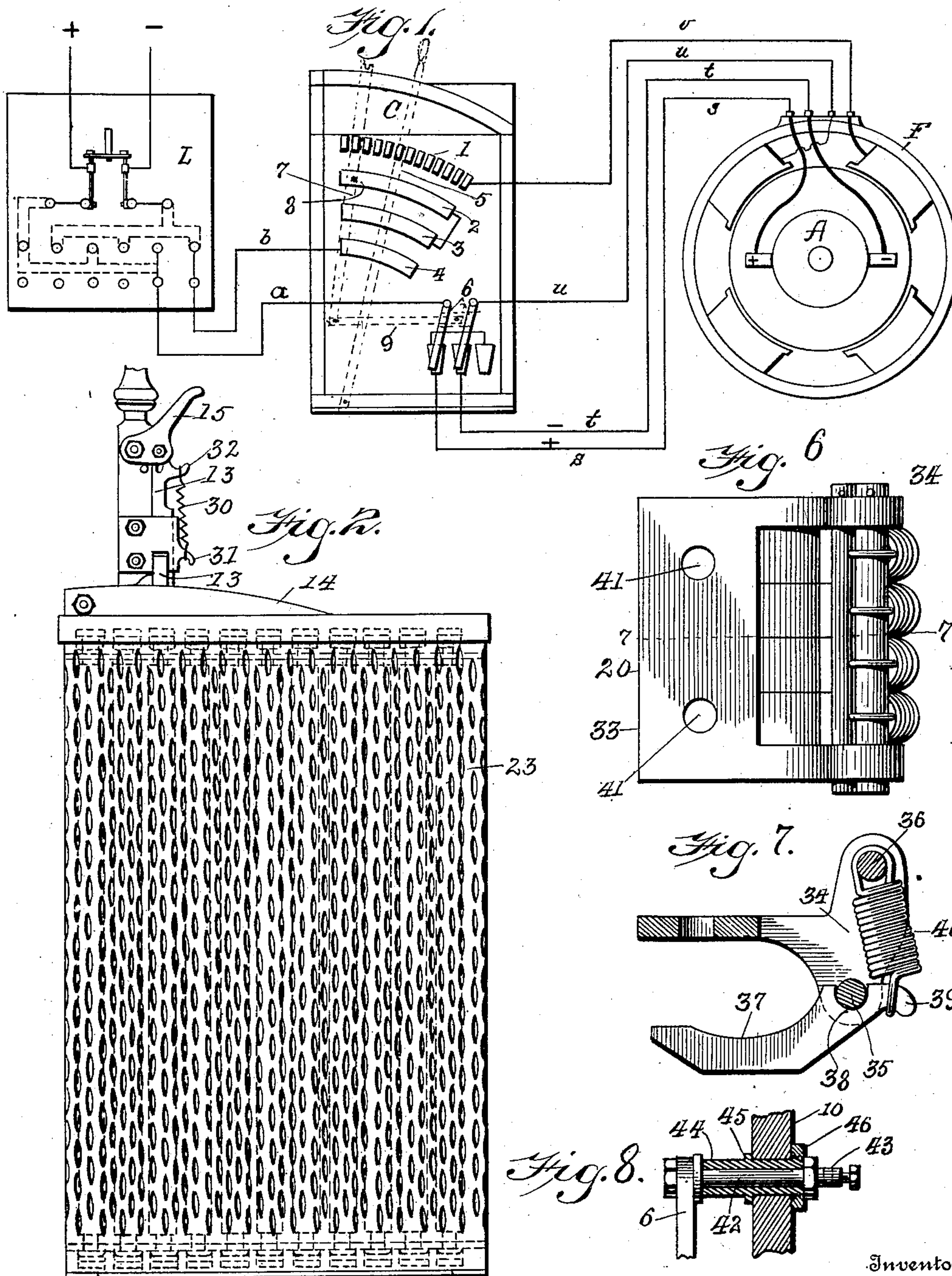


J. H. HOLLAND.
ELECTRIC CONTROLLER.
APPLICATION FILED JUNE 23, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



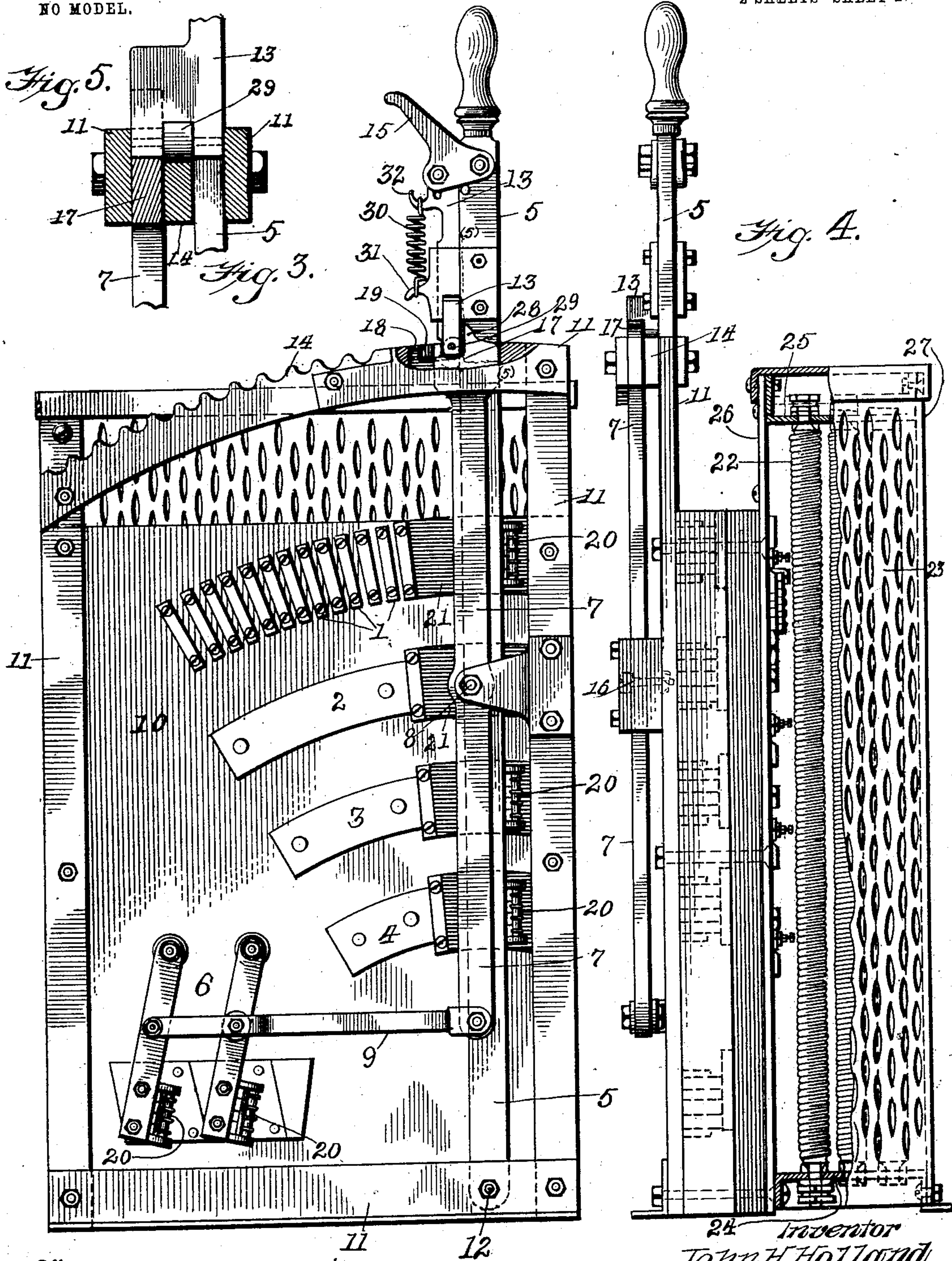
Witnesses
H. S. Dieterich
H. Lewis

Inventor
John H. Holland
By *Knight Bros*
Attorneys

J. H. HOLLAND.
ELECTRIC CONTROLLER.
APPLICATION FILED JUNE 23, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses

H. S. Dieterich
H. Lewis,

By

John H. Holland
Knight Bros
Attorneys

UNITED STATES PATENT OFFICE.

