No. 710,096. Patented Sept. 30, 1902.

W. A. CARRELL.

ELECTRIC CONTROLLER.

(Application filed June 21, 1901.)

(No Model.) 2 Sheets—Sheet 1.

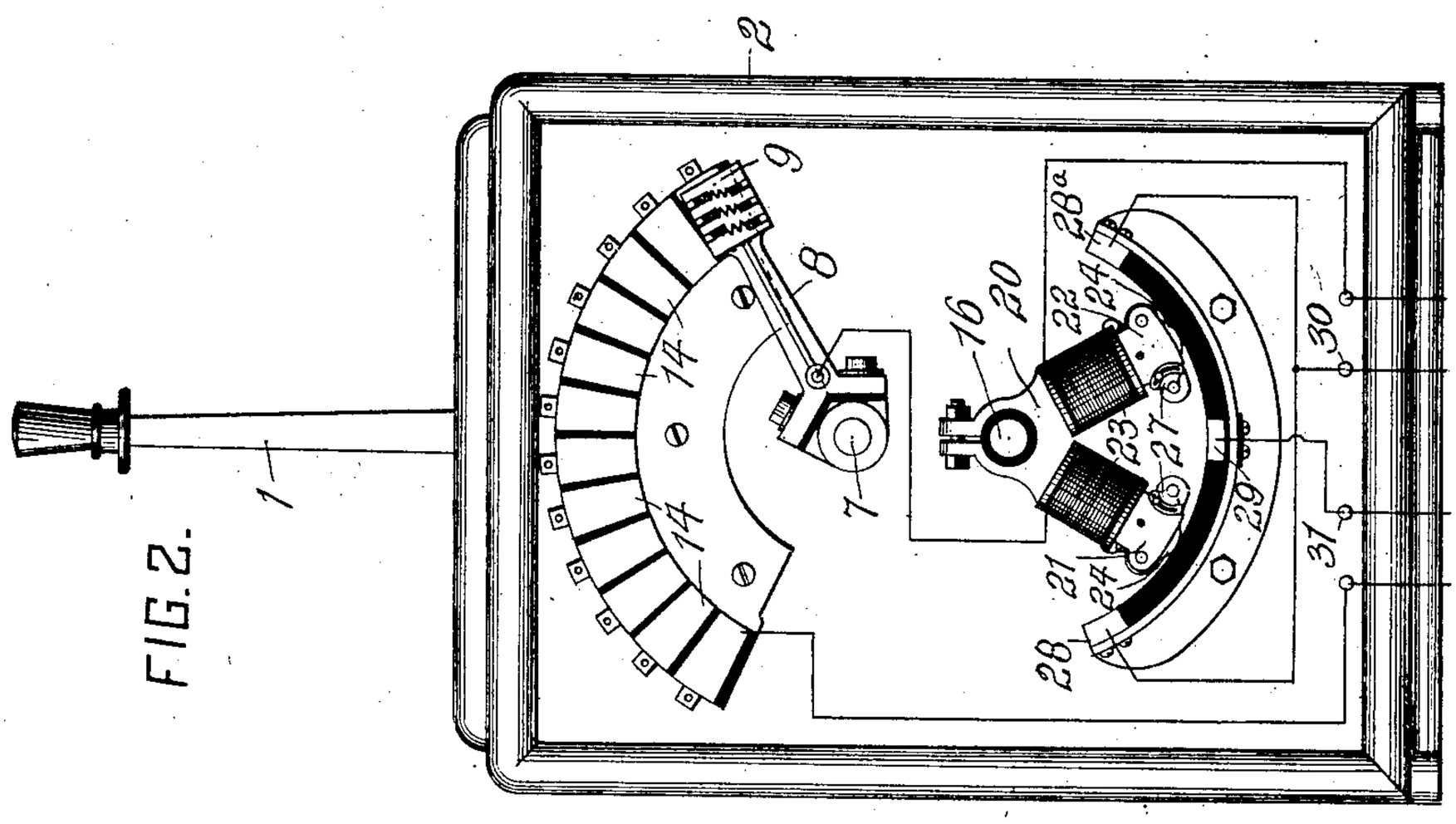

FIG. 2.

