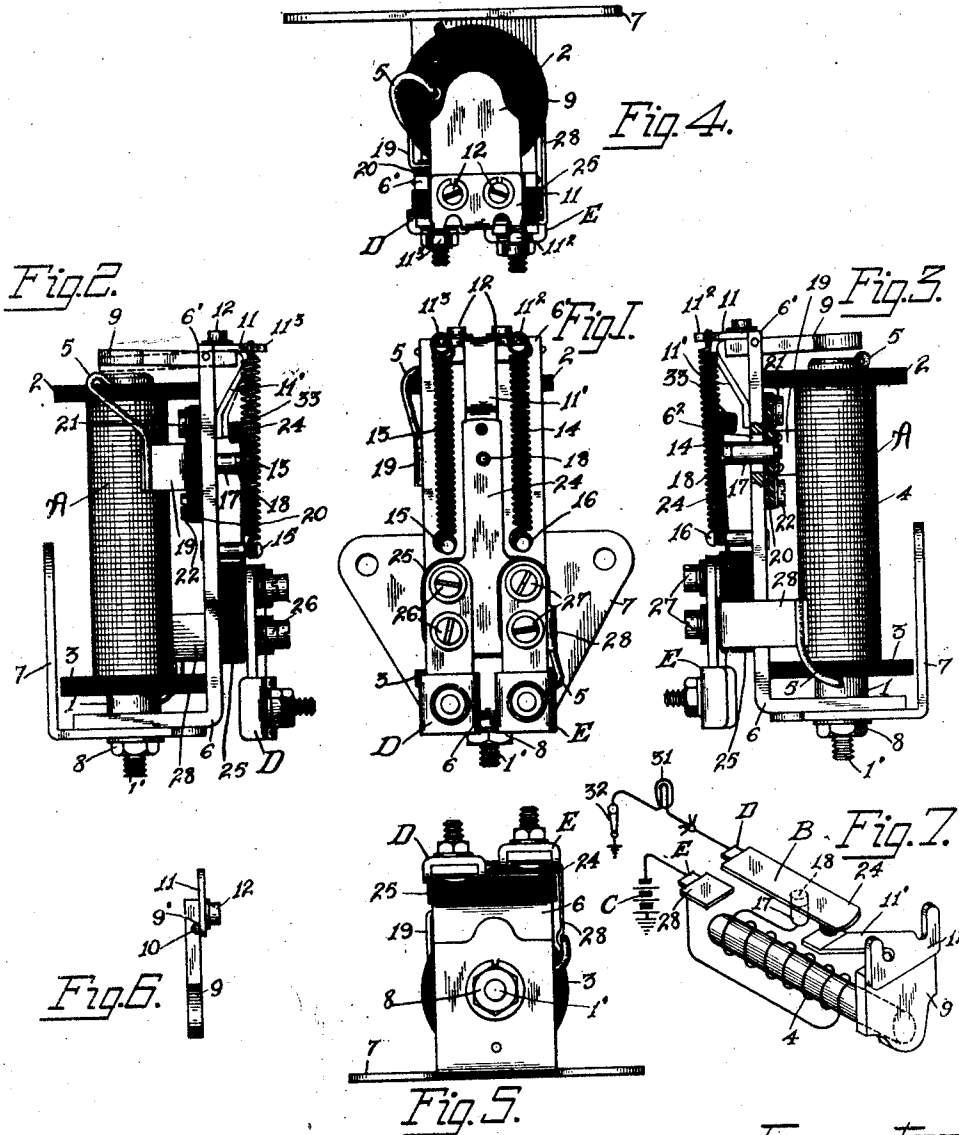


A. H. WEISS.
CIRCUIT BREAKER RELAY.
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UNITED STATES PATENT OFFICE.

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CIRCUIT-BREAKER RELAY.

1,186,959.

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To all whom it may concern:

Be it known that I, ALFRED H. WEISS, a citizen of the United States of America, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Circuit-Breaker Relays, of which the following is a specification.

My invention relates to circuit breaker relays, being directed more particularly to devices of that character in which normally tensioned armatures are provided, and adapted to be actuated by an abnormal current flow through the electromagnet, whereby a contact connected to said circuit is operated to affect the electromagnet so as to cause a rapid vibration of its armature and said contact, an object of my invention being to provide an improved and simplified device of this character which is more positive in its operation and simple to maintain adjusted.

Certain advantages of construction and operation will be more particularly referred to in the ensuing specification.

