No. 725,195. PATENTED APR. 14, 1903.

H. P. BALL.

CIRCUIT CLOSING DEVICE.

APPLICATION FILED JAN. 29, 1902.

NO MODEL.

Fig. 1.

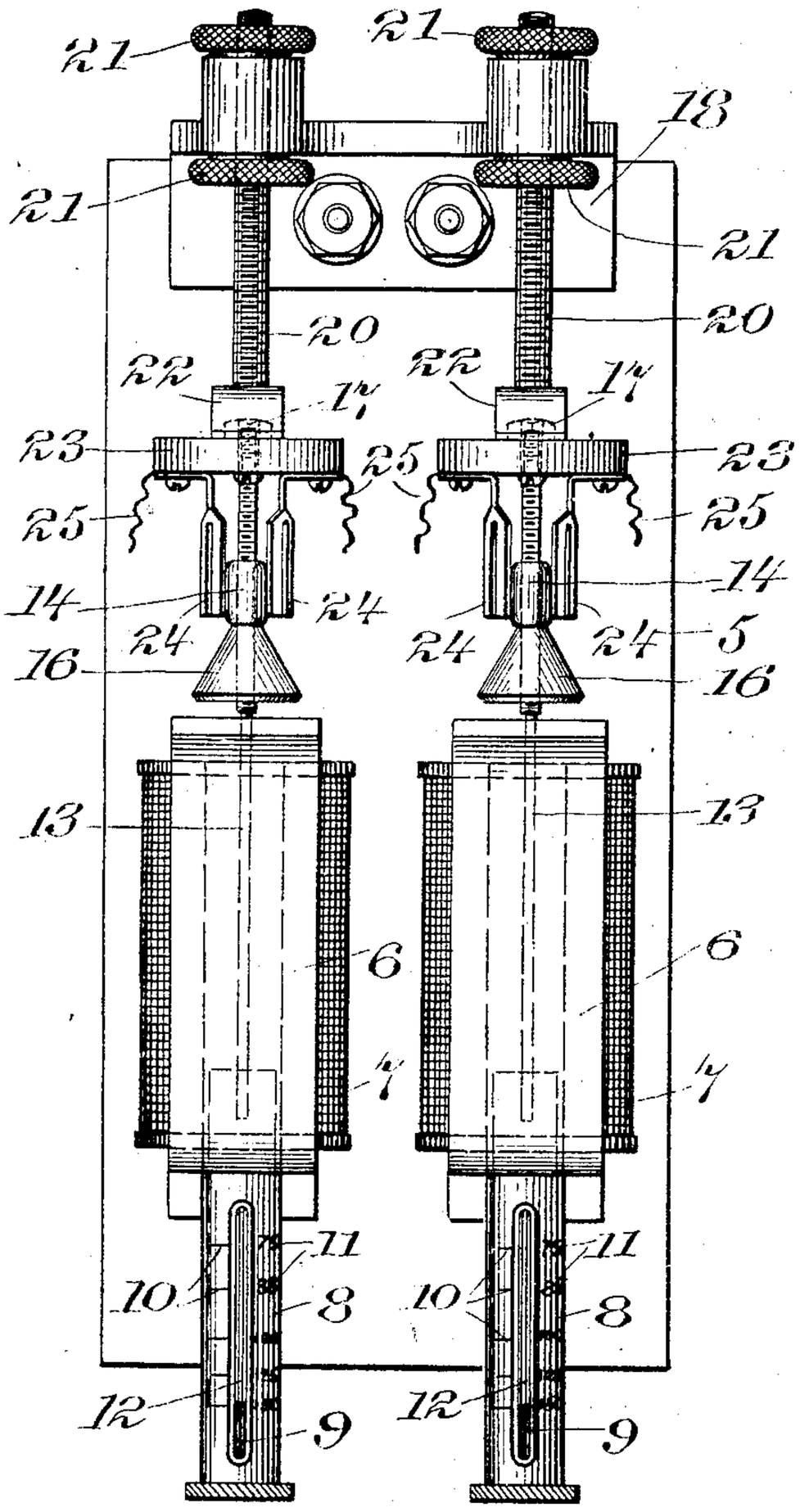
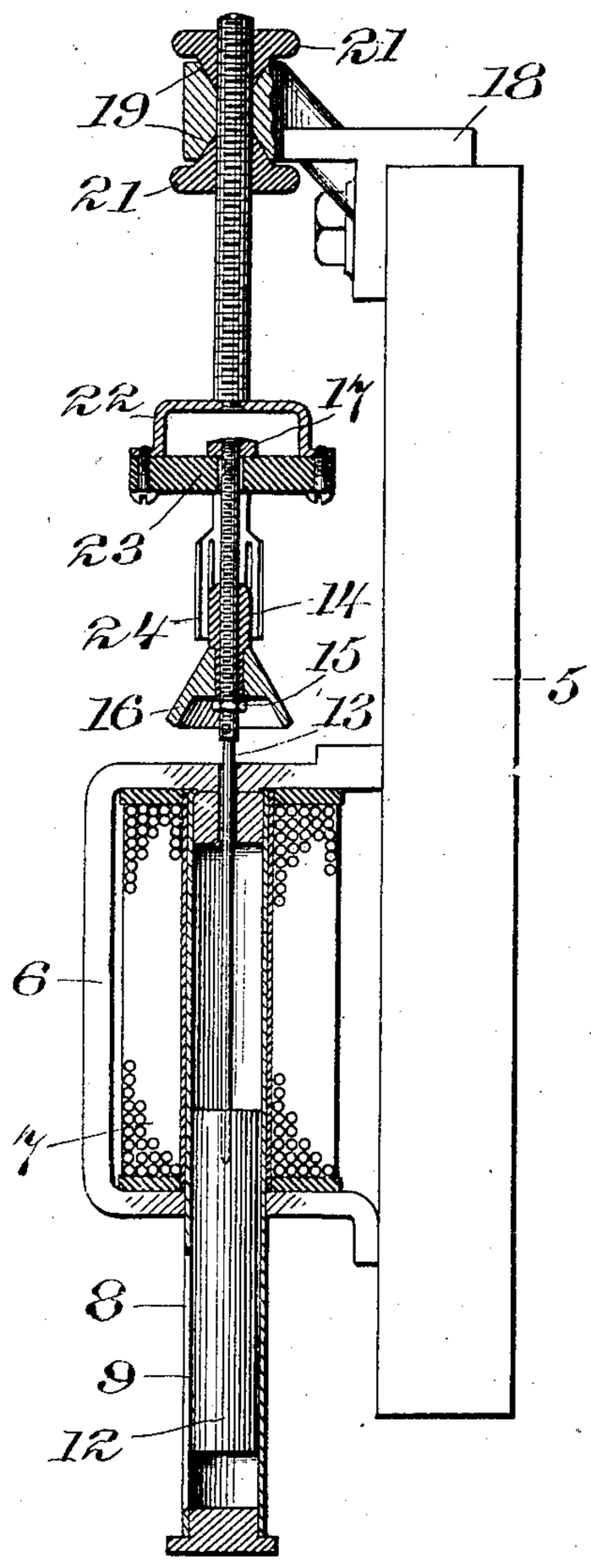


