(No Model.)

E. THOMSON.

INDUCTION COIL.

No. 354,274. Patented Dec. 14, 1886.

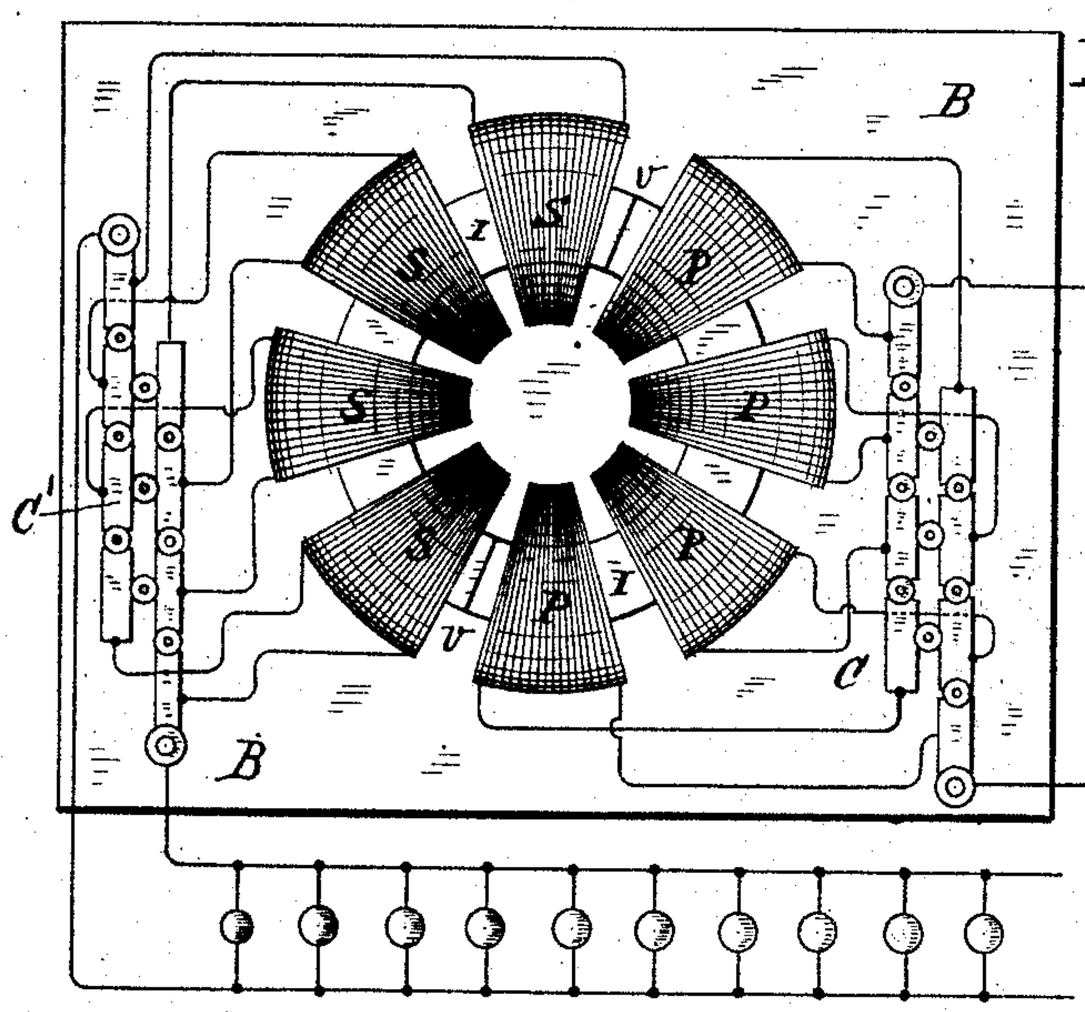


Fig. 1.

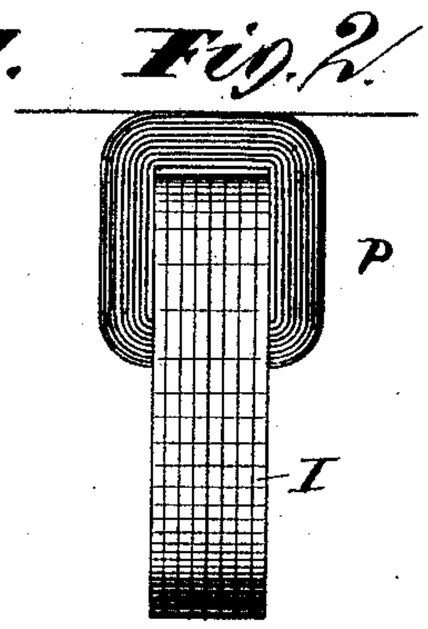


Fig. 2.

