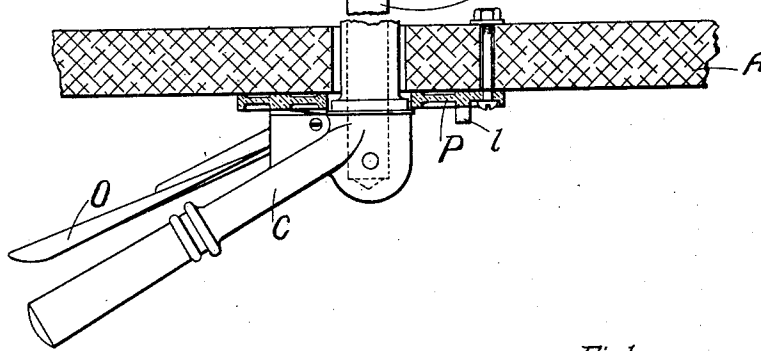
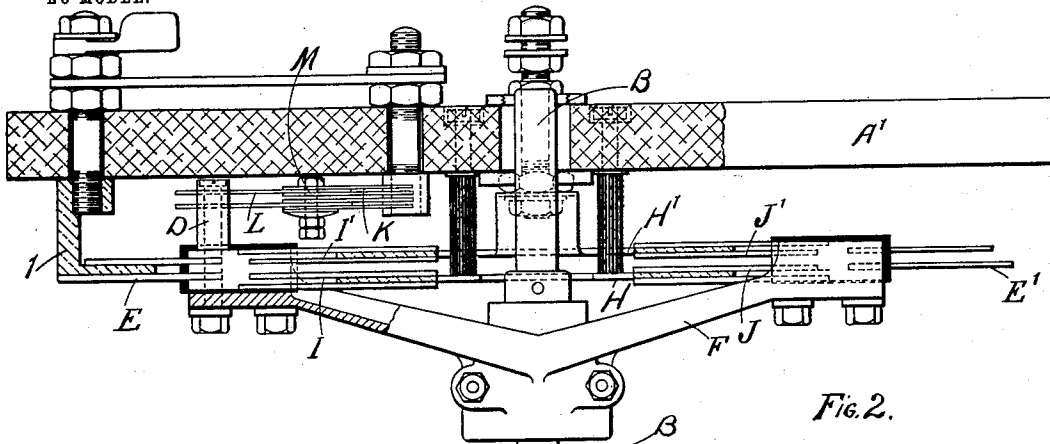


G. WRIGHT & H. M. ACLY.
ELECTRIC REGULATOR.
APPLICATION FILED JAN. 31, 1903.

2 SHEETS—SHEET 1.

NO MODEL.



WITNESSES:
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UNITED STATES PATENT OFFICE.

GILBERT WRIGHT AND HARRY M. ACLY, OF PITTSFIELD, MASSACHUSETTS,
ASSIGNORS TO STANLEY ELECTRIC MANUFACTURING COMPANY, OF
PITTSFIELD, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

ELECTRIC REGULATOR.

SPECIFICATION forming part of Letters Patent No. 738,870, dated September 15, 1903.

Application filed January 31, 1903. Serial No. 141,333. (No model.)

To all whom it may concern:

Be it known that we, GILBERT WRIGHT and HARRY M. ACLY, citizens of the United States, and residents of Pittsfield, Massachusetts, have invented certain new and useful Improvements in Electric Regulators, of which the following is a specification.

Our invention relates to switches for controlling the voltage of electric devices—such, for example, as a regulating transformer—when it is desirable to control the number of coils in circuit and control the direction of current-flow therethrough; and the object of our invention is to provide a switch of this character which will act efficiently with a smaller number of contacts than heretofore and with a total avoidance of cross connections. To this end we provide a single row of contacts connected to each one of the various coils and provide a contact-arm having contacts at either end to engage such contacts, one end of said arm being always out of action, and we provide a reversing-switch automatically changed in position by the movement of the arm past its center point when one or the other end is to make engagement with the fixed contacts.

