No. 721,273. PATENTED FEB. 24, 1903.

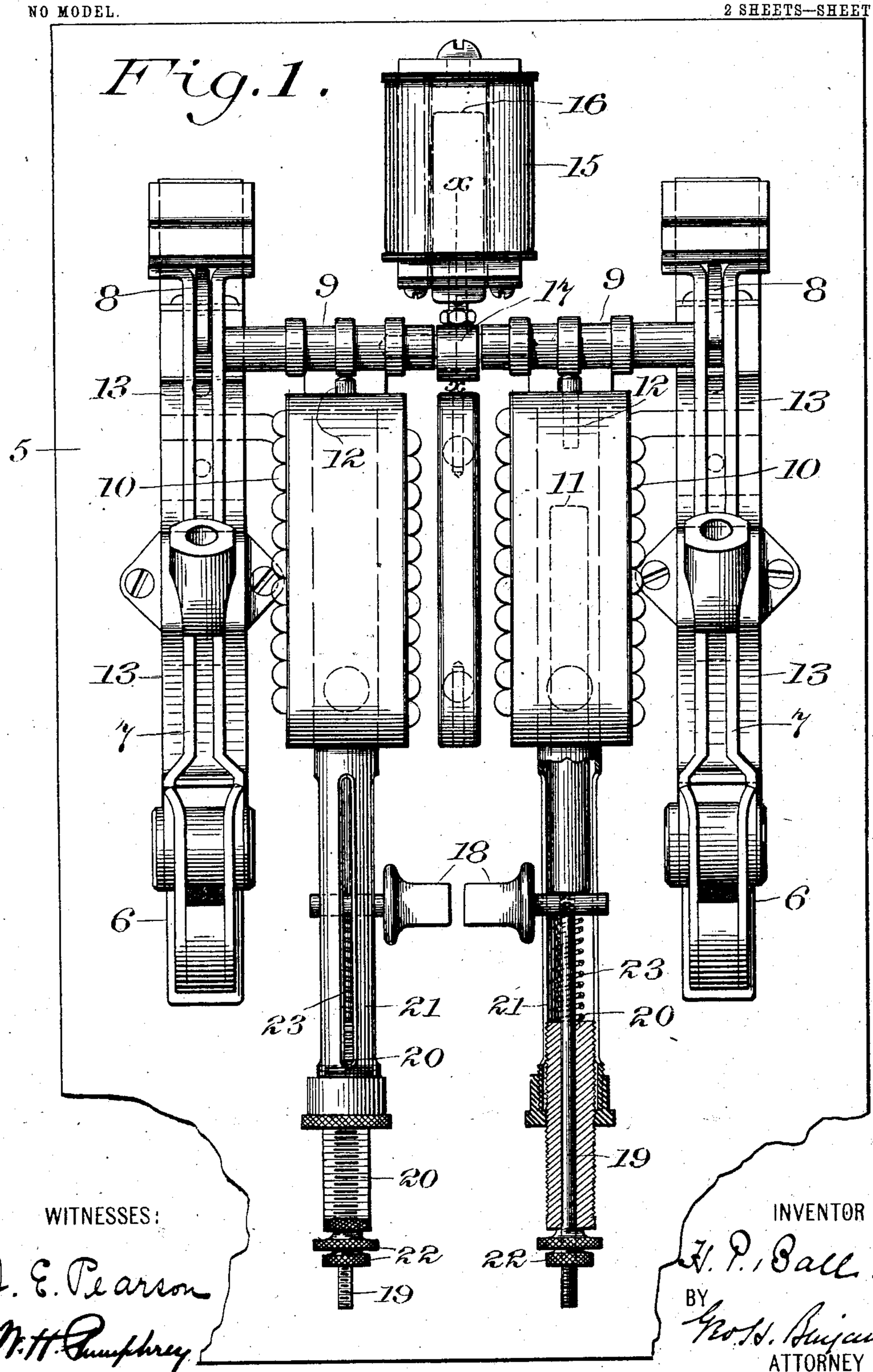
H. P. BALL.

CIRCUIT BREAKER.

APPLICATION FILED JAN. 29, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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Fig. 2.

