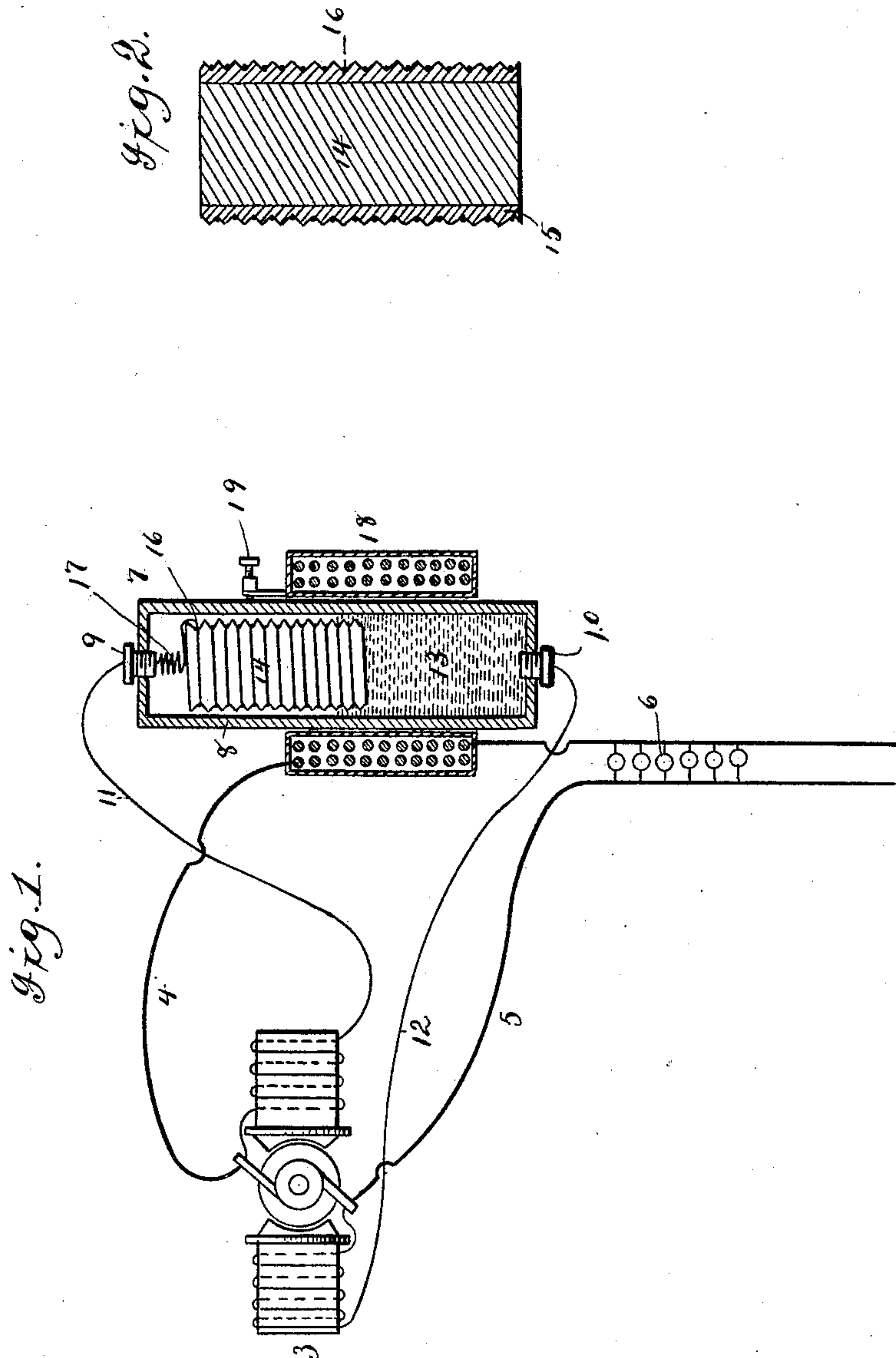


(No Model.)

J. H. ROBERTSON.  
REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 405,743.

Patented June 25, 1889.



Witnesses:

W. E. Bowen.

J. M. Bowen

Inventor:

J. Hart Robertson  
per J. C. Behrens  
att'y

# UNITED STATES PATENT OFFICE.

JAMES HART ROBERTSON, OF RUTHERFORD, NEW JERSEY, ASSIGNOR OF  
THREE-FIFTHS TO THERON A. RICHARDS AND JOHN ROBERTSON, OF  
BROOKLYN, NEW YORK.

## REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 405,743, dated June 25, 1889.

Application filed May 17, 1888. Serial No. 274,225. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES HART ROBERTSON, a citizen of the United States, and a resident of Rutherford, in the county of Bergen and State of New Jersey, have invented a certain new and useful Automatic Regulator for Dynamo-Electric Machines, of which the following is a specification.

