(No Model.) 2 Sheets—Sheet 1.

H. LEMP & W. S. MOODY.

REACTIVE COIL.

No. 428,620. Patented May 27, 1890.

Fig. 1.

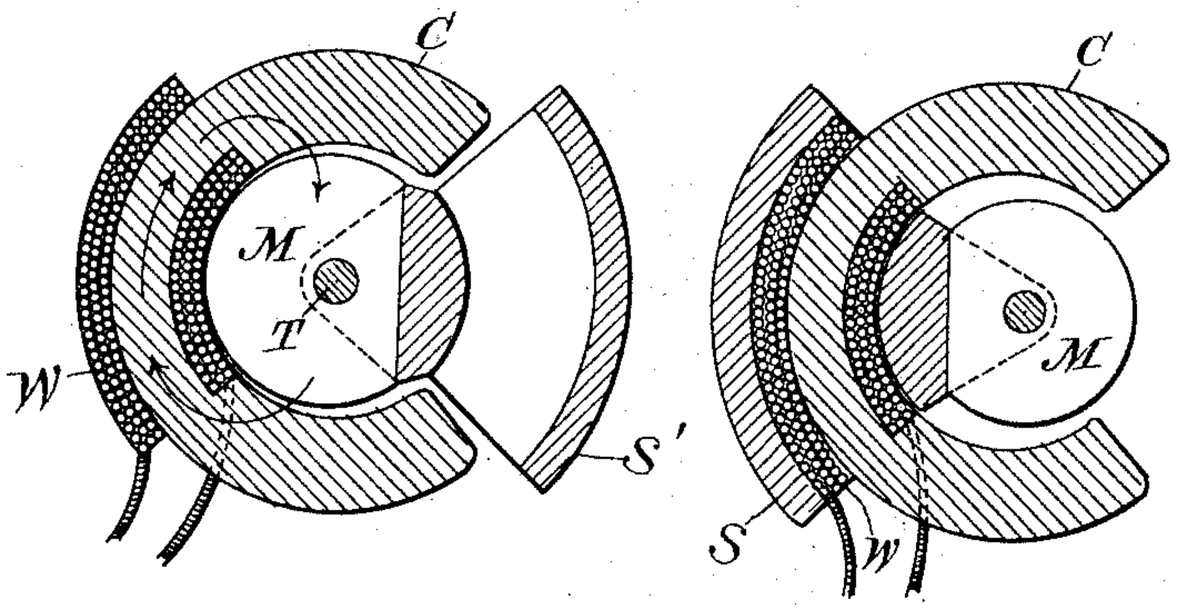

Fig. 2

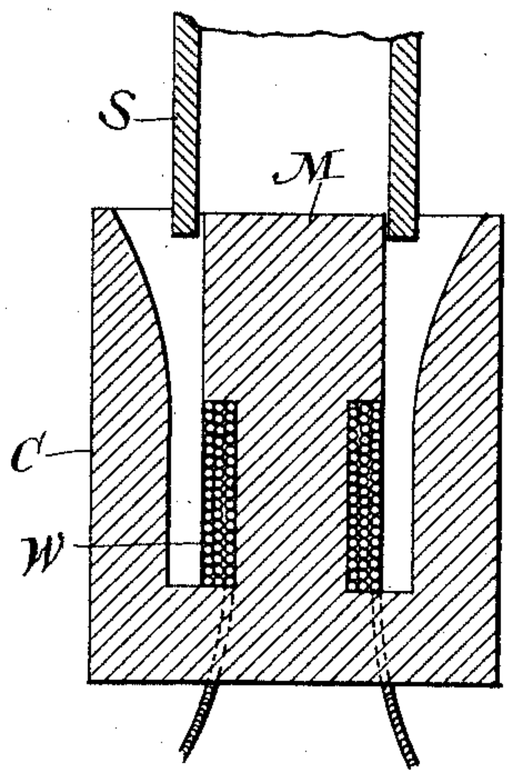

Fig. 3.