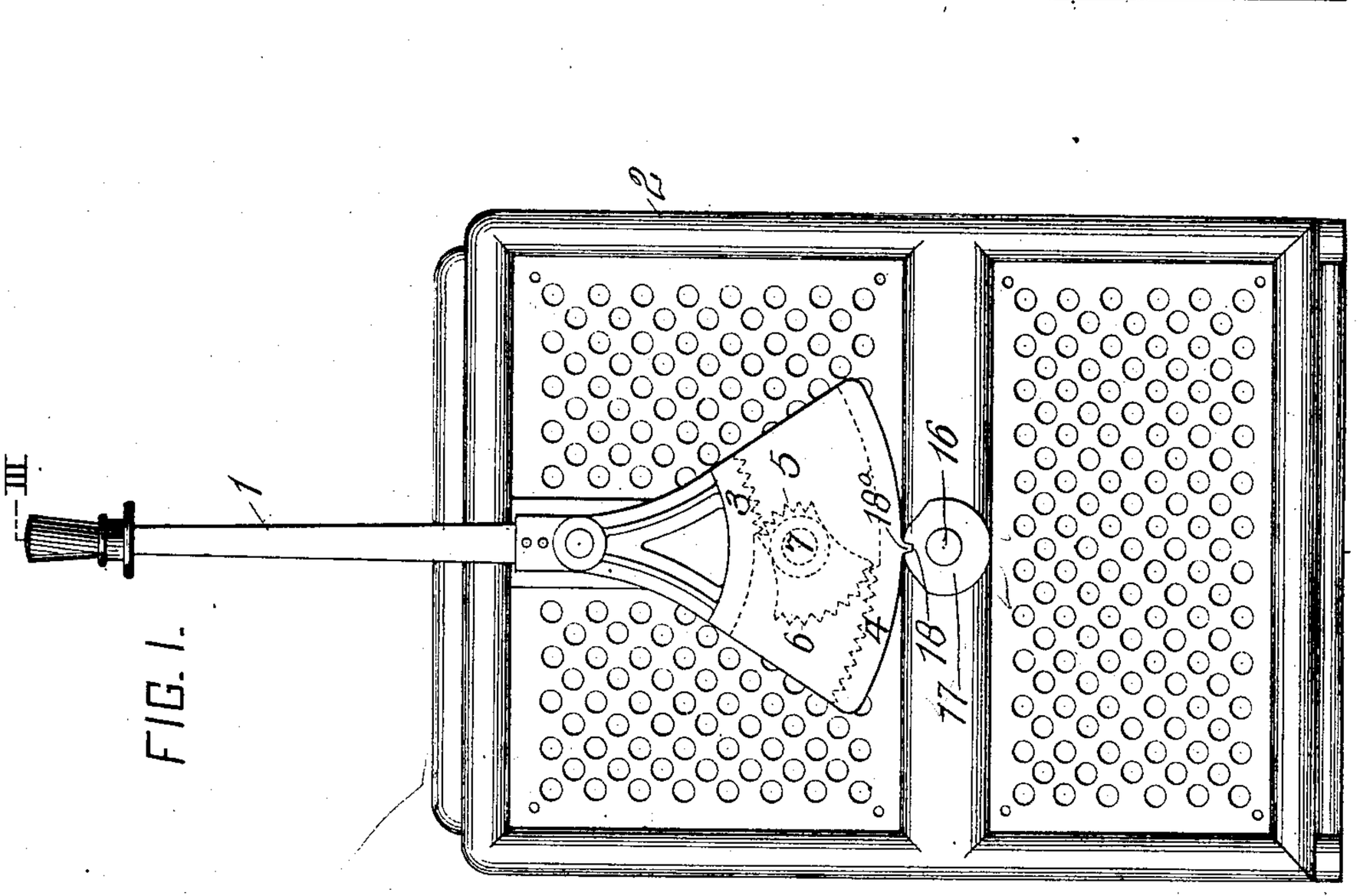

FIG. 1.

