(No Model.) 2 Sheets—Sheet 1.

C. E. L. BROWN.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 372,201. Patented Oct. 25, 1887.

Fig. 1

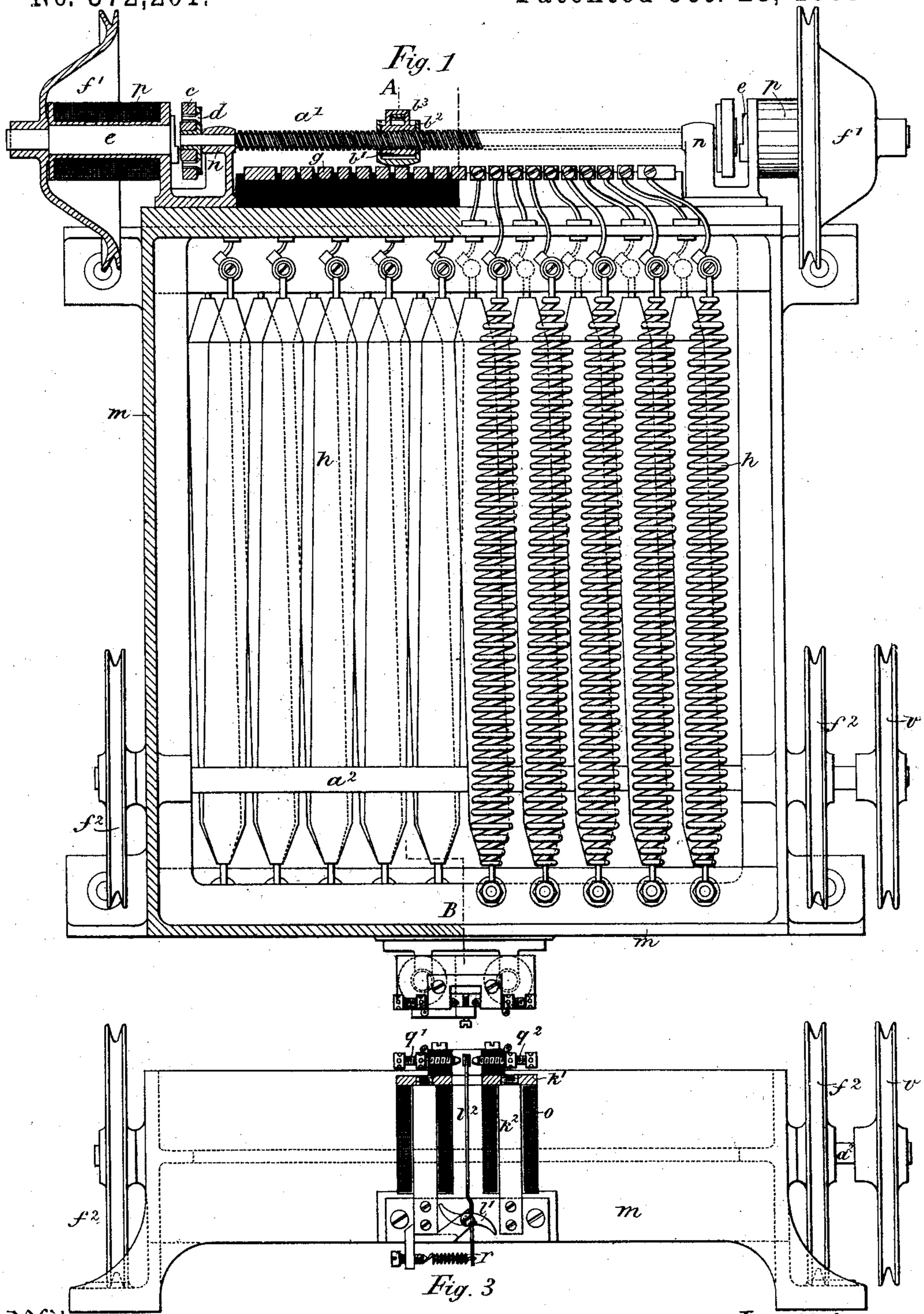

Fig. 3

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(No Model.) 2 Sheets—Sheet 2.

