

J. N. MAHONEY AND H. G. MACDONALD.

CIRCUIT INTERRUPTER.

APPLICATION FILED DEC. 26, 1913.

1,318,784.

Patented Oct. 14, 1919.

2 SHEETS—SHEET 1.

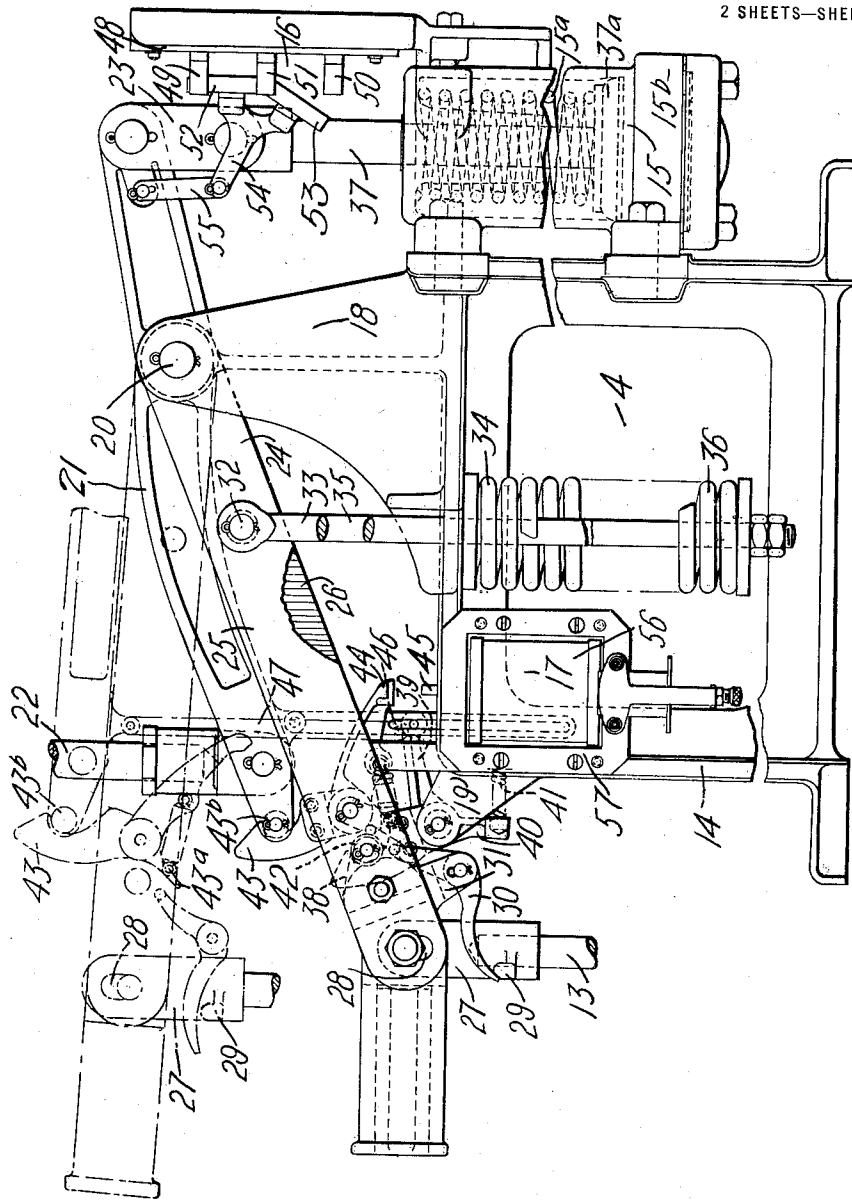


Fig. 1.