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FIG. 3.

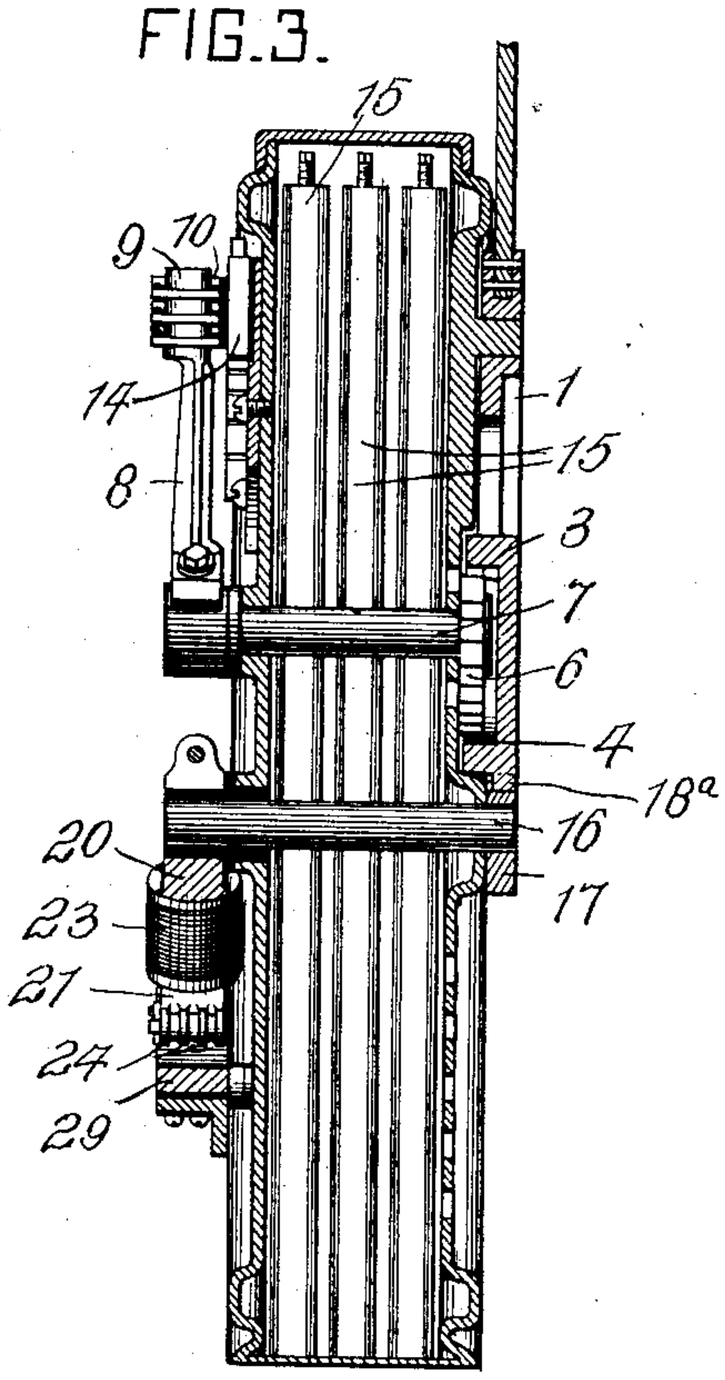


FIG. 4.

