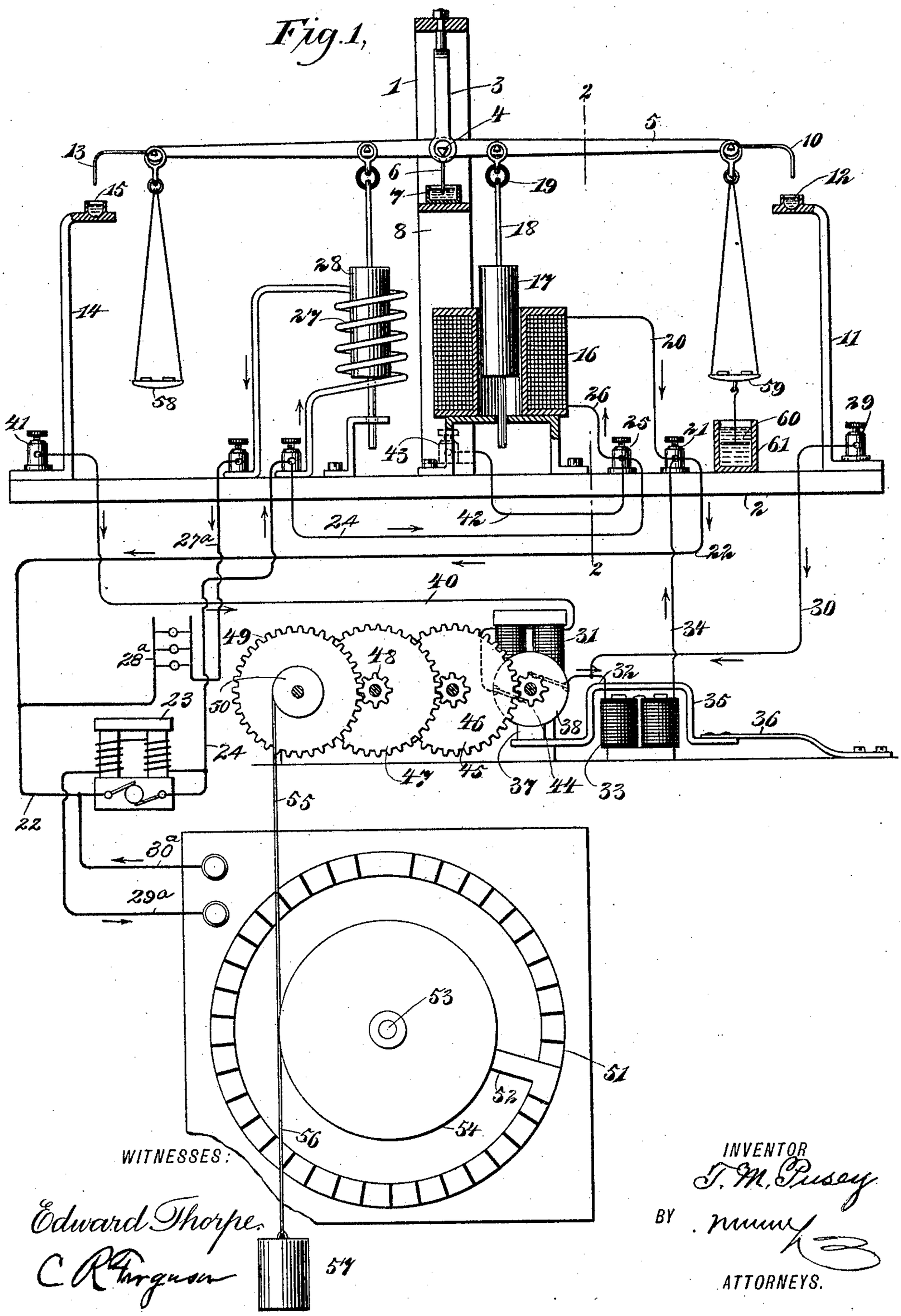
(No Model.) 2 Sheets—Sheet 1.

T. M. PUSEY.

VOLTAGE REGULATOR FOR DYNAMOS.

No. 574,217. Patented Dec. 29, 1896.

