H. W. CHENEY.

CIRCUIT BREAKER.

APPLICATION FILED FEB. 1, 1911.

1,030,568.

Patented June 25, 1912.

Fig. 1

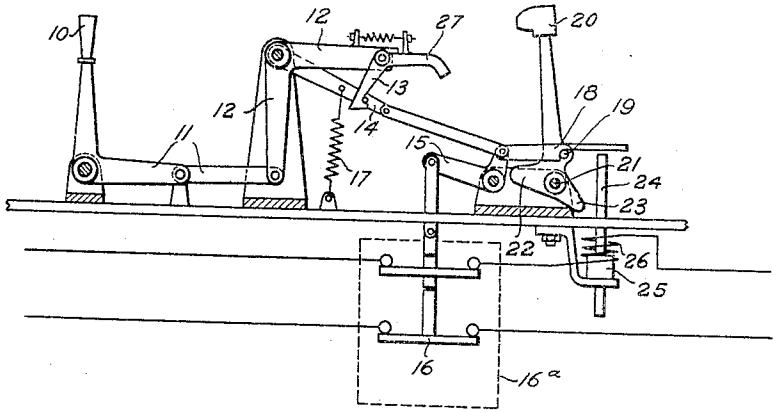
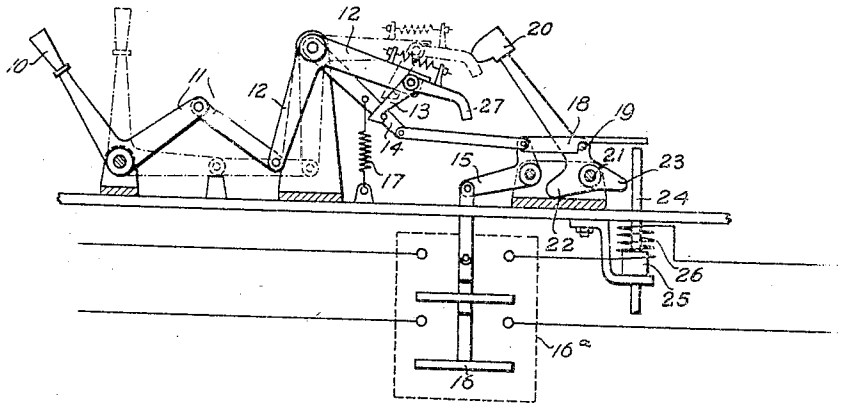


Fig. 2



Witnesses

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UNITED STATES PATENT OFFICE.

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CIRCUIT-BREAKER.

1,030,568. Specification of Letters Patent. Patented June 25, 1912.

Application filed February 1, 1911. Serial No. 605,853.

To all whom it may concern:

Be it known that I, HERBERT W. CHENEY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a full, clear, and exact specification.

My invention relates to automatic circuit-breakers, and more particularly to the tripping mechanism thereof.

On account of the pressure which must be exerted on the contacts of a circuit-breaker, there is tendency to lock or bind the latch of the tripping mechanism thereof, so that considerable energy is necessary to release it. If this energy is furnished directly by a tripping coil, the latter must be fairly large, whereby it is rendered expensive and consumes considerable energy. Moreover, in large circuit-breakers a direct-acting trip coil is not entirely reliable.

It is the object of my invention to improve the tripping mechanism of circuit-breakers. The trip coil trips the circuit-breaker through an intermediate energy-storing device, the trip coil releasing the energy-storing device, and the latter then acting on the latch of the tripping mechanism of the circuit-breaker to trip it. The energy-storing device is reset by the next closing movement of the circuit-breaker, the resetting means for the energy-storing device preferably being identical with the latch which holds the energy-storing device in its energy-storing position and is released by the trip coil.

My invention is particularly adapted to the oil circuit-breakers commonly used for large currents or high voltages.

The various novel features of my invention will appear from the description and drawings and will be particularly pointed out in the claims.

The two figures of the drawing show semi-diagrammatically the closed and open positions respectively of a circuit-breaker constructed in accordance with my invention.

The handle 10 is attached to one arm of a toggle 11, the other arm of which is attached to one arm of a bell-crank lever 12. A spring-pressed latch 13 furnishes a collapsible connection between the other arm of the bell-crank lever 12 and an arm of another toggle 14, and the other arm of this toggle is connected through a second bell-crank lever 15 to the movable contact of the switch 16, which is biased to open position as by a spring 17. This switch is shown diagrammatically as a two-pole switch immersed in oil in a tank 16^a, but it may have any desired number of poles and be of any desired construction. The operating mechanism also is capable of wide modification.