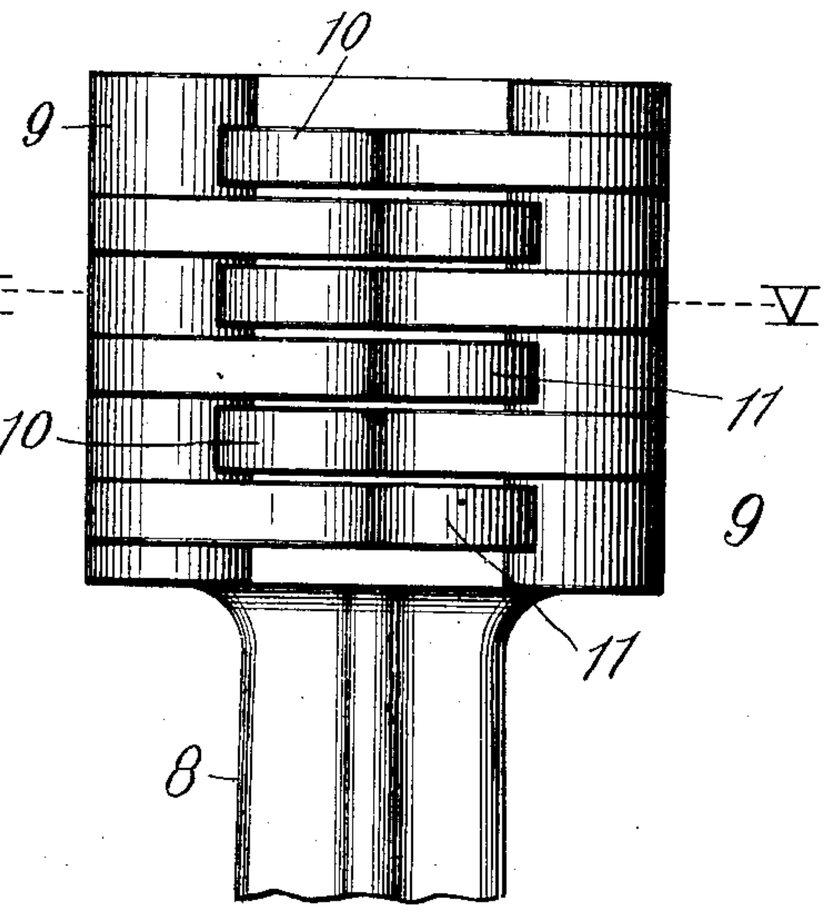


FIG. 5.

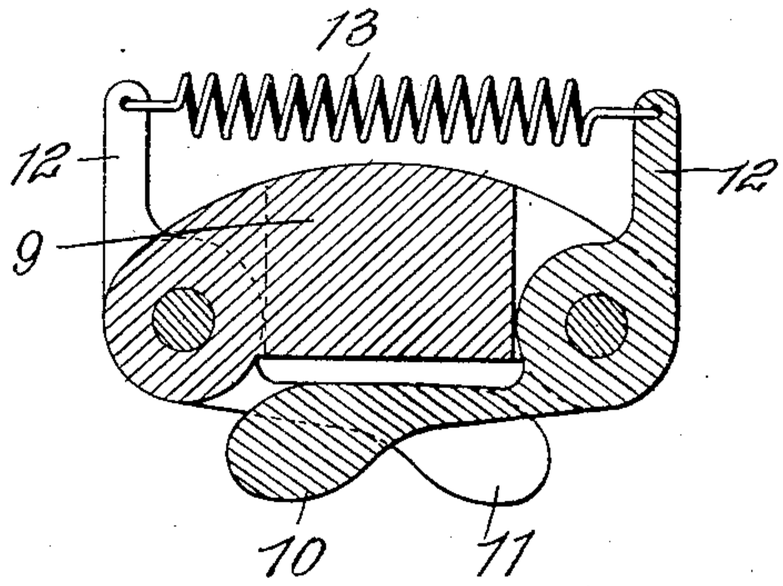
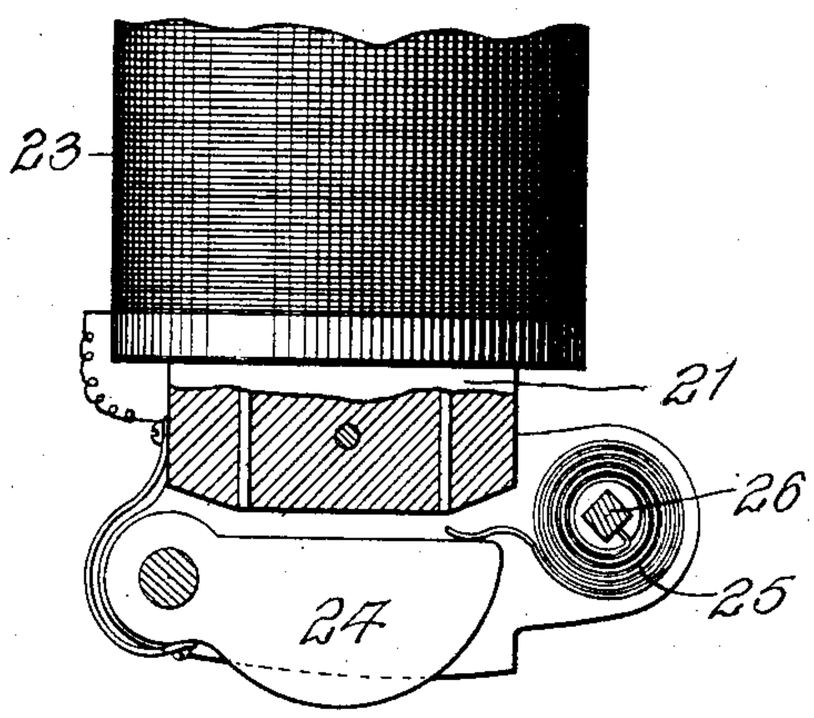


