No. 617,381. Patented Jan. 10, 1899.

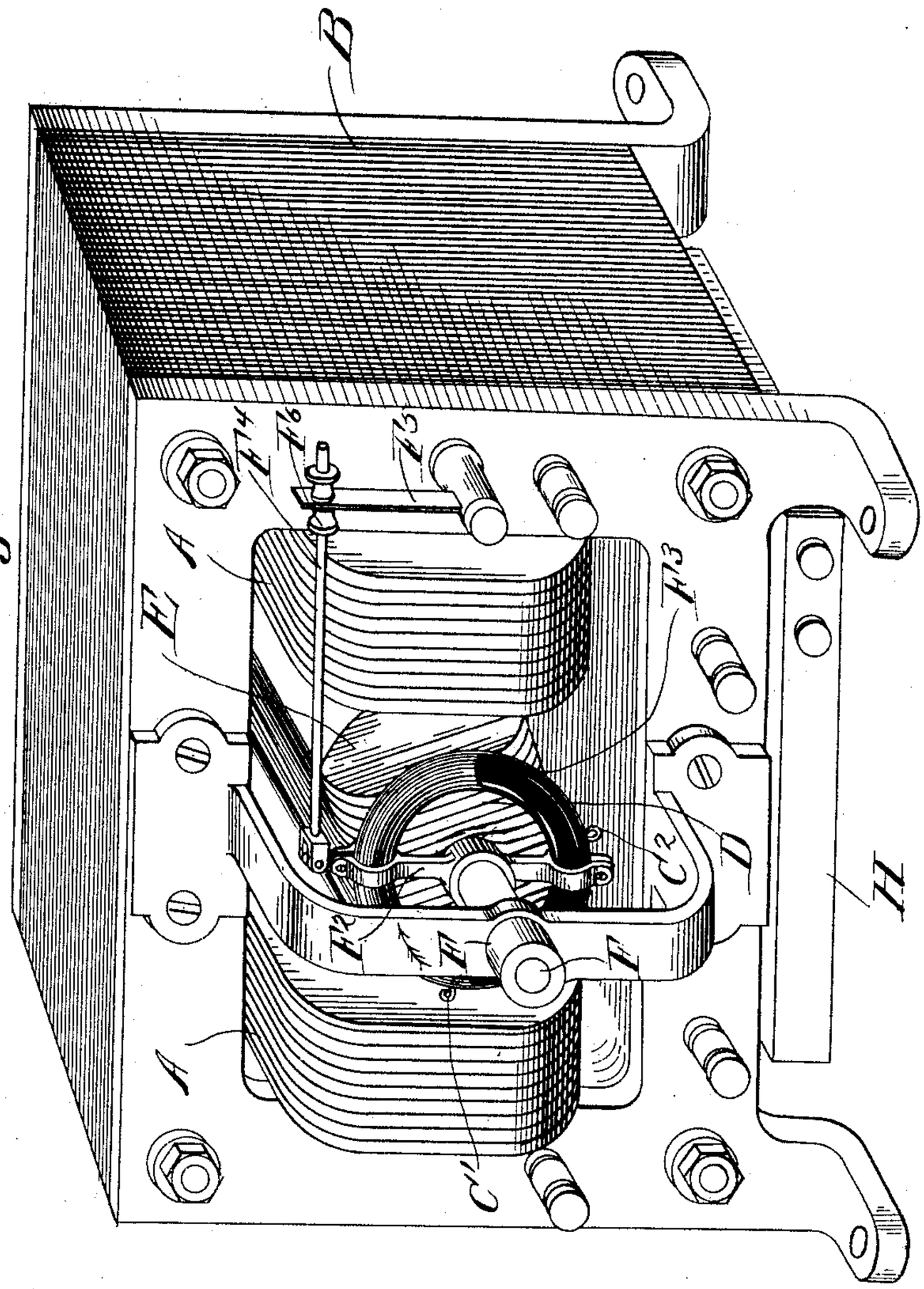
D. H. WILSON.

ELECTRIC TRANSFORMER.

(Application filed July 30, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses:
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Fig. 2.