JOHN H. HOLLAND, OF COLUMBUS, OHIO, ASSIGNOR TO THE CASE MANUFACTURING COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 721,372, dated February 24, 1903.

Application filed June 23, 1902. Serial No. 112,920. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. HOLLAND, a citizen of the United States, and a resident of Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Electric Controllers, of which the following is a specification.

My invention has for its object to provide an electric controller which is adapted for a special purpose—such, for instance, as controlling a motor on an electric crane where it is desirable not only to close a circuit in either direction through the motor with resistance interposed in the circuit and to gradually cut out said resistance to increase the current supplied to the motor, but also to automatically reverse the connections with the motor or leave the connections in a certain position each time the controller is moved to the off point.

The invention will be fully understood with reference to the accompanying drawings, in which—

Figure 1 is a schematic view of a motor and its circuits which the present invention is to control. Fig. 2 is a rear elevation of the controller. Figs. 3 and 4 are respectively a front elevation and an end view of a controller, portions being broken away in each view to disclose interior parts. Fig. 5 is an enlarged vertical section on the line 5 5, Fig. 3. Fig. 6 is a plan view of one of the moving contacts with a plurality of contact-fingers. Fig. 7 is a section on the line 7 7, Fig. 6. Fig. 8 is an axial section through the fulcrum of one of the two reversing-switch blades.

The object of my invention will be apparent upon reference to Fig. 1, in which A represents the armature, and F the field, of a motor to be controlled, and L represents a line-circuit switch connecting with any suitable source of current-supply, while C represents a controller, forming the subject of the present invention, which controls the circuits of said motor. The controller C is provided with rheostat-terminals 1 and with slide-terminals 2, 3, and 4, of which 2 and 3 are permanently connected, while 1 are to be connected with 2, and 4 to 3, by the controller-lever 5. 6 represents a reversing-switch, which is operated by a separate lever 7, fulcrumed at 8 and con-

nected to switch 6 by link 9. Each time the lever 5 is thrown off it shifts the lever 7 to the same position, while movement of the lever in the direction of closing the circuit imparts limited movement to lever 7 and through it to switch 6. The course of the current is as follows: line-switch L, conductor *a*, reversing-switch 6, conductor *s*, armature A, conductor *t*, switch 6, conductor *u*, field-winding F, conductor *v*, rheostat-terminals 1, controller-lever 5, terminal 2, terminal 3, controller-lever 5, terminal 4, and conductor *b* to line-switch L. As controller-lever 5 is moved to the off point it is desired to have it automatically shift the reversing-switch 6 onto the other contacts, so that the connections through the armature A will be reversed. If it is desired to impart current to the motor while the reversing-switch is in the opposite position to that shown in Fig. 1, means is provided for releasing the engagement of lever 5 with lever 7 as the lever 5 leaves the off point, as will be hereinafter fully described.

Referring to Figs. 2 to 8, 10 represents the slate or other back upon which contact parts are mounted, and 11 the frame supporting said back. Lever 5 is fulcrumed at 12 in the frame 11 and carries at its upper end a dog 13, engaging with the rack 14, under control of a finger-lever 15. Lever 7 is fulcrumed at 16 at an intermediate point in the lever and is formed at its upper end with a bifurcated head 17, in which the dog 13 engages to cause the lever 7 to move with lever 5 for a certain distance in the movement of the latter sufficient to impart the necessary opposite movements to the reversing-switch 6. From so much of the description it will be obvious that if the lever 5 is thrown to the left, as shown in Fig. 3, it will carry with it the head 17 and throw the lower end of the latter to the right, so that the switch 6 will be shifted to its other position. 18 represents a stop in the path of the head 17, and 19 is a stop in the path of the dog 13. When the lever 5 has moved sufficiently to bring its dog 13 against stop 19 and the head 17 against the stop 18, the dog is raised over the stop 19 and the lever 5 may continue its movement without the lever 7. 20 represents contacts carried by the levers 5 and 7. The contacts