FIG. 6.



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UNITED STATES PATENT OFFICE.

WILBER A. CARRELL, OF WEST HOMESTEAD, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JOHN O. HORNING, OF PITTSBURG, PENNSYLVANIA.

ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 710,096, dated September 30, 1902.

Application filed June 21, 1901. Serial No. 65,459. (No model.)

To all whom it may concern:

Be it known that I, WILBER A. CARRELL, a citizen of the United States, residing at West Homestead, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Electric Controllers, of which improvements the following is a specification.

The invention described herein relates to certain improvements in electric controllers, and has for its object a construction whereby on the shifting of a lever in either direction a circuit will be completed and by a further movement of the lever resistances will be cut out or placed in the circuit, such further movement also locking the circuit-closer, so as to prevent an opening of the circuit until the lever is returned to normal position.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a front elevation of my improved controller. Fig. 2 is a rear elevation of the same Fig. 3 is a sectional elevation on a plane indicated by the line III III, Fig. 1. Fig. 4 is an elevation, on an enlarged scale, of the contact-head for the resistances. Fig. 5 is a transverse section of the same on a plane indicated by the line V V, Fig. 4; and Fig. 6 is a view, partly in section and partly in elevation, of the lower end of one of the circuit-controllers.

In the practice of my invention the operating-lever 1 is pivotally mounted on a suitable supporting frame or box 2. Two segmental rack-bars 3 and 4, which are formed on or secured to the lever, are arranged to engage the toothed sectors 5 and 6, secured on the shaft 7. As the segmental racks 3 and 4 are at different distances from the center of movement of the lever 1 and are formed on arcs of different radii, the toothed sectors are so proportioned that the angular movement of the shaft 7 shall correspond to the angular movement of the lever regardless of the direction in which the lever is moved. On the shaft 7 is secured an arm 8, provided with a head 9, carrying one or more pairs of contact pieces or blocks 10 and 11. These blocks are pivotally mounted in slots or recesses formed in the head and are provided with arms 12, to which springs 13 are connected, so as to yieldingly hold the blocks against the contact-plates 14, arranged in an arc of a circle corresponding to that described by the head 9. The springs can be conveniently arranged to connect the arms of each pair of blocks, as shown in Figs. 2, 4, and 5, the members of each pair being oppositely arranged on opposite sides of the head. The blocks and contact-plates 14 are so arranged with reference to each other that one block will make contact with one plate before the other contact will pass off of the adjoining plate. The plates 14 are suitably connected to resistances 15, arranged in the box or case 2.

