hit and ionized by the canal rays. Recently more direct experimental evidence for this conjecture has been obtained. A discharge tube was so designed that the pressure of the gas through which the canal rays pass can be varied in the ratio of 1 to 20 without changing the number or the velocity of the canal rays. Photographic measurements of the intensity of the light from the path of the rays showed it to vary directly as the pressure. Also, measurements of the energy transported by the rays (by means of their heating effect) and of the intensity of the light emitted, showed that for a cathode fall of potential between 1,500 and 5,000 volts the relation $I = kEp$ holds within experimental errors. That is, the intensity of the light emitted is proved to be proportional to the number of collisions times the mean energy transmitted at each collision. A statistical calculation has been made which tends to show that the intensity minimum observed between the displaced and rest lines in the Stark effect can be explained on the basis of the emission of the series line spectrum as a result of molecular collision only if we assume that no light is emitted unless the hit molecule is ionized by the collision and that the bombarding molecules do not emit the series line spectrum. This is equivalent to assuming that the series spectrum lines which show the Stark effect are emitted only by positively charged molecules or atoms—a law for which there is other evidence but which has been much disputed.

¹Abstract of a paper presented at the Chicago meeting of the Physical Society, November 26, 1910.