(No Model.)

# A. EKSTROM.

## ELECTRICAL TRANSFORMER.

No. 508,688. Patented Nov. 14, 1893.

FIG. 1.

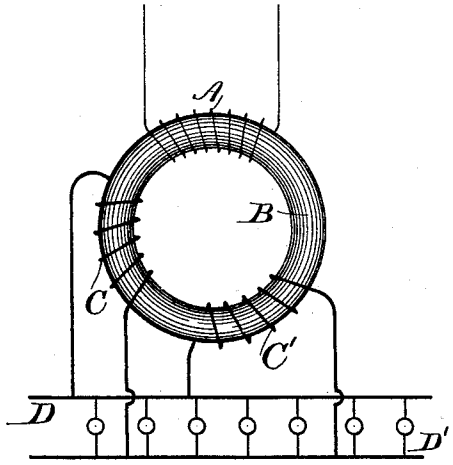



FIG. 2.

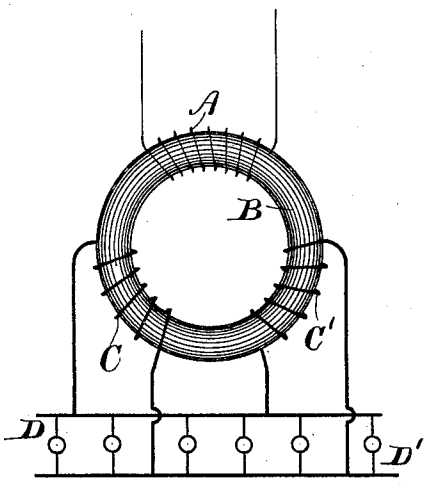
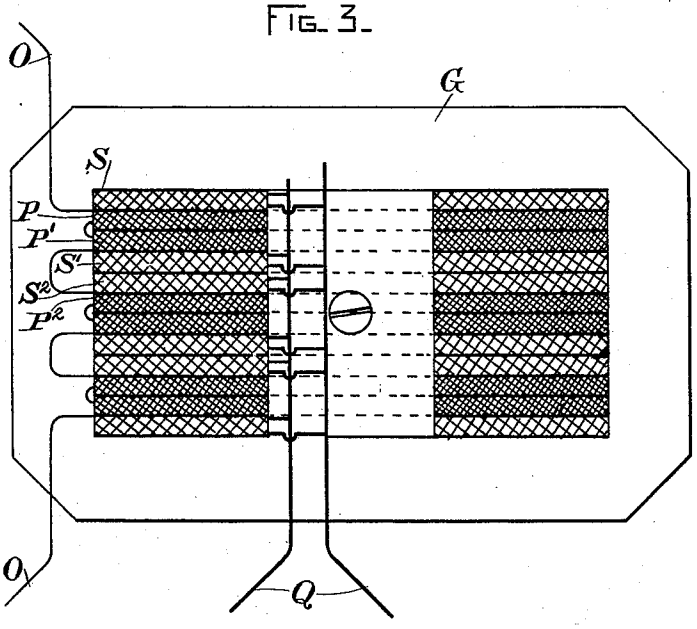



FIG. 3.




WITNESSES.
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# UNITED STATES PATENT OFFICE.

AXEL EKSTROM, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

## ELECTRICAL TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 508,688, dated November 14, 1893.

Application filed November 16, 1892. Serial No. 452,146. (No model.)

*To all whom it may concern:*

Be it known that I, AXEL EKSTROM, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented a certain new and useful Improvement in Transformers, of which the following is a specification.

My present invention relates to improvements in transformers, and its particular aim is to insure that when a number of secondaries are connected in multiple into a single circuit they all shall be exposed to equal or substantially equal inductive effects, else the work done will not be distributed in proper proportion between the different secondary coils, those doing most work will become unduly heated, and the translating devices in the main circuit will be more or less completely short circuited through the coils doing less than their proper fraction of work.

In the accompanying drawings Figures 1 and 2 are diagrams showing the principle of my invention, and Fig. 3 is a diagram of a preferred construction of transformer embodying my invention.

In Fig. 1 A represents a primary coil wound on a magnetic ring or core B, and C, C′ are secondary coils both connected in multiple into the line circuit D, D′. From the position given the secondaries in this figure, it will be seen that coil C is nearer the primary and is exposed to considerably greater inductive action, than is the coil C′. Hence it will do more than its fair share of work, and such a transformer will not operate satisfactorily for the reasons already outlined. If, however, the secondaries be arranged at equal distance from the primary as is indicated in diagram in Fig. 2, then each will work properly and good results will be secured. I have embodied this idea of equal inductive action in the various coils of a transformer having multiple secondaries in the construction shown in Fig. 3. Here G represents a magnetic frame of ordinary construction forming a closed magnetic circuit through which the lines of force thread both the primary and secondary coils. The primaries P, P′, $P^2$, &c., are shown connected in series with the supply line O, and the secondaries S, S′, $S^2$, &c., are coupled in multiple with the work circuit Q. The primary and secondary coils are arranged alternately, as indicated, and in such manner that all will be exposed to equal inductive effects from the primaries.

Transformers having multiple primary and secondary coils with the secondaries connected in multiple into a common circuit have previously been used, but I know of no constructions such as claimed herein in which the arrangement of the primaries and secondaries has been such as to secure equal inductive effects in the latter, and the advantages arising therefrom are very marked.

What I claim as new, and desire to secure by Letters Patent, is—

A transformer having a plurality of primary and secondary coils, the primaries being connected in series, and the secondaries connected in multiple with a single work circuit, said primary and secondary coils being alternately disposed in such manner that all the secondaries are exposed to equal or substantially equal inductive effects, substantially as described.

In testimony whereof I have hereto set my hand this 9th day of November, 1892.

AXEL EKSTROM.

Witnesses:
JOHN W. GIBBONEY,
BENJAMIN B. HULL.