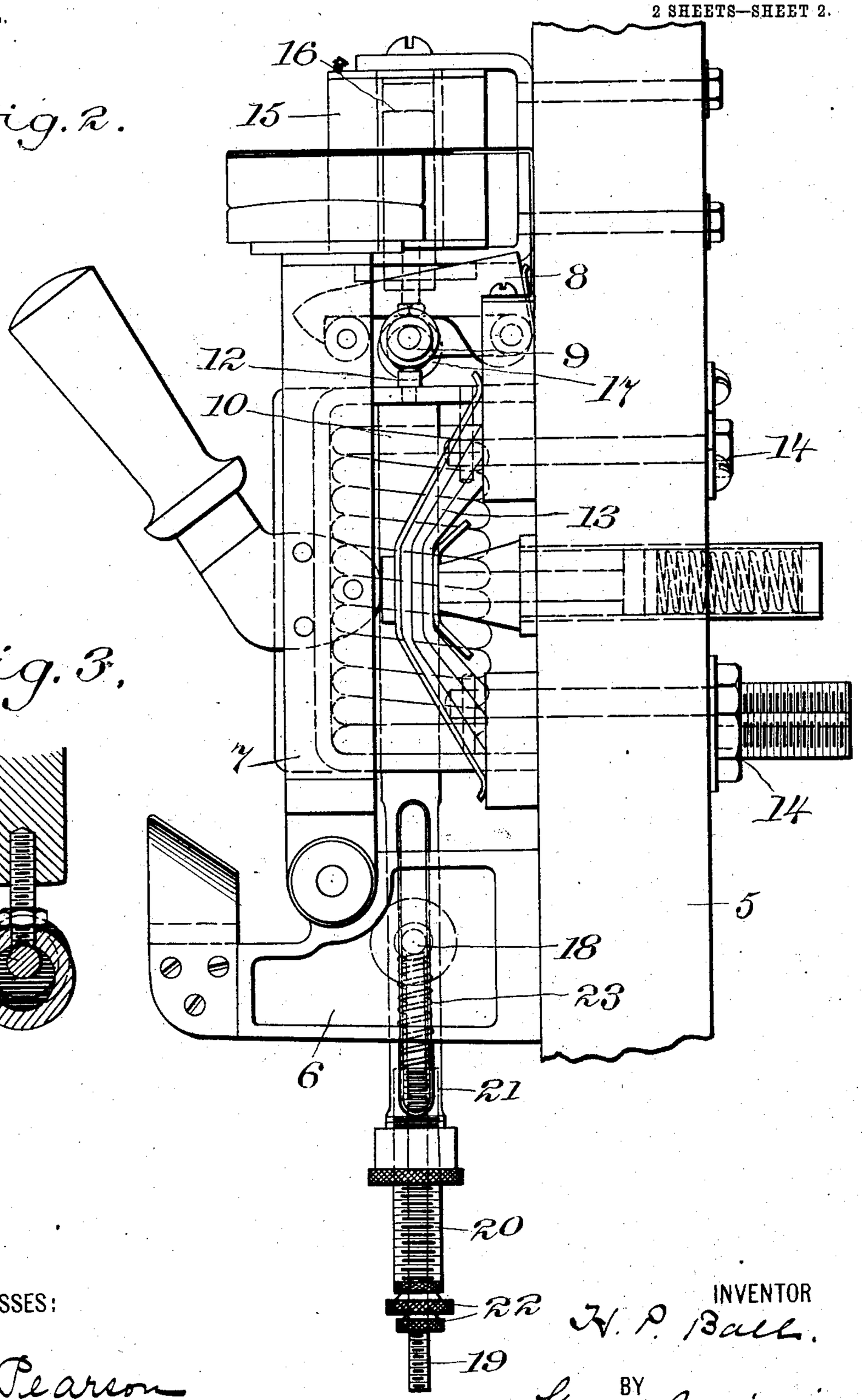
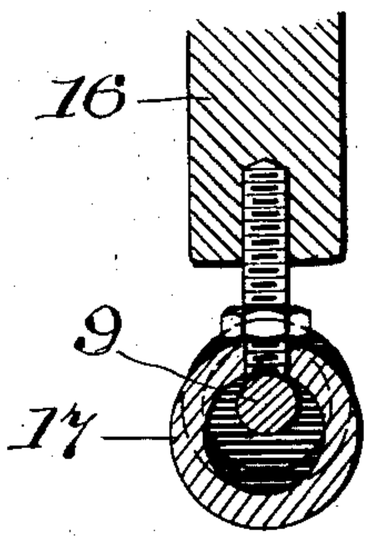


Fig. 3.



