(No Model.)

C. J. VAN DEPOELE.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 335,659. Patented Feb. 9, 1886.

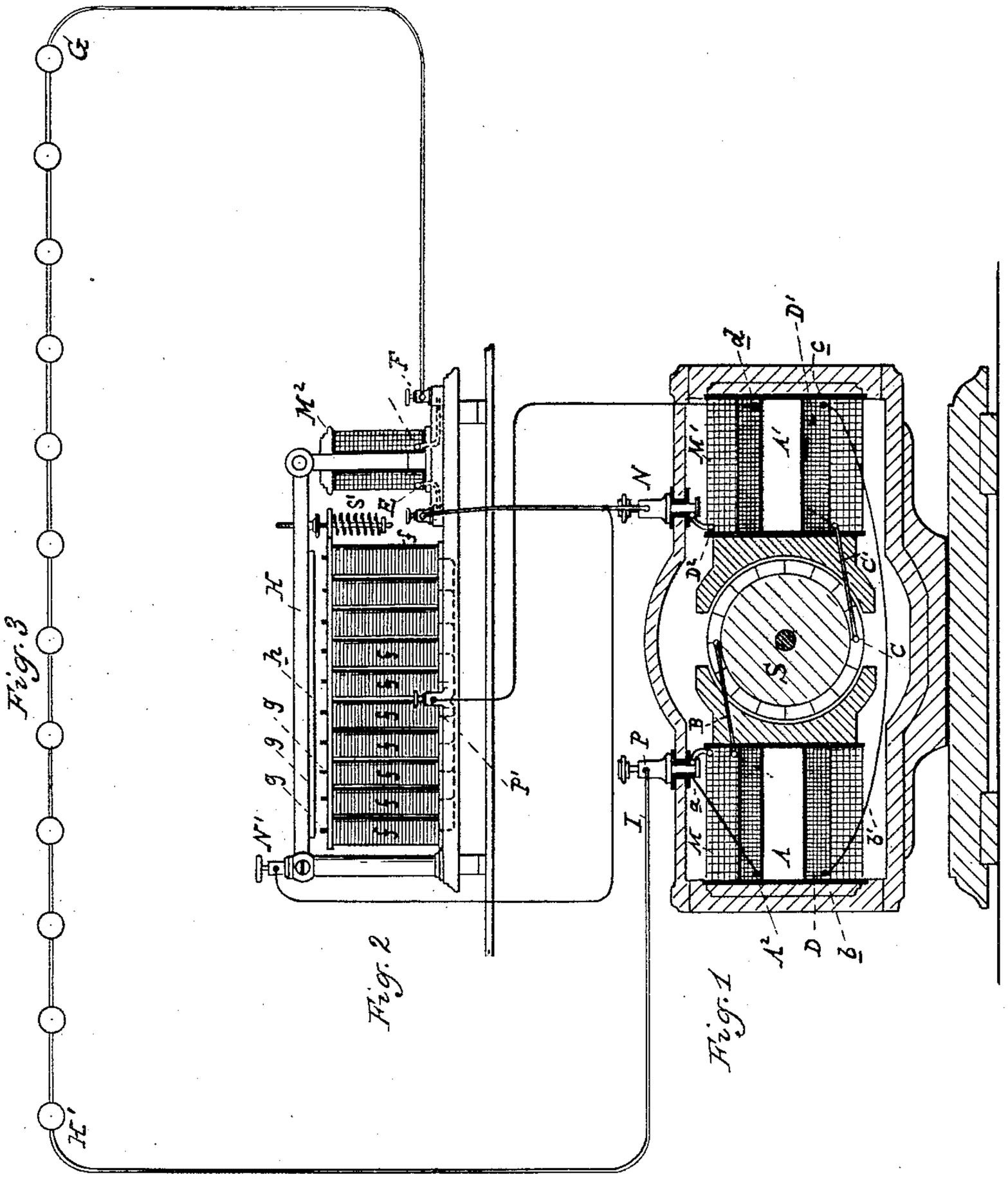

Fig. 3

Fig. 2

Fig. 1

Attest:

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CHARLES J. VAN DEPOELE, OF CHICAGO, ILLINOIS.

REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 335,659, dated February 9, 1886.

Application filed November 8, 1882. Serial No. 76,261. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, of Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Dynamo-Electric Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

The nature of this invention relates to certain new and useful improvements in the construction of dynamo-electric machines, by which the electro-motive force of the machine is equalized or kept up to meet the different requirements on the line—as, for instance, when the machine is adapted to run twenty lights in a circuit, and it is expedient, from any cause, to extinguish at a certain time a part of the lights, one after another, without warning to the central station. The device works automatically without attention, and the force necessary to run the lights will correspond to the number of such lights in actual use.

The invention consists in winding the main magnets of the machine differentially and in the combinations and construction of parts and their operation, as more fully hereinafter described.

Figure 1 is a vertical longitudinal section through the axis of my improved dynamo. Fig. 2 shows the connection between the dynamo and the governor. Fig. 3 shows the connections between the dynamo, governor, and a number of lights in circuit.

In the accompanying drawings, which form a part of this specification, A A′ represent the iron cores of the magnets, one of which is placed on each side of the armature.