Fig. 1.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

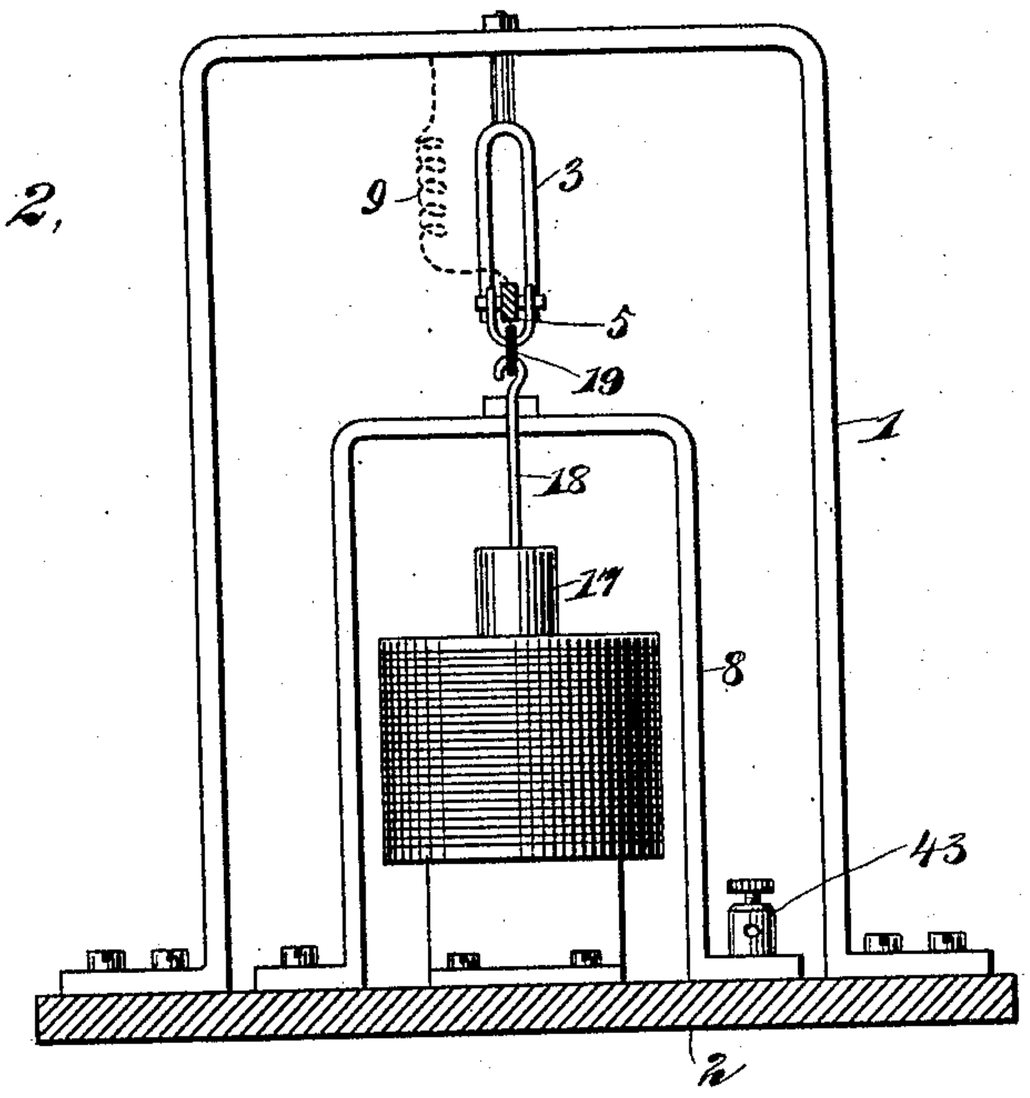
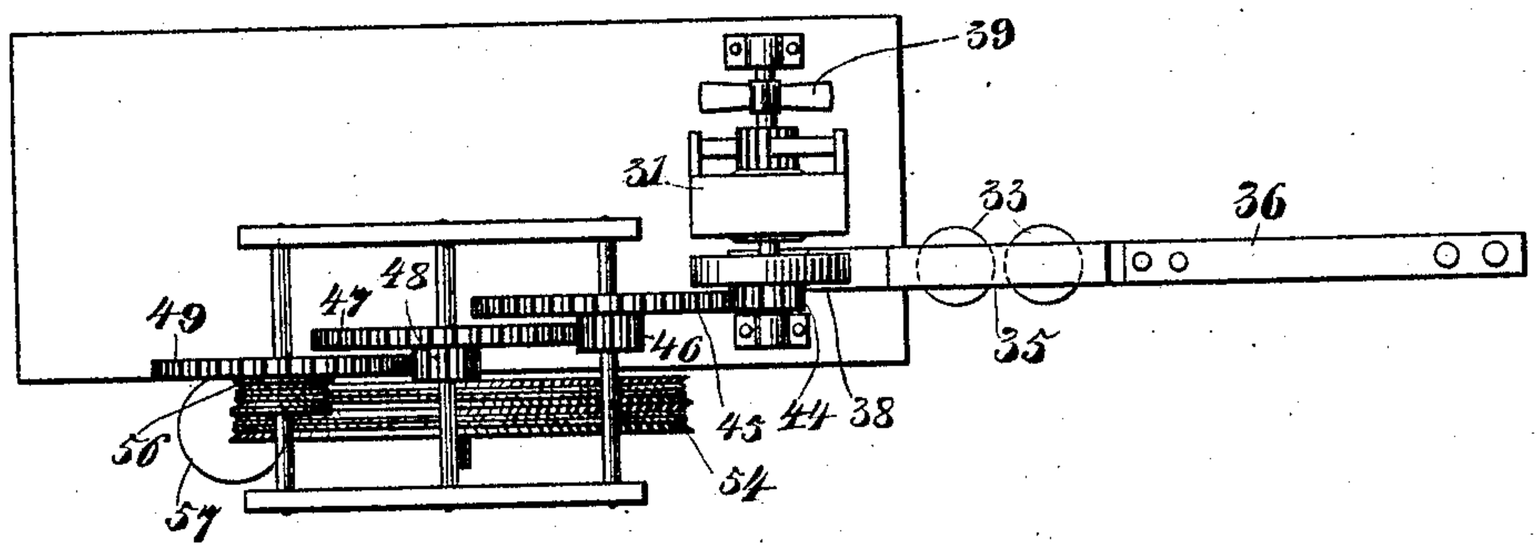


Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS M. PUSEY, OF KENNET, PENNSYLVANIA.

VOLTAGE-REGULATOR FOR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 574,217, dated December 29, 1896.

Application filed May 22, 1896. Serial No. 592,538. (No model.)

To all whom it may concern:

Be it known that I, THOMAS M. PUSEY, of Kennet Square, in the county of Chester and State of Pennsylvania, have invented a new and Improved Voltage-Regulator for Dynamos, of which the following is a full, clear, and exact description.

The object of this invention is to provide a simple mechanism for automatically controlling the voltage of a dynamo or generator, therefore providing a practically-even current or voltage through a circuit leading from the dynamo to lamps or other devices.

I will describe a device embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a partial sectional elevation and a partial diagrammatic view of a device embodying my invention. Fig. 2 is a section substantially on the line 2 2 of Fig. 1, and Fig. 3 is a plan view thereof.

Referring to the drawings, 1 designates a yoke extended upward from a base-plate 2, and suspended from the top bar of this yoke is a hanger 3, comprising two arms having openings at their lower ends, into which the fulcrum-points 4 of a balanced beam 5 extend. The beam 5 has at its central portion a downwardly-extended contact-finger 6, which projects into mercury in a metal mercury-cup 7, which is in electrical engagement with a support 8, extended upward from the base 2. It is to be understood, however, that the parts 6 and 7 may be omitted and the beam 5 in such cases connected by means of a wire 9 with the yoke 1.

One end of the beam 5 is provided with a contact-finger 10, adapted to make electrical connection with an arm 11, extended upward from the base 2. As here shown, the arm 11 has a mercury-cup 12 on its upper end, into which the contact-finger 10 may engage. The opposite end of the beam 5 is provided with a contact-finger 13, adapted to make electrical connection with an arm 14, extended upward from said base 2, and this arm 14 is shown as provided with a mercury-cup 15.