of lever 5 travel on non-conducting filling-pieces 21 until after the dog 13 passes the stop 19, after which said contacts pass upon the rheostat-terminals 1 and the sliding terminals 2 3 4, which are employed to provide a multiple brake when opening the circuit. 22 represents the resistance-coils of the rheostat, which are inclosed in ventilated housing 23 in rear of the back 10 and connected to the terminals 1 in any suitable manner well understood in devices of this character. The coils 22 and their housing 23 are supported by the base 24 and top 25, which, together with the uprights 26 27, form a rheostat-frame. 28 represents a horn or projection on one side of the bifurcation of the head 17, with which the dog 13 engages as the lever 5 is moved to the off point in order to insure the automatic shifting of lever 7 to a position to reverse the current through the motor each time the controller is moved to the off point. If it is desired to supply current to the motor while the circuit through the armature is reversed, this may be accomplished by simply raising the dog 13 before commencement of movement of lever 5, which will permit the lever 7 to remain stationary.

As shown in Fig. 5, the dog 13 carries roller 29 in the line of the rack 14, which permits the dog to travel over the rack while registering the different steps in the lever's movement corresponding to cutting out or in the several sections of the rheostat connected to the terminals 1. 30 represents a spring stretching between a horn 31 on guide 31^a, which supports dog 13 and is bolted to lever 5, and a horn 32 on dog 13 for holding the dog downward.

The novel construction of the contacts 20 will be observed upon reference to Figs. 6 and 7, in which it will be seen that said contacts comprise an attaching-bracket 33, having arms 34, enlarged in a direction perpendicular to the plane of the bracket 33 and supporting at one end of each enlargement a metallic fulcrum 35 and at the other end of each enlargement a supporting-bar 36, of insulating material; also, contact-fingers 37, having semicircular bearings 38, engaging beneath the fulcrum 35, and horns 39, each of which receives one end of a spring 40, the other end of which is held by the insulated supporting-bar 36. When the contacts 20 are secured in place on the under sides of the several levers upon which they are mounted and to which they are attached by screws passing through perforations 41 in the brackets 33, the contact-fingers 37 bear against terminals over which said fingers travel and hold the fingers in position parallel to bearing-faces of the terminals in opposition to springs 40. Contact of said fingers with the terminals and the tension of springs 40 hold bearings 38 of said fingers against their common fulcrum 35, and tension of the springs causes the fingers to bear evenly over the surface of the contacts, notwithstanding any irregularities in

the latter. The insulating-support 36 prevents the passage of current through springs 40, and thus avoids affecting the elasticity of the latter. The construction of these contacts is such that any one or more of the fingers may be readily removed when worn and replaced by another without disturbing any of the remaining parts.

Fig. 8 represents the fulcrum of one of the two reversing-switch levers, which are similarly mounted, said fulcrum comprising the conducting-pintle 42, connected with lever 6 and terminating in rear of the back 10 in a binding-post 43, and a surrounding insulating-post 44, formed with a shoulder 45 and secured by a nut 46.

Having thus described the invention, the following is what is claimed as new therein:

1. In combination with a controller and its lever; of a reversing-switch, a reversing-switch lever, and means carried by one of said levers, automatically engaging the other to compel them to move simultaneously for a limited distance, and released manually.

2. In combination with a controller and its lever; of a reversing-switch, a reversing-switch lever, means locking them together for simultaneous movement, and manually-operated means releasing them.

3. In combination with a controller and its lever; of a reversing-switch, a reversing-switch lever, means automatically locking them together for simultaneous movement, and manually-operated means releasing them.

