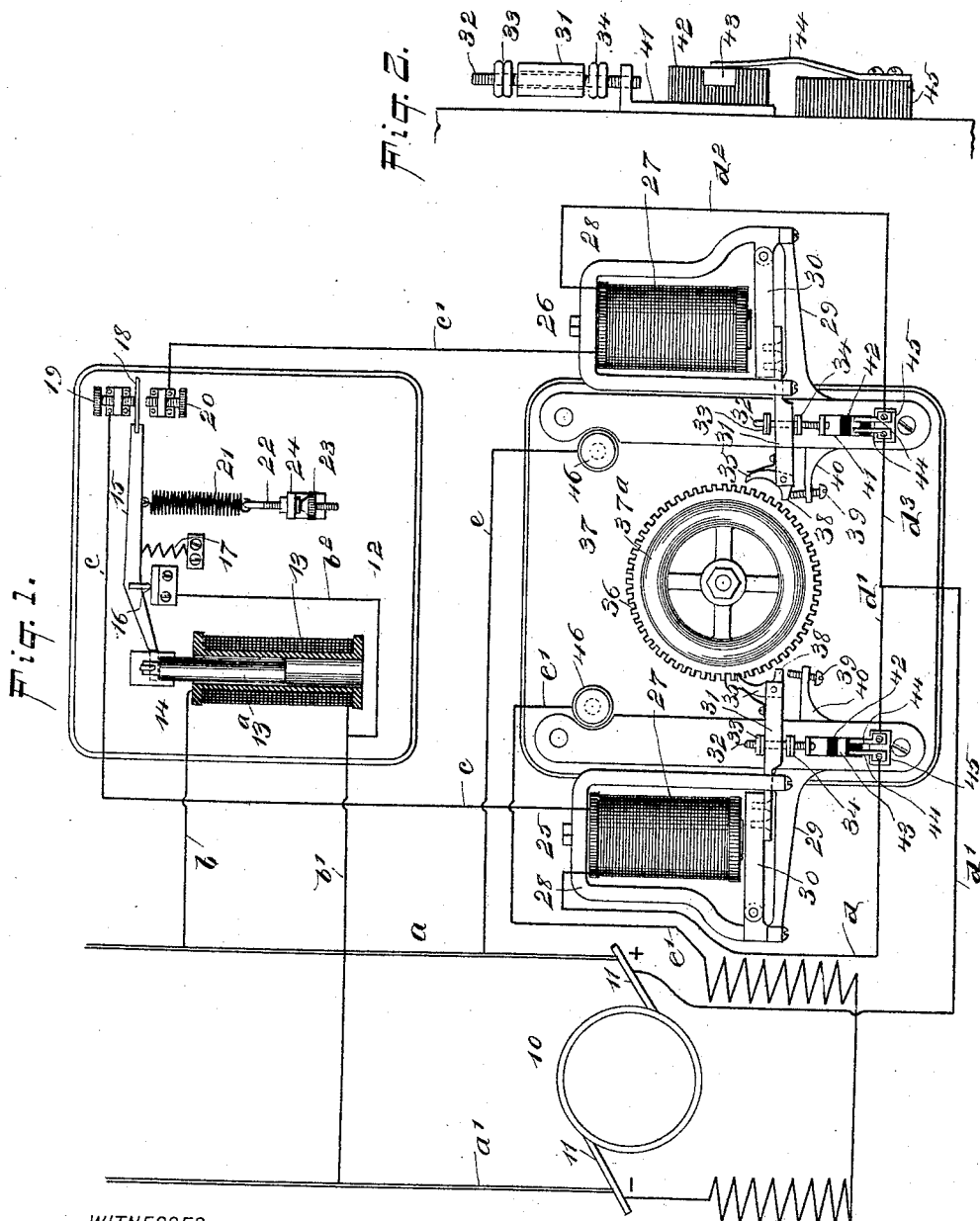


(No Model.)

M. P. RYDER.  
VOLTAGE REGULATOR FOR DYNAMOS.

No. 526,583.

Patented Sept. 25, 1894.



WITNESSES:  
William Goebel.  
H. B. Hutchinson

INVENTOR  
M. P. Ryder  
BY  
Munn & Co.  
ATTORNEYS.

# UNITED STATES PATENT OFFICE.

MALCOLM P. RYDER, OF NEW YORK, N. Y.

## VOLTAGE-REGULATOR FOR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 526,583, dated September 25, 1894.

Application filed May 12, 1894. Serial No. 510,977. (No model.)

*To all whom it may concern:*

Be it known that I, MALCOLM P. RYDER, of New York city, in the county and State of New York, have invented a new and Improved  
5 Voltage-Regulator for Dynamos, of which the following is a full, clear, and exact description.

My invention relates to improvements in that class of devices which are used in connection with electric generators to regulate the  
10 current; and the object of my invention is to produce an extremely simple device which may be used in connection with an ordinary dynamo of any kind, and which in connection with a rheostat operates automatically to main-  
15 tain a constant voltage in the line, the apparatus being also arranged in such a manner that the rheostat may be operated by hand if desired without interfering with the system.

To these ends my invention consists of a  
20 voltage regulator, the construction and arrangement of which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification,  
25 in which similar figures and letters of reference indicate corresponding parts in both the views.