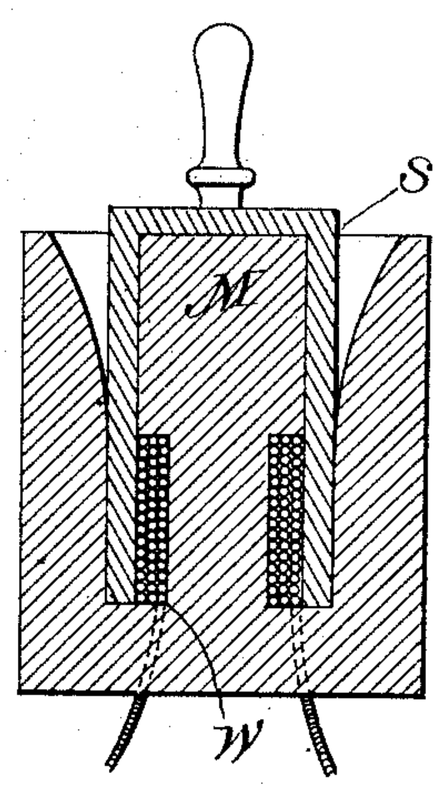

Fig. 4.

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(No Model.) 2 Sheets—Sheet 2.

H. LEMP & W. S. MOODY.

REACTIVE COIL.

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Fig. 5.

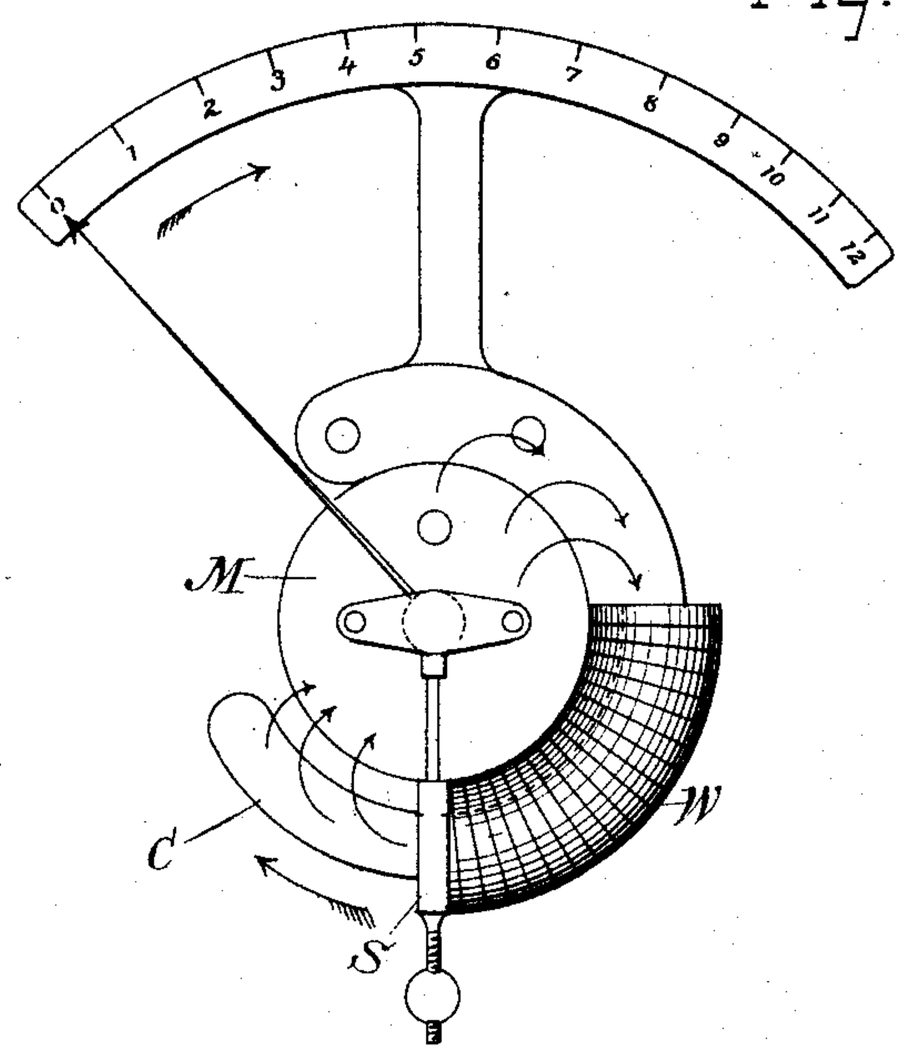
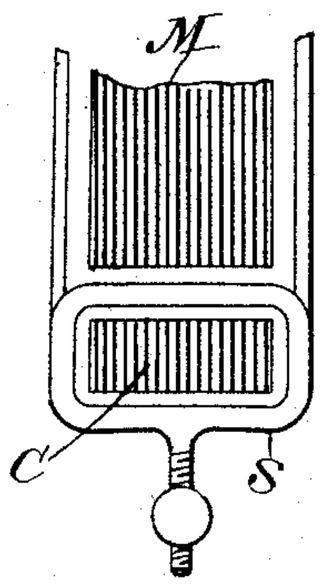


Fig. 6.



