126. *Instantaneous Photographs of Electrically Exploded Wires.*

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A general feature of the explosion of wires and threads by the discharge of high tension condensers was reported in No. 108¹⁾ of the proceedings. However rapid the discharge may take place, there must be gradual rise of current and consequently the heating will not be instantaneous. As the explosion seems to occur by the sudden rise of temperature, the gradations in the process can be studied by means of instantaneous photographs. Through the kindness of Prof. Terada, a photographic camera for securing the image of the exploding wire was utilised for the purpose. The lens was so placed that the image of the wire came to the focus after passing through a slit on a rotating disc, on which photographic film was fixed, and the disc was moved by a small electromotor, making 107 revolutions per second. The speed was generally sufficient to show the various stages of explosion; even with magnesium ribbon showing luminosity longer than wires of other elements, the phases can be studied with photographs extending over one revolution. The current was mostly of the order of 10^3 amperes.

As already stated in the former communication, the wire is first heated at numerous spots or becomes continuously luminous; this state persists for about 10^{-4} sec. and suddenly reaches the explosive condition, which continues for some time till it fades away continuously. The progress of explosion must be largely dependent on the strength of the current passing through the wire, so that the interval of time above stated is subject to variation according to the capacity of condensers and the inductance included in the circuit. Sometimes the luminous spots vanish after a very short interval, and then they enter into an explosive state. With an iron wire three stages were observed; the tail resembles very much that of comets, sometimes divided into many branches, sometimes stretched into bushy end. The last mentioned aspect is most prominent when the wire is stretched parallel to the direction of

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1) NAGAOKA and FUTAGAMI: Proc. Imp. Acad. 2 (1926) 328.

rotation of the disc. The accompanying diagrams illustrate these points better than a detailed description.

We hoped to get some photographs showing the electric oscillations by inserting selfinductance in the circuit, but only a few poor images were secured.

Fe wire:
R 0.32 mm.
L 50 cm.

Manganine
wire:
R 0.12 mm.
L 10 cm.

Cu wire:
R 0.08 mm.
L 20 cm.

Cu wire:
R 0.15 mm.
L 10 cm.
motion
parallel
to wire.