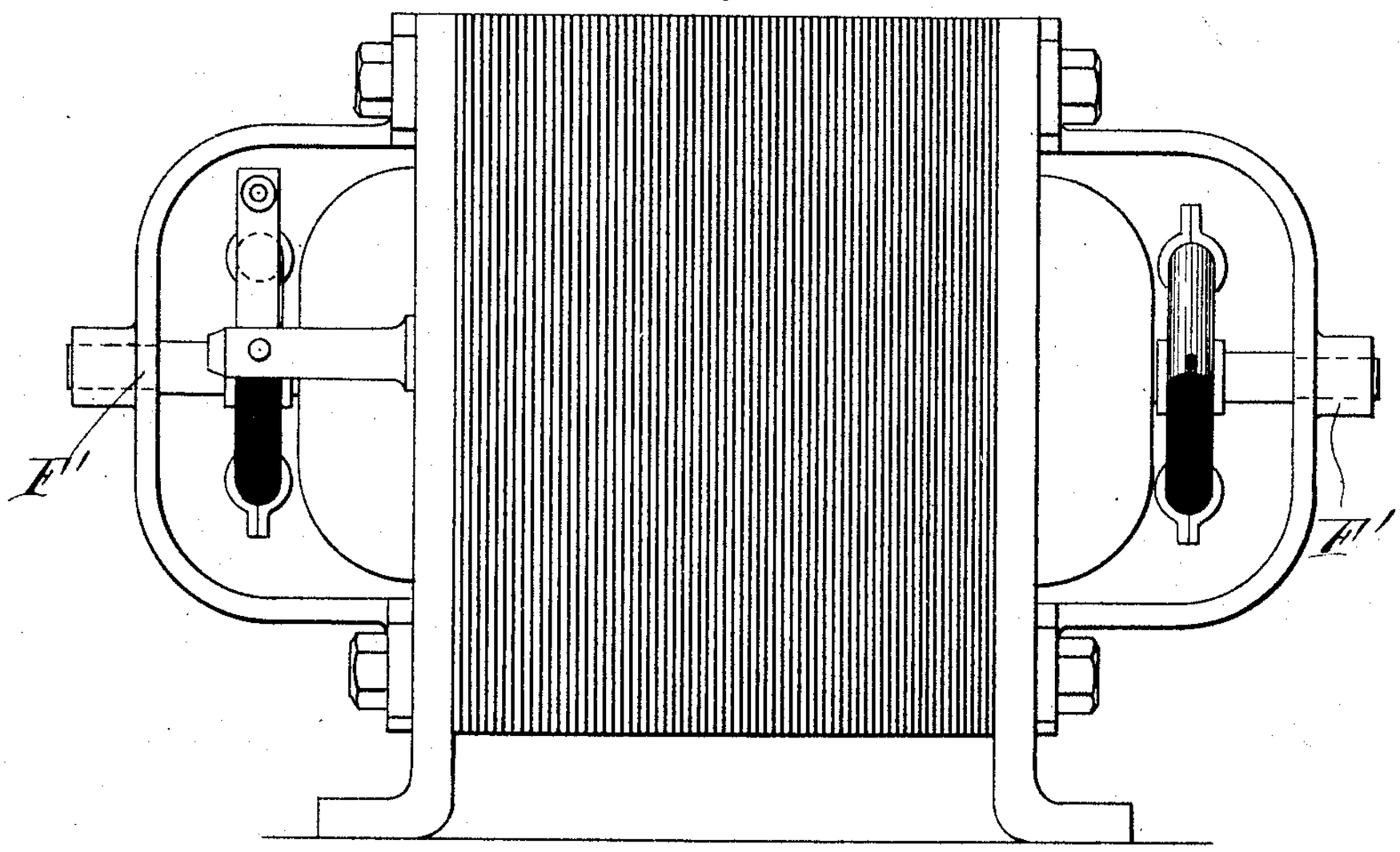
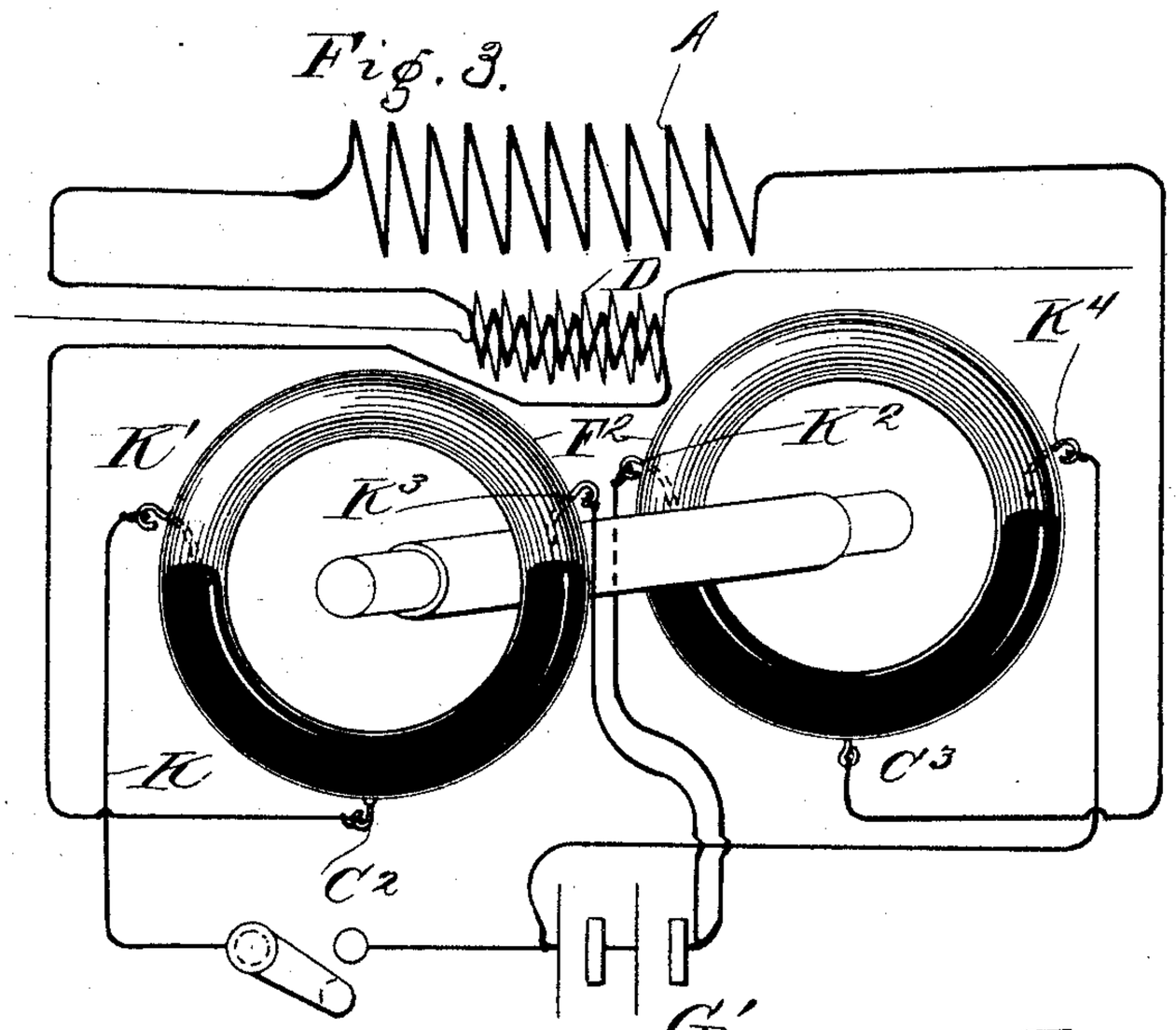


