H. W. BROWN.

ELECTRICAL RELAY.

APPLICATION FILED JAN. 7, 1914.

1,341,629. Patented June 1, 1920.

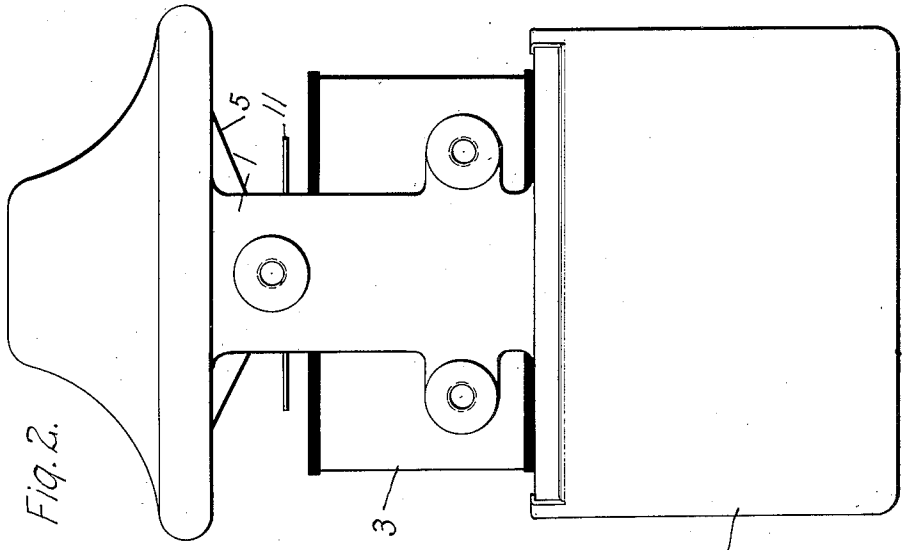


Fig. 2.

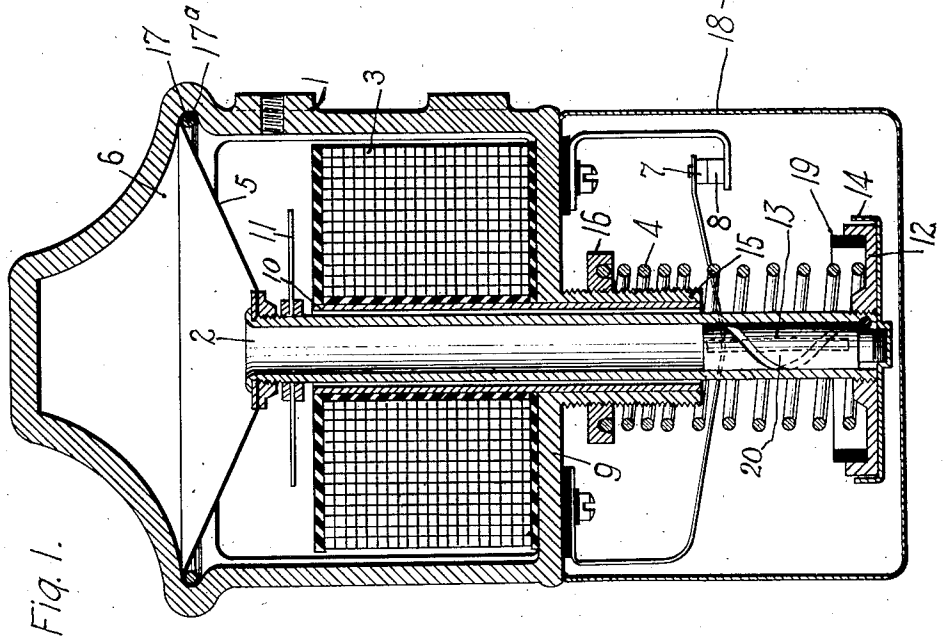


Fig. 1.

WITNESSES:

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ELECTRICAL RELAY.

1,341,629. Specification of Letters Patent. Patented June 1, 1920.

Application filed January 7, 1914. Serial No. 810,799.

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 Relays, of which the following is a specification.

My invention relates to electromagnetic devices and particularly to relays as are provided to protect electrical circuits from injuries resulting from overloads and similar disturbances.

The object of my invention is to provide an electro-magnetic type of relay of the character indicated which shall have a time period between the beginning of a flow of current that exceeds a predetermined amount and the instant when a circuit-breaker is tripped that is inversely proportional to the amount by which the current exceeds the predetermined amount.

It is broadly old in the prior art to provide a relay embodying an inverse time element feature but my present invention provides a relay constituting an inverse time element feature of such novel construction as to greatly increase its adjustments and to materially reduce the cost of manufacturing the same.

My invention possesses exceedingly simple adjustments and has means for increasing the time limit of its operation beyond that heretofore provided and it also possesses a greater flexibility of adjustment than have previous relays of the above mentioned type.