A high-resistance helix 16 is supported on the base 2, and a core 17, depending from the beam 5, extends into this helix, and is designed to be drawn downward thereby to cause the contact-finger 10 to engage in the mercury-cup 12 and close the circuit, as will be hereinafter described. The core 17 is suspended from the beam 5 by means of a standard 18, engaging with a ring 19, of insulating material, such, for instance, as hard rubber, which connects with a ring on the beam. From the helix 16 a wire 20 leads to a binding-post 21 on the base 2, and from this binding-post 21 a main wire 22 extends to one brush of the dynamo or generator 23. From the other brush of this dynamo or generator a wire 24 leads to a binding-post 25, which has a connection 26 with the helix 16. Therefore it will be seen that this helix is in the main circuit of the dynamo or generator. This main circuit also comprises a low-resistance helix 27, designed to operate a core 28, suspended from the beam 5 at the side of its fulcrum opposite that from which the core 17 is suspended. One end of this helix 27 is connected to a binding-post with which a lamp-circuit wire 27^a connects, the other lamp-circuit wire 28^a being in connection with the wire 22.

From a binding-post 29 on the arm 11 a wire 30 extends through the brushes and commutator of a small motor 31, adapted to operate a rheostat in the field-magnet circuit, as will be hereinafter described. From the wire 30 a shunt-wire 32 extends to one pole of an electromagnet 33, and from the other pole of this electromagnet a wire 34 extends to the binding-post 21. Coacting with this electromagnet 33 is an armature-lever 35, mounted on a spring 36, which is secured at one end to a suitable base or support. The free end of this armature-lever 35 is provided with a brake-shoe 37, adapted for frictional engagement with a disk 38, mounted on the armature-shaft of the motor 31. The armature-shaft of this motor 31 may have a regulating device, such, for instance, as fan-blades 39. As before stated, the wire 32 connects with one pole of the motor 31. The other pole of said motor has a connection 40 with a binding-post 41 on the arm 14, and from the binding-post 25 a wire 42 extends to a binding-post 43, connecting with the support 8. If, however, the connection 9 (shown in Fig. 2)

be employed instead of the parts 6 and 7, this binding-post 43 will be mounted on the yoke 1.

The armature-shaft of the motor 31 has a pinion 44 meshing with a gear-wheel 45, on the shaft of which is a pinion 46, meshing with a gear-wheel 47, having on its shaft a pinion 48, meshing with a gear-wheel 49, on the shaft of which is mounted a drum 50.

The rheostat 51 is located in the circuit 22 24 by means of the wire 30^a, connecting with the wire 22 and a wire 29^a, extended through the field of the generator 23 and connecting with the wire 24. This rheostat comprises a circular series of contact-plates which are connected to one of the main wires in the usual way, and an arm 52, coacting with said plates, is mounted on the rotary shaft 53 in a central portion of the rheostat, this arm 52 having electrical connection with the other main wire. On the shaft 53 is rigidly mounted a double-grooved drum 54, around one portion of which a cord or flexible connection 55 extends to the drum 50, and around the other portion of which is extended a cord 56, connected at its lower end to a weight 57.

The resistance of the beam 5 may be regulated as desired by means of weights placed in pans 58 59, suspended from the opposite ends of said beam. To cause the beam 5 to move steadily or to prevent its vibrating, I suspend a plate 60 from the pan 59 and into a vessel 61, containing water or other liquid.

The operation of the device is as follows: As the speed of the dynamo or generator increases beyond a desired point the increased current flowing through the helix 16 will draw the core 17 downward, and consequently rock the beam 5 to engage the contact-finger in the mercury-cup 12, and then the circuit will be closed through the wire 42, the support 8, the mercury-cup and finger, the beam 5, the arm 11, the wire 30, and the electromagnet 33, and from the electromagnet 33 the current will flow through the wires 34 22 to one pole of the generator or battery. When this electromagnet 33 is energized, the armature 35 will be drawn downward and release the shoe 37 from its engagement with the friction-disk 38, thereby allowing the armature-shaft of the motor 31 to freely rotate with the chain of gearing. When in this condition, the weight 57 by moving slowly downward will move the rheostat-arm 52 to the proper place of resistance, and thus control or regulate the voltage of the dynamo, and when said voltage has fallen to its proper point or pressure the strength of the helix 16 will of course be diminished and allow the core 17 to move upward and consequently allow the beam 5 to break its connection with the mercury-cup 12, and then of course the spring 36 will operate the armature 35 to move the shoe 37 into engagement with the friction-disk 38, thus bringing the armature-shaft and gearing to a stop. Should the voltage of the dynamo fall below a desired point, the weights in the pan 58 will draw the beam 5 downward to connect the finger 13 with the mercury-cup 15, and the circuit will be closed through the motor 31 by means of the wires 40 and 34 and the electromagnet 33. At this time the electromagnet 33 will be energized to draw the shoe 37 out of engagement with the disk 38, which will allow the current passing through the field of the motor 31 to operate the armature-shaft of said motor, and the rotary motion of this armature-shaft will, through the medium of the gearing and the cord 55, rotate the rheostat-arm 52 to the point of necessary resistance, which will allow for an increase of voltage in the dynamo.