C. E. L. BROWN.

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Fig. 4

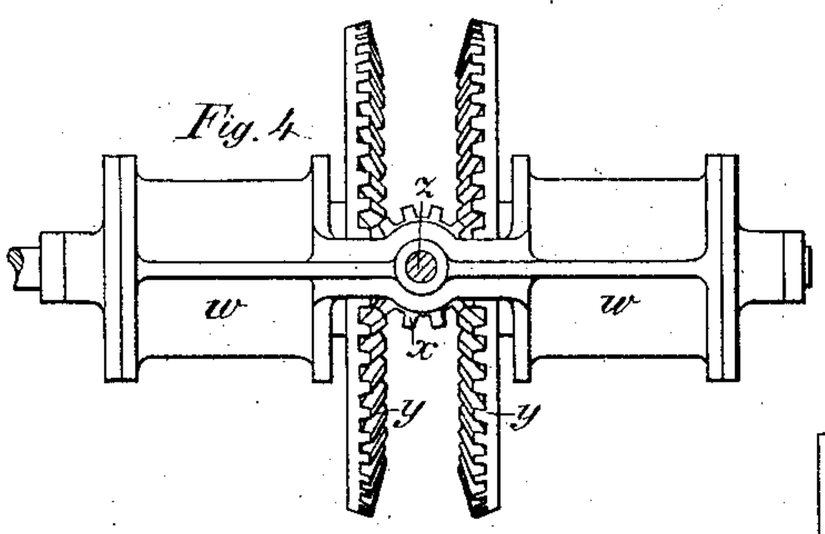


Fig. 5

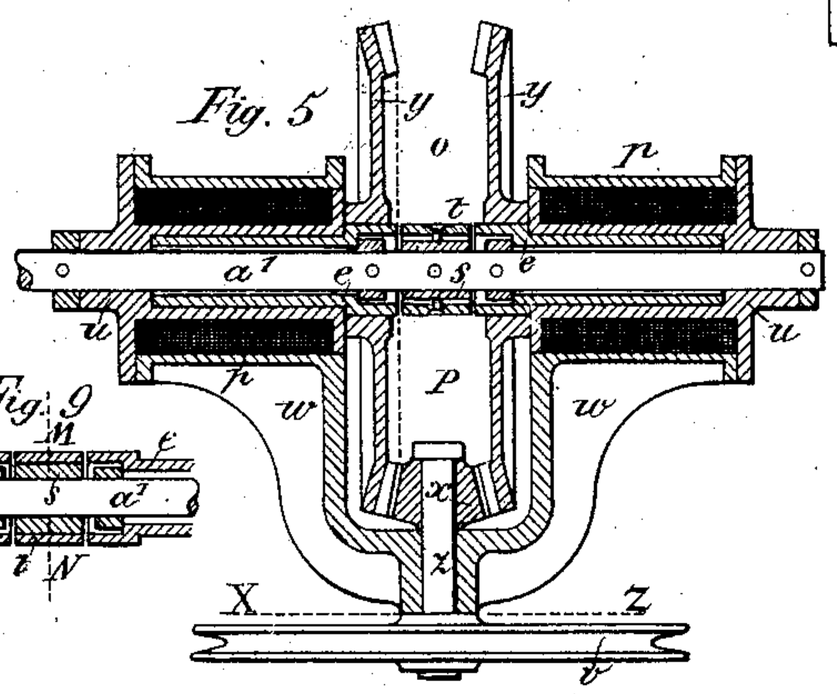


Fig. 6

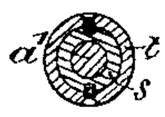


Fig. 8

Fig. 9

Fig. 2

