

R. W. BROWN.  
ELECTRIC CONTROLLER.  
APPLICATION FILED AUG. 30, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1

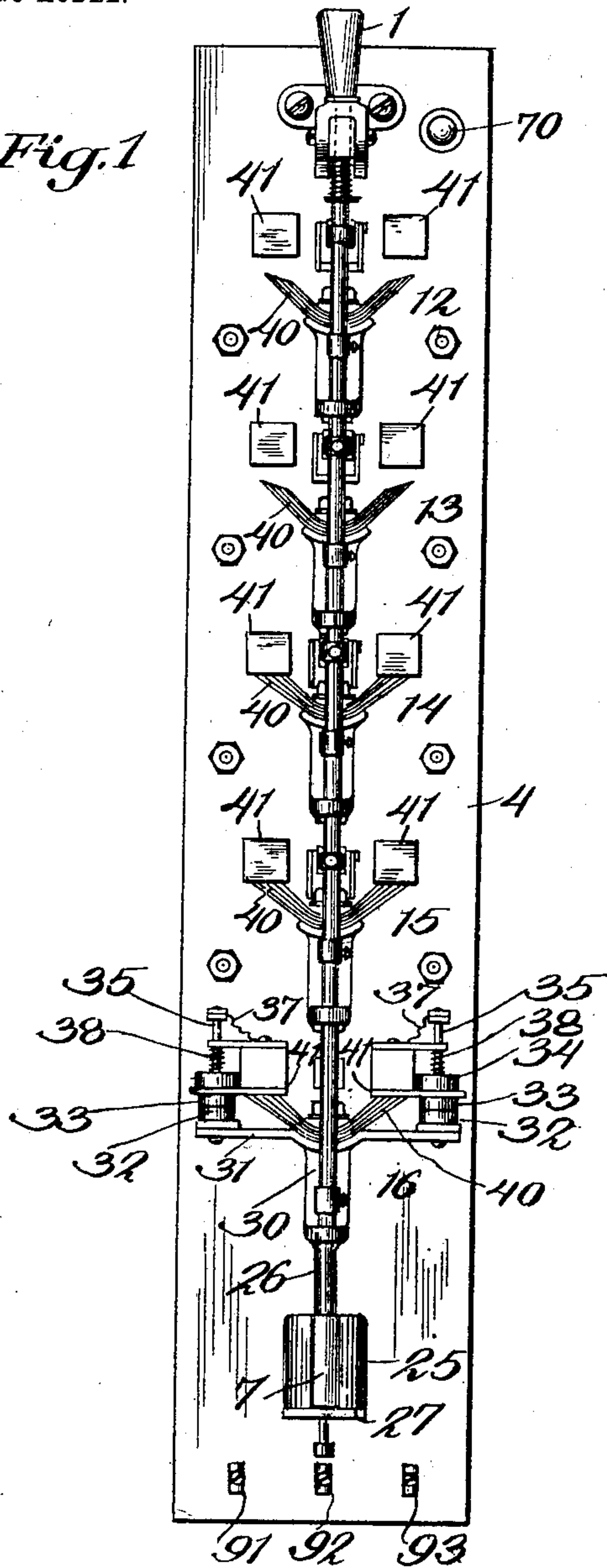
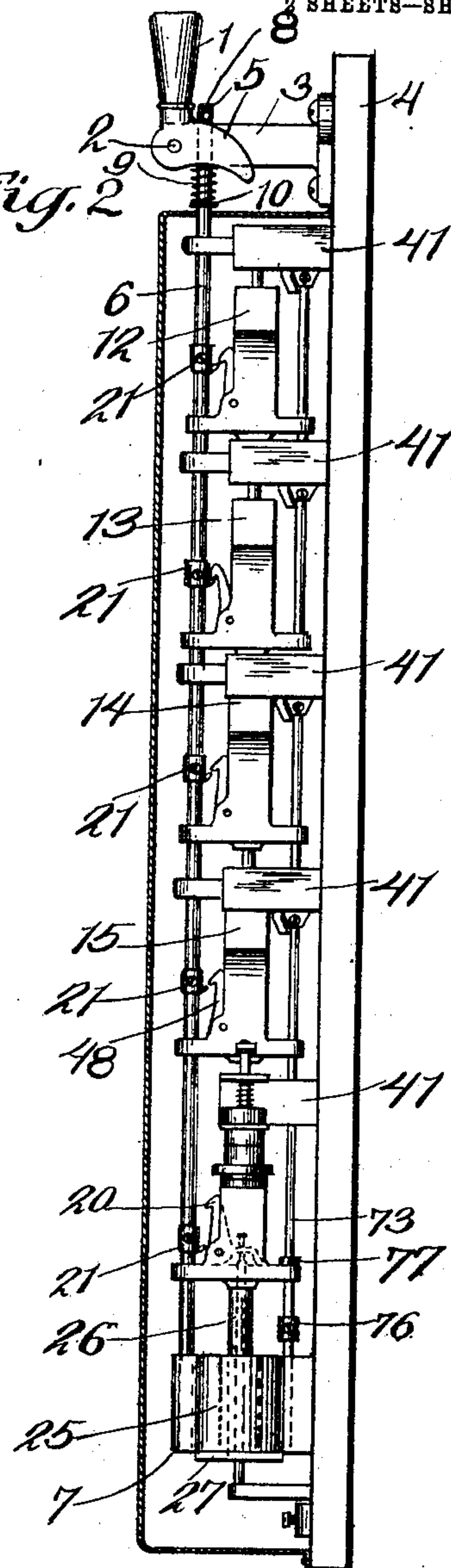


