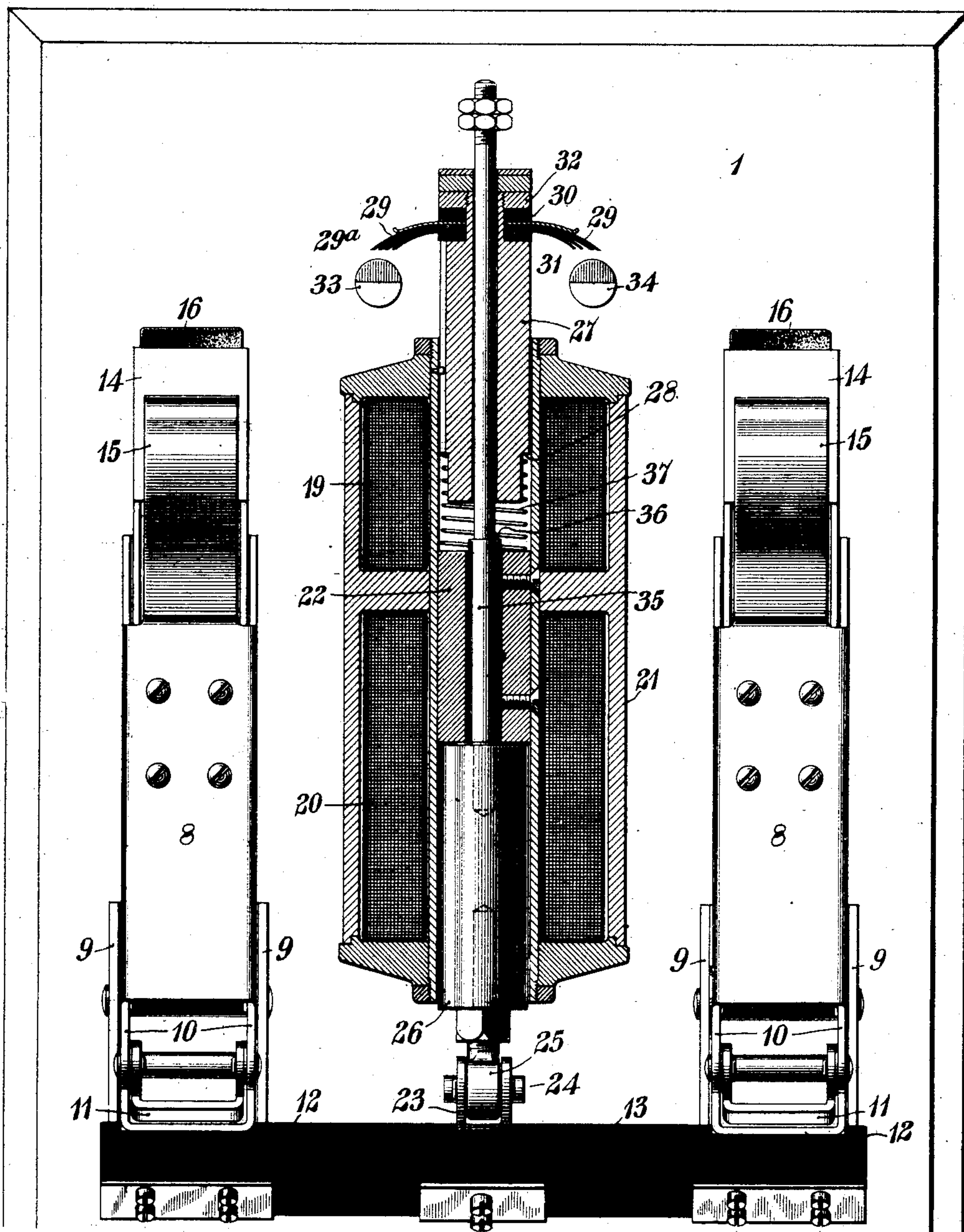


B. P. RUCKER.
SWITCH FOR ELECTRIC CIRCUITS.

APPLICATION FILED OCT. 8, 1904.

2 SHEETS—SHEET 1.



WITNESSES:

C. L. Belcher
Otto S. Schairer

Fig. 1.