4. In a controller, the combination of a suitable support, circuit-terminals mounted on said support, a circuit-closing lever carrying contacts coöperating with said terminals, a reversing-switch, a reversing-switch lever projecting adjacent to and moving coincident with a part of the throw of the circuit-closing lever, a dog carried by the circuit-closing lever, engaging the reversing-switch lever to compel the latter to follow the movement of the former, and manually-operated means for releasing the reversing-switch lever.

5. The combination with the controlling and the reversing levers, of a dog on the controller-lever holding it in predetermined positions, and adapted to engage the reversing-lever to effect simultaneous movement of the two levers.

6. The combination with the controlling and reversing levers, of a dog on the controller-lever holding it in predetermined positions, and means for causing the dog to automatically engage with the reversing-lever.

7. The combination with the controlling and reversing levers, of a dog on the controller-lever holding it in predetermined positions, means for causing the dog to automatically engage with the reversing-lever, and manually-operated means for operating the dog to release the lever.

8. In an electric controller, the combination of a suitable support, circuit-terminals and a reversing-switch mounted on said support, a

circuit-closing lever having contacts cooperating with the circuit-terminals, a reversing-switch lever, said levers having ends projecting and moving substantially parallel for a limited distance, a stop arresting the movement of the reversing-switch lever, the dog carried by the circuit-closing lever engaging the reversing-switch lever and means for releasing said dog to permit the circuit-closing lever to continue its movement after the reversing-switch lever is arrested by its stop.

9. In an electric controller, the combination of a suitable support, circuit-terminals and a reversing-switch mounted on said support, a circuit-closing lever having contacts cooperating with the circuit-terminals, a reversing-switch lever, said levers having ends projecting and moving substantially parallel for a limited distance, a stop arresting the movement of the reversing-switch lever, the dog carried by the circuit-closing lever, engaging the reversing-switch lever, and means for releasing said dog to permit the circuit-closing lever to continue its movement after the reversing-switch lever is arrested by its stop; the reversing-switch lever having a projection 28 which intercepts the dog as the circuit-closing lever is returned to off position, and compels the automatic shifting of the reversing-switch.

10. In a controller, the combination of a suitable support, circuit-terminals mounted on said support, a circuit-closing lever carrying contacts cooperating with said terminal, a reversing-switch mounted on said support, a reversing-switch lever projecting substantially parallel with the circuit-closing lever, a rack-bar adjacent to the path of the circuit-closing lever, a dog carried by the circuit-closing lever cooperating with the rack-bar and having a lateral extension by which it engages the reversing-switch lever, and means for withdrawing said dog from engagement with the reversing-switch lever.

11. In a controller, the combination of a suitable support, circuit-terminals mounted on said support, a circuit-closing lever carrying contacts cooperating with said terminal, a reversing-switch mounted on said support, a reversing-switch lever projecting substantially parallel with the circuit-closing lever, a rack-bar adjacent to the path of the circuit-closing lever, a dog carried by the circuit-closing lever cooperating with the rack-bar and having a lateral extension by which it engages the reversing-switch lever, and means for withdrawing said dog from engagement with the reversing-switch lever; said dog having a roller in the plane of the rack-bar, through which it impinges the latter.

12. A contact for electric switches, comprising a suitable bracket or support, a fulcrum-pin mounted in said support, fingers having semicircular bearings fitted to said fulcrum pin, and having ends extended beyond the same, a spring-supporting rod of insulating material, springs stretched between said spring-supporting rod and the projecting end of the fingers.

13. In an electric switch, the combination of the bracket having an attaching-base and extensions enlarged in a direction perpendicular to said base, of a fulcrum-pin extending through one side of the enlargements, the spring-supporting rod of insulating material extending through the other side of the enlargements, contact-fingers having semicircular bearings fitted to the fulcrum-pin and springs extending between the spring-supporting rod and the contact-fingers, substantially as herein set forth.

The foregoing specification signed this 15th day of May, 1902.

JOHN H. HOLLAND.

In presence of—

C. N. SHOUGH,
W. F. BILLINGSLEY.