Our invention further consists in the more specific construction and arrangement of our switch and its connections with certain specific advantages, as will appear hereinafter.

Referring to the drawings, Figure 1 is a plan, and Fig. 2 is a side elevation, partly in section, of a switch embodying our invention. Fig. 3 is a diagram of connections, and Fig. 4 represents one form of face-plate that may be used in connection with our switch.

Referring now to Figs. 1 and 2, A A' represent slabs of marble or other suitable insulating material, on which the switch-shaft B is mounted rotatably. By means of this construction all parts of the switch except the handle C are inclosed between insulating-slabs, thus rendering the manipulation of the switch perfectly safe for the operator. On slab A' are mounted the contacts 1 2 3, &c., arranged in a semicircle which are connected, as will be explained later, to the regulating-

coils. Sweeping over contacts 1 2 3, &c., are the movable contacts E E', carried by and insulated from arm F, which is mounted on switch-shaft B. The contacts E E' are split in two, as indicated at e e', and the two parts are insulated from each other. Also mounted on slab A' are the parallel conducting-rings H H', which are insulated from each other. Bearing on rings H H' are the movable contacts I I' and J J', also carried by and insulated from arm F. I is electrically connected to one half of E and I' to the other half. J is electrically connected to one half of E' and J' to the other half. Also mounted on slab A' are contacts K, K', and K'' and the switch-blade L, rotatably pivoted at M. L is electrically connected to K and is adapted to be moved by insulated stud D, carried by arm F, so as to connect K with K' or K'', according as stud D is moving to the right or to the left, as viewed in Fig. 1. C is the operating-handle projecting in front of slab A. O is a trigger carried by the handle and engaging slots p p p, Fig. 4, in face-plate P, which is mounted on the front of slab A concentrically with the switch-shaft. Slots p p p correspond in position to contacts 1 3 4, &c.

Referring now to Fig. 3, the switch is shown diagrammatically, the parts being lettered as before. The source of current is indicated by coils Q R S, &c. Q is the main coil and R S, &c., are the regulating-coils. The movable contact E is represented as bearing on contact 1. The movable contact E' is open-circuited and switch L is open, these being the conditions as represented in Fig. 1 also. This is the position of the switch for mean or average voltage. The circuit is as follows: from the line-wire Y to q, through main coil Q to q', to contact 1, to the split movable contact E, to the movable contacts I I', to rings H H', to the differential choke-coil X, and to line-wire Z. Thus the voltage on the line is the voltage of coil Q. The purpose of the differential choke-coil is to permit of the temporary short-circuiting of a coil while the switch is moving from one contact to another, and it is because of this feature that contacts

E and E' are split, as shown. If now contact E be moved to the right to contact 2, the only change produced will be the closing of switch L to connect K and K', thereby connecting Q and R. No change is produced in the line-voltage, because 1 and 2 are now connected through L, as shown. If now contact E be moved to 3, the circuit will be from Y to *q*, through Q to *q'*, to contact 1, to contact K, through L to K', to *r*, through R to *s*, to contact 3, to E, to I and I', to H and H', through X to Z. Thus R is placed in series with Q and its voltage is added to that of Q to raise the line-voltage. By moving E to 4, S will be added in series, as will be evident from tracing the connections, and so on until 7 is reached, when all the regulating-coils will be in series with Q and the maximum voltage will be on the line. If the direction of rotation is reversed, the regulating-coils will be successively cut out until when E is on 2 the mean voltage will again be on the line. As E passes from 2 to 1 the only change will be the opening of switch L. If now the rotation be continued until E' reaches 7, E will be open-circuited and switch L will be closed, so as to connect K and K'', thereby connecting *q'* and *w*. The circuit will be Y *q q'* 1 K L K'' 7 E'' J J' H H' X Z. Thus the voltage of Q alone or the mean voltage will still be impressed on the line. If now E' be moved to 6, the circuit will be Y *q q''* 1 K K'' 7 *w v* 6 E' J J' H H' X Z. It is evident that V is now connected in opposition to Q and that the line-voltage is the difference between the voltage of Q and V. As the rotation is continued U, T, S, and R will be consecutively thrown in series with V and in opposition to Q until E' reaches 2, which is the position of minimum line-voltage and of all opposition of all the regulating-coils to Q. Thus the single row of contacts 1 to 7 are used both when the coils R to V are adding their voltage to coil Q and when they are opposing their voltage thereto. Stops 1 and 1' (shown in Fig. 4) prevent E' from passing 2 and E from passing 7 when the switch is rotated in the other direction.