WITNESSES:

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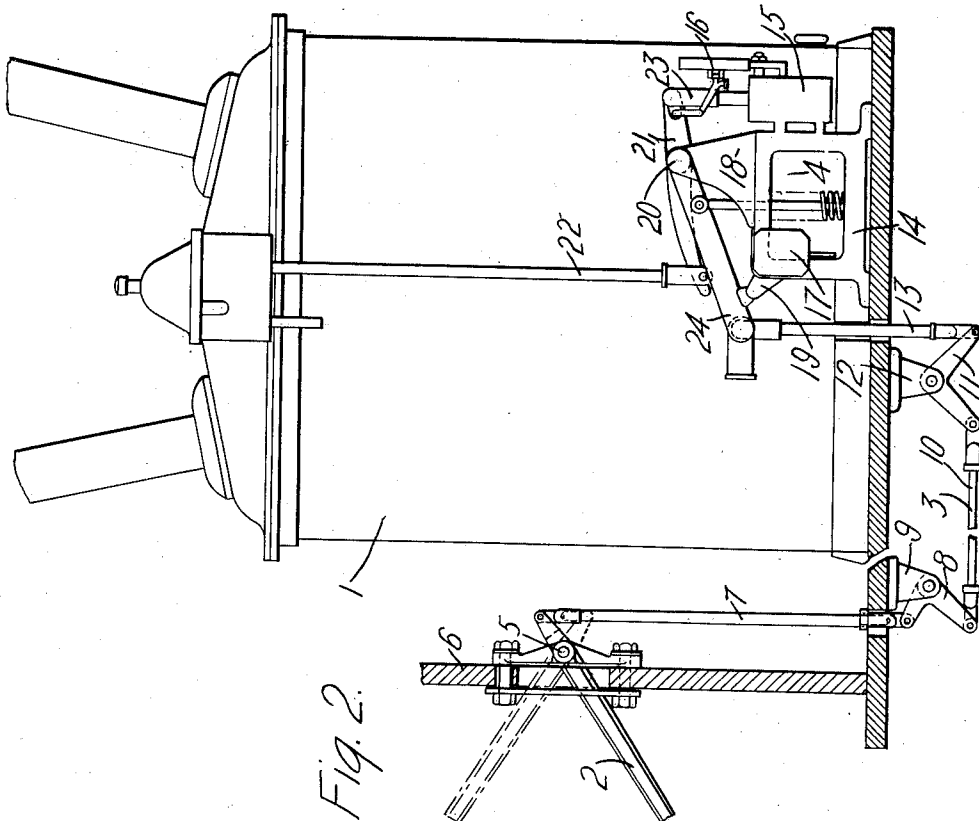
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UNITED STATES PATENT OFFICE.

JOSEPH N. MAHONEY AND HOWARD G. MACDONALD, OF WILKINSBURG, PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

CIRCUIT-INTERRUPTER.

1,318,784.

Specification of Letters Patent.

Patented Oct. 14, 1919.

Application filed December 26, 1913. Serial No. 808,717.

To all whom it may concern:

Be it known that we, JOSEPH N. MAHONEY, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, and HOWARD G. MACDONALD, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Interrupters, of which the following is a specification.

Our invention relates to circuit interrupters, and it has particular reference to devices of the oil-immersed type which are provided with means for remotely closing and for manually and automatically tripping the same.

One object of our invention is to provide a device of the above-indicated class which will be applicable to circuit breakers of relatively large current or power capacities, and which require a comparatively large amount of power for operation.

Another object of our invention is to provide means whereby circuit interrupters may be tripped by the same means which effect their closing operation.

Heretofore considerable difficulty has been encountered in the remote manual operation of circuit interrupters of large current or power capacity. To overcome this difficulty, we have provided, in our present invention, a device which stores energy during the first part of its movement and gives up this energy during the latter part to assist in the closing of the interrupter.

In the accompanying drawings, Figure 1 is a side view, partially in elevation and partially in section, of a device embodying our invention, and Fig. 2 is a view, partially in section and partially in elevation, of a circuit interrupter to which our invention has been adapted.

Referring to the drawings, the apparatus here shown comprises in general, a circuit breaker 1, a remotely disposed operating handle 2, a bell crank mechanism 3 for mechanically connecting the operating handle 2 to a device 4 embodying our invention.

