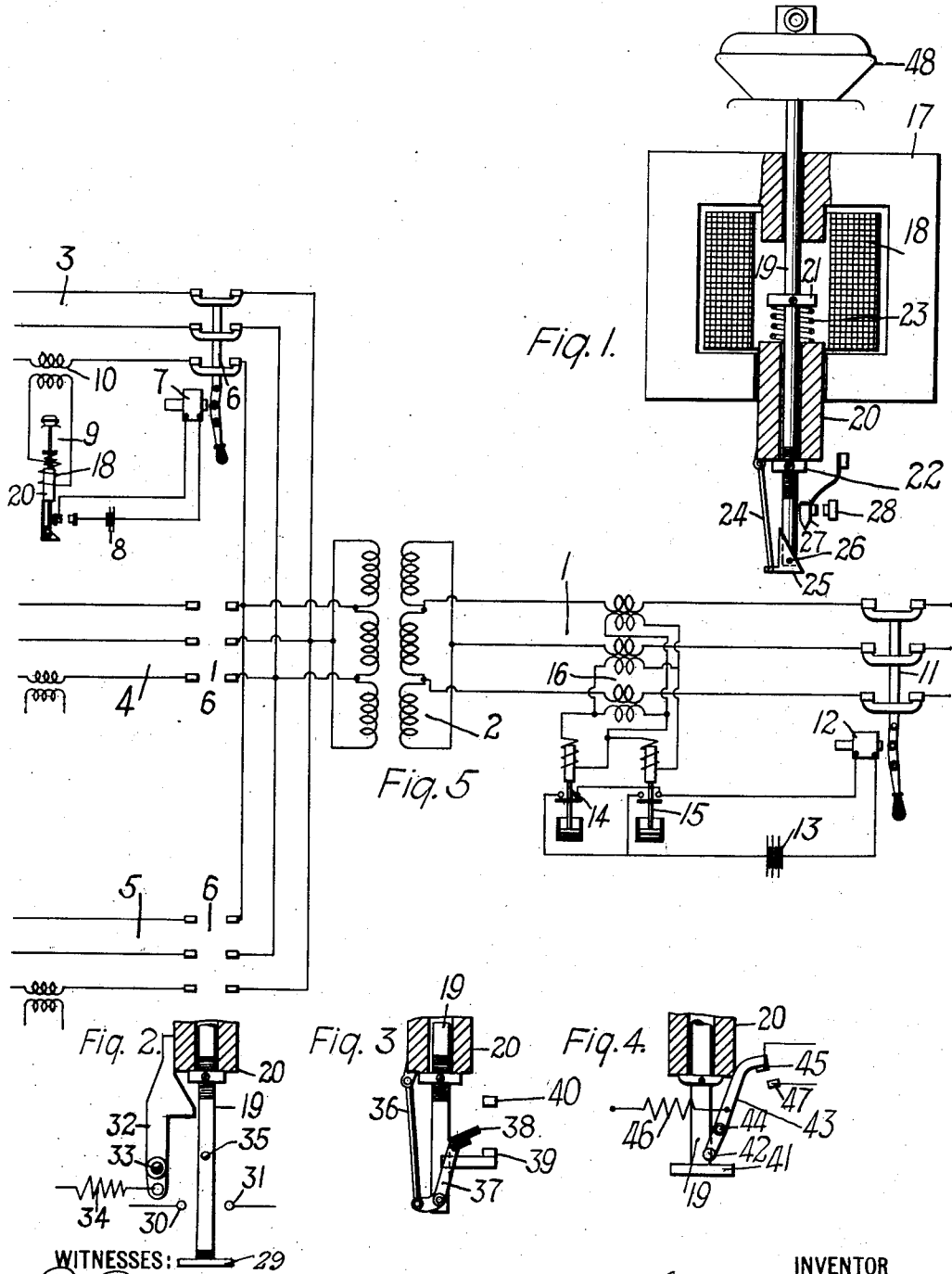


H. W. BROWN.
ELECTRICAL PROTECTIVE DEVICE.
APPLICATION FILED DEC. 19, 1913.

1,253,207.

Patented Jan. 15, 1918.



WITNESSES:
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ELECTRICAL PROTECTIVE DEVICE.

1,253,207.

Specification of Letters Patent.

Patented Jan. 15, 1918.

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To all whom it may concern:

Be it known that I, HAROLD W. BROWN, a citizen of the United States, and a resident of Ithaca, in the county of Tompkins and State of New York, have invented a new and useful Improvement in Electrical Protective Devices, of which the following is a specification.

My invention relates to electrical protective devices and particularly to relays.