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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-BREAKER.

SPECIFICATION forming part of Letters Patent No. 721,273, dated February 24, 1903.

Application filed January 29, 1902. Serial No. 91,742. (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-Breakers, of which the following is a specification.

My invention relates to certain improvements in the circuit-breaker described in my former patent, No. 686,918, dated November 19, 1901, and which improvements consist, first, in providing means for opening the circuit-breaker from a distance, and, second, in providing means whereby the normally responsive action of the circuit-breaker to open the circuit upon an overload will not take place within certain limited periods of time, or not until an overload exists very much greater in amount than that at which the circuit-breaker is normally designed to operate.

The accompanying drawings will serve to illustrate my invention.

Figure 1 is a front elevation of a circuit-breaker and partial section through one of the adjusting-tubes. Fig. 2 is a side elevation. Fig. 3 is a longitudinal section on the line X X of Fig. 1.

In my former patent, No. 686,918, dated November 19, 1901, I have described and claimed the general features of construction of the circuit-breaker, and it will therefore only be necessary in the present application to describe the circuit-breaker generally and then point out the various improvements which I have made therein.

In my patent above referred to I have shown a circuit-breaker provided with but a single tripping-coil. In Fig. 1 of the present drawings the circuit-breaker is shown as provided with two tripping-coils as adapted for use in a two-phase four-wire system—*i. e.*, a single pole for each phase.

In the drawings the general construction of the circuit-breaker consists of a suitable switchboard or supporting-plate 5.

6 is a bracket projecting from the switchboard and carrying a pivoted switch-plate 7; 8, a latch which normally holds the switch-blade in a closed position; 9, an insulated bar under latch; 10, a magnet; 11, an armature of magnet, (shown in dotted lines to the right of Fig. 1;) 12, a pin over armature and under bar 9; 13, a spring-bridge device, and 14 circuit-terminals.

It will be understood that in the normal operation of the circuit-breaker when an overload occurs the armature 11 is attracted, which, impinging upon pin 12, will lift the bar 9 and through it the latch 8, thereby releasing the switch-blade 7 and opening the circuit.

I will now describe my improvements.

To enable the circuit-breaker to be opened from a distance at any time and entirely irrespective of the question of overload, I locate over the insulated bar 9 a magnet 15, provided with the armature 16, the lower end of which is connected to a ring 17, which surrounds and is somewhat larger in diameter than the bar 9. The magnet 15 may be placed in circuit with one or more push-buttons located at a distance. When it is desired to open the circuit-breaker, the circuit is closed through the magnet, which attracts its armature 16, which lifts the ring 17, which latter, by reason of its size, imparts a hammer-blow to the rod 9 and finally a pull upon the rod 9, thereby lifting the latch 8 and releasing the circuit-breaker.

To enable a circuit-breaker to be used in connection with electromotors which require in starting a current in excess of that at which the circuit-breaker is normally designed to operate and open the circuit, I provide means for altering the position of the armature 11 relative to the tripping-coil. In Fig. 1 the armature 11 is shown as resting upon a horizontal insulated pin 18, mounted on the end of the vertical rod 19, arranged to move freely in the cylindrical bearing 20, secured to the bottom of the tube 21, in which the armature moves. On the end of the rod 19 are adjusting-screws 22, by reason of which the length of the rod which projects within the tube 21 may be determined. Located between the insulated pin 18 and the top of the bearing 20 is a helical spring 23. The operation of this device is as follows: When the parts are located as shown, the armature 11 is in a position to be moved upward and to release the switch-blade at the normal overload. When it is desired to start a motor or other device

requiring more current than is necessary to open the circuit-breaker, the horizontal pin 18 is depressed by hand or otherwise, the effect of which is to compress the spring 21 and carry the armature 11 downward and further out of the magnet 10 and into such position where it will not be effectively lifted by the normal overload to open the circuit-breaker or into such a position where a greater overload must exist to enable the magnet to attract its armature and open the circuit-breaker.

I wish it understood that I do not limit myself to the use of a horizontal insulated pin, as any device which will serve to carry the armature below the position at which it normally will be actuated to open the circuit-breaker will be within the intent of my invention.