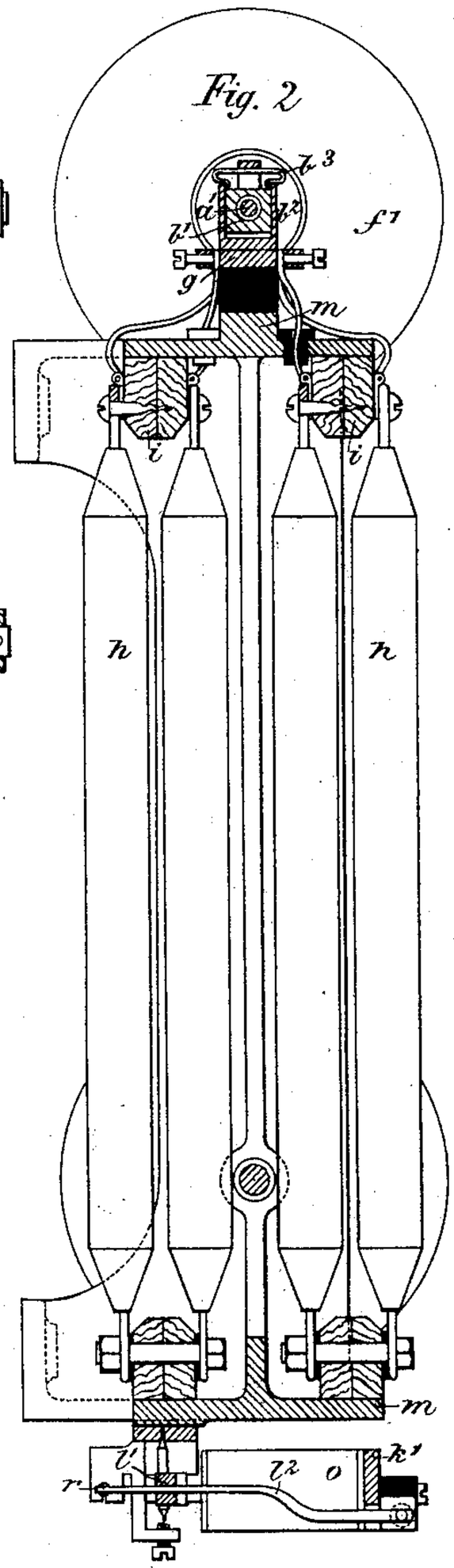
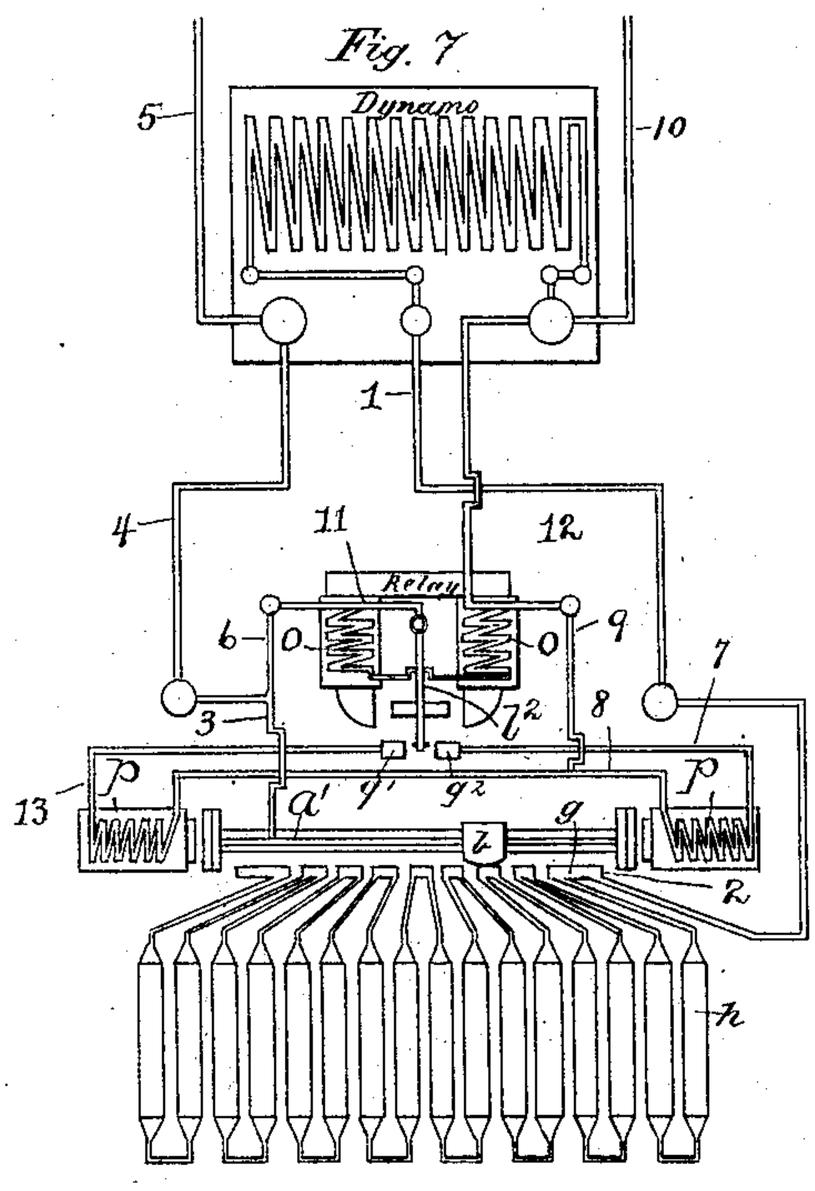


Fig. 7



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Inventor:
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UNITED STATES PATENT OFFICE.

