J. KELLEHER.

of Toronto and the FitzGerald Laboratories, Niagara Falls, N. Y., to ascertain if this time element really existed and, if so, how it was affected by material, temperature, etc.

During the winter of $191^{\circ}-1920$, at the University of Toronto. preliminary experiments we carried out on a Siemens singleelectrode furnace employing direct current, the main object of these experiments being to determine the effect of slags of different compositions upon the current variation caused by a given movement of the electrode. The average power used in the furnace was 20 kw., and the electrodes ranged from 2 inches (5.1 cm.) to 4 inches (10 cm.) in diameter, both graphite and carbon



being used. Due, however, to the difficulty of maintaining constant potential across the furnace terminals, the results were rather confusing, and perhaps even untrustworthy. It was during these experiments that certain phenomena were observed which appear to be worth recording at this time, although the work planned has not been completed.

A bath of iron-nickel alloy covered by an acid calcium silicate slag was melted in the furnace. To observe the arc under these various conditions the following arrangement was employed: An opening was made in the front wall of the furnace. The opening was then covered by a piece of sheet iron in which a pinhole had been drilled. The light emerging from the opening was allowed to fall on a ground glass screen, which was moved back-

82