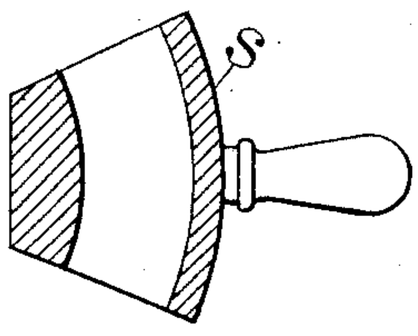


Fig. 7.

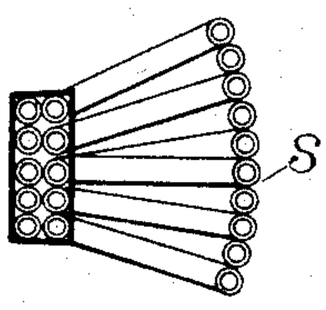


Fig. 8.

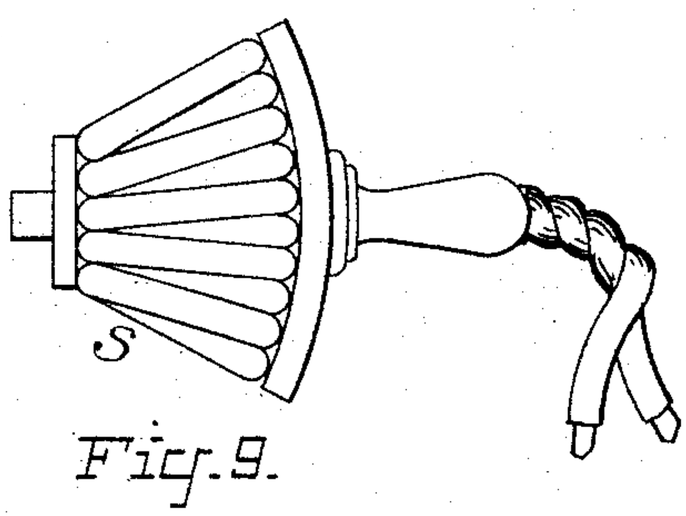


Fig. 9.

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UNITED STATES PATENT OFFICE.

HERMANN LEMP AND WALTER S. MOODY, OF LYNN, MASSACHUSETTS, ASSIGNORS TO THE THOMSON ELECTRIC WELDING COMPANY, OF MAINE.

REACTIVE COIL.

SPECIFICATION forming part of Letters Patent No. 428,620, dated May 27, 1890.

Application filed February 7, 1890. Serial No. 339,511. (No model.)

To all whom it may concern:

Be it known that we, HERMANN LEMP and WALTER S. MOODY, citizens of the United States, and residents of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Reactive Coil, of which the following is a specification.

Our invention relates to the construction of alternating-current reactive or motive devices, such as form the subject of patent to E. Thomson, No. 397,616, and in which two coils or conductors are applied to a magnetic circuit of iron, which threads the coils as an iron core, and may be said to provide in effect an endless magnetic circuit, such coils or conductors being constructed and mounted so that they may be adjustable or movable with relation to one another on the core from a position in which one shall encircle the other to a greater or less extent to a position in which each shall surround different parts of the same core. In the construction shown in said patent the iron of the core is a continuous or endless mass, and it is necessary when one of the conductors consists of a shell or solid piece of copper to build it up in two parts, which shall be soldered or screwed together. Even when the conductors are made as coils it is difficult to apply them, owing to the endless form of the iron core.

In our present invention we aim to so construct the apparatus that the coils or conductors which shall encircle the iron core may be separately formed or constructed and then applied to such core.

A further object of our invention is to preserve the efficiency of the apparatus when specially constructed to permit this to be done.

Our invention consists in providing the iron core or magnetic circuit with an opening or gap, so as to permit the coils or conductors to be slipped upon the core, the masses of iron at the opposite sides of the gap being, however, in some forms of our invention in such close proximity as not to interfere materially with the continuity of the magnetic circuit when the device is in use. In general, however, we prefer to employ, in connection with the iron core over which the coils or conductors are slipped, a mass of iron which shall partially bridge the gap allowed for the application of the coil, or shall in effect form a magnetic shunt around the gap for the magnetism of the iron core which threads the conductors. In a preferred form of our invention we mount this iron mass on the movable element of the apparatus, so that when the two coils or conductors are superposed the iron mass or armature will be brought into position to complete the magnetic circuit for the core at the point where the gap exists to allow the coils or conductors to be slipped upon it.