In the accompanying drawing, Figure 1 is a side view, partially in section and partially in elevation, of a relay embodying my invention, and Fig. 2 is a rear elevational view of the relay shown in Fig. 1.

Referring to the drawing, my invention comprises a stationary, magnetizable member 1, a hollow movable magnetizable core member 2, an exciting winding 3 concentrically disposed with respect to the core member 2, a spring 4 for opposing the action of the said movable core member, a flexible member 5 to be associated with the movable core member 2 and the stationary member 1 to form a bellows 6, a movable contact member 7 that is suspended from the lower portion 9 of the member 1 and is normally in engagement with a stationary contact member 8 that is also suspended from the lower portion 9 of the member 1.

The movable core member 2 is slidably mounted in a non-magnetic tubular member 10 which has an easily saturable magnetic vane or pole piece 11 attached to its upper end for modifying the inverse action of the relay, according to its position. To the lower end of the member 2 is attached a support 12 for the spring 4. In the lower portion of the member 2 is fitted a tubular member 13 having a helical groove on its outer surface extending through approximately one circumference to serve as a passage for the escape of air. The lower part of the core member 2 is provided with a relatively narrow longitudinal slot 20 of a length slightly less than the length of the tube 13. The tube 13 is provided with an indicator handle 14 for adjusting the position of the same with respect to the slot 20 in the core member 2 and for indicating on a scale (not shown), which is mounted on the support 12, the time of operation at a predetermined overload.

The base member 9 has a downwardly projecting portion 15 that is screw threaded to coöperate with a nut 16 having an annular groove to receive the upper end of the spring 4 and being adjustable to set the spring for different values of current. The flexible member 5 is wedged at its upper edges into grooves 17 within the stationary magnetizable member 1 by an annular spring member 17^a and is clamped securely at its lower edge to the upper part of the movable core member 2 by any suitable means. A suitable case 18 is provided to protect the spring 4 and the contact members 7 and 8.

An insulating collar 19 is mounted upon the support 12 for engaging the movable contact member 7 when the core member 2 moves upwardly. The spring 4 is not wound uniformly but the spacing of the turns is so proportioned that, as the spring is compressed by turning the nut 16, a considerable number of turns of the same are closed consecutively. Thus, the gradient of the spring pressure is steeper when the relay is set for heavier loads.

When an overload or other disturbance occurs upon an electrical circuit (not shown) an increased current that is proportional to the increased current flowing through the

circuit will traverse the winding 3 of the relay and cause upward movement of the core member 2 against the action of the spring 4 and the bellows 6 at a rate which is inversely proportional to the excess current traversing the electrical circuit.

By moving the indicator 14, the tube 13 is turned to change the length of the path through the portion of the helical groove through which the air passes, and thus change the time of operation at any value of current. The indicator is placed in a position corresponding to the time setting desired for certain values of current; and for, any current exceeding that value, the relay will operate, as hereinbefore described, in inverse ratio to the value of the current.

The magnetic vane or pole piece 11 is unsaturated at relatively low values of currents. Thus, the action of the relay will become relatively stronger at light loads and relatively weaker at heavy loads, and thus, the pull of the relay will be nearly the same at all loads. From the foregoing, it will be understood that a substantially definite time element characteristic is obtained.

Although the specific form of construction shown is that which is preferred when my invention is used as a relay it is obvious that modifications may be made within the spirit of the invention, and I desire to include all such modifications within the scope of the appended claims.

I claim as my invention:

1. A relay comprising a stationary magnetizable member, a movable core member, a nonmagnetizable member disposed around the movable core member and an easily saturable member mounted on the movable core member to obtain a definite time element in the operation of the relay.

2. A relay comprising a stationary magnetizable member, a movable core member, a winding for the said members and an easily saturable member disposed adjacent to the said winding on the movable core member for the purpose of obtaining a definite time-element characteristic in the operation of the relay.

3. In an electrical relay, the combination with a movable core member, a stationary magnetizable member and a winding therefor, of a magnetizable vane disposed on the said movable core member and adapted to become saturated under predetermined conditions to accentuate the time-element characteristic of the relay.

4. In a relay, the combination with a movable core member and a winding therefor, of an easily saturated vane mounted on the movable core member, said vane being adapted to accentuate the definite time-limit characteristic of the relay.

5. In a relay, the combination with a movable core member and a winding therefor, of a magnetizable member mounted on the movable core member and adapted to become saturated when a predetermined current traverses the said winding.

6. A relay comprising a movable core member, a winding therefor and a saturable member, said saturable member being disposed adjacent the said winding on the said movable core member.

In testimony whereof I have hereunto subscribed my name this 29th day of December, 1913.

HAROLD W. BROWN.

Witnesses:
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