Connected to some suitable point on the operating mechanism, as to the bell-crank lever 15, is a pawl 18 which coöperates with a pin 19 on a weight or hammer 20. This hammer is pivoted at any suitable point, as at 21, and may be limited in its movement by arms 22 and 23. The pawl 18 may be separated from the pin 19 by an extension 24 from the core 25 of an overload coil 26, the latter being connected in any suitable manner so that it is responsive to the current passing through the switch 16.

The switch may be closed by moving the switch 10 from the full line position shown in Fig. 2 to the full line position shown in Fig. 1. This cramps the toggle 11, turns the bell-crank lever 12 in a counter-clockwise direction, almost straightens the toggle 14, and raises the switch 16 from open to closed position. At the same time, through the engagement of the pawl 18 and pin 19, the hammer 20 is moved from the full line position shown in Fig. 2 to the full line position shown in Fig. 1. The center of gravity of the hammer 20 is still to the left of its pivotal point. The various parts remain in the full line position shown in Fig. 1 because of the cramping of the toggle 11.

Upon an overload, the coil 26 raises its core 25, and the extension 24 lifts the pawl 18 to separate it from the pin 19. The hammer 20 immediately falls from the position shown in Fig. 1 to the position shown in Fig. 2, striking the extension 27 of the latch 13 and releasing the toggle 14 from said latch. The spring 17, which at this time is under tension, immediately moves the toggle 14, the bell-crank lever 15, and the switch 16 from the closed position shown in Fig. 1 to the open position shown in Fig. 2, but does not interfere with the position of the handle 10, the toggle 11, and the bell-crank lever 12. To reclose the switch, the

handle 10 must first be moved to the full line position shown in Fig. 2, whereupon the latch 13 again engages the toggle 14 and allows the switch 16 to be closed by a proper movement of the handle 10. At the same time that the latch 13 engages the toggle 14, the pawl 18 engages the pin 19, so that by the closing of the switch 16 energy is stored in the hammer 20. Should the overload still exist, the pawl 18 is again lifted immediately and the hammer 20 again falls to the left to separate the latch 13 from the toggle 14 and allow the switch to be opened. It is thus impossible to maintain the switch in closed position during the continuance of an overload.

While I have shown my invention as particularly applied to a non-closable circuit-breaker, in which type of circuit-breaker I prefer to use it, its broad features are capable of use in any type of circuit-breaker whatsoever. Many modifications may be made in the precise arrangement shown and described, and all such which do not involve a departure from the spirit and scope of my invention I aim to cover in the following claims.

What I claim as new is:

1. In an automatic circuit-breaker, the combination of switch contacts, operating mechanism for the switch including a latch for holding it in closed position, an energy-storing device releasably connected to the switch-operating mechanism, said energy-storing device being put in energy-storing condition by the closing of the switch and operating to release said latch when said releasable connection is released, and means for releasing said releasable connection.

2. In an automatic circuit-breaker, the combination of switch contacts, operating mechanism for the switch including a latch for holding it in closed position, an energy-storing device releasably connected to the switch-operating mechanism, said energy-storing device being put in energy-storing condition by the closing of the switch and operating to release said latch when said releasable connection is released, and means responsive to an overload for releasing said releasable connection.

3. In an automatic circuit-breaker, the combination of switch contacts, operating mechanism for the switch including a latch for holding it in closed position, an energy-storing device which when released from energy-storing condition releases said latch to allow the opening of the switch, means operated by the closing of the switch for putting said energy-storing device in energy-storing condition and mechanically dependent upon the closed condition of the switch for holding said device in such condition, and means for releasing said energy-storing device from said holding means.

4. In an automatic circuit-breaker, the combination of switch contacts, operating mechanism for the switch including a latch for holding it in closed position, an energy-storing device which when released from energy-storing condition releases said latch to allow the opening of the switch, means operated by the closing of the switch for putting said energy-storing device in energy-storing condition and mechanically dependent upon the closed condition of the switch for holding said device in such condition, and means responsive to an overload for releasing said energy-storing device from said holding means.

5. In an automatic circuit-breaker, the combination of switch contacts, operating mechanism for the switch including means for holding it in closed position, an energy-storing device releasably connected to the switch operating mechanism, said energy-storing device being put in energy storing condition by the closing of the switch and operating to release said means when said releasable connection is released, and means for releasing said releasable connection.

Milwaukee, Wis., Jan. 26, 1911.

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

HERBERT W. CHENEY.

Witnesses:

CHAS. L. BYRON,

ROB. E. STOLL.