The object of the present invention is to devise means whereby dynamo-electric machines may be automatically regulated—that is, the dynamo may be set for performing a certain amount of work, as, for instance, the running of a definite number of lamps, and cannot be forced beyond the maximum service for which it is adjusted. The apparatus by which I accomplish this result is entirely independent of the dynamo, with the exception of the wire connections between the two, and it will be located in convenient proximity to the dynamo. As the apparatus comprises no part of the dynamo structure itself, it may therefore be employed in connection with any type of dynamo-electric machines.

The construction and mode of operation of the apparatus will now be described in connection with the accompanying drawings, which form a part of this specification, and in which like features are indicated by like figures of reference in both views.

In the drawings, Figure 1 is a vertical sectional view of a structure embodying my invention, connected electrically with a dynamo-electric machine, which latter is shown in side elevation; and Fig. 2 is a central vertical section of the solenoid or core which operates within the closed cylinder shown in Fig. 1.

The dynamo is indicated by 3, and the main-line wires, which connect with the brushes of the dynamo, by 4 and 5.

The apparatus is illustrated as operating a series of incandescent lamps, indicated at 6.

The automatic regulator is designated by 7, and it comprises a vessel 8, of non-conducting material, or lined with such material, which is provided with platinum screws 9 and 10 at its respective ends, to which are attached the shunt-wires 11 and 12, the opposite ends

of which are attached to the coils of the field-magnets.

The vessel 8, which is air-tight, is supplied with a quantity of mercury or other suitable liquid 13, in which floats the core-iron 14. This core is covered with insulating material 15, in which is cut screw-threads, and within the latter is wound a conductor 16, that is not affected by the fluid in vessel 8, the upper end of which conductor is connected to the spiral 17, which in turn is connected to the screw 9, as shown. The spiral 17 in no sense supports the core 14, as that is sustained by the liquid in which it floats.

The helix or hollow magnetic coil 18 is placed around vessel 8 and held at any desired point of adjustment upon said vessel by means of the set-screw 19. The coil 18 is located on the main line 4 5, while the circuit of the shunt 11 and 12 is completed through the conductor on the core and the mercury 13 within the vessel 8.

The operation of this apparatus is as follows: The parts being arranged as shown and described, if there be no lamps in use all the current generated by the dynamo will pass through the shunt and none through the hollow coil 18, and hence, as nearly all of the core 14 is out of the mercury 13, the greater part of the wire around said core is in the shunt-circuit, which adds to its resistance and thus allows the dynamo to run easily; but when the lamps are put on the current will pass also, of course, through the wire of the coil 18, and this will pull the core 14 into the mercury 13, and in proportion to the number of lamps in use—that is, the core 14 will continue to descend as lamps are added, with the effect of cutting out resistance on the shunt-circuit and consequently energizing the field-magnets proportionally. It will thus be seen that a certain ratio of resistance is maintained between the current passing through the helix or hollow core 18 and the current passing through the vessel 8 when the lamps are on, and as the extent to which the core 14 may descend in the mercury is regulated by the position to which the helix on vessel 8 has



been adjusted no greater load can be put on the dynamo than that predetermined by such adjustment, since when the core has descended to its limit the minimum resistances of the respective currents will have been reached and the work to which the dynamo can be subjected is thus automatically regulated.

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

1. In a regulator for dynamo-electric machines, the combination, with a helix arranged apart from the dynamo in the main line of a circuit, of a core capable of magnetic induction and controlled by said helix, and a conductor placed on said core and in shunt with the main line, whereby the resistance of the shunt is decreased in proportion to the decrease of resistance in the main line, substantially as set forth.

2. In a regulator for dynamo-electric machines, the combination of a helix arranged apart from the dynamo in the main line of a circuit, with a vessel upon which the helix is supported, said vessel inclosing a quantity of mercury or other suitable liquid, and an iron core and a shunt-circuit connected to said core, substantially as set forth.

3. An electric regulator consisting of a vessel of non-conducting material, in which is inclosed a quantity of mercury or other suitable liquid, an iron core which floats in said liquid and which is connected to one of the wire-attaching devices in the respective ends of said vessel, and a hollow coil or helix arranged upon the vessel, substantially as set forth.

4. A dynamo-regulator consisting of a vessel of non-conducting material, provided with wire-attaching screws at its respective ends and containing a quantity of mercury or other suitable liquid, an insulated iron core having screw-threads cut thereupon, a wire wrapped within said screw-threads and connected electrically with the attaching-screw in the top of said vessel, and a hollow coil or helix adjustably supported around said vessel, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 30th day of March, A. D. 1888.

J. HART ROBERTSON.

Witnesses:

T. A. RICHARDS,  
JOHN ROBERTSON.