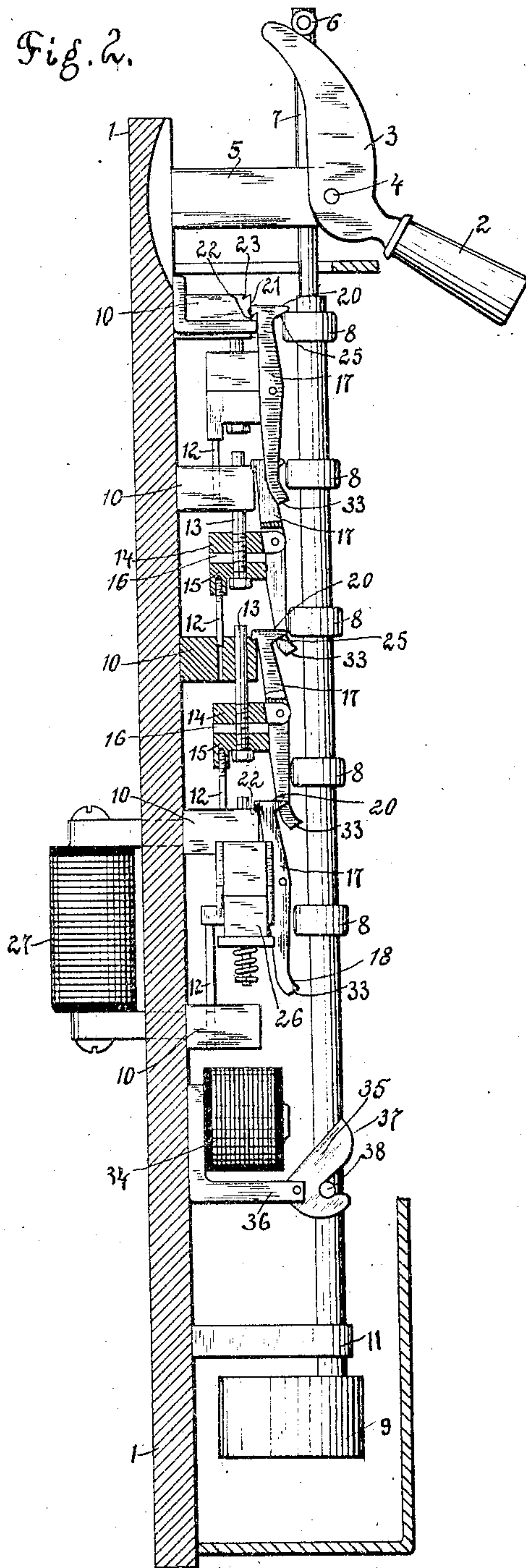
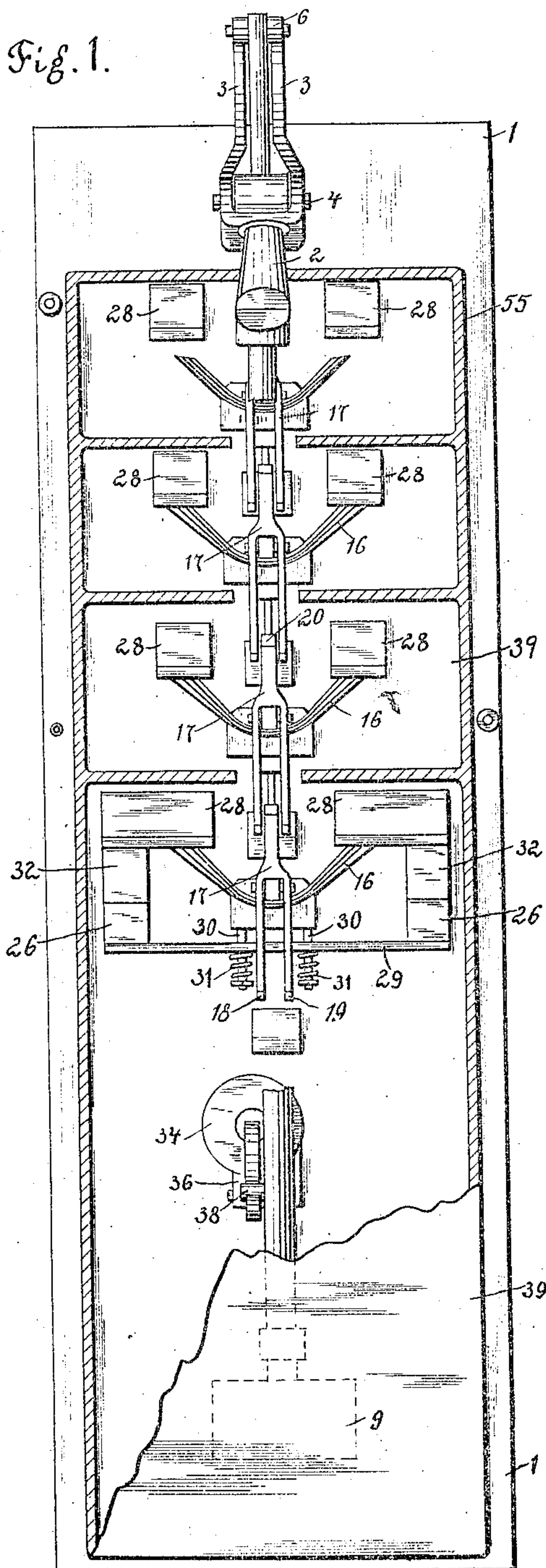