Fig. 2.



WITNESSES:

E. E. Pearson

C. E. Stecher

INVENTOR

H. P. Ball

BY

Geo. H. Benjamin

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY PRICE BALL, OF NEW YORK, N. Y., ASSIGNOR TO GENERAL INCANDESCENT ARC LIGHT COMPANY, OF NEW YORK, N. Y., A CORPORATION.

CIRCUIT-CLOSING DEVICE.

SPECIFICATION forming part of Letters Patent No. 725,195, dated April 14, 1903.

Application filed January 29, 1902. Serial No. 91,746. (No model.)

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Circuit-Closing Devices, of which the following is a specification.

My invention relates to a device adapted to be included in an electric circuit and which has for its purpose to close a second circuit when the current or overload on the first circuit exceeds a predetermined amount.

The object of my invention is to construct a circuit-closing device in which the part which acts to close the circuit will have a definite movement or length of travel and entirely irrespective of the position of the armature within the influencing-solenoid and of the amount of overload or current which creates the movement of such moving part.

The accompanying drawings will serve to illustrate my invention, and in which similar numerals indicate like parts.

Figure 1 is a front elevation of my improved circuit-making device as designed for use in a three-phase system. Fig. 2 is a vertical section.

In the drawings, 5 indicates a suitable supporting-plate or switchboard; 6, a metallic bracket projecting from said plate or switchboard and carrying one or more solenoidal magnets 7. Secured within each of the magnets and depending below the supporting-bracket 6 is a non-magnetic tube 8 of brass or other suitable material. This tube has formed in its face a slot 9, and the slot is divided into a number of parts, which parts are indicated by horizontal lines 10 and numbers 11 on the face of the tube. The lines and numbers upon the face of this tube serve to indicate the positions which may be given to the actuating-armature in order that such armature may be influenced by a predetermined overload.

Located within the solenoid 7 and tube 8 is a soft-iron core or armature 12. Connected to the upper end of this armature is a rod 13, provided with a screw-thread along its upper end. Mounted on the rod 13 is a sleeve of insulating material 14, screw-threaded upon its interior, and secured to this sleeve by means of the nut 15 is a metallic cone or bridge-piece 16. The particular shape given to this portion of the device is immaterial.

It will be observed that by reason of the screw-threaded sleeve of insulating material 14 the cone or bridge-piece 16, carried by it, may be adjusted vertically upon the rod 13. The object of providing this adjustment is to, by moving the cone or bridge-piece upward along the rod 13, insure contact between the bridge-piece and the circuit-terminals in case of any distortion of the terminals.