CHARLES EUGEN LANCELOT BROWN, OF ZURICH, ASSIGNOR TO THE WERKZEUG UND MASCHINENFABRIK OERLIKON, OF OERLIKON, NEAR ZURICH, SWITZERLAND.

REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 372,201, dated October 25, 1887.

Application filed September 1, 1886. Serial No. 212,381. (No model.) Patented in Germany July 4, 1885, No. 36,550, and in France March 24, 1886, No. 174,989.

To all whom it may concern:

Be it known that I, CHARLES EUGEN LANCELOT BROWN, a citizen of England, residing at Zurich, in the Canton of Zurich and Republic of Switzerland, have invented certain new and useful Improvements in Electro-Magnetic Regulators of Currents for Dynamo-Machines, (for which patents have been obtained in Germany on the 4th of July, 1885, No. 36,550, and in France on the 24th of March, 1886, No. 174,989;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to the class of self-acting regulators of dynamos, and has the purpose to maintain the constancy of the electromotive force or strength of the current as well with a varying number of revolutions of the motor as with an irregular requisition. I obtain this result in applying the principle of the magnetic coupling, by which, according to the necessity, more or less resistance is automatically inserted into the current.

The general dispositions are represented in Sheets I and II by Figure 1, half front view, half longitudinal section; Fig. 2, a cross-section on line A B; Fig. 3, a view from below, and Fig. 7 the diagram of the electric arrangement. Figs. 4, 5, 6, 8, and 9 illustrate some modifications in the coupling disposition; Fig. 4, a section on line X Z in Fig. 5; Fig. 5, a section; Fig. 6, a section on line O P; Fig. 8, a section on line M N in Fig. 9.

The casing *m*, which can be screwed to a wall, contains the coils of resistance *h*, made of iron wire. They are placed vertically abreast, in four rows, between the strips *i*, of insulating material. Their lower extremities are connected together, while their upper ends are electrically connected to the brass pieces *g* in such a way that all the coils form but one single continual conductor divided into a number of subdivisions by the brass pieces *g*. The brass pieces *g* are separated from each other and placed on a staff of insulating material parallel to the screw *a'*, which is supported in the bearings *n*. The screw *a'* is provided with a nut, *b'*, which cannot turn. It has a slotted section, b^2, which is pressed against the brass pieces by the spring b^3. Therefore the screw *a'*, according to its position, is electrically connected with one or the other of the brass pieces. When the screw *a'* is revolving, the nut *b'* will slide along it, and as one of the wires of the main line is electrically connected to the first wire coil, *h*, and the other wire to the nut *b*, this latter will therefore, according to the direction in which the screw *a'* is turning, bring more or less of the coils into the main circuit. The screw *a'* is reversed by means of electro-magnets which are controlled by a relay. The extremities of the screw *a'* outside of the bearings *n* are provided with brass disks, which hold the iron rings *c* by means of the driver-peg *d*. These rings have a play in the axial sense, and represent the armatures for the opposite iron cores, *e*, lying in the stationary solenoid-bobbins *p*. The cores *e* are continually turned in opposite directions by means of the pulleys *f'* and f^2 and shaft a^2, which is driven by the dynamo itself, or by another motor, through the pulley *v*. For the sake of simplicity the sockets of the solenoid-coils *p* are cast in one piece with the bearings *n*, and, according to the direction of the current sent through the one or the other solenoid, the one or the other of the cores *e* becomes magnetic, holds fast the opposite ring, *c*, and thereby constrains screw *a'* to participate in the rotary motion.

The solenoid-coils *p* are in a branch circuit which can be broken by a relay, or completed through the one or the other of the solenoids. The relay, being also in the branch circuit, works as soon as there is a certain tension in the main current, or (if regulated to the force of the current) as soon as a certain force of current is exceeded. The relay is screwed to the bottom of the casing *m*, and forms a horse-

shoe-magnet composed of the plate k', the iron cores k^2, and the coils o. A piece of insulating material cut in a U form, in the branches of which the two adjustable screws q' and q^2 are secured, is screwed to the plate k', and the screws q' and q^2, as seen in the diagram, Fig. 7, are electrically connected reciprocally with one extremity of one of the solenoid-coils.