M M′ represent the main magnet-conductors, and D D′ the differential magnet-conductors, both being wound in the usual way around the cores and insulated from each other, the main magnet-conductors being wound outside the differential-magnet conductors, as shown. The outer end of the main conductor is connected to the binding-post P, the current passes from the outer to the inner part of the coil or main conductor and through the connecting-wire B to the top collector of the armature S S, as usual in ordinary dynamos; thence the current passes from the top part of the armature down to the lower part, C, of the same through the collector and connecting-wire C′ to the inner end of the coil M′ and out at the outer end of said coil at D^2, when it is connected to the binding-post N. This is the circuit in the main coils in the machine.

The differential current runs as follows with relation to the main coils: The inner end, A^2, of the coil D is connected with the binding-post P, which is in electrical contact with the main coil. The current thus flows from the inside of the coil D to the outside terminal, *b*, thereof, whence it passes by means of the connection *b′* to the outside of the coil D′ at *c*, and out at *d*, and then through a connection to be hereinafter described.

In Fig. 2 is shown a regulator or governor, such as is described in Letters Patent granted to me January 9, 1883, No. 270,352; hence a description thereof is not deemed necessary here. Suffice it to say, P′ is a binding-post, to which a number of coils or passages, *f*, are connected by their lower ends or terminals. All the outer ends of these coils or passages *f* protrude on top of said coils *f* at *g*, and all are insulated from each other.

H is a copper bar, (or other suitable metal,) edged by a platinum strip, *h*, running the length of the contacts *g*. The bar H, when not brought down by the magnet M^2, will be forced upward by the spring S′, and thereby break all communication with the contacts *g*, so that the amount of current passing will depend, first, on the tension of such currents, and, second, on the number of coils or passages *f* in or out of circuit. This is actuated by the magnet M^2 upon the bar H. One of the terminals of all the said coils or passages *f* is connected in multiple arc to the binding-post P′, communicating with the differential circuit, and the free ends *g* thereof are acted upon by the contact-bar H, as explained.

Having thus described the construction of my improved dynamo, I will now attempt to clearly indicate its operation. Let us suppose that a dynamo is capable at its maximum force to run thirty lights. We connect the wire I to the binding-post P and to the lamp-circuit

at H′, and out of said circuit at G, and thence to the magnet M² through post F and out at E, to the binding-post N of the dynamo. The armature should now be revolving at the normal speed, and all the lamps will be found to be burning normally. The magnet M² is not now powerful enough to draw in its core, being counteracted by the spring S′, which lifts the bar H out of communication with the contacts *g;* hence there is no current passing through the coils *f* or through the differential coils D and D′. These differential coils, as will be seen, are so connected as to magnetize the cores in opposition to the main coils M M′. The circuit of the differential coils outside of the machine will be understood at a glance by referring to the annexed drawings. The inner end, *a*, is connected to the binding-post P of the machine, while the outer end, *d*, is connected to the binding-post P′ of the regulator, and when the bar H is drawn down upon the contacts *g* the current will flow through said bar to the post N′ and back to the binding-post N of the machine. Thus it will be seen that the differential current is connected between the main circuit of the machine at P and N. When the magnet M² is sufficiently energized to draw down the bar H, and thereby establish communication with the contacts *g*, a portion of the current will at once flow through the coils D D′ and oppose the action of the main coils M M′, and this opposition will be strongest when all the contacts *g* are in communication with the bar H. Thus all that is necessary in order to have a dynamo become automatic in its own regulation—to control its force according to the work required of it—is, first, to properly adjust the resistance of the coils D D′ with regard to the main current, and, second, to regulate the tension of the spring S′ in the regulator. Thus it will be seen that on cutting out one or more lamps the magnet M² will be over excited and draw its core in deeper until the spring S′ and the attractive power of the magnet will again balance. At the same time the bar H will make communication with one or more contacts *g*, and these will send a corresponding amount of current through the coils D D′, thus diminishing the power of the main coils M M′. On cutting out more lamps the magnet M² will continue to operate with increased force upon the bar H, thus making more contacts and diminishing more and more, as the case may be, the power of the main magnets.

I do not desire to confine myself to the above *modus operandi* of regulating the flow of the currents in the differential magnets—as, for instance, the main magnets may be wound with two wires running parallel with each other, so that while the main current is passing through one of the wires a current may be made to pass in an opposite direction, thus weakening the magnetism of the field-cores, as may be required, without departing from the spirit of my invention.

What I claim as my invention is—

1. In a dynamo-electric machine, a separate helix supplementary to the main helix of the field-magnet, the separate helix being so wound and connected that the machine working normally will not be influenced thereby, but on the current becoming abnormally strong said supplementary helix will be brought into action and tend to diminish the magnetism of the field-magnet, and automatically regulate the strength thereof to accommodate the outside work, substantially as set forth.

2. The combination, with the field-magnets of a dynamo-electric machine, of two series of opposing helices, one series serving to excite the field-magnets and the other series serving as regulating-helices for the same, a branch circuit, including the regulating-helices, a variable resistance, also included in the branch, and means for controlling the resistance in the branch, whereby the field-magnets may be regulated as required.

3. In a dynamo-electric generator, a separate helix supplementary to and wound differentially upon the cores of the field-magnet and included in a normally-open circuit, also including variable-resistance coils having a movable contact operated by the moving core of an electro-magnet located in the main circuit, to successively make or break contact with one or more of the coils of the regulator and to close or partially close the differential circuit by the action of the varying resistance of the main circuit operating upon the electro-magnet and resistance-coils, and thereby demagnetizing to a greater or less extent the field-magnet and automatically regulating the electro-motive force of the machine, substantially as set forth.

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Witnesses:
THEO. P. BAILEY,
AARON K. STILES.