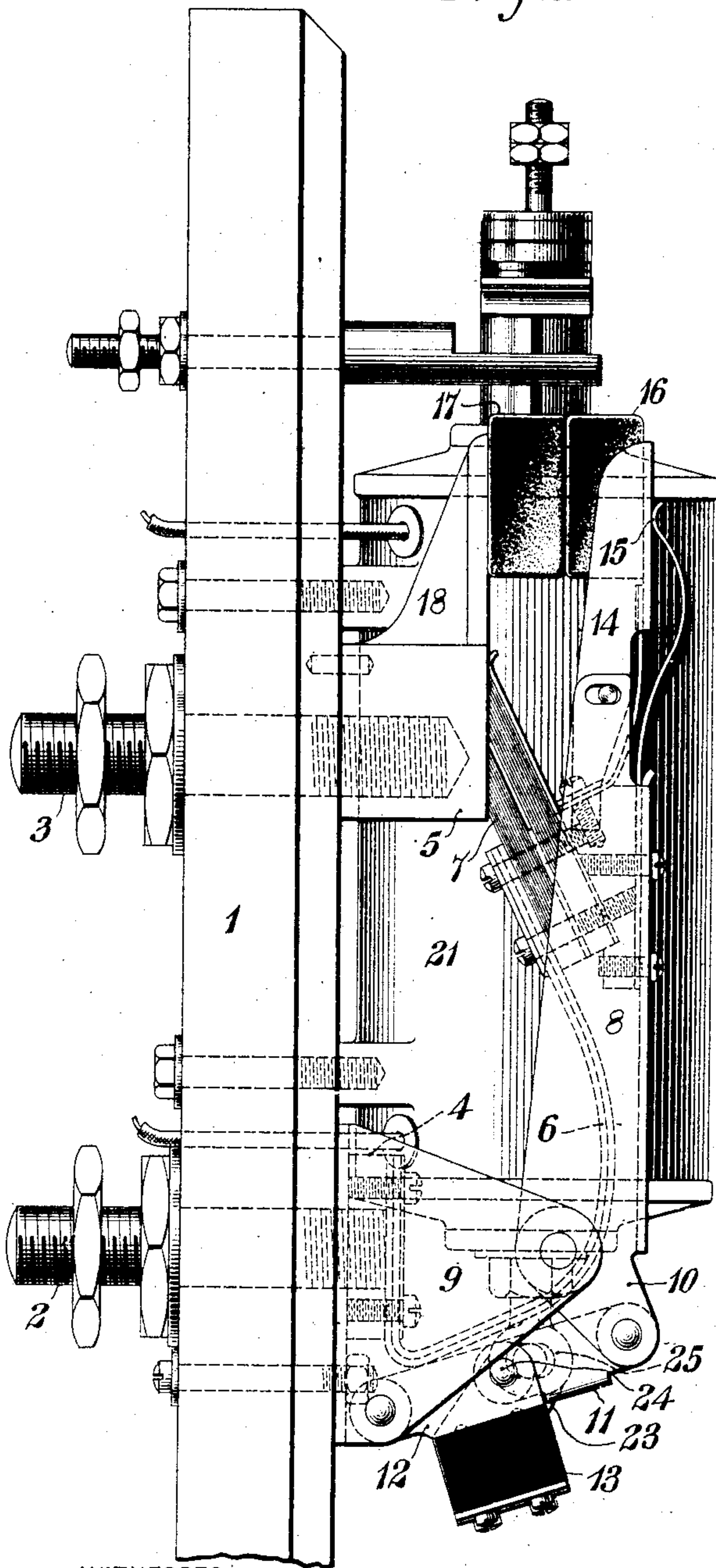
INVENTOR
Benjamin P. Rucker

BY
Wesley J. Carr
ATTORNEY

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2 SHEETS—SHEET 2.