The inner or lower end of the lever is constructed to rotate a shaft 16, which is adapted to operate movable members and circuit-controller. A convenient construction for operating the shaft consists of a disk 17, secured on the shaft and provided with a notch 18, adapted to engage a toe on the end of the lever when the latter is in middle or normal position. By a short preliminary movement of the lever in either direction the shaft is rotated sufficiently to close the circuit, as hereinafter stated. As the projection or toe 18^a passes out of the notch the curved perimeter of the lower end of the lever will enter one of the concave seats 19, formed in the disk on both sides of the notch, and thereby lock the disk and shaft as against movement until the lever is returned to normal position. On the shaft 16 is secured a cast-iron block 20, provided with arms 21 and 22, which form the cores of electromagnets 23, included, as shown, in the circuit to be controlled and regulated. One or more contact-blocks 24 are pivotally mounted on the ends of the arms or cores 21 and 22 and are pressed outwardly by springs. As shown in Fig. 6, spiral springs 25, having one end connected to shafts 26 and the opposite ends bearing on the blocks, can be conveniently employed for forcing the blocks outwardly. In order to adjust the tension of the springs, slotted arms 27 are secured to the ends of the shafts, said arms being held in adjusted positions by clamping-screws passing through the slots in the arms. It will be

observed that by the employment of electromagnets as contacts for the current-controller a magnetic blow-out is formed to prevent any injurious arcing between the contact-blocks carried by the cores of the magnets and contact-plates 28, 28ª, and 29, which are secured to the supporting-frame in such position that the blocks will be brought into contact therewith when shifted. The plates 28 28ª are electrically connected; but the middle plate 29 is insulated from each of the others.

It will be observed that the contact pieces or blocks carried by the head 9 are always in contact with the contact-plates 14 and the blocks 10 and 11 are so constructed and arranged with reference to the spacing of the contact-plates 14 that one of the blocks will always be in contact with a plate before the other block leaves the adjoining plate, thereby preventing any arcing between the plates and blocks. It is a further characteristic of my improvement that by arranging the blow-out upon the circuit-changer no arcing can be formed such as will injure the plates 14 and blocks 10 and 11.

As the rack-bars 3 and 4 operate on opposite sides of the shaft to rotate the same, it follows that the movement of the arm 8 will be always in the same direction—*i. e.*, from right to left in Fig. 2—regardless of the direction in which the lever 1 is shifted from normal position.

The several parts of the mechanism are so connected that when the controller is shifted to the right in Fig. 2 the current will flow in one direction through the working circuit connected to the binding-posts 30 and 31, one of said posts being connected to both plates 28 and 28ª and the other post to the plate 29, and by shifting the shaft 16 in the opposite direction the current through the working circuit will be reversed.

The connections from the lever 1 to the shafts 7 and 16 are so arranged that the controller will effect a closure of the circuit before any material movement is imparted to the arm 8 of the regulator.

I claim herein as my invention—

1. A regulator or controller having in combination, a series of contact-plates connected to resistances, a head carrying contacts and movable along the line of the contact-plates, a circuit-changer consisting of electromagnets having contact-plates in circuit with the magnets and stationary contact-plates, and means for shifting the head and circuit-changer in succession, substantially as set forth.

2. A regulator or controller having in combination, a series of contact-plates connected to resistances, a head carrying contacts so arranged with reference to the contact-plates as to maintain a closed circuit at all times and a circuit-changer provided with a magnetic blow-out, substantially as set forth.

3. A regulator or controller having in combination a series of contact-plates connected to resistances, a shaft having toothed sectors formed on arcs of different radii, a contact-head carried by said shaft and a lever having toothed racks formed on arcs of different radii and adapted to engage said sectors alternately, whereby the angular movement of the shaft will always correspond to the angular movement of the lever, substantially as set forth.

4. A regulator or controller having in combination a series of contact-plates connected to resistances, a shaft having toothed sectors formed on arcs of different radii, a contact-head carried by said shaft, a lever having toothed racks formed on arcs of different radii and adapted to engage said sectors alternately, a circuit-changer operated by the lever and a lock for the circuit-changer adapted to lock the same in either position as against further movement by the lever, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILBER A. CARRELL.

Witnesses:

DARWIN S. WOLCOTT,

F. E. GAITHER.