In the accompanying drawings, Figure 1 is a side elevation and partial section of an apparatus embodying our invention. Fig. 2 shows the parts in a different position. Figs. 3 and 4 are similar views of a modified form of iron core. Fig. 5 shows our invention as applied to a device for indicating the strength of an alternating current. Fig. 6 is an edge view of the lower part of the apparatus shown in Fig. 5. Figs. 7, 8, and 9 illustrate modifications in the construction of that one of the two conductors which is generally massive or of large cross-section and operates as a kind of magnetic shield.

Referring to Figs. 1 and 2, C indicates the iron core, upon which a conductor W is wound. At the back part or opposite the coil W the core C is left open to permit the conductor S to be slipped over it. The conductor S may be a solid casting of copper, and may be, if desired, mounted on pivots at T. The conductor S, when placed in the position shown in Fig. 2, will operate through the reaction between itself and the conductor W in the manner described in the patent before referred to.

M is a mass of iron, which may be carried by the same shaft as the conductor S, and may be moved thereby into the position indicated in Fig. 2, so as to bridge the gap between the ends of the core C, thus giving in practical effect the same results that are secured when the core C is a continuous or endless piece of iron without any gap. The iron core, instead of being circular, might be straight, as shown in Figs. 3 and 4. The copper tube or conductor S in this case is formed as a section of

straight tube, and might be a piece of drawn copper. The gap in the magnetic circuit of the iron mass C is only sufficient to permit the copper tube S to be slipped down over the conductor W. In this case no movable iron mass is here employed for preserving the magnetic circuit, as in Figs. 1 and 2; but dependence is placed upon a mass M, forming the extension from the part of the core surrounded by coil W. The space to be bridged is in this instance so small that the use of an additional movable mass like M, Figs. 1 and 2, is not necessary. It will be understood that the iron employed in the structure is a laminated mass, as usual in alternating-current apparatus and as indicated in Fig. 6.

In Fig. 5 the movable conductor S is actuated by repulsion and carries a suitable pointer for movement over a scale. The general construction in other respects is the same as in Figs. 1 and 2, with the exception that the iron mass M is of symmetrical shape and may be stationary, since, as will be seen, it is cut away to a proper extent on one side to allow the conductor S to be slipped into place. In this form of the invention the mass M might be at the upper side a continuation of the core portion and integral therewith. In this form also the coil W might be wound on a form and slipped over the core. The conductors W S are preferably of material—such as German silver—whose resistance will not vary greatly with changes of temperature. The two conductors may be connected and used in any of the ways described in the patent of Thomson before referred to.

In Fig. 7 we have shown the conductor S as a solid mass of cast-copper without joints. In Fig. 8 it is shown as made from heavy copper wire, the two ends of which are joined together to form a closed circuit.

In Fig. 9 the two ends of the conductor S are brought out through the handle of the frame or support by which it is carried to permit the coil to be connected into any electric circuit—as, for instance, with the coil W in the manner described in the Thomson patent. The curving of the end of the iron core, Fig. 3, gives a more gradual effect.

What we claim as our invention is—

1. In an alternating-current motive or regulating device having two coils or conductors adjustable over one another, as described, a magnetic circuit of iron for said coils, the poles or ends of which iron circuit are located in proximity to one another, but are separated to a sufficient extent to permit the coils to be slipped upon the iron through the gap.

2. In an alternating-current motive or regulating device, the combination, with the two coils or conductors adjustable over one another into coincidence or to positions more or less removed from coincidence, of an iron core discontinuous or interrupted sufficiently to permit the coils or conductors to be placed upon it, and a mass of iron M for carrying the magnetic lines across the gap.

3. The combination, in an alternating-current regulating or motive device, of two coils or conductors adjustable one over the other, a curved iron core, the ends of which are separated to a sufficient distance to permit the coils or conductors to be slipped upon it, and a mass of iron M, carried by the movable element of the device, as and for the purpose described.

4. The combination, with the curved iron core C, carrying a coil, as W, and having its ends bent around toward one another, of a second conductor adapted to be slipped upon the core through the gap between such ends and adjustable over the first coil or conductor.

5. The combination, substantially as described, of an iron core, the ends of which are brought around into proximity, a coil, as W, upon such core, a coil or conductor S, adapted to be slipped over the core through the gap between the ends and into position over the first-named conductor, and a mass of iron M, placed in position to form a part of the magnetic circuit passing through the coil W and from one end to the other of the core.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 4th day of February, A. D. 1890.

HERMANN LEMP.
WALTER S. MOODY.

Witnesses:
ALBERT L. ROHRER,
JOHN W. GIBBONEY.