Fig. 3.



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UNITED STATES PATENT OFFICE.

DAVID H. WILSON, OF CHICAGO, ILLINOIS.

ELECTRIC TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 617,381, dated January 10, 1899.

Application filed July 30, 1897. Serial No. 646,508. (No model.)

To all whom it may concern:

Be it known that I, DAVID H. WILSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Transformers, of which the following is a specification.

My invention relates to transformers or induction-coils, and has for its object to produce a new and improved device of this description.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a perspective view of a transformer or induction-coil embodying my invention. Fig. 2 is a side elevation of a transformer provided with two circuit-breakers. Fig. 3 is a diagrammatic view showing the arrangement of the circuits when two circuits are used.

Like letters refer to like parts throughout the several figures.

The transformer or induction-coil is provided with two coiled conductors. The coiled conductor A is provided with a core B. It is of course evident that this core may be of any suitable construction, and as shown in the drawings it is made up of a series of pieces forming a continuous circuit and being provided with inwardly-projecting pole-pieces, around which the conductor is coiled. A second coiled conductor D is provided with the core E. The coiled conductors A and D may be independent of each other, or a portion of the coil A may be wound upon the core of the coil D, as illustrated, for example, in Fig. 3. The coil D and core E are mounted on the shaft F, having bearings F′ F′.

I have shown a part of the coil A as being wound upon the core of the coil D. This construction may be omitted, if desired; but I find in many instances better results are produced when the coils are wound in this manner.