My invention is adapted for use in connection with power circuits in general and is particularly useful in connection with power circuits on automobiles and movable vehicles where the device is subject to considerable vibration and jar.

In the accompanying drawing I have illustrated the preferred embodiment of my invention, the parts being shown in their normal position and like parts being indicated by like reference characters in the different views.

Figure 1 of the drawing is a top view of the preferred form of my invention; Fig. 2 is a left side view of Fig. 1; Fig. 3 is a right side view of Fig. 1 being partly broken away to show the preferred mounting arrangement for one of the contacts; Fig. 4 is a top end view of Fig. 1; Fig. 5 is a bottom view of Fig. 1; Fig. 6 shows the armature removed from the relay to illustrate the manner of supporting the armature pivot pin and Fig. 7 illustrates diagrammatically the relay connected in circuit.

In the embodiment of my invention as illustrated, I provide an electromagnet A comprising a core 1, having heads 2 and 3 driven thereon and a winding 4 constructed of wire 5 suitable for carrying the maximum

current to which the relay may be exposed. The core 1 has a threaded extension 1¹ extending through a pole piece 6 and bracket 7, a nut 8 being provided for clamping the elements 6 and 7 to the core 1. At the front end 6¹ of the forwardly extending part of the member 6, an armature 9 is provided being slotted at 9¹, (Fig. 6) to support a pivot pin 10 adapted to be inserted through bearings in the front end 6¹, said pin 10 being clamped against the armature 9 by means of a member 11 and clamping screws 12. The pin 10 is rotatable in the bearings in the ends 6¹, this method of supporting the armature being the preferred one although it is to be understood that my invention is not limited to this particular construction. A rearwardly extending member 11¹, preferably integral with the clamping part of 11, is adapted for operating the relay contact, the extension 11¹ normally resting against the member 6, thus also acting as a stop for the armature 9.

I preferably provide means independent of the contact springs B for placing a normal tension upon the armature and to this end I provide spring members 13, 14, supported at their fixed ends by pins 15, 16 engaging upwardly projecting ears 11², 11³, of the member 11.

As will appear from Fig. 7, I preferably connect the winding 4 and contact springs B in series with the source of power C, the contact arrangement B therefore preferably comprising a pair of normally closed contact pieces 17, 18. Contact 17 is attached to a terminal plate 19 which plate is pinned to an insulating block 20. This block is secured to the under side of pole piece 6 preferably by means of screws 21, 22, contact 17 projecting through an orifice 6² to engage contact 18, the connected terminal plate 19 being bent at right angles and adapted to receive one end of the winding 4 as shown in Fig. 2. A yielding contact spring 24 is provided for supporting the contact 18, said spring 24 being rigidly clamped at one end to the member 6 and insulated therefrom by an insulated supporting block 25. The fixed part of the spring 24 is wide enough to be secured to the screws 26, 27, a terminal D being held in electrical contact with spring 24 while the terminal E and its terminal plate 28 are insulatingly secured

by the screws 27, plate 28 being connected to the other end of the winding 4 but insulated from spring 24 and pole piece 6.

Normally the electrical circuit through the relay follows a path which may be traced from terminal D, through contact spring 24, contacts 18, 17, terminal plate 19, winding 4, terminal plate 28, to terminal E.

In Fig. 7, I have illustrated the preferred method of connecting the relay in circuit, a source of current C being shown connected to terminal E and extending through the magnetic winding and contacts of the relay to terminal D from which point it may extend through one or more circuits, a circuit being shown through the lamp 31 and a switch 32 to ground. The tension springs 13, 14 are preferably adjusted so that the normal operating supply of current through the winding 4 is not sufficient to cause a breaking operation of the armature 9. By this I mean that with a flow of normal operating current through the winding 4, the armature is not attracted sufficiently to break the contacts 17, 18 although it may move off normal. Furthermore, I have found that by providing an air gap between the buffer 33 and the arm 11¹, sufficient to allow substantial movement of the armature without interrupting the contacts, any slight increase above the normal current flow or jarring of the armature 9 does not cause an operation of the relay to break its circuit. Thus when using the relay in connection with lighting and ignition circuits on an automobile, a slight increase of normal operating current or jar of the armature 9 will not interrupt the contacts 17, 18. But should the circuit become grounded or short-circuited through a low resistance path, armature 9 is readily attracted against the tension of springs 13, 14, until the arm 11¹ engages the buffer 33 at which time armature 9 is in a position as indicated by the dotted lines in Fig. 2. With the armature in this position there is such a decrease in the air gap between the core 5 and armature 9, that although the attracting movement of arm 11¹ is retarded by engagement with the buffer 33, of contact spring 24, due to the decrease in the said air gap, the attraction of armature 9 is continued until contacts 17, 18 are interrupted, thus interrupting the circuit of winding 4 and permitting armature 9 to retract to again close the operating circuit through the contacts 17, 18. As long as the abnormal current flow is continued the armature 9 is of course rapidly vibrated, such vibration being indicated to the operator by the fluctuation of the lamps as 31 or an audible signal is produced by the vibration of the armature itself.