The operating handle 2 is pivoted at a point 5 on a panel 6 and its inner end is operatively connected to the upper end of a rod 7 which in turn is attached to one arm of a bell crank lever 8. The bell crank

lever 8 is pivoted on a bracket 9 and its lower arm is operatively connected to one end of a rod 10 the other end of which is attached to one arm of a bell crank lever 11. The bell crank lever is pivoted on a bracket 12 and one of its arms is operatively connected to a rod 13, for purposes hereinafter described.

The device 4 comprises in detail a frame 14 for supporting an accelerating and retarding device 15, an indicating device 16, a tripping device 17 and having a plurality of brackets 18 and 19 thereon for supporting the operating mechanism of the same. A lever arm 21 is pivoted upon a pin 20 with which the brackets 18 are provided, the said arm being forked at one end to receive a pivotally attached vertical rod 22 and having a link 23 pivotally attached to its other end. A forked lever arm 24, consisting of two side-by-side members 25 and 26 that are connected together at one end and are spaced apart at the other end, is also pivoted on the pin 20. To the end of the lever arm 24 where its members 25 and 26 are connected together, is attached a member 27 in which the upper end of the rod 13 is seated and which is provided with a slot 28 to permit of a slight relative rectilinear movement of the rod. The member 27 is provided with a lug 29 that is adapted to engage a bell crank trigger 30 which is pivoted on a bracket 31 extending from the lever 24. The lever 21 is located between the members 25 and 26 of the lever 24 for reasons of symmetry. To the member 25 of the lever 24 is attached, by means of a pin 32, a rod 33 that is adapted to support one end of a spring 34, the other end of which rests against the frame 14. The member 26 of the lever 24 has pivotally attached to it a rod 35 that is adapted to support a spring 36 which is similar to the spring 34 and is similarly supported with respect to the frame 14.

The link 23 is connected, at its lower end, to a piston rod 37 of the accelerating and retarding device 15 which comprises a spring 15^a that rests against a piston 37^a at one end and against the cylinder 15^b at its other end. A latch member 38 is attached to the brackets 19 and is provided with an operating arm 39 and an arm 40 to which is connected one end of a spring 41 the other end of which is attached to the frame 14. The latch member 38 engages a

roller 42 that is disposed between the lever members 25 and 26. The arm 39 has a pin therein which is movable in a slot 46 in a link 47 that is pivotally attached to a projection on the lever arm 21. A latch member 43 is pivotally mounted at a point relatively near the junctions of the lever members 25 and 26. The latch member 43 is provided with an operating arm 43^a that is adapted to engage the trigger 30 and a relatively movable operating arm 44 which is disposed substantially at right angles to the arm 43^a and connected thereto by a spring 44^a. The arm 44 is adapted to be engaged by the movable core member 45 of the electromagnet device 17. The latch member 43 engages a roller 43^b that is disposed within the bifurcation of the lever arm 21.

The rod 22, which is pivotally attached to the lever arm 21, is a mechanical means for transmitting the movements of the operating handle to the contact members (not shown) of the circuit breaker 1.

The indicating device 16 is supported by the accelerating device 15 and comprises an insulating member 48 upon which are mounted two stationary contact members 49 and 50 and a stationary terminal member 51 upon which is pivotally mounted a member having two knife blade arms 52 and 53, the said arms being attached to a member 54 that is pivotally connected to one end of a link 55, the other end of which is pivotally attached to the lever arm 21, substantially as shown.

Assuming the circuit interrupter to be closed and the various parts of the apparatus to occupy the positions shown, the opening of the circuit by manual means is accomplished as follows:

The handle 2 is slightly raised and its movement is transmitted through the bell crank mechanism 3 to the rod 13 which is free to move upwardly a relatively short distance, by reason of the slot 28, to cause the lug 29 to engage the trigger member 30 and move it into engagement with the arm 43^a of latch member 43 to effect withdrawal of the latter from the roller 43^b and thus permit the lever 21 to fly upwardly to open the circuit interrupter through the rod 22. The opening of the circuit interrupter is accelerated by the spring 15^a of the accelerating device 15 during the first part of its operation and is retarded during the latter part by compression of the air between the piston 37^a and the bottom of the cylinder 15^b. The forked lever 24 remains in its lower position but it is released from engagement with the latch member 38 by reason of the action of the link member 47 in carrying the operating lever 39 of the latch member 38 upwardly when the lever 21 operates.