Fig. 2



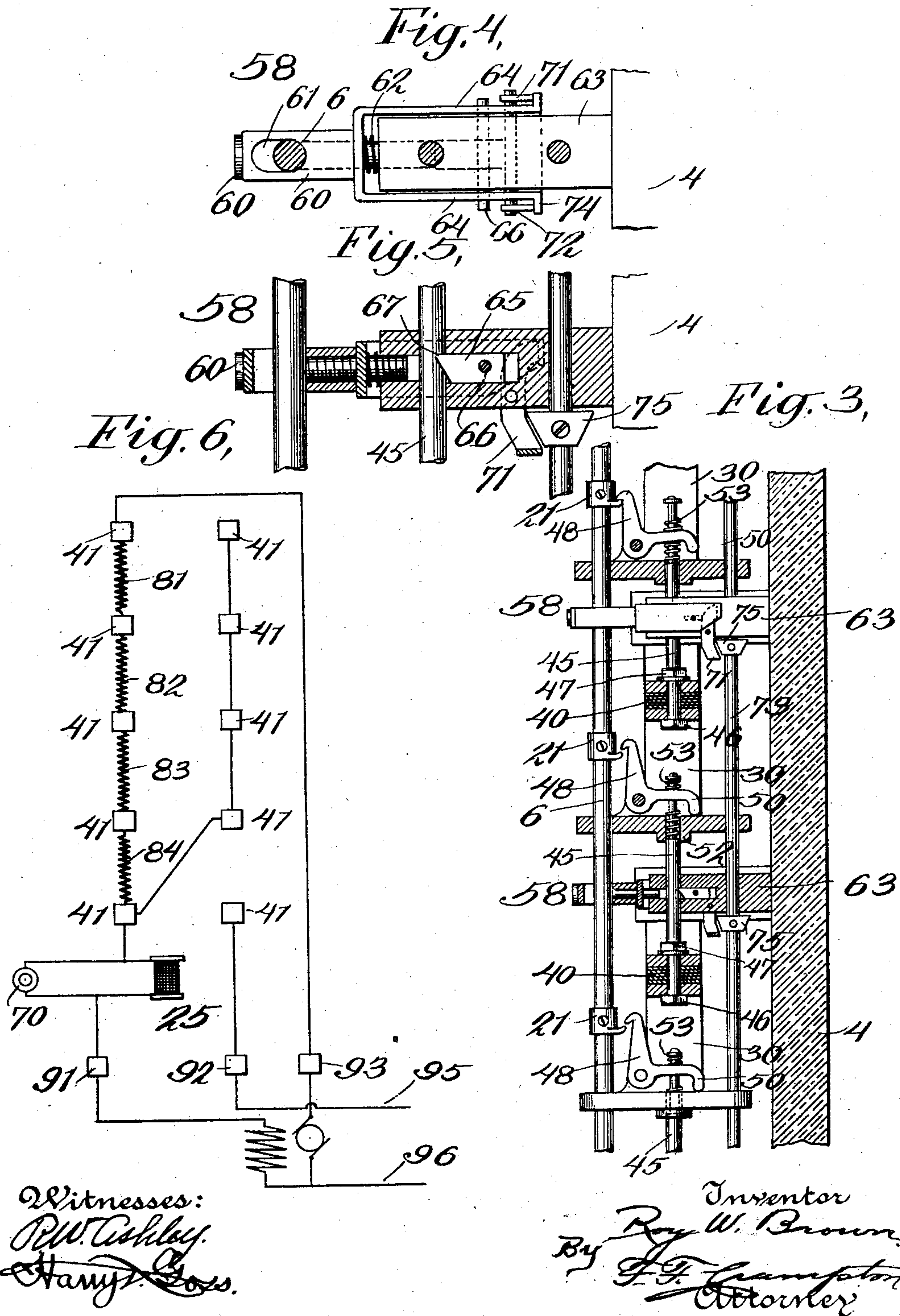
Witnesses:  
R. W. Tishley  
Harry L. Lorr