An arm or spider F^2 is attached to the shaft F and supports the receptacle or tube F^3, which is partially filled with some conductor—as, for example, mercury—and is provided with the contact-points C′ and C^2. A rod F^4 is connected to the upper end of the arm F^2 and to a spring F^5 associated with the transformer. The rod F^4 is provided with the adjusting ends F^6, by which the position of the tube or receptacle F^3 and the conductor D may be varied. The spark at the breaking of the circuit is reduced by the condenser H, which is adapted to be connected in the circuit. The coil D is partially rotated by the spring F^5 and rod F^4, so as to be normally held in an angular position. When the coil is in this position, both contact-points C′ and C^2 are in contact with the mercury in the tube F^3 and the circuit is completed through said tube. If now the circuit through the coil A is closed, the pole-pieces or inwardly-projecting parts of the core B will be energized and will attract the coil D and move said core and coil in the direction of the arrow and against the force of the spring F^5 toward a position of equilibrium. The receptacle or tube F^3 being connected with the core of the coil D moves with it, and after said receptacle has moved a predetermined distance the contact-point C′ is withdrawn from the mercury or other conductor and the circuit through the coil A is broken. The coil A now becomes deënergized and the spring F^5 brings the coil back to its normal position and the circuit is again completed, the operation above described being repeated. The lines of force passing between the pole-pieces of the core B are conducted by the wire E through the core D and an induced current is sent out over the line at each break of the circuit. The rapidity of the breaks in the primary coil may be regulated by varying the angular position of the coil D, thus varying the distance it must be moved in order to withdraw the contact-point C′ from the conductor in the receptacle F^3.

It is of course evident that the circuit in the coil A need not be broken in order to produce a current in the secondary coil, for if the strength of the current is varied, for example, this secondary current will be produced.

In Figs. 2 and 3 I have shown an arrangement of circuits wherein two circuit making and breaking devices are used. In this case two receptacles or tubes F^3 are used, and the coil A has one end connected to the contact-point C^2 of one tube and the other end to contact-point C^3 of the other tube. As illustrated in Fig. 3, the circuits will be traced as follows: from battery or other source of elec-

tric supply G′ by wire K to contact-point K′, thence through the conductor in the receptacle F^3 to contact-point C^2, thence through the coil A to contact-point C^3, thence through the conductor in the receptacle F^3 to contact-point K^2, and thence back to battery or other source of electric supply G′. When the coil A is energized, the coil D and the mercury-tubes are moved (as described with reference to Fig. 1) until the contact-points K′ and K^2 are withdrawn from the mercury and the circuit broken. This motion of the tubes F^3 brings the contact-points K^3 and K^4 in contact with the conductor in the receptacle F^3 and the circuit is completed, which will be traced as follows: from the source of electric supply G′ to contact K^4, thence through conductor in the receptacle F^3 to contact-points C^3, thence through coil A in an opposite direction to that described above to contact-points C^2, thence through the conductor in the tube to contact-point K^3, and thence back to the source of electric supply G′. When the coil D and the tubes F^3 are in position to complete the latter circuit, the coil will have moved past its position of equilibrium and the energizing of the coil A will cause the coil D to move back to its first position, and the operation described above will then be repeated. It will be seen that by this arrangement an alternating current will be produced in the primary circuit, and also that the circuits may be broken or varied more rapidly. The coil D is preferably constructed so that when no current is flowing through it will take a position where the magnetic forces acting upon it when the coil A is energized will be unbalanced.

In the drawings and description I have referred to the movable coil as being the "secondary" coil; but I may in some cases use said movable coil as the primary coil, and I of course do not limit myself in this particular.

I have used the words "transformer" and "induction-coil," though of course it is evident that my invention is not limited by any peculiar significance which may be given to these terms.

In the particular form of device which I have here shown the motion imparted to the movable coil is only a small portion of a revolution, though it might be necessary to so construct it as to have a much wider range of motion.

I have shown one form of a circuit-varying device to be used in connection with the coil; but it is of course evident that any other suitable circuit-varying device might be used, and I of course do not limit myself to this construction.

In some instances the coil D may be held stationary while the current is being transformed. I have found that with this construction I am enabled to obtain results in the secondary circuit which cannot be obtained by the ordinary transformer.

When a transformer is used with a varying current, as in a telephone system, or with an alternating current, it is of course evident that it is not necessary to use the circuit-breaker, and the movable coil may be either allowed to move or be held stationary, as desired. I have found that with a transformer such as herein described—that is, having one coiled conductor having a core of magnetic material with pole-pieces in proximity to each other, and a second coiled conductor provided with a core mounted between the pole-pieces of the core of said first coiled conductor, so as to form a part of the magnetic circuit—I am enabled to produce results which cannot be produced by the ordinary transformer or any of the transformers now upon the market.