The object of my invention is to provide a relay which will operate on a relatively small overload but which will not operate on a relatively excessive overload.

Various relay systems have been provided for either inverse or definite time limit action on ordinary overload conditions, but frequently an overload is perceptible on a branch circuit which is much greater than the ultimate breaking capacity of the circuit interrupter employed, and, should the overload be interrupted, it might cause the circuit interrupter to be injured. To protect against an ordinary overload on a branch circuit, and to cause the excessive overload to be taken care of by a larger circuit interrupter in the main circuit, I have provided a relay employing an electromagnet with a plunger system comprising a bellows-controlled rod having a plunger loosely mounted thereon and pressed down by a spring attached to said rod and having a device attached to the plunger for either completing or preventing the completion of a circuit, according to the extent of the overload.

Referring to the accompanying drawings of which Figure 1 is a view of an electromagnet in which my invention is incorporated, shown partially in elevation and partially in section; Figs. 2, 3 and 4 are fragmentary views of relays, all embodying modified forms of my invention, and Fig. 5 is a diagrammatic view of a circuit showing the principal application of my invention.

Referring to the drawings, my invention is used in conjunction with a main high-tension circuit 1 which feeds low-tension circuits 3, 4 and 5 through a transformer 2. Each of the circuits 3, 4 and 5 is protected by a circuit breaker 6 having a tripping electromagnet 7 which is energized by a battery 8 and is controlled by a relay 9 receiving current from a transformer 10 that is

proportional to the current traversing the circuit to be interrupted. Circuit 1 is provided with a circuit breaker 11 having a tripping electromagnet 12 which is energized by a battery 13 and is controlled by relays 14 and 15 which receive current from transformers 16 that is proportional to the current traversing circuit 1. The circuit-breaker 11 is of such size that it will be operated by any excessive overload which the breaker 6 is not capable of interrupting without injury.

Referring to Fig. 1, the relay 9 comprises a magnetic circuit 17, an energizing coil 18, a rod 19, a plunger 20 loosely mounted on said rod 19 and limited in its travel on said rod 19 by collars 21 and 22, a spring 23 interposed between collar 21 and the plunger 20, an arm 24 having its respective ends pivotally connected to the plunger 20 and to a triangular-shaped member 25 which is pivotally mounted at a point 26 on the rod 19 so that it either presses contact pieces 27 and 28 together or pivots around the point 26 and presses them apart, thereby either closing or preventing the closing of the circuit through the battery 8 and the electromagnet 7.

Referring particularly to Fig. 2, a contact piece 29 is attached to the lower end of the rod 19 which, when said rod operates, bridges contact members 30 and 31, thereby closing a circuit through the battery 8 and the electromagnet 7. A latch 32 is pivotally mounted at point 33 and bears against the plunger 20 by reason of the pressure of a spring 34 to prevent the rod 19 from rising by engaging a pin 35.

Referring to the modification shown in Fig. 3, the respective ends of an arm 36 are pivotally connected to plunger 20 and to a bell crank lever 37 which is pivotally mounted on the rod 19 and carries an insulating barrier 38. The rod 19 also carries a movable contact piece 39 which, when it comes into contact with a stationary contact piece 40, completes the circuit through the battery 8 and the coil of the electromagnet 7 to effect operation of the circuit breaker 6.

Referring now particularly to Fig. 4, a collar 41 is mounted on the end of the rod 19 which permits the end 42 of an arm 43 to ride over it. The arm 43 is pivotally

mounted at a stationary point 44 and carries a contact piece 45, and is held against the plunger 20 by a spring 46. A stationary contact piece 47 coöperates with the contact piece 45 to complete the circuit through the battery 8 and the coil of the electromagnet 7 to effect operation of the breaker 6. In all the modifications, the rod 19 should be provided with a bellows or dash pot 48 to permit of an inverse time limit in its action, and for reasons hereinafter explained.

The operation of my invention is as follows: When an excessive overload traverses the circuit 3, the coil 18 of the relay 9 is energized to raise the plunger 20 and cause the triangular piece 25 to pivot around the point 26, until its upper end passes the lower end of the contact member 27. The rod 19 is prevented by the dash pot 48 from moving upwardly until after a predetermined interval of time. The circuit breaker 11 will operate if the breaker 6 does not, thus interrupting the whole circuit. The breaker 11 is of such capacity that interrupting an excessive overload will not injure any of its parts and is of any ordinary construction. If, however, the overload on the circuit 3 is relatively small, the plunger 20 and the rod 19 will rise simultaneously and thus cause the triangular piece 25 to push the contact piece 27 into engagement with the contact piece 28, thereby completing the circuit through the battery 8 and the coil 7 to effect operation of the breaker 6.