Connected to the upper end of the rod 13 is a nut 17, preferably of insulating material, and which serves by limiting the upward movement of the rod 13 and cone 16 to prevent the cone from forcing the spring-terminal contacts so far apart as to give them a permanent set.

Secured to the top of the switchboard or plate 5 is a bracket 18, the outer end of which is provided with the cone-shaped bearings 19. Supported in the bracket 18 by means of the threaded rod 20 and the cone-shaped nuts 21 is a strap 22, carrying a plate of insulating material 23, and depending from this plate of insulating material are pairs of spring-contacts 24. The particular shape of the spring-contacts is immaterial, provided they will coact with the cone or bridge-piece 16.

25 indicates the terminal wires of the circuit, to which the spring-contacts are connected.

It will be observed from the construction described that by means of the adjusting-nuts 21 on the rod 20 the armature 12 may be given any desired position within the solenoid 7, and the device thus may be arranged to be operative at any required overload. For instance, if the armature is given the position shown in Fig. 2, opposite the figures 150, a considerable excess of current or overload will be required to operate the device, whereas if the bottom of the armature is opposite the figures 75 a much smaller current or overload will operate the device, and, fur-

ther, that the length of travel of the cone or bridge-piece 16 relative to the contacts will be exactly the same irrespective of whether the device is adjusted to operate upon a small or large overload.

The operation of my device is as follows: When an overload or excess current is transmitted through the solenoid 7, the armature 12 is attracted, which transmits its motion through rod 13 to the cone or bridge-piece 16, thereby pressing such cone or bridge-piece between and into sliding contact with the spring-contacts 24, thus closing the circuit between the contacts 24. Upon cessation of an overload the armature 12 will immediately drop to its initial position and the cone or bridge-piece separate from the contacts 24, thus opening the circuit between them.

It will be understood that by reason of the very limited movement given to the armature within the solenoid the device will act to close the circuit upon a very slight increase in current or overload and upon the return of the current to the normal will immediately drop the armature and open the circuit. This feature is one of considerable importance where a circuit-maker is designed to be used in connection with a time-limit device. If the movement of an armature within a solenoid of such a device is not limited, the armature will be progressively moved within the solenoid, requiring less current as it advances within the solenoid to move it and hold it in position, with the result that such device will close a circuit under the influence of a current much below that required to primarily move its armature and with the effect that such circuit is held closed until the time-limit device acts. In my device, on the contrary, the device closes a circuit upon the creation of a determined current and breaks the circuit on the cessation of that current, never holding the circuit closed unless the excess current has been maintained until the time has expired within which the the time limit will act.

Having thus described my invention, I claim—

1. A circuit-maker, comprising a solenoidal magnet, an armature therefor, a bridge-piece carried by said armature, terminal contacts adapted to coact with the bridge-piece, and means for adjusting the position of the armature and terminal contacts relative to the magnet.

2. A circuit-maker, comprising a solenoidal magnet, an armature therefor, a bridge-piece carried by said armature, terminal contacts adapted to coact with the bridge-piece, means for adjusting the position of the armature and terminal contacts relative to the magnet, and means for limiting the movements of the bridge-piece relative to the terminal contacts.

3. A circuit-maker, comprising a solenoidal magnet, an armature, a bridge-piece carried by the armature, a slotted and numbered tube for containing the armature, terminal contacts adjustably mounted above the bridge-piece, and means for adjusting the position of the armature and terminal contacts relative to the solenoid.

4. A circuit-maker, comprising a supporting-plate, a bracket projecting from the front of the plate, a threaded rod carried in said bracket, means for vertically adjusting the rod in the bracket, terminal contacts carried by said rod, a solenoidal magnet, a core for said magnet, and a bridge-piece also carried by said rod.

5. A circuit-maker, comprising a solenoidal magnet occupying a fixed position, terminal contacts adjustable relative to the magnet, an armature for said magnet suspended from the support for the terminal contacts, and a bridge-piece adjustable relative to the armature.

6. A circuit-maker, comprising a solenoidal magnet occupying a fixed position, terminal contacts adjustable relative to the magnet, an armature for said magnet, a rod connected to said armature, and extending through the support for the terminal contacts, and a bridge-piece adjustable on said rod.

7. A circuit-maker, comprising a solenoidal magnet, terminal contacts, an armature, a bridge-piece, means for adjusting the bridge-piece relative to the armature, and means for adjusting the position of the armature and terminal contacts relative to the magnet, whereby the movement of the armature to close the circuit by the bridge-piece through the terminal contacts will be the same, irrespective of the position of the armature in the magnet.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY PRICE BALL.

Witnesses:
J. E. PEARSON,
C. E. STECHER.