R. W. BROWN.
ELECTRIC CONTROLLER.
APPLICATION FILED JAN. 23, 1906.

2 SHEETS—SHEET 1.



Witnesses
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2 SHEETS—SHEET 2.

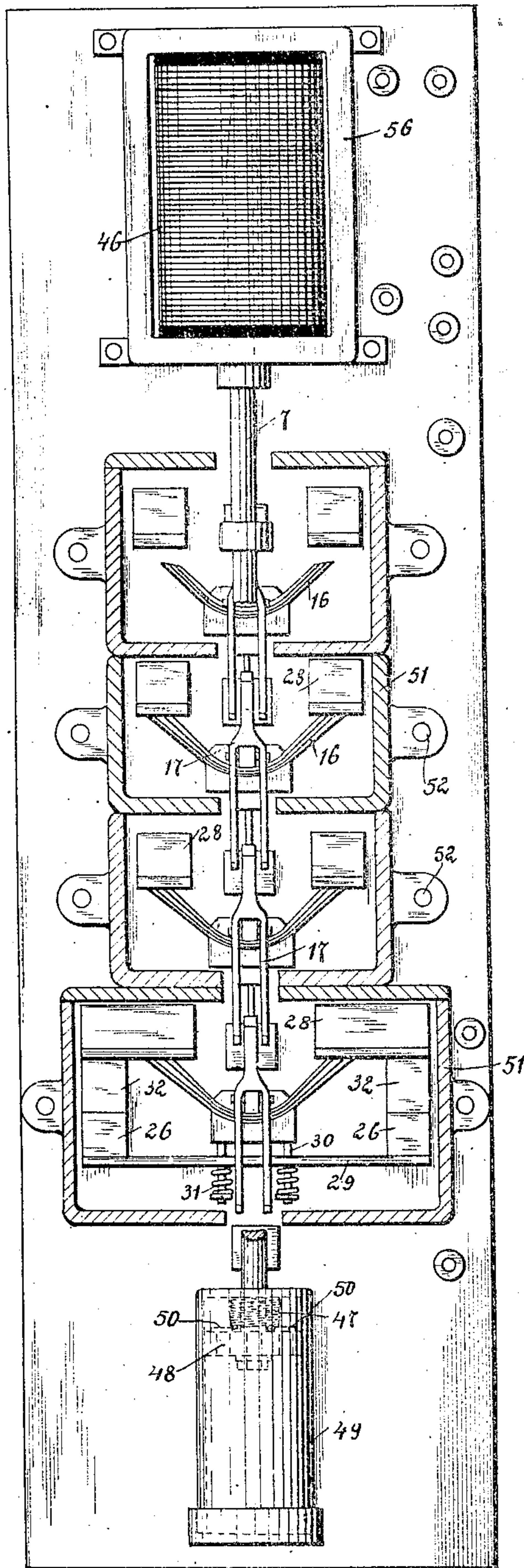


Fig. 4.