I claim—

1. The combination in an induction-coil of a coil of wire having a metallic magnetic circuit, a second coil of wire, the core of which is part of said magnetic circuit, said second coil being movably mounted in said magnetic circuit in such a manner as to be moved out of its normal position when the first-mentioned coil is energized, a circuit-varying device connected with said movable coil so as to be operated thereby.

2. The combination in an induction-coil of a primary coil having a metallic magnetic circuit, a secondary coil, the core of which is permanently mounted in the magnetic circuit of the primary coil, said secondary coil being movably mounted in said magnetic circuit, and a circuit-breaker in the circuit of the primary coil, said circuit-breaker being connected with the secondary coil so as to be operated thereby.

3. The combination in an induction-coil of a coil of wire having a core formed into opposed pole-pieces, a secondary coil of wire movably mounted between said pole-pieces so that its core completes the magnetic circuit of the first coil, an elastic device connected with said second coil and adapted to hold it in a position where the magnetic forces acting upon it when the first coil is energized are unbalanced, and a circuit-varying device connected with said movable coil so as to be operated thereby.

4. The combination in an induction-coil of a primary coil having a core formed into opposed pole-pieces, a secondary coil movably mounted between said pole-pieces so that its core completes the magnetic circuit between said pole-pieces, a spring connected with said secondary coil and adapted to hold it in an angular position where the magnetic forces acting upon it when the first coil is energized are unbalanced, and a receptacle containing a liquid-conductor and provided with contact-points that are in contact with said liquid-conductor when the coil is in its angular position, said contacts being so arranged that one of them will be withdrawn from the liquid-conductor by the movement of the secondary coil and the circuit through the primary coil broken.

5. The combination in an induction-coil of a primary coil having a core provided with opposed pole-pieces, a secondary coil movably mounted between said pole-pieces so that its core completes the magnetic circuit between them, a spring connected with said secondary coil and adapted to hold it in an angular position where the magnetic forces acting upon it when the first coil is energized are unbalanced, a receptacle containing a fluid-conductor and provided with contact-points that are in contact with the mercury in the tube when the second coil is in its angular position, said contacts being so arranged that one of them will be withdrawn from the mercury by the movement of the secondary coil, and the circuit through the primary coil broken, and means associated with said secondary coil by which its normal angular position may be varied so as to regulate the rapidity of the breaks in the circuit.

6. The combination in a transformer of a primary coil having a core provided with opposed pole-pieces, a secondary coil movably mounted between said pole-pieces so that its core completes the magnetic circuit between them, said secondary coil being so constructed that it is normally held in a position where the magnetic forces acting upon it when the primary coil is energized are unbalanced, and a current-reversing device in circuit with the primary coil and connected with the secondary coil so as to be operated by the movement of said secondary coil.

7. The combination of two coils, each having its own circuit, one movably mounted in the magnetic field of the other and normally so positioned that the magnetic forces acting upon it when the first coil is energized will be unbalanced, and a circuit-varying device in the circuit of the first coil to which said movable coil is responsive.

8. The combination of two coils, each having its own circuit, one movable in the magnetic field of the other so as to be moved out of its normal position when the first coil is energized, and a circuit-varying device in the circuit of the first coil responsive to the motion of the movable coil, said movable coil in turn responsive to the operation of the circuit-varying device.

9. The combination in an induction-coil of a coiled conductor having a metallic core with poles in proximity to each other, a second coiled conductor provided with a metallic core, said second conductor and core mounted between the poles of said first conductor so as to form part of its magnetic circuit.

10. The combination in an induction-coil of a coiled conductor having a metallic core with poles in proximity to each other, a second coiled conductor provided with a metallic core, said second conductor and core mounted between the poles of said first conductor so as to form part of its magnetic circuit, a portion of said first coil being also wound upon the core of said second coil.

11. The combination in an induction-coil of a coiled conductor having a metallic core provided with opposed pole-pieces, a second coiled conductor provided with a metallic core, said second conductor and core permanently mounted between the pole-pieces of the core of said first conductor so as to at all times form part of the magnetic circuit of said first-mentioned conductor, one of said conductors acting as a primary coil, the other acting as a secondary coil.

DAVID H. WILSON.

Witnesses:
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