Inventor  
R. W. Brown  
By J. E. Hampton  
Attorney

R. W. BROWN.  
ELECTRIC CONTROLLER.  
APPLICATION FILED AUG. 30, 1902.

NO MODEL.

2 SHEETS—SHEET 2.





# UNITED STATES PATENT OFFICE.

ROY W. BROWN, OF CHICAGO, ILLINOIS.

## ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 719,991, dated February 10, 1903.

Application filed August 30, 1902. Serial No. 121,684. (No model.)

*To all whom it may concern:*

Be it known that I, ROY W. BROWN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Controllers, of which the following is a specification, reference being had to the accompanying drawings, forming part hereof.

My invention relates to electric controllers; and it has for its object to control the supply of electric current to electric devices, and thereby control such devices.

It also has for its object to provide a controlling device which will connect a number of resistance-bodies to an external circuit step by step, and thereby decrease the resistance of the said circuit by degrees.

The invention consists in providing a plurality of resistance-bodies connected in a circuit and means for shunting any number of the said resistance-bodies.

The invention also consists in providing a means for shunting the said resistance-bodies one after the other, according as the supply of the electric current is to be controlled.

The invention also consists in providing a switch and a plurality of subswitches which operate to shunt the circuit through the said resistances. The invention also consists in providing means for disconnecting any one of the said switches and a means for disconnecting all of the said switches.

The invention consists in other features of construction and combinations of parts hereinafter described and claimed.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 illustrates a front view of the electric controlling device. Fig. 2 illustrates a side view showing the cover of the electric controlling device in section. Fig. 3 is a sectional view showing the working parts of three of the switches. Fig. 4 illustrates a latch used for supporting each of the switches of the controller. Fig. 5 illustrates a sectional view of the latch. Fig. 6 is a diagram illustrating the connections of the different parts of the controlling device with an electric system.

Referring to Figs. 1 and 2, 1 illustrates a handle pivoted at 2 upon a support 3, fastened to the base-board 4 of the controller.