Witnesses
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Fig. 3.

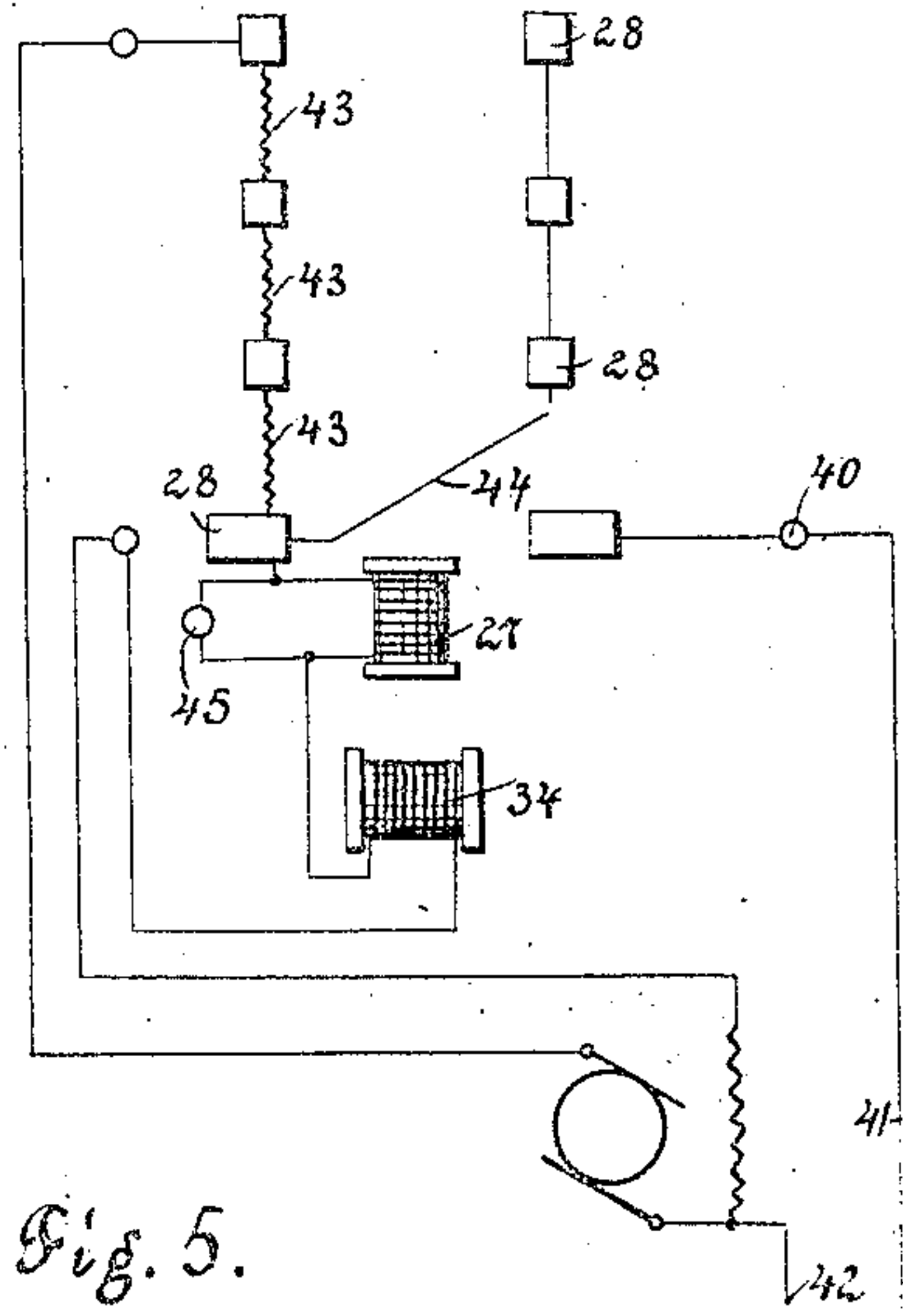
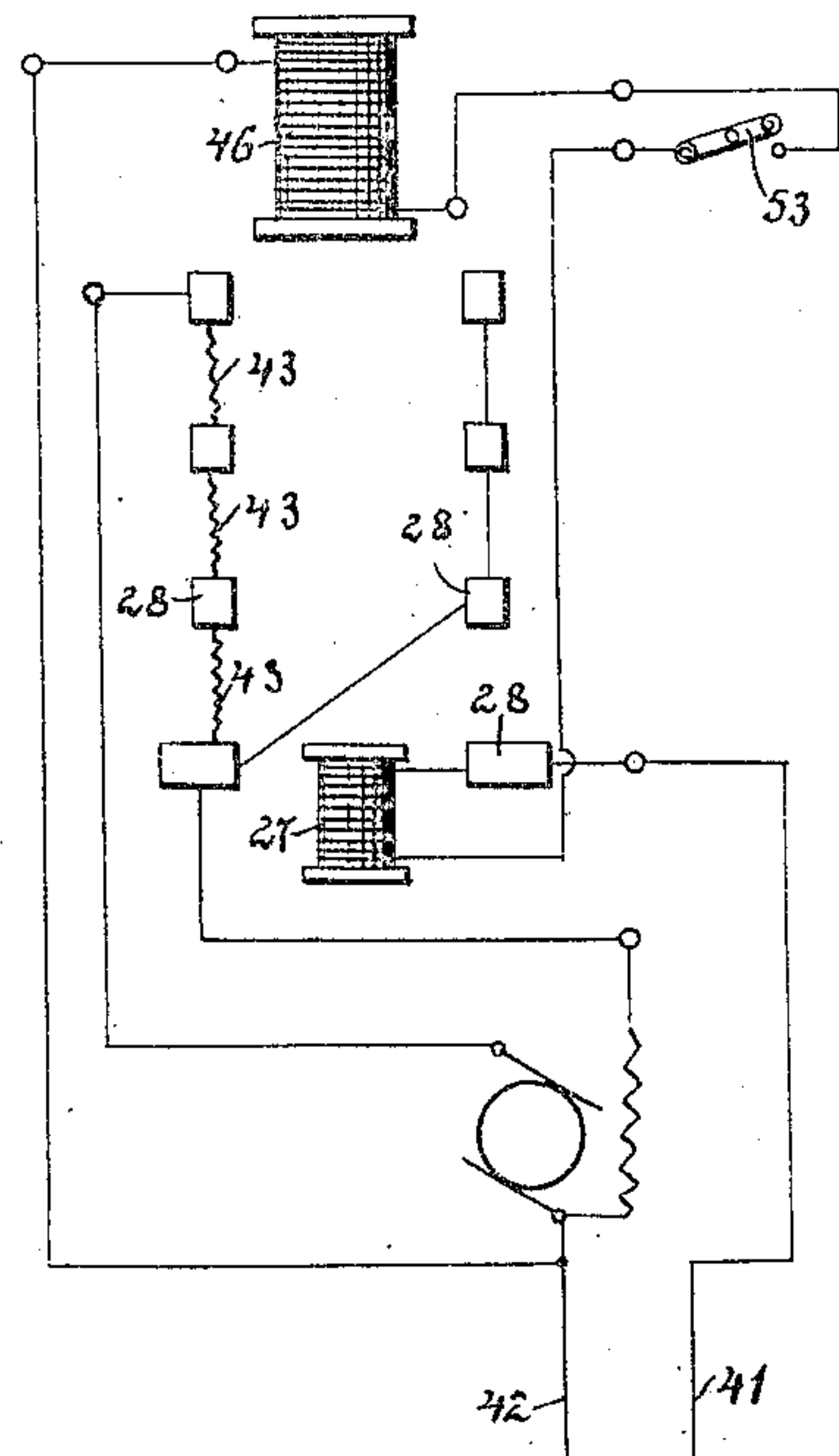


Fig. 5.