Fig. 3

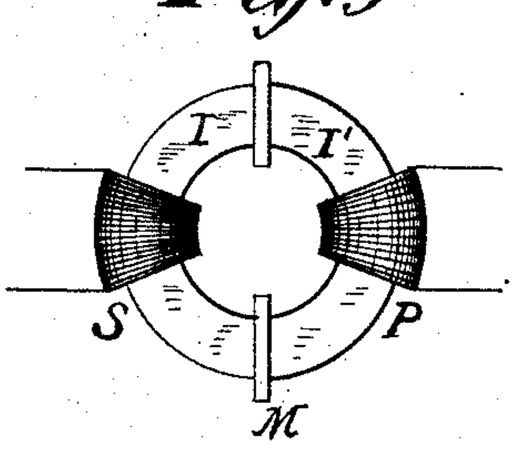


Fig. 4.

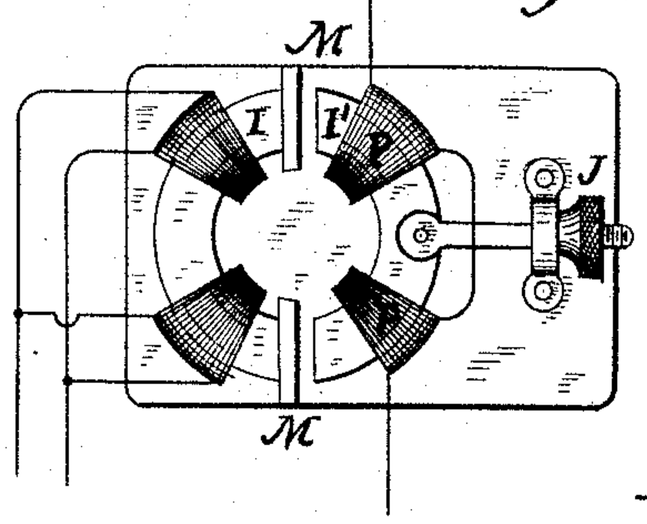


Fig. 5.

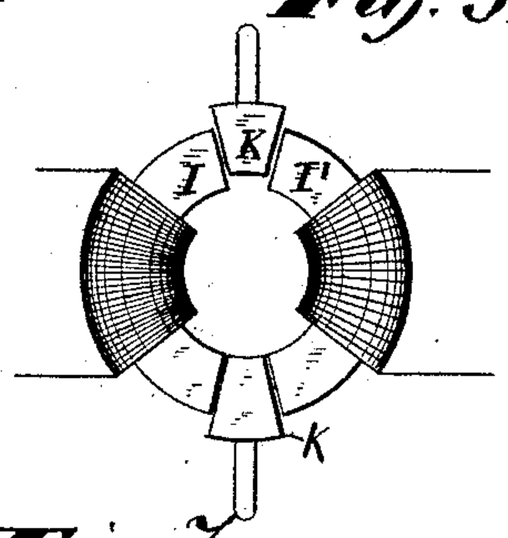
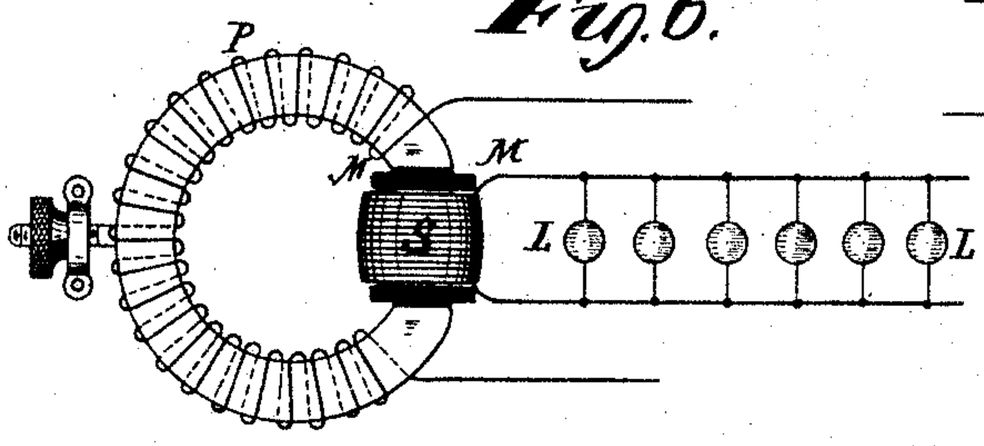
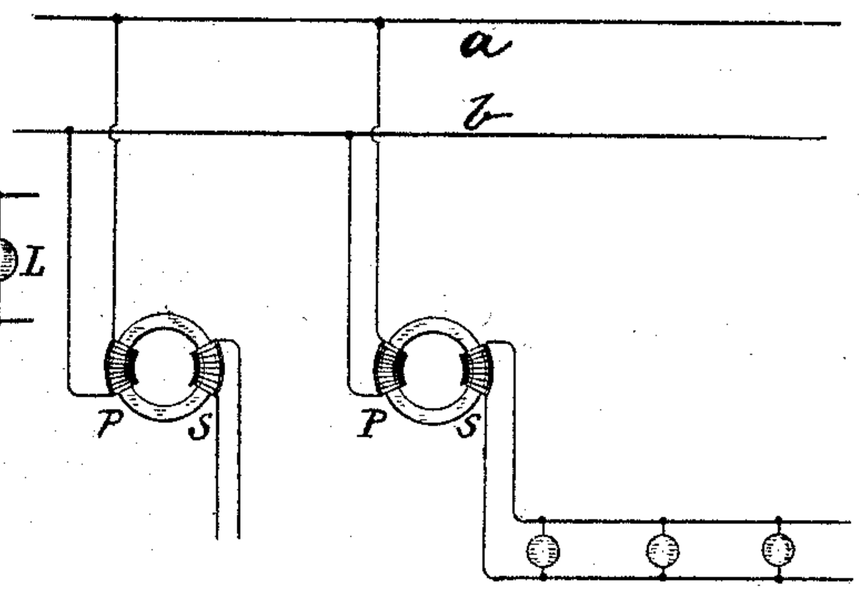