A cam 5 is attached to the lower end of the handle 1. Below the handle and extending the full length of the controller is a rod 6, which is guided by the supports 7 and 3, which are located on the base-board 4. At the upper end of this rod there is located a cam-roller 8, adapted to bear upon the cam-surface of the cam 5. A spring 9, which is located between the pin 10, located upon the rod 6, and the support 3, tends to force the rod 6 downward. As the lever 1 is pulled down the cam-surface of the cam 5 operates upon the roller 8 to lift the rod 6 against the tension of the spring 9. The rod 6 is provided with devices for closing the switches 12, 13, 14, 15, and 16 as the rod is lifted. The switches 12, 13, 14, 15, and 16 are arranged along the rod and are associated with mechanism which is adapted to close one of the switches each time the rod is lifted. The first time that the rod is lifted by the operation of the handle 1 the lower switch 16, or the master-switch, is lifted, and upon a return motion of the rod 6 the mechanism of switch 15 is placed in position so as to be lifted in its turn by the rod 6 as it is moved upward. When the rod 6 returns, the switch 14 is likewise caught and lifted upon the return of the rod 6, and so on with each of the switches. In order to perform this function of lifting each of the switches in succession, a catch is provided for each of the switches and a latch for securing the switch when it is lifted. Mechanism is also provided for placing the catch of each of the switches in a position to be caught by the rod 6 after the switch located just below has been lifted by a preceding operation of the rod. The switches are each provided with a catch 20, which is adapted to seize upon the projection of each of the collars 21, located on the rod 6. The catch 20 is pivoted to the frame of the switch 16. When, therefore, the rod 6 is first raised, the catch 20 seizes upon the projection of the collar 21 and the switch 16 is raised by the upward motion of the rod 6. Just below the switch 16 is located an electromagnet 25. A rod 26 is attached to the framework of the switch 16 and passes down through the core of the magnet 25. An armature 27 is attached to the lower end of the rod 26. The electromagnet is connected to one side of the switch



16 and also with one of the mains, as shown in Fig. 6, so that when the switch 16 is closed by the operation of the rod 6 the electric current passes through the electromagnet 25.

5 This energizes the magnet and it retains its armature 27 and holds the switch 16 in its closed position. The switch 16 consists of a frame 30, having a yoke 31. On the outer ends of the yoke 31 are located the carbon-

10 terminals 32, which are adapted to make contact with the carbon contacts 33, supported by the base-board of the controller. The carbon contacts 33 are supported in cups located at the ends of the spring-pressed rods

15 35. The rods 35 are connected to the terminal contacts 41 by the connecting-wire 37. As the switch-frame 30 is raised the carbon contacts 32 make contact with the contacts 33 and press the contacts 33 upward against

20 the tension of a spring 38, located in the rod 35. A leaf spring or contact 40 is also carried by the frame 30 and makes contact with the fixed contacts 41 when the frame 30 is brought to its highest position. When in this

25 position, it is retained by the magnet 25. On each of the switch-frames there is located a rod 45, which extends upward and through the lower part of the switch-frame located above it. The rod 45 has at its lower end

30 nuts 46 and 47, which are employed to secure the leaf springs or contacts to the upper part of the frame on which they are supported and also to secure the rod to the frame. The frames of the other switches are substantially the same as that of the switch 16,

35 except that the carbon contacts 32, with their supporting-yoke, are omitted. The rod 45 of each of the frames except the top passes upward through the switch-frame above and

40 controls the catch mechanism of that frame. As each of the frames is lifted the catch of the frame above is affected. The lower end of each catch has an extending foot 50, which is adapted to receive the rod 45. Rod 45 carries

45 two springs 52 53 at its upper end, located on each side of the foot 50. The lower spring 52 tends to push the foot 50 upward and the upper spring 53, which is located between the foot 50 and upper end of the rod 45, tends

50 to push the foot 50 downward. When the switches are in their normal positions, the upper spring tends to hold the catch 48 away from the projection on each of the collars 21. When, however, the switch-frame below is

55 lifted—as, for instance, the master-switch—by the operation of the rod 6, the rod 45, carried by the said master-switch, is pushed upward. This brings into operation the lower spring

60 52, located on the rod 45, which pushes the catch 48 of the switch 15 forward, so that it will engage with the collar 21, when the rod 6 is again raised by the operation of the cam 5. As the rod 6 returns after lifting the master-switch 16 the projection on the collar 21

65 passes by the catch 48 of the switch 15, and then as the rod 6 returns the catch engages with the collar and the switch 15 is lifted.