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UNITED STATES PATENT OFFICE.

ROY W. BROWN, OF AMSTERDAM, NEW YORK.

ELECTRIC CONTROLLER.

No. 836,666.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed January 23, 1906. Serial No. 297,411.

To all whom it may concern:

Be it known that I, ROY W. BROWN, a citizen of the United States, and a resident of Amsterdam, county of Montgomery, State of New York, have invented new and useful Improvements in Electric Controllers, of which the following is a specification.

My invention relates to electric controllers; and the object of my invention is to provide a controller which will operate to vary the amount of current fed to any electrical device.

The invention also consists in providing a plurality of switches and a means for closing the said switches in succession as the said means is moved along in one direction.

The invention also consists in providing a plurality of switches, a means for causing the said switches to be closed in succession, and to open the said switches.

The invention also consists in providing a switch having an engaging device which slips over the pole of a magnet and permits the switch to be opened when the magnet is de-energized.

The invention also consists in providing a plurality of switches, a means for closing and opening the said switches in succession, and a means for locking the said switches.

The invention consists in other features disclosed in the following description, illustrated in the drawings, and claimed in the claims.

Referring to the drawings, Figure 1 illustrates a front view, partly in section, of one form of my invention. Fig. 2 illustrates a side view, partly in section, of the device illustrated in Fig. 1. Fig. 3 is a diagram of the connections between the parts of the device illustrated in Figs. 1 and 2. Fig. 4 is an illustration of the front view, partly in section, of a modification of my invention. Fig. 5 is a diagram showing the connections between the parts of the device illustrated in Fig. 4.

1, Figs. 1 and 2, is the base of my electric controller. A manual means is supported at the top of the base. The manual means consists of a handle 2, having a cam 3, which is pivoted at 4 to a post 5, located at the top of the base 1. A roller 6 is adapted to move on and be raised by the surface of the cam 3 as the handle 2 is moved.

The roller 6 is attached to a rod 7, which passes through and is guided by the posts 5 and 11. Rod 7 is provided with a plurality

of collars 8 8, which are located along the rod and at equal distance apart. The lower end of the rod 7 is attached to a weight 9. A spring 47 may be used in place of the weight 9 if it is desired, as shown in Fig. 4. The manual means located at the top of the panel 1 is adapted to move the rod in one direction, and the weight 9 or spring is adapted to move the rod in the opposite direction.

The collars 8 are arranged so that they will operate to close switches or leaf-spring 16. The leaf-spring contacts 16 are guided by posts 10 10, which are attached to the base 1. Guiding-pins 12 12 pass through the posts 10 10, and screw-pins 13 13 also pass through posts 10 10 and operate to guide the switches. The guiding-pins 12 and 13 are in each case attached to blocks 14 15, which are located on each side of the leaf-spring contact 16. The blocks 14 and 15 and the leaf-spring contact 16 are secured together by means of the screw-pin 13, which passes through the three parts. The movable leaf-spring contacts make contact with the fixed contact 28, located on each side. To the lowest block 15 is also attached carbon contacts 26, which are mounted on a cross-piece 29. Rod 30 30 pass through the cross-piece 29. Springs 31 31 are located on the ends of the rod 30 30 and are adapted to press the contacts 26 against the carbons 32 and until after the leaf-spring 16 is removed from contact 28. The contacts 32 are attached to the fixed contacts 28.