Fig. 7.

Fig. 6.





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ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 354,274, dated December 14, 1886.

Application filed July 26, 1886. Serial No. 209,144. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Electric Induction Apparatus, of which the following is a specification.

My present invention relates to induction apparatus in which two sets of coils are employed and the flow of currents in one coil or coils by induction sets up current in the other set of coils.

My invention is designed to provide an apparatus of this character, which shall be particularly suited to feeding secondary local circuits—such, for instance, as electric-light circuits—with induced currents generated by the flow of currents on primary feeding-mains deriving their currents—such as alternating currents—from a suitable station or source.

The object of the invention is to provide a means whereby the action of the apparatus may be regulated so as to obtain on the secondary circuit the desired potential of current, and also to provide means whereby the apparatus may be adapted to main or feeding circuits or lines conveying currents of different strength or potential.

An apparatus constructed in accordance with my invention is especially desirable where it is necessary to supply or feed incandescent lamps of different volts from the same general primary line or circuit.

To the above ends I make both the primary and secondary coils of the apparatus from wire fine enough to give or work with the highest potential required or used, when the sections of the coils are connected in series, and I combine with said coils a suitable switch apparatus, whereby the sections of wire may be connected either in multiple arc or part in series or part in multiple, so as to adapt the primary coils to different currents on the main circuit, as well as to cause the apparatus to deliver currents of different potential from the secondary. I also propose to make the iron core upon which the coils are wound into sections or parts, upon one of which is applied the primary coil or coils, while upon the other the secondary coil or coils are wound. By thus making the core in sections I obtain a discontinuous core, and in combination with the same I employ means for varying the magnetic intervals between the sections, so as to vary the degree of magnetic continuity, and thus vary the action of the apparatus.

I sometimes separate the parts or sections of the discontinuous core by mica or other insulating material, to prevent possible leaks from the primary line or coils to the secondary line or coils, when the potential of the primary is so very high as to involve a risk of shock to persons using current from the secondary coil or line.

In the accompanying drawings, Figure 1 is a plan of an induction apparatus constructed in accordance with my invention. Fig. 2 is an edge view of the iron core with a single coil applied thereto. Fig. 3 is a plan of the discontinuous core with plates of insulating material interposed between the sections to prevent leaks. Fig. 4 is a plan of an apparatus embodying means for adjusting the position of two sections of core with relation to one another so as to vary the degree of magnetic continuity, and thus vary the power of the apparatus. Fig. 5 illustrates an equivalent way of varying or adjusting the magnetic continuity. Fig. 6 is a plan of an improved form of the apparatus. Fig. 7 is a diagram illustrating a way of connecting the apparatus to supply mains delivering current to the primaries of the apparatus.