Between the pole ends of the cores k^2 an armature, l', is arranged in such a way on a loose pin that this armature must turn itself with the pin as soon as a current is felt in the coils o. A thin rod, l^2, is fast with the armature, and has play on one end with the points of the screws q' and q^2. The other end is connected with an adjustable spring, r, in such a way as to constantly press the rod l^2 against the point of screw q^2. If, however, there is enough current in the coils o to overcome the tension of spring r, the armature l' will be turned and rod l^2 make contact with screw q'. In the first case the branch current would be led through one of the solenoids p, and in the last case through the other solenoid. The nut b' would therefore interpose more resistance-coils into the main current in one case and less in the other case. It is therefore only necessary to adjust correctly spring r and to choose the right sort of wire for the coils of the relay in order to regulate the current to the desired constant intensity or the desired constant force. As to the electrical dispositions of the regulator and the dynamo which has to be regulated, I refer to the diagram, Fig. 7.

By reference to said diagram, Fig. 7, it will be noticed that the disposition of circuits and connections admits of the following application: The current is led from the dynamo by wire 1 to coils on bobbins h, connection being made at the point indicated by 2, so that all the bobbins will be included in series in the circuit. The latter is continued through nut b, rod a', wires 3 and 4, to line 5. A portion of the current passing to line is deflected through wire 6, contact-rod l^2, thence through screw q^2 and wire 7 to solenoid p, from whence it passes by wires 8 and 9 to return-wire 10 of the line and to the machine.

It will be seen that the coils of the solenoids $p\,p$ are in a circuit derived by lapping the wires 6 and 9 at 11 and 12. When the rod l^2 is in contact with screw q', the current passes through the wire 13 and the coils of the other solenoid, p, and then by wire 8 to wire 9 and back to machine.

The dispositions of the coupling, as shown by Fig. 1, can be modified without changing the substance of my invention.

In Figs. 4 and 5 the two solenoid coils p are placed at one end of the shaft and are supported by the brass sockets u, which are connected to the bearer w. The hollow cores e are bedded in the sockets u and retained from moving in an axial sense by stay-rings. Between the extremities of the cores e there is an iron ring, t, representing the armature for both cores. It is connected to the socket s, fast on shaft a', in such a way that it has only a play in the axial direction and constrains the shaft a' to rotate by the aid of two screws sliding in the grooves of the socket s. The two bevel-wheels y are fast on the projecting extremities of the two cores e and gear into the conical wheel x. This and the pulley v are keyed on the shaft z, lying in the bearing w. The pulley v is driven by the dynamo and gives rotation in opposite directions to the bevel-wheels y, and, in consequence, to the cores e. Therefore, according to the current passing through the one or the other of the coils p, the one or the other of the cores e is excited, attracts ring t, which it holds fast, and makes shaft a' to rotate with it in one or the other direction. The effect is therefore the same as in the dispositions shown by Fig. 1.

In place of the two screws sliding in grooves to effect the driving of the sockets s with the ring t, a square or prismatic section can be given to the socket s, on which the ring t is adjusted, as shown by Figs. 8 and 9.

I claim—

1. In an electro-magnetic regulator, the combination, with a series of resistance-coils, of a screw-shaft, a nut adapted to travel thereon and contact with portions of said coils, an armature having an axial play on said shaft, and a magnet adapted to be rotated and when energized to effect the magnetic connection of the armature with its core and insure the rotation of the screw-shaft with said magnet, substantially as set forth.

2. In an electro-magnetic regulator, the combination, with a series of resistance-coils, of a screw-shaft and magnet thereon, a nut adapted to travel thereon and contact with portions of said coils, a differential device having two helices, each adapted when energized to magnetically connect with the magnet on the screw-shaft, and a relay for alternately diverting the current through the coils of said helices, substantially as set forth.

3. In an electro-magnetic regulator, the combination, with a series of resistance coils, of a screw-shaft, a nut adapted to travel thereon and contact with portions of said coils, a spring-section on said nut, forming a yielding contact therefor, an armature having an axial play on said shaft, and a magnet adapted to be rotated and when energized to effect the magnetic connection of the armature with its core and insure the rotation of the screw-shaft with said magnet, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES EUGEN LANCELOT BROWN.

Witnesses:

JULIUS A. BOURRY,

GEORGE L. CATLIN.