To the blocks 14 are pivoted engaging devices or catches 17 17. The catches 17 are forked and are provided with legs 18 and 19, which extend on each side of the head 20 of the switch below. The front 21 of the head 20 is smooth and adapted to move over the tops of the posts 10. The lower side 22 of the front portion of the head is slightly undercut or beveled inward and is adapted to register with the notch or beveled portion 23, located at the top of each of the posts 10 10. The lower catch 17, however, has the front portion of its head beveled in the opposite direction and the upper edge of the post correspondingly beveled. The two lower posts 10 are made of iron and form the poles of the electromagnet 27, located on the back of the panel. When the catch 17 is drawn upward sufficiently high so that the head of the catch extends over the end of the post 10, the catch makes a sufficiently close contact so that the electromagnet 27 will retain the catch in this

position and hold the switches connected therewith closed.

The catches are engaged by the collars 8 8, located on the rod 7. They are adapted to
5 press upon the inclined surfaces 25 of the catches 17 when the rod 6 is raised by the operation of the cam.

The second collar 8 counting from the lower end of the rod 7 first comes in contact with
10 the inclined surface 25 of the lowest catch 17, and as the rod is raised the catch 17 is drawn upward, together with the leaf-spring 16 and the carbon contacts 26 26, until the head of the catch 17 slips over the posts 10. The
15 leaf-spring contact closes with the fixed contact and the carbon contacts 26 close with the carbon contacts 32. A circuit then passes through the electromagnet 27 and the post 10 becomes magnetized and the lowest
20 catch 17 is engaged and held thereby, which holds the lowest contact closed.

As the rod 7 moves on in its upward direction the second collar passes the head of the lowest catch 17 and the next collar above it
25 engages the next catch 17 and draws it upward until the leaf-spring attached thereto is closed with the fixed contact 28 28 and the head 20 slips over the top of the post 10 and engages in the notch 23. As the rod 7
30 is moved on up the next collar comes into play and operates upon the next catch in the same way until all of the contacts are closed.

When the rod 7 is allowed to return, the collars 8 are adapted to open the switches.
35 This is done by the collars operating upon the catches 17. The lower parts of the catches are provided with inclined lugs 33 33, which extend outward and are located in the path of the collars 8 when the catches are in
40 position to hold the contacts in closed position. The catches 17 being forked and the head of each catch being located above the lower end of the catch above it, the collar which operated to close it is adapted to operate
45 upon the lug 33 of the catch above it and open the catch above it. When the rod 7 is allowed to return, the second collar 8 counting from the top of the rod 7 first operates upon the inclined surface of the lug 33 and
50 disengages the uppermost catch 17 from the post 10 and the uppermost movable contact drops and the circuit is opened at that point. As the rod 7 moves downward the next lower collar 8 operates upon the next catch 17 and
55 likewise disengages that from the post 10. When the lowest collar strikes the lowest switch 8 in its downward motion, it pulls the upper end of the catch 17 away from the post 10 and allows the contacts 16 and 26 to open.

If the rod is not drawn upward sufficiently to close all the contacts, it will return by its own weight to open the switches that it has closed. In order to hold the rod 7 in its uppermost position after all of the movable
65 contacts are closed, the magnet 34 is provided.

It has an armature 35, pivoted to the pole 36 of the magnet 34. The end of the armature 35 has a cam-surface 37. A pin 38 is located on the rod 7, and as the rod 7 is raised it first strikes the cam-surface 37 and pushes the
70 armature 35 upward until the pin 38 reaches its highest position—that is, when the last switch is closed. This presses the armature 35 against the magnet 34, and the magnet 34 maintains it in this closed position and holds
75 the rod 7 until the said magnet is deenergized.