We do not desire to be limited to the specific construction and arrangement shown, since changes therein which attain the objects of our invention and are within the scope of the appended claims may readily be made by those skilled in the art.

Having thus fully described our invention, what we claim, and desire to protect by Letters Patent, is—

1. In a switch for electric regulators, a series of stationary contacts, and movable contacts carried at each end of a rotary arm, each of said movable contacts making contact with the stationary contacts through half of the range of said rotary arm.

2. In a switch for electric regulators, a rotary switch-arm carrying movable contacts at each end, and a series of stationary contacts

so arranged as to make contact successively with each of said movable contacts for half of the range of the switch-arm.

3. In a switch for electric regulators, a rotatable switch-arm, a series of stationary contacts, two stationary contact-rings in planes parallel to the plane of rotation of the switch-arm, and movable split contacts carried at each end of the switch-arm, each part of said split contacts adapted to make contact with the stationary contacts and with one of the contact-rings.

4. In a switch for electric regulators, a rotatable switch-arm, a series of stationary contacts, two stationary contact-rings in planes parallel to the plane of rotation of the switch-arm, a choke-coil connected between the contact-rings, and movable split contacts carried at each end of the switch-arm, each part of said split contacts adapted to make contact with the stationary contacts and with one of the contact-rings.

5. In a switch for electric regulators, a series of stationary contacts, movable contacts carried at each end of a rotary arm, each of said movable contacts making contact with the stationary contacts through half of the range of said rotary arm, and a reversing-switch operated by the movement of the rotary arm.

6. In a switch for electric regulators, a series of stationary contacts, movable contacts carried at each end of a rotatable switch-arm, each of said movable contacts contacting with the stationary contacts through half of the range of said rotary arm, and a reversing-switch adapted to be so operated by the movement of the rotary arm as to be in one position while one of the movable contacts is contacting with the stationary contacts and to be in the reverse position while the other of the movable contacts is contacting with the stationary contacts.

7. In a switch for electric regulators, a rotary switch-arm, two contact-rings mounted concentrically with the axis of the switch-arm and parallel to the plane of its rotation, a series of contacts arranged in a semicircle, movable split contacts carried at each end of the switch-arm, each part of said contacts being adapted to make contact with the stationary contacts and with one of the contact-rings and each of said split contacts contacting successively with the stationary contacts through half of the range of the switch-arm, and a reversing-switch adapted to be operated by the movement of the switch-arm.

8. In a switch for electric regulators, a series of stationary contacts, two contacts carried by a movable arm, each of said contacts being adapted to make contact with the stationary contacts during half the movement of the movable arm through its range, and a reversing-switch operated by the movement of the movable arm.

9. In a switch for electric regulators, a series of stationary contacts, two contacts carried

by a movable arm, each of said contacts being adapted to make contact with the stationary contacts during half the movement of the movable arm through its range, and a reversing-switch adapted to be so operated by the movement of the movable arm as to be in one position while one of the movable contacts is contacting with the stationary contacts and to be in the reverse position while the other

movable contact is contacting with the stationary contacts.

Signed at Pittsfield, Massachusetts, this 22d day of January, 1903.

GILBERT WRIGHT.
HARRY M. ACLY.

Witnesses:

RICHARD EYRE,
R. E. HAYNES.