When the switch 15 is lifted, the rod 45, located on its frame, is also pushed upward through the frame of the switch 14. This brings the

70 lower spring of the rod of the switch 15 to bear against the catch 48 of the switch 14, and this catch is likewise thrown forward, so as to be engaged by the collar 21 on the rod 6 when the said rod is again raised. As the

75 rod returns the collar passes the catch 48 of the switch 14 as it did in the case of the switch 15, and upon the succeeding upward motion of the rod 6 the switch 14 is raised. This same operation takes place with each of

80 the switches. Any number of switches may be located along the rod 6 and may be operated in succession in the same way until all the switches are closed. By this means any

85 number of the switches may be closed, depending upon the number of operations of the reciprocating rod 6. The switch-frames are guided by the rod 6 and a second rod 73,

90 located at the back of the switch-frames for controlling the retaining means of the frames. When the subswitches are raised, they are also fastened in their raised or closed position,

95 as in the case of the master-switch 16. In order to retain the subswitches in their raised position, the rod 45 passes through a latch mechanism 58. This latch mechanism is illustrated in detail in Figs. 4 and 5. The latch

100 mechanism 58 consists of a push-button 60, having a slot 61, adapted to receive the rod 6. A spring 62 is located between the push-button 60 and the support 63. The support 63 is fastened upon the base-board 4 of the controller. When the push-button 60 is pushed

105 inward, it operates against the tension of the spring 62, which returns the push-button 60 into its normal position when the finger is removed from the push-button. A yoke 64 is fastened to the push-button 60 and extends on each side of the support 63. To this yoke

110 64 and in a slot in the support 63 is attached a latch 65. The latch 65 is fastened to the yoke 64 by means of the pin 66. The rod 45 passes up through a hole in the support 63 and in front of the latch 65. There is located

115 in the rod 45 a notch 67. When the rod 45 is raised by the upward motion of the frame 30 of the switch below by the operation of the rod 6, the latch 65 engages with the rod 45 at the notch 67. Upon the return motion of the rod 6 the rod 45, together with the switch-

120 frame to which it is attached, is retained in its upward position by the latch 65. When, however, it is desired to open any one of the switches, the push-button 60 is operated, and the yoke 64, together with the pin 66 and

125 latch 65, is moved inward, and the rod 45, together with the switch-frame, is permitted to drop, thus opening the switch connected with the rod 45. In order to open the master-switch, a push-button 70 is provided, which

130 is connected to the terminals by the electromagnet 25. When this push-button 70 is closed, the electromagnet 25 is short-circuited, and the current passes through the con-



tacts of push-button 70, the electromagnet 25 is deenergized, and the armature 27, together with the rod 26 and the frame 30 of the master-switch, is allowed to drop. The leaf-springs 40 of the master-switch first separate from the contacts 41. The springs 38 force the terminals 33 against the carbon contacts 32 until after the spring-contacts have separated from the fixed contacts. This permits of the circuit being broken through the carbon-terminals last in order to reduce the burning effects of the electric current which occur at the breaking of a circuit. The sub-switches 12, 13, 14, and 15 may also be opened with the leaf-springs of the master-switch by means of mechanism associated with each of the latches. A yoke 71 is pivoted to each of the supports 63 by the pin 72. The ends of the yoke are positioned so as to operate on protruding lugs 74, located on the yoke 64. At the back of the frames 30 and extending the full length of the controller there is located a rod 73, which forms a guide, together with rod 6, for the frames as they are moved up and down. A plurality of adjustable cam-collars 75 is located on the rod 73 and in proximity to one end of each of the yoke-levers 71. When the rod 73 is moved downward, the cam-collars 75 operate on the levers 71. The levers 71 press upon the yokes 64, and the latches 65 are moved out of the notches located on the rods 45, and the frames are allowed to drop. In order to move the rod 73 so as to open the latches 65 an adjustable collar 76 is located on the rod 73 and at a point just below the frame 30 of the master-switch 16. When the master-switch is allowed to drop by the magnet 25 becoming deenergized, the frame of the switch 16 comes in contact with the collar 76, and the rod 73 with the cam-collars opens the latches. When the latches are opened, the switch-frames drop and the switches are opened. A second adjustable collar 77 is also located on the rod 73 above the frame of switch 16. When the frame of the switch 16 is raised by the rod 6, the frame comes in contact with the collar 77 and the rod 73 is raised, which moves the collar 75 clear of the levers 71 and permits the latches to engage with the rods on the frames as they are moved upward.