All of the working parts of the controller may be inclosed in a case 55, of porcelain or any other material, and the same filled with
80 oil in order to prevent the arcing between the contacts and also to keep the working parts thoroughly lubricated, or the switches may be located in compartments, as shown in Figs. 1 and 4.
85

Referring to the diagram shown in Fig. 3, the controller (illustrated in Fig. 1) is shown as being connected with an electric motor. The binding-post 40 is connected with the main line 41. The other main line 42 is con-
90 nected to the binding-post of the motor. The lowest contact 28 of the controller is connected to the binding-post 40, and when the lowest contact 16 and the carbon contacts 26 are closed the current passes from the
95 main line 41 through the resistances 43 43 to the armature of the motor and also from the left contact 28 to the magnets 27 and 34 to the field of the motor. When the next contact above is closed, the lowest resistance 43
100 is short-circuited by the connection 44 to the right contact 28 of the pair located above. When the next contact 16 is closed, the next resistance 43 is short-circuited, and so on until all of the resistances or as many as are
105 desired of the resistances are short-circuited. The current to the armature of the motor is thus regulated.

If it is desired to open the circuit, the switch or push-button 45 may be closed and
110 the magnet 27 short-circuited. This will permit the lowest switch to open, since the catch 17 will then slip off from the post 10 and the connection with the right contact 28 will be broken and the current through mag-
115 net 34 will be discontinued and the armature 35 allowed to swing down, which will permit the rod 7 to drop, and all of the contacts will be opened. By opening the lowest switch first the carbon points 26 will take the arcing
120 of the current and will prevent any injury being done to the leaf-spring 16 of any other switches.

Referring to Fig. 4, the same numerals refer to the same parts. In this form of the
125 invention the rod 7 is operated by means of a solenoid 46. The rod 7 operates to lift the catches 17, as in the form of invention shown in Figs. 1 and 2. To the lower end of the rod is attached a piston 48, which is located in a
130

cylinder 49, which operates to cushion the action of the solenoid. The piston 48 is provided with valves 50, which are adapted to be closed when the piston is moved upward and to open when the piston moves in the opposite direction. A spring 47 may also be used to press the piston 48 downward. The contacts 16 are located in compartments 51, which are made of porcelain and prevents any arcing between the contacts of the different compartments. Each compartment, as here shown, is separable and completely incloses each set of contacts.

The diagram of the connections between the parts of the device illustrated in Fig. 4 is shown in Fig. 5. Here the magnet 27 is connected to the switch 53, which is in turn connected to the solenoid 46. When the switch 53 is closed, a current passes from the main line 41 through the magnet 27, switch 53, solenoid 46 to the main line 42. This operates to draw the rod 7 upward by means of the solenoid 46, and at the same time energizes magnet 27 and permits the lowest catch 17 to engage with the post 10 and be retained thereby. This causes the current to pass through all of the resistances 43 and the armature of the motor. As the solenoid 46 continues to draw the rod 7 on upward the next pair of contacts 28 are closed and the lowest resistance 43 is short-circuited. The solenoid 46 thus operates until all of the resistances 43, or as many as is desired, are short-circuited. The solenoid 46 operates to hold the rod 7 in its uppermost position and permit the switches to remain closed until the switch 53 is opened, when the magnet 27 will allow the lowest catch 17 to slip off from its pole and open the lowest switch first. The carbon contacts, as before, will thus take the arcing at the breaking of the circuit. In the meantime the solenoid 46 permits the rod 7 to drop, and the switches are opened in succession, as before. The current passing through the motor is thus regulated or controlled.

The invention may be varied by those skilled in the art without departing from the spirit thereof.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In an electric controller the combination of a plurality of switches, a means for closing the said switches, an electromagnetic means for allowing one of the said switches to open and to permit the said closing means to open the remaining switches.

2. In an electric controller the combination of a plurality of switches, a means for closing the said switches in succession, a retaining means connected with each of the said switches, a receptacle containing an insulating fluid for inclosing the said switches and the said retaining means, the said recep-

tacle having compartments and a switch located in each of the said compartments.

3. In an electric controller the combination of a plurality of switches, a plurality of catches associated with the said switches, a rod, means located on the said rod for engaging the said catches and adapted to move the said switches until the said catches are so engaged as to maintain the said switches closed.