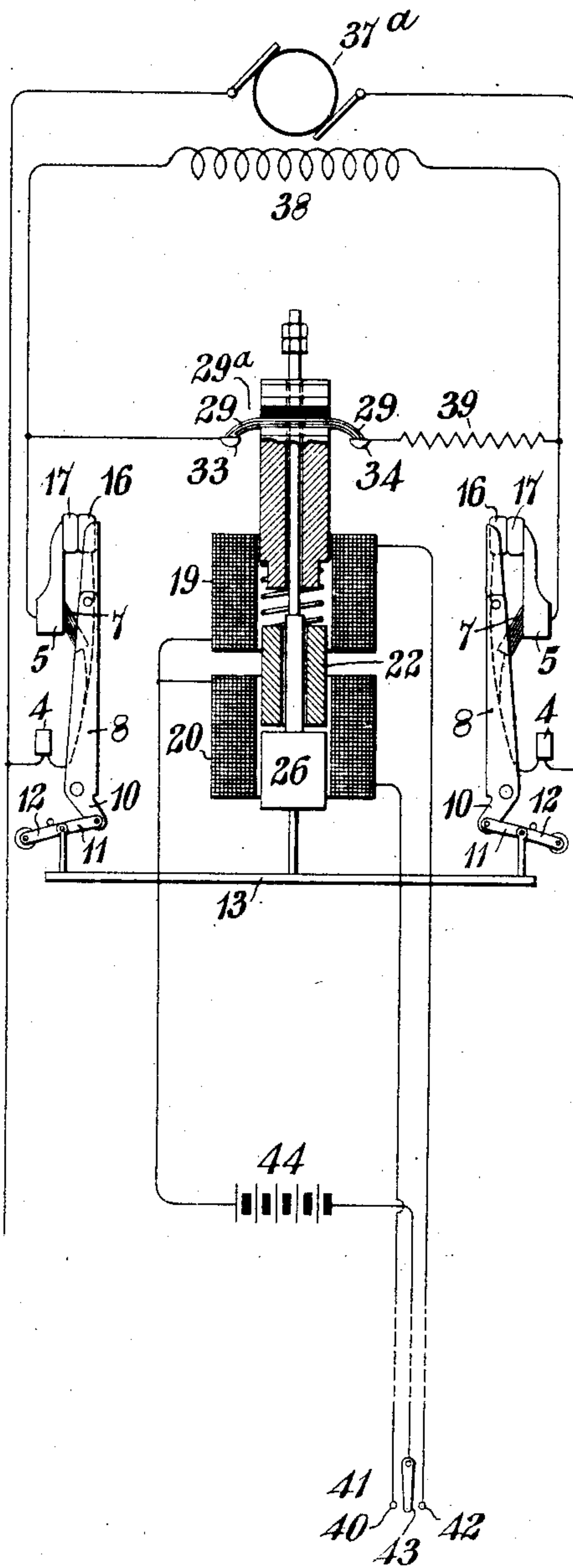
Fig. 2.



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C. L. Belcher
Otto S. Schairer

Fig. 3.



INVENTOR

Benjamin P. Rucker

BY

Wesley S. Rucker
 ATTORNEY

UNITED STATES PATENT OFFICE.

BENJAMIN P. RUCKER, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO
WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPO-
RATION OF PENNSYLVANIA.

SWITCH FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 790,983, dated May 30, 1905.

Application filed October 8, 1904. Serial No. 227,708.

To all whom it may concern:

Be it known that I, BENJAMIN P. RUCKER, a citizen of the United States, and a resident of Wilkesburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Switches for Electric Circuits, of which the following is a specification.

My invention relates to switches for electric circuits, and it has particular reference to devices of this general character which are employed in connection with dynamo-electric generators for short-circuiting the field-magnet coils through a resistance at the instant of or before opening the field-circuit.

The object of my invention is to provide a switch of the general character above indicated which may be controlled from a distant point and which may be effectively opened and closed to attain the desired result by electro-magnetic means.

While the invention is primarily intended for the purpose above stated, it may be utilized either in whole or in part in other relations and for other purposes, and it is therefore to be considered as of such general adaptation as its structural characteristics may warrant or permit.

In the accompanying drawings, Figure 1 is a view, partially in front elevation and partially in section, of a switch constructed in accordance with my invention, a portion of the supporting-panel being broken away. Fig. 2 is a side elevation of the apparatus shown in Fig. 1. Fig. 3 is a diagram of the circuits which are utilized and controlled by the switch illustrated in Figs. 1 and 2.

As here illustrated, the switch is of the double-pole type and is mounted upon an insulating-base 1, which may and generally will be a switchboard-panel of marble or slate. As the making and breaking devices for the two sides of the circuit are duplicates of each other, a description of one will, in general, suffice for both. Considering only one of the two duplicate members, the panel 1 is provided with two terminal studs 2 and 3, which

project through it and on its front side are respectively connected to terminal blocks 4 and 5. The terminal block 4 is connected, by means of flexible strips 6, of copper or other good conducting material, to a laminated contact-terminal piece 7, which is bolted to an arm 8 and the free end of which is beveled to make close contact with the face of the terminal block 5. The arm 8 is pivotally mounted adjacent to its lower end in a bracket 9, that is bolted to the panel 1, and the end 10 of the arm 8, that projects beyond its pivotal support, is connected to the bracket 9 by means of toggle-levers 11 and 12. The levers 12 of the two switches are rigidly connected together by means of a bar 13.

Pivoted to the free end of the arm 8 is an extension-piece 14, that is normally pressed inward by means of a spring 15 and is provided at its ends with a contact-block 16, of carbon or other substantially infusible conducting material. This block 16 makes contact with a similar block 17, which is supported by a bracket 18, that projects from the contact-terminal block 5, this arrangement being such that when the switch is opened the blocks 16 and 17 will remain in engagement until the contact-terminal 7 has become separated from the contact-terminal 5, thereby insuring the final break of the circuit between the carbon blocks 16 and 17 in accordance with well-known practice.