The upward movement of the lever 21

operates the movable members of the indicating device 16 to indicate, by means familiar to those versed in the art, that the circuit interrupter is in its open position.

Assuming the lever 21 to be in the position shown by the broken lines in Fig. 1, and the lever 24 to be in its lower or full line position, the closing of the circuit interrupter is accomplished as follows:

The operating handle 2 is moved upwardly to cause the lever 24, which has been disengaged from the latch 38 as hereinbefore described, to move upwardly to compress the springs 34 and 36 until the latch 43 is a short distance above the roller 43^b on the lever arm 21. The operating handle is then moved downwardly. The first part of its movement releases the engagement of the trigger 30 from the arm 43^a to permit engagement of the roller 43^b by the latch 43 and further movement depresses the levers 21 and 24, with the assistance of the springs 34 and 36, until the position shown in full lines in Fig. 1 is attained and the latch member 38 again engages the roller 42. This movement is transmitted through the rod 22 to close the circuit interrupter 1 by any well known means, and the indicating device 16, as hereinbefore described, will indicate the closing of the same.

The springs 34 and 36 are of such a size that they will materially assist in the closing of the circuit interrupter, which operation would be impracticable without their assistance.

If a short circuit occurs on the circuit which the circuit interrupter is protecting, sufficient current will traverse the winding 56 of the magnet 57 of the tripping device 17 to move the core member 45 upwardly to engage the arm 44 of the latch member 43 and thus effect withdrawal of the same from the roller 43^b, thus allowing the lever 21 to move upwardly to open the circuit interrupter, in the manner hereinbefore described.

While we have shown and described a circuit interrupting and closing device of specific structural details and arrangements and location of parts, those skilled in the art will readily understand that various modifications may be effected therein without departing from the spirit and scope of the same, and we therefore desire that only such limitations shall be imposed as are indicated in the appended claims.

We claim as our invention:

1. In a circuit-closing device, the combination with two coaxially pivoted members, and means for automatically latching the members together when in their upper positions, of a spring operatively connected to one member for storing energy when that member is moved to its upper position to automatically effect latching engagement

with the other member, said spring subsequently entirely releasing its stored energy in assisting to move the members to their closed positions.

5 2. In an actuating device for a circuit interrupter, the combination with coaxially pivoted actuated and actuating lever arms, and means for automatically latching the said arms together under predetermined
10 conditions, of a spring operatively connected to the actuating lever arm and adapted to exert a downward force on the actuated lever arm only when the actuating
15 lever arm is raised into latching engagement with the actuated lever arm to thereby assist in the downward movement of the latched lever arms.

3. In an actuating device for a circuit interrupter, the combination with coaxially
20 mounted actuated and actuating lever arms, and means for automatically latching the same together under predetermined conditions, of a spring element connected to the actuating lever arm and which is compressed
25 when the actuating lever arm is raised into latching engagement with the actuated lever arm, the stored energy in the com-

pressed spring being available in its entirety to assist in the downward movement of the latched lever arms.

4. In an actuating device for a circuit interrupter, the combination with a compound operating lever arm and means for automatically latching the component parts together only when both component parts occupy their open position, of a device that is
35 operatively connected to one of said component operating lever parts and in which energy is stored when said connected lever part occupies its open position, the energy
40 in said device being then available to exert a force to assist said first component lever part in returning the second component lever part to its closed position after latching engagement between the component
45 lever parts has been effected.

In testimony whereof, we have hereunto subscribed our names this 18th day of Dec. 1913.

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Witnesses:

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