4. In an electric controller the combination of a plurality of switches, a catch associated with each of the said switches, a mechanical means adapted to engage with the said catches in succession until the said switches are successively closed as the said mechanical means is moved along in one direction.

5. In an electric controller the combination of a plurality of switches arranged in a series, a mechanical means for holding the said switches in a closed position and an automatic means whereby the said switches will be opened in case the means for closing the said switches have not closed a certain number.

6. In an electric controller the combination of a plurality of switches arranged in a series, retaining mechanism for holding said switches in a closed position and means for releasing the said retaining mechanism, a receptacle having compartments, one of said switches located in each of said compartments and for containing insulating fluid or compound.

7. In an electric controller the combination of a plurality of switches arranged in a series, retaining mechanism for holding said switches in a closed position and means for releasing the said retaining mechanism, a receptacle having compartments, a separate compartment for containing each of the said switches, the walls of the said compartments being composed of porcelain or other insulating material.

8. In an electric controller the combination of a plurality of switches, a catch connected to each of the said switches, a rod adapted to engage with each of the said catches in succession as the rod is moved continuously in one direction.

9. In an electric controller the combination of a plurality of switches, a plurality of catches connected to the said switches, means for cooperating with the said catches to retain each of the said switches in a closed position, a rod adapted to engage the said catches to close the switches as the said rod moves continuously in one direction and to trip the said catches to open the switches as the rod moves continuously in the opposite direction.

10. In an electric controller the combination of a plurality of switches, catches con-

needed to the said switches, means coöperating with the said catches to retain the said switches in a closed position, a means for moving the said catches and causing them to engage and for tripping the said catches to open the switches.

11. In an electric controller the combination of a plurality of switches, catches adapted to retain the said switches in closed positions, means for closing the said switches and causing the said catches to engage and for tripping the said catches.

12. In an electric controller the combination of a plurality of switches, catches adapted to retain the said switches in closed positions, a movable body adapted to operate on the said catches and cause the same to become engaged, a magnet having an armature operated by the said movable body and adapted to hold the same when the said movable body reaches a predetermined point.

13. In an electric controller the combination of a plurality of switches, a movable body adapted to close the said switches in succession and to open the said switches in succession, a magnet having an armature operated by the said movable body and adapted to retain the said movable body in a predetermined position.

14. In an electric controller the combination of a plurality of switches, catches connected to the said switches, a post located between each of the said switches and adapted to guide the same, means for causing the said catches to engage with the said posts.

15. In an electric controller the combination of a plurality of switches, a post located between each of the said switches for guiding the said switches, a plurality of catches connected to the said switches and adapted to engage on the said posts, a movable body adapted to close the said switches and to open the said switches in succession.

16. In an electric controller the combination of a plurality of switches, an electro-

magnet, a plurality of posts for guiding the said switches, certain of the said posts constituting the poles of the said magnet, a magnetic means for retaining certain of the said switches in a closed position and an electromagnetic means coöperating with the said electromagnet for retaining them and the said switches in a closed position.

17. In an electric controller the combination of a plurality of switches, a plurality of posts for guiding the said switches, certain of the posts being magnetic, an electromagnet connected to the said magnetic posts, a plurality of catches adapted to engage with the said posts to hold the said switches in a closed position, a movable body for engaging the said catches to close the said switches in succession and for tripping the said catches to open the said switches in succession.

18. In an electric controller the combination of a plurality of switches, a mechanical means connected to each of said switches for causing the said switches to remain closed and a means for operating on each of said mechanical means to close the said switches in succession and to open the said switches in succession.

19. In an electric controller the combination of a plurality of switches, a mechanical means for completely closing the said switches in succession as the said means is moved continuously in one direction, a mechanical means for retaining each of the said switches in a closed position, the said mechanical means for closing the said switches adapted to operate upon each of the said retaining means to open the said switches in succession.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROY W. BROWN.

Witnesses:

FRED G. MORSE,
J. H. DEALY.