In Fig. 6 I have illustrated the connections of my controller with an electric system. Resistance-bodies 81, 82, 83, and 84 of any type are connected between the terminals 41 on one side of the controller. The terminals 41 on the opposite side of the controller except one are connected together. The lowest terminal 41 on that side of the controller is connected to the binding-post 92, which is connected to one of the mains 95 or to the source of supply of an electric current.

I have illustrated an electric shunt-wound motor connected with my controller. The controller, however, may be used to control the electric current supplied to any form of electric device. The armature is connected to the main 96 and to the binding-post 93. The

binding-post 93 is connected to the uppermost resistance-terminal 41. The lowest resistance-terminal 41 is connected to the line-terminal 41 of the pair of terminals just above it, to the electromagnet 25, and to the push-button 70. The magnet and the push-button are connected to the binding-post 91. The field of the motor is connected to the binding-post 91 and to the main 96. The current supplied to the motor is controlled by connecting the terminal 41 on one side of the controller to terminals on the opposite side by means of the switches. When the lowest pair of terminals are connected by the switch 16, the current passes through all of the resistances to the armature, thence to the mains. The current also passes through the field of the armature to the mains. As the switches are closed one by one the resistances are short-circuited to the line-terminals 41, switch 15 short-circuits resistance 84, switch 14 resistance 83, switch 13 resistance 82, and switch 12 short-circuits resistance 81 and connects the armature directly with the main 95 through the line-terminals 41. The full load of the current is thus turned upon motor. The current is diminished either by pressing the buttons 60 and allowing the switches to open one by one or by pressing the button 70 and opening all of the switches. The connections of the controller, however, may be varied according to the device to be controlled.

The features that I have described above and illustrated are merely of a preferable form, and they may be varied by those skilled in the art without departing from the spirit of my invention.

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

1. In an electric controller the combination of a plurality of resistance-bodies connected to an electric circuit, a plurality of contacts connected to the said resistance-bodies, a plurality of switches for shunting the said resistance-bodies, and a manual means for operating one upon each successive movement of the said means.

2. In an electric controller the combination of a plurality of switches, means for closing the said switches in succession upon each successive movement of the said means, a latch associated with each of the said switches adapted to be independently operated for permitting the said switches to open.

3. In an electric controller, the combination of a plurality of pairs of fixed contacts, a plurality of spring-contacts adapted to close the circuit between the contacts of each of the said pairs, a reciprocating device, and means for connecting the said reciprocating device to the said spring-contacts in succession and a latch associated with each of the said spring-contacts adapted to be independently operated for opening the said circuits.

4. In an electric controller the combination of a plurality of switches, a plurality of circuits closed by the said switches, a recipro-



cating means for operating the said switches and causing them to close the said circuits, and a thumb-latch associated with each of the said switches for retaining them in a closed position.

5. In an electric controller the combination of a plurality of pairs of fixed contacts, a spring-contact adapted to close the circuit between each pair, a reciprocating means for operating the said spring-contacts, latches adapted to open the said contacts individually or all together.

6. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts, a reciprocating means, a plurality of catches connected to the said movable contacts and adapted to engage the said means in succession and thumb-latches for opening the said contacts which said thumb-latches are mechanically connected together whereby they may be operated individually or all together.

7. In an electric controller, the combination of a plurality of fixed contacts and a plurality of spring-contacts a reciprocating device, a means associated with each of the said movable contacts for engaging with the said reciprocating device as it moves successively in the same direction, a manual means for retaining the said movable contact, an electromagnet for controlling the said retaining means whereby the connections between any number of the said movable contacts and the said fixed contacts may be opened.

8. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts, a reciprocating device adapted to engage the said movable contacts in succession, a manually-operated means for automatically moving the said movable contact to a closed position, a retaining means, an electromagnetic means for controlling the said retaining means whereby all of the said contacts may be opened at the same time or any number of them may be opened.

9. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts adapted to close connections between the said fixed contacts, a reciprocating rod, a plurality of catches associated with the said movable contact and adapted to engage with the said rod in succession, a thumb-latch adapted to retain the said movable spring-contact in a closed position, an electromagnetically-controlled means for controlling the said retaining means.

10. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts, a reciprocating rod, a plurality of catches associated with the said movable contacts and adapted to engage with the said reciprocating rod as the said rod moves successively in the same direction, a thumb-latch adapted to retain the said movable contacts in a closed position, a means for opening any number of the said contacts at the same time.

11. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts, a reciprocating rod, a plurality of catches associated with the said movable contacts and adapted to engage with the said reciprocating rod as it moves successively in the same direction, a thumb-latch associated with each of the said movable contacts and adapted to retain the said movable contact in a closed position, means for opening the said latches, an electromagnet for controlling the said means.

12. In an electric controller the combination of a plurality of fixed contacts, a plurality of movable contacts, a reciprocating means, a latch associated with each of the said movable contacts and adapted to secure the said means, and a manual means for operating the said latches.

13. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts, means for closing the said movable contacts with the said fixed contacts, thumb-latches for retaining the said movable contacts in a closed position, and a rod having collars for operating the said latches whereby one or more of the said movable contacts may be opened.

14. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts, means for closing the said movable contacts with the said fixed contacts, thumb-latches for retaining the said movable contacts in a closed position adapted to be individually operated, a rod having collars for operating the said latches and allowing all of the said contacts to open an electromagnet for controlling the operation of the said rod.

15. In an electric controller, the combination of a plurality of fixed contacts, a plurality of movable contacts, a reciprocating rod, a catch associated with each of the said movable contacts and adapted to engage with the said rod a means associated with each of the said movable contacts to operate the catches of the succeeding movable contact as the said movable contacts are moved upward, a manually-operated means for retaining the said movable contacts in a closed position, a rod having collars also for operating the said retaining means, an electromagnet for operating the said rod.

16. In an electric controller the combination of a reciprocating rod, a lever for operating the said rod, a plurality of switches, means for moving the said switches in succession, a rod associated with each of the said switches, a catch also associated with each of the said switches for retaining the said switches in a closed position and adapted to be operated by a rod of a preceding switch, a latch also associated with each of the said switches and adapted to secure the said rods and hold the said switches in a closed position, and a manual means for disconnecting the said latches.



17. In an electric controller, the combination of a reciprocating rod, a cam-lever for operating the said rod, a plurality of fixed contacts and a plurality of movable contacts,  
5 a catch associated with each of the said movable contacts and adapted to engage the said rod, a rod associated with each of the said movable contacts and adapted to operate the catches of each of the succeeding movable  
10 contacts as the said rod is moved upward, an electromagnet and latches adapted to retain the said movable contacts in a closed posi-

tion, a rod having collars adapted to open the said latches and controlled by the said electromagnet, and a push-button for short-cir- 15 cuiting the electromagnet.

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

ROY W. BROWN.

Witnesses:

EDWARD O. HAYMAN,  
PAUL GRUNWALD.