In Fig. 1 B B is a board or base-plate upon which the parts are mounted. I I is an iron ring-core constructed of flat rings of sheet-iron piled upon one another, with paper or varnish or other non-magnetic material between the sheets. This core is wound with coils of wire P P P P, called "primaries," and S S S S, called "secondaries," and for convenience of placing such coils on the core the core is sometimes split into halves at *v v*, or built up of two sections of half-rings of sheet-iron, instead of complete rings. The terminals of the coils P P P P are attached, as shown at C, to a series of plates or blocks, which, by means of plugs inserted between them, permit connection of all or a part in series or all or a part in multiple to be made in obvious way. The secondaries S S S S are similarly provided with plugs and plates at C′, whereby they also may be connected in series or in multiple or in multiple series.

These provisions permit an easy adjustment as to effective length and section of conductor to suit varied conditions of working. It will of course be understood that the coils are carefully insulated from one another and from the core I.

In Fig. 3 the core I is shown as divided into sections I I′, which are insulated by plates of glass or mica or other suitable insulator, M M, to prevent possible leaks of current from P to I′, and thence to I and to S, which would be dangerous in the case in which coil P is fed from very high potential alternating-current lines.

In Fig. 4 one of the sections of the core, as I′, is shown adjustable to and from the other through a short space for the purpose of adapting the power of the current developed in the secondary to the needs of its circuit by varying the magnetic interval or gap between the sections of core.

In Fig. 5 the parts of the core are immovable; but a wedge of sheet-iron pieces, K, adjustable in position in the interval or gap, serves to more or less completely close the connection magnetically between I and I′.

In Fig. 6 a very useful and readily-constructed modification of the apparatus is shown. The primary P is wound on the largest section of the core, forming a sort of horseshoe or letter C. The coil P is of little depth, a few layers only being used, but it nearly covers the core, as shown. A short section of core is wound with the secondary coil and to a considerable depth. The secondary is connected to the local circuit of lights or other working resistances. Insulating-plates M M, of mica or glass, &c., can be inserted between the sections of core. To adjust the potential it is only necessary either to move the part of the core upon which P is wound or to withdraw the coil S and its core-section in part out from between the poles of the horseshoe to a greater or less extent as may be needed, so as to vary the magnetic continuity of the core, the maximum effect in S being producible when the cores are exactly matched.

The connection of the apparatus in a system is indicated in Fig. 7. *a b* are alternating-current mains from which branch wires are carried to the induction apparatus, as shown, a number being used in multiple arc.

What I claim as my invention is—

1. In an induction apparatus for electric distribution, a main or charging circuit and a local or independent circuit, in combination with an induction-coil having a divided primary coil, and switch apparatus whereby any desired connection of the sections of such coil may be effected.

2. In an induction apparatus, a discontinuous iron core for the primary and secondary coils, in combination with means for varying the magnetic continuity.

3. The combination, in an induction apparatus, of two sets of coils wound in sections, one constituting the primary and the other the secondary coil, in combination with switch apparatus whereby the primary coils may be connected in series or in multiple or in series multiple, and additional apparatus whereby similar connections of the secondary coils may be effected at pleasure.

4. The combination, with an induction apparatus having its core made in sections, carrying, respectively, the primary and secondary coils, of insulating-plates M M interposed between the core-sections.

5. In an induction apparatus, core-sections wound, respectively, with primary and secondary coils, and means for varying the magnetic continuity at the intervals between said core-sections, as and for the purpose described.

6. In an induction apparatus, an iron core made in sections carrying, respectively, primary and secondary coils, in combination with means for adjusting one section with relation to the other, so as to vary the degree of continuity.

7. In an induction apparatus, a core formed in two sections, one of greater length than the other, and having a primary coil upon the longer section and a secondary coil upon the shorter section wound to a greater thickness or depth than the primary.

8. In an induction apparatus, the combination, with a long core-section wound with a primary and a short core section wound with a secondary, of means for adjusting said sections with relation to one another, so as to vary the magnetic continuity of the core.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 21st day of July, A. D. 1886.

ELIHU THOMSON.

Witnesses:
M. L. THOMSON,
GEORGE J. CARR.