AN OSCILLOGRAPHIC STUDY OF AN INDUCTION COIL WITH HIGH FREQUENCY LOAD.

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A report was made to this Academy a year ago on a Chemical Study of a High Frequency Corona Discharge[1]. During the preliminary work a large induction coil capable of throwing a 40 cm. spark was connected to the Tesla coil as described in that reference. The source

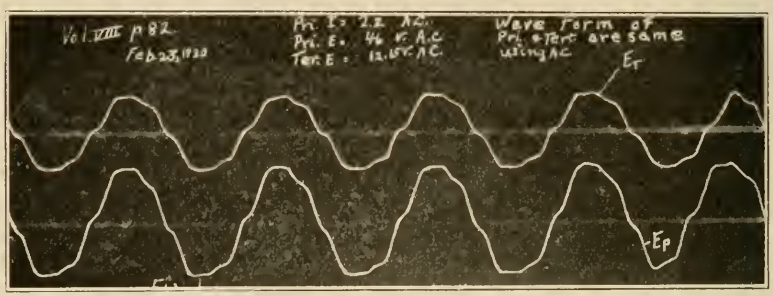

Fig. 1. An oscillograph showing that the wave form of the voltage from a tertiary coil wound outside of the secondary coil of an induction coil is the same as the alternating voltage impressed upon the primary coil, all three coils being concentric.

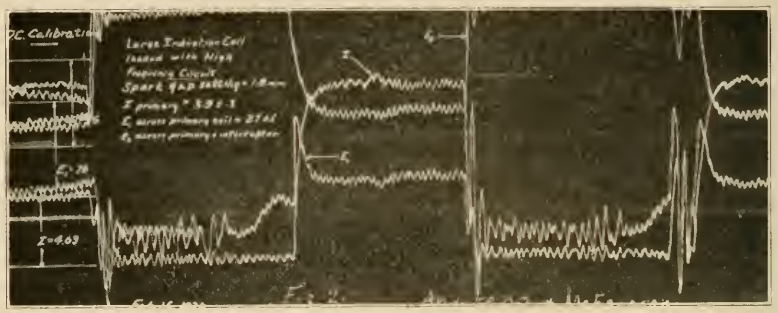

Fig. 2. The wave forms of the current and voltages of the primary circuit of a large induction coil. The current was supplied by an 8-pole d.c. generator, explaining the small waves.

of supply for the primary of the induction coil was the campus direct current at 100 v. The yields of ozone obtained with this arrangement were very unsatisfactory as to consistency of results. Later, a transformer was used in place of the induction coil with much better results. A General Electric oscillographic apparatus being available, a study was made of the induction coil to see if the variations could be explained.

The secondary current could be obtained directly with the aid of a sensitive element. To get the secondary voltage a tertiary coil was

[1] Proc. Ind. Acad. Science, 1921, p. 157.

"Proc. 38th Meeting, 1922 (1923)."

wound around the outside of the secondary and the ratio between the secondary and tertiary was determined with a standard spark gap. The ratio was 440:1. Figure 1 shows an oscillograph of the primary and tertiary voltage waves and it is seen that the two forms are identical as would be expected, when it is remembered that the winding in the induction coil consists of a primary coil wound on the magnetic core

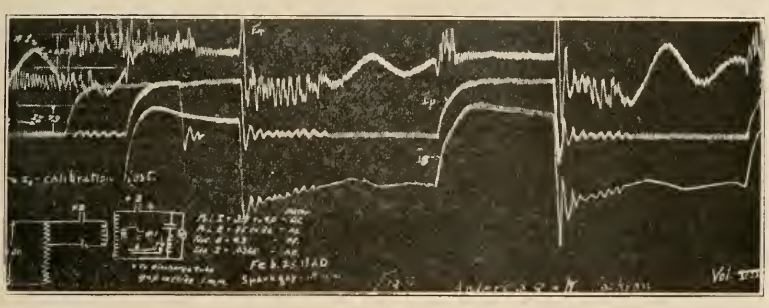

Fig. 3. The induction coil was loaded with a high frequency discharge. The peculiar character of the tertiary voltage wave is noteworthy. Note the considerable part of the wave below the zero line indicating reversal of voltage.

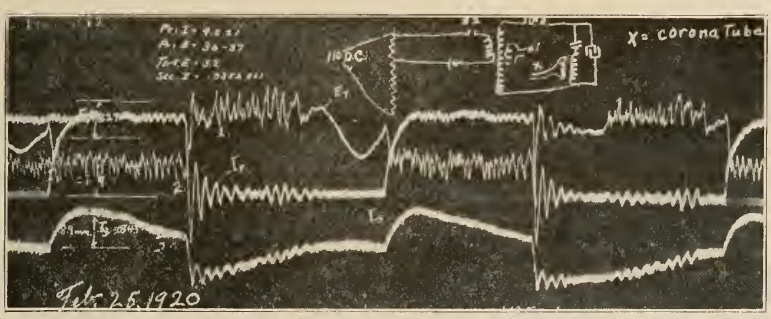

Fig. 4. Same as figure 3. Note the alternating character of the secondary current and of the tertiary voltage. These oscillographs indicate the marked deviation from unidirectional current usually associated with the induction coil.

around which is the secondary and finally the tertiary is wound outside of that.

The other figures, 2, 3, and 4, are self-explanatory. The voltage and current waves are far from being even uni-directional. Attention is called to the peculiarities of the tertiary voltage wave. From the oscillographs it is not to be wondered that the chemical effects, which are so sensitive to small voltage charges, are so inconsistent.