Figure 1 is a diagrammatic view, partly in elevation and section, showing the general arrangement of the entire apparatus; and Fig. 2  
30 is a detail elevation of one of the circuit breakers used in connection with the apparatus.

The dynamo 10 may be of any usual kind  
35 and it is provided with the usual brushes 11 with which the line wires *a*, *a'* connect and is connected also, as described presently, with the controller 12, which has a solenoid magnet 13 which may be of any approved type and in  
40 which moves the plunger armature 13<sup>a</sup> which is connected by a knife-edge bearing 14 with the tilting lever 15 which is also supported on a knife-edge bearing 16 so that it may move without friction, and it is provided with the  
45 customary centering spring 17 while at one end of it is a contact plate 18 adapted to contact with the screws 19 and 20, which are arranged above and below it. The solenoid is connected in parallel with the wires *a* and *a'*,  
50 by means of the wires *b* and *b'*, the latter wire being also connected by a wire *b*<sup>3</sup> with the bearing 16 and so with the lever 15. The con-

tact screws 19 and 20 connect by wires *c* and *c'* with the regulators 25 and 26, which are arranged to enter the rheostat and are connected therewith and with the dynamo, as  
55 hereinafter described. The regulators 25 and 26 are exactly similar in construction, and each is provided with a magnet 27 having an ordinary yoke 28 supported on a bracket 29 or  
60 equivalent support, while beneath the magnet is a swinging armature 30 having an arm 31 projecting from one end thereof, although the arm and armature may be integral if desired; and the arm moves vertically and has project-  
65 ing through it a screw 32 with check nuts 33 and 34 above and below the arm, so that the arm moves freely for a short distance and then, striking one of the check nuts, moves the screw.  
70

The arm 31 has at its free end a spring-pressed pawl 35 which engages a ratchet wheel 36 on the rheostat 37 which has the usual hand wheel 37<sup>a</sup> to the spindle of which the ratchet wheel is attached, so that the rheostat may  
75 be operated by hand if desired or by the ratchet wheel. The rheostat is not shown in detail, as it may be of any usual kind.

The pawl 35 has a tail 38 adapted to strike the abutment screw 39 beneath it in a bracket  
80 40, so that when the arm 31 drops the screw 39 will strike the tail of the pawl just before the arm reaches the limit of its movement, and the pawl will thus be thrown out of engagement with the ratchet wheel 36. The screw 32 carries a slide plate 41 which serves as a circuit  
85 worker, as described presently, this plate having an insulating block 42 thereon with a conducting plate 43 on its face, this plate being adapted to simultaneously strike the con-  
90 ducting springs 44 which are secured to an insulating block 45 beneath the block 42, this block 45 being held stationary. The two arms 31 and their pawls are arranged so that each pawl is adapted to engage the ratchet  
95 wheel 36, but one is adapted to turn it in one direction and the other in the opposite direction.

The electrical connections are as follows: The magnets 27 are connected as described  
100 with the contact screws 19 and 20, and the magnet of the regulator 25 connects by a wire *d* with one of the springs 44, while a wire *d'* leads from the adjacent spring to the dynamo,

and the magnet of the regulator 26 connects by a wire  $d^2$  with one spring 44 of the regulator 26, while the other spring connects by a wire  $d^3$  with the wire  $d'$  and so with the dynamo. The rheostat has one of its binding posts 46 connected by a wire  $e$  with the line wire  $a$ , while the other binding post connects by means of a wire  $e'$  with the field of the dynamo. The spring 21 is adjusted so as to just balance the lever 15 when the voltage is normal and hold the plate 18 midway between the screws 19 and 20. If, however, the voltage gets too high, the increased energy of the solenoid 13 draws down the plunger  $13^a$  and tilts the lever 15 so as to throw the plate 18 against the contact screw 19. This closes the circuit through the regulator 25, the circuit being from the dynamo through the wire  $d'$ , the contact springs 44, the contact plate 43, the wire  $d$ , the magnet 27, the wire  $c$ , the contact screw 19, the lever 15, the wire  $b^2$ , and the wire  $b'$  to the line. The magnet 27 thus draws up the armature 30 throwing the pawl 35 into engagement with the ratchet wheel and turning the same and, at the same time, lifting the plate 43 out of contact with the springs 44, thus breaking the circuit and permitting the arm 31 and armature 30 to drop back again, when the circuit is again closed by the plate 43 striking the springs 44 and thus the armature is moved up and down and the ratchet wheel turned until the rheostat cuts in sufficient re-

sistance to reduce the voltage to normal value. If, on the other hand, the voltage drops too low the spring 21 pulls the lever 15 down so as to bring the contact plate 18 against the screw 20, and thus the magnet of the regulator 26 is operated and the ratchet wheel turned in the reverse direction, so as to move the rheostat and reduce the resistance and increase the voltage.

It will be understood that any kind of magnets may be used, and that the rheostat also may be of any approved kind. When the voltage regulator is applied to the alternating system, the controller is connected to the station transformer, and the current to operate the regulator magnets is taken from the exciter.

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

The combination, with the regulator magnet and the swinging armature, of the circuit breaker actuated by the armature and comprising a slide plate, a conducting block insulated thereon, and conducting springs secured to a stationary support and adapted to contact with the conducting plate, substantially as described.

MALCOLM P. RYDER.

Witnesses:

NICHOLAS ZOGG,  
JOHN RUDDEN.