With the modification shown in Fig. 2, the plunger 20 moves upwardly against the action of the spring 23 until it reaches the collar 21; this permits the latch 32 to engage the pin 35 and prevent the bridging contact piece 29 from completing the circuit of the breaker tripping coil. However, if the load is relatively small, the whole movable structure rises and the pin 35 slides over the outer face of the latch 32 and thus permits the bridging contact member 29 to complete the circuit of the breaker tripping coil.

The operation of the modification as shown in Fig. 3 is such that insulation piece 38 is thrust between contact members 39 and 40 when a heavy overload occurs, while a relatively small overload causes contact members 39 and 40 to engage, and, as hereinbefore explained, operation of the breaker 6 is accordingly effected.

The modification of my invention, as shown in Fig. 4, prevents the circuit from being opened on an excessive overload because the contact arm 43 is pulled back by the spring 46 until the point 42 is in vertical alinement with the point 44, thus preventing the rod 19 from moving upwardly. If a relatively small overload occurs, however, the movable structure rises and the bearing point 42 of the arm 43 is engaged by the collar 41 which causes the arm 43 to

turn on its pivot and effect engagement of the contact pieces 45 and 47 as hereinbefore described.

I do not limit my invention to any particular structure, since it is applicable to numerous modifications which lie within the scope of the appended claims.

I claim as my invention:

1. A relay comprising a movable core member, a movable rod, resilient means for connecting the core member to the rod, an actuating winding, coöperating contact members, and means controlled by the relative movement of the rod and core member for effecting engagement of the contact members when a relatively small overload traverses the winding and for preventing the engagement thereof when an excessive overload traverses the winding.

2. A relay comprising a movable core member, a movable rod, a spring for operatively connecting the core member to the rod, an actuating winding, coöperating contact members, and means dependent upon the relative movement of the rod and core member for effecting engagement of the contact members only when a relatively small overload traverses the winding.

3. A relay comprising a magnetizable core member, a movable rod, resilient means for operatively connecting the said core member and the rod together, an actuating winding for the magnetizable core member, contact members, and means controlled by the relative movement of the rod and the movable core member for effecting the engagement of the contact members under predetermined conditions and for preventing the engagement thereof under other conditions.

4. A relay comprising a movable magnetizable core member, a relatively movable guiding member therefor, an actuating winding, contact members, and means controlled by the relative movement of the core member and the movable guiding member for effecting engagement of the contact members under predetermined conditions and for preventing engagement under other conditions.

5. In an electrical relay, the combination with an actuating coil and a magnetic structure surrounding the said coil, of a rod, a movable core member adapted to surround the rod and to be actuated by the said coil, means for limiting the relative movement of the said rod and the said core member, and means for preventing the operation of the rod when an excessive overload traverses the coil and for causing the rod and movable core member to operate when a relatively smaller overload traverses the coil.

6. A relay comprising an actuating winding, a movable core member, a movable rod, means for resiliently connecting the core member and the rod together, movable and

stationary contact members and means pivotally connected to one of the movable members and actuated by the other movable member for effecting or preventing the engagement of the contact members.

7. A relay comprising an actuating winding, a movable core member, a movable rod, cooperating contact members, and means pivotally connected to one of the movable members and actuated by the other movable member for effecting and preventing the engagement of the contact members.

8. A relay comprising a movable magnetizable core member, a relatively movable guiding member therefor, an actuating winding, contact members, and means controlled by the relative movement of the core member and the movable guiding member for effecting engagement of the contact members when a normal overload traverses the actuating winding and for preventing the engagement when an excessive overload traverses the winding.

9. A relay comprising an actuating winding, a movable core member, a movable rod, cooperating contact members, and means connected to one of the movable members and actuated by the other for effecting en-

gagement of the contact members only when a relatively small overload traverses the winding.

10. A relay comprising a movable core member, a movable rod, a spring for operatively connecting them together, means for actuating the movable core member, contact members, and means controlled by the relative movement of the core member and the rod for effecting the engagement of the contact members under predetermined conditions and for preventing the engagement under other conditions.

11. A relay comprising an actuating winding, a movable core member, a movable rod, cooperating contact members, and means connected to one of the movable members and actuated by the other for preventing engagement of the contact members when a relatively large overload traverses the winding.

In testimony whereof, I have hereunto subscribed my name this 28th day of November, 1913.

HAROLD W. BROWN.

Witnesses:

FRED L. CLOCK,
D. V. PROCTOR.