Having thus described my invention, I claim—

1. The combination with a circuit-breaker, of means energized by a current independent of that traversing the circuit within which the circuit-breaker is included, for actuating the circuit-breaker from a distance, and means for temporarily altering the sensitiveness of the circuit-breaker without changing its normal calibration.

2. The combination with a circuit-breaker, of two independent means for actuating the circuit-breaker, one of said means adjustable as to sensitiveness without permanently altering its normal calibration.

3. The combination with a circuit-breaker having two switch-blades and two tripping-coils carrying movable cores, of two independent means for actuating the circuit-breaker, one actuated from a distance and the other adjustable to vary the sensitiveness of one or both of the cores without altering their normal calibration in the coils.

4. In a circuit-breaker, a solenoid and core, means for adjusting the core relative to the solenoid, and means for temporarily shifting the position of the core without changing its adjustment relative to the solenoid.

5. In a circuit-breaker, a solenoid and core, means for adjusting the core relative to the solenoid, and means for manually shifting the position of the core without altering its normal adjustment relative to the solenoid.

6. The combination with a circuit-breaker having two switch-blades and two tripping-coils carrying movable cores, of independent means for varying the sensitiveness of the respective cores without altering their normal calibration in the coils.

7. In a circuit-breaker, the combination of electroresponsive mechanism, means for adjusting the sensitiveness of said mechanism, means for temporarily changing the sensitiveness of said mechanism without changing its original adjustment, and means acting to restore the original sensitiveness of the electroresponsive mechanism.

8. In a circuit-breaker, the combination of an electroresponsive device, means for adjusting the position of said device to respond to a definite current, means for adjusting said mechanism so that it will only respond to a current in excess of that at which it was first adjusted to operate, and means acting in opposition to the said second-named means to restore said mechanism to its first adjustment.

9. In a circuit-breaker and in combination with an electroresponsive device, capable of adjustment to respond to various degrees of magnetization, means for changing its sensitiveness, and means continually tending to return the device to its original degree of sensitiveness.

10. In a circuit-breaker, in combination with an electroresponsive device, means for normally determining the sensitiveness of the device, means for decreasing the sensitiveness of the device, and means acting to constantly keep the device in its most sensitive condition.

11. In combination with the switch-blade of a circuit-breaker, a latch engaging said switch-blade, an insulated bar under said latch, a solenoid occupying a fixed position over said bar, a core moving in said solenoid, and a ring larger in diameter than said bar and enveloping the bar, whereby when the solenoid is actuated a hammer-blow will be imparted to the bar.

12. In a circuit-breaker and in combination with the actuating-magnet and its armature, of means for regulating the position of the armature relative to the magnet, and means for temporarily altering the position of the armature relative to the magnet.

13. The combination with a circuit-breaker having two switch-blades and two tripping-coils carrying movable cores, said coils adapted to be traversed by different phases of a current of a system of electrical distribution, and means for varying the sensitiveness of the respective cores without altering their normal calibration in the coils.

14. In a circuit-breaker, the combination of a solenoid, a core, a tube within which the core moves, means for adjusting the position of the core, a resilient device located under the core, and means for overcoming the action of the resilient device.

15. In a circuit-breaker, the combination of a solenoid, a core, a tube within which the core moves, a spring located under the core, means for depressing the spring, and means for defining the position of the spring and core relative to the solenoid.

16. In a circuit-breaker, and in combination with the actuating-magnet and its armature, of an elastically supported and adjustable means for regulating the position of the armature and for temporarily altering the position of the armature.

17. In a circuit-breaker, and in combination with the actuating-magnet and its armature, of a horizontally-disposed insulated bar under the armature, a rod connected to said

bar, an adjustable bearing in which said rod moves, and a resilient device between said insulated bar and said bearing.

18. In a circuit-breaker, two magnetically-responsive members, each responsive to a definite overload, and means for varying the sensitiveness of each member without changing its normal calibration.

19. In a circuit-breaker, a pair of magnetically-responsive members, means for adjusting said members so that they will respond under two conditions of current, and another means whereby the difference between the current conditions can be adjusted.

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

HENRY PRICE BALL.

Witnesses:
J. B. COWEN,
LEWIS WINTNER.