For the purpose of opening and closing the switches just described I provide two solenoids 19 and 20, that are mounted in a single casing 21 with their axes in alignment and are provided with a single stationary core 22, the major portion of which is located within the coil 20.

Connected to the bar 13 by means of a bracket 23, a pin 24, and an eyebolt 25 is a movable solenoid-core 26, which is located within the coil 20 below the stationary core 22. The solenoid 19 is provided with a movable core 27, the lower end of which is reduced in diameter to form a shoulder 28, and to its upper end is fastened a double lami-

nated member 29 of a switch 29^a by means of insulating-disks 30 and 31 and a nut 32. The stationary contact-terminals 33 and 34, with which the ends of the member 29 make contact, are mounted upon the panel 1, as indicated in Fig. 2. The core 26 of the solenoid 20 is provided with a rod 35, that projects loosely through the stationary core 22 and through the solenoid-core 27, the upper portion being of reduced diameter to form a shoulder 36. When the solenoid 19 is deenergized, the core rests upon a coil-spring 37, that is interposed between its shoulder 28 and the upper end of the core 22; but when the solenoid is energized it draws the core downward against the action of the spring. The several parts are so arranged and adjusted that the downward movement of the core 27 will first serve to bring the ends of the switch member 29 into engagement with the respective contact-terminals 33 and 34, and then its lower end will strike the shoulder 36, and thus serve, through the core 26, the eyebolt 25, and the connection of the latter with the bar 13, to move the toggle-levers 11 and 12 out of locking position and permit the main switches to open.

In Fig. 3 I have indicated a generator 37^a, having a shunt field-magnet winding 38, the terminals of which are respectively connected to the terminal 33 of the switch 29^a and to one terminal of a resistance 39, as well as to the main-switch terminals. The other terminal of the resistance 39 is connected to the terminal 34 of the switch 29^a.

One terminal of the solenoid 20 is shown as connected to a stationary contact-terminal 40 of a more or less remote controlling-switch 41, and the corresponding terminal of the solenoid 19 is connected to another stationary contact-terminal, 42, of the switch 41, a movable switch-arm 43 of this switch being connected to one terminal of a suitable source of current 44. The other terminals of the solenoids 19 and 20 are both connected to the other terminal of the source of current 44.

It will be understood from the construction illustrated and described that if the arm 43 of the controlling-switch 41 is moved into engagement with the contact-terminal 42 the solenoid 19 will be energized and will draw down the core 27 to close the switch 29^a. Immediately after this switch is closed the toggle-levers 11 and 12 will be moved to such position that the main switches will be thrown open. When it is desired to close the main switches, the switch-arm 43 will be moved into contact with the terminal 40, thus closing the circuit of the generator 44 through the solenoid 20. The solenoid will thereupon raise the core 26 and the bar 13, and thus

move the switches and their operating toggle-levers to locking position.

A single-pole switch might be employed and the details of construction be otherwise varied within considerable limits without departing from my invention.

I claim as my invention—

1. The combination with a main switch and an auxiliary switch, of two magnet-coils having a single stationary core and movable armatures respectively connected to the movable members of the main and auxiliary switches, and means for energizing either of said magnet-coils to open one of said switches and close the other successively.

2. Means for short-circuiting the field-magnet winding of an electrical machine through a resistance, comprising a main switch, an auxiliary switch, two magnet-coils having a single core, armatures respectively connected to the movable members of the main and the auxiliary switches and means for energizing either of said magnet-coils at will to open one of said switches and to close the other successively.

3. Means for short-circuiting the field-magnet winding of an electrical machine through a resistance, comprising a main switch, an auxiliary switch, a magnet-coil for closing the main switch and opening the auxiliary switch, a second coil for closing the auxiliary switch and opening the main switch and means located at a more or less distant point for controlling the supply of current to said coils.

4. Means for short-circuiting the field-magnet winding of an electrical machine through a resistance, comprising a main switch for opening the armature-circuit, an auxiliary switch for closing the circuit through the resistance, electromagnet-coils for closing one of said switches and opening the other, and means for controlling the current-supply to said coils.

5. Means for short-circuiting a field-magnet winding through a resistance, comprising a switch for the electrical-supply circuit, a switch for the field-magnet and resistance-circuit, a magnet-coil for first closing the resistance-circuit switch and then opening the electrical-supply-circuit switch, a second magnet-coil for closing the electrical-supply-circuit switch and opening the resistance-circuit switch and means for controlling the current-supply to said coils from any desired point.

In testimony whereof I have hereunto subscribed my name this 21st day of September, 1904.

BENJAMIN P. RUCKER.

Witnesses:

R. B. TAPLIN,
BIRNEY HINES.