The helix 27 is made of three or four turns of the main conductor-wire, and this helix will draw downward the core 28 as the strength of amperage of the current increases, thus tending to raise the voltage of the main dynamo or generator, so as to overcome the increased resistance of the main conductor or wire due to the increased amperage. In this way the voltage at the terminals of the lamps is kept practically even.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A voltage-regulator for dynamos, comprising a main circuit, a rheostat in a shunt-circuit of the dynamo, a helix also comprised in a shunt-circuit, a balanced beam operated by said helix and serving as a contact-closer, a rheostat-operating motor, an electrically-operated brake for the armature of said motor, and connections between the said armature and the rheostat, for operating said rheostat, substantially as specified.

2. A voltage-regulator for dynamos, comprising a rheostat located in a shunt-circuit of a dynamo or generator, a high-resistance helix in a shunt-circuit, a balanced beam having contact-fingers and serving as a part of the circuit, a core suspended from said beam into the helix, an electromagnet energized by a current closed by a movement of the beam, a motor also operated by a current closed by a movement of said beam, a brake for the motor operated in one direction by the electromagnet, a chain of gearing operated from the armature-shaft of said motor, a drum on the shaft of one of the gear-wheels, a flexible connection between said drum and a drum on the shaft of the rheostat-arm, and a weight having a flexible connection with the drum on the shaft of the rheostat-arm, substantially as specified.

3. A voltage-regulator for dynamos, comprising, in connection with the main current of the dynamo or generator, a balanced beam carrying circuit-closers, two helixes, one located in the main circuit and the other located in a shunt-circuit and adapted to operate said beam, means for changing the resistance at the ends of said beam, and a rheostat in a shunt-circuit operating upon the closing of the circuit by said beam, substantially as specified.

4. A voltage-regulator, for a dynamo, comprising in combination with a main circuit and a rheostat located in a shunt from the main circuit, a yoke, a hanger on the yoke, a beam fulcrumed on said hanger, contact-fingers on the ends of said beam, weight-attaching devices at the ends of said beam, and the electrical connections closed by the operation of said beam to regulate the voltage of a dynamo, substantially as specified.

5. The combination with a base, of a yoke mounted thereon, a fulcrumed beam supported by said yoke, weight-pans suspended from the opposite ends of said beam, a plate suspended from one of the said pans into a liquid-containing vessel, and electrical connections the circuit through which may be closed by the movements of the beam, substantially as specified.

6. The combination, with a rheostat comprising an arm mounted on a rotary shaft, of a chain of gearing having a flexible connection with said shaft, a motor, the armature-shaft of which has operative connection with the chain of gearing, the said motor being in the circuit comprising the rheostat, a disk mounted on the armature-shaft of said motor, a frictional shoe adapted for engagement with said disk, an electromagnet for drawing the shoe out of engagement with the disk, the said electromagnet being also included in the circuit comprising the rheostat, and means for automatically closing the circuit through said electromagnet and through the motor, substantially as specified.

7. A voltage-regulator for dynamos, comprising a base a yoke extended upward from said base, a fulcrumed beam supported by said yoke, arms extended upward from the base, mercury contacts on the upper ends of said arms, contact-fingers on the ends of said beam for engaging the said mercury contacts, a metal support on the base, a mercury-cup on said support, a finger extended from the central portion of the beam into said mercury-cup, a helix located in a shunt of the circuit to be governed and serving to operate said beam, a rheostat comprised in a shunt-circuit of the circuit leading to a generator, a motor for operating said rheostat, and the electrical connections, substantially as specified.

THOMAS M. PUSEY.

Witnesses:
JOHN C. WALTON,
J. G. ROBINSON.