From the foregoing it will be apparent that although the armature may be moved slightly by jarring or a slight flow of cur-

rent without interrupting the contacts 17, 18, to cause an indicating operation of the relay, it is only when an excessively abnormal flow of current is produced that the armature 9 is attracted sufficiently to interrupt the circuit of the magnet through the contacts 17, 18 and thereby bring about an indicating operation of the relay.

In illustrating my invention I have chosen an embodiment worked out for commercial purposes, but it will be obvious to those skilled in the art that minor changes may be made without departing from the spirit of my invention, and therefore I do not desire to be limited to the exact arrangement as shown.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. A circuit breaker relay comprising an electromagnet having a winding, a pole piece secured to one end of the core of said electromagnet and extending parallel thereto, an armature pivotally supported by said pole piece in operative relation to the free end of the core of the electromagnet, a pair of contacts, a spring member secured to said pole piece for one of said contacts, a member secured to the inner face of said pole piece for supporting the other of said contacts, a contact operating element secured to said armature but normally out of operative relation with said contact spring member, spring means for holding said armature in normal position, said contacts and winding being adapted to be serially connected in electrical circuit, said spring means and said normally inoperative relation permitting a definite flow of current without effecting an interruption of said contacts but whereby an abnormal flow of current through said circuit will rapidly operate said armature and spring supported contact during such abnormal flow as an indication thereof.

2. A circuit breaker relay comprising an electromagnet, a pole piece secured to one end of the core of said magnet and extending parallel to the core thereof, an armature pivotally secured to the free end of said pole piece in operative relation to the core of the electromagnet, a contact spring secured to said pole piece and adapted to be actuated by a contact operating member secured to said armature, a contact supporting member secured to the inner face of said pole piece for supporting a second contact normally in engagement with said first contact, a spring member for holding said contact operating member in its normal position free from contact with said contact supporting spring thereby permitting an initial movement of said armature without interrupting said contacts whereby a normal flow of current through the winding of said relay will not operate to interrupt said con-

tacts but whereby an abnormal flow of current through said winding will rapidly operate said armature and contact during such abnormal flow.

5 3. A relay comprising a spool-shaped electromagnet, a pole-piece secured to one end of the core of said magnet and extending adjacent the peripheral surface thereof, an armature pivotally supported by a free end
10 of said pole-piece in operative relation to the free end of the core of the electromagnet, a contact spring secured to said pole-piece and adapted to be actuated by said armature, a contact supporting member secured
15 to the inner face of said pole-piece, and a contact secured to said member and extending through an orifice in said pole-piece into operative relation with said contact spring.

4. A relay comprising a spool-shaped electromagnet, a pole-piece secured to one end of the core of said magnet and extending adjacent the peripheral surface thereof, an armature pivotally supported by said pole-piece in operative relation to the free end
20 of the core of the electromagnet, a contact spring, a cooperating contact secured to said pole-piece, a contact operating member secured to said armature and extending back along said pole-piece for operating said con-
25 tacts, a pair of ears extending from the last said member, and a pair of helical retractile springs for said armature secured at one end to said ears and at their other ends to said pole-piece so as to give said armature a normal tension independent of said contact
30 spring.

5. A circuit breaker relay comprising an electromagnet having a winding, a pole piece for said electromagnet, an armature for said electromagnet pivotally supported to the
40 free end of said pole piece, a pair of normally closed contacts, a supporting spring for one of said contacts, a supporting member attached to the under side of said pole piece for supporting the other of said contacts,
45 a retractile spring secured at its one end to said pole piece and at its other end to an operating member for giving the said relay armature a normal tension independent of said contact spring and also acting as a
50 back stop for holding said armature in its retracted position, said operating member being free from contact with said contact springs so as to permit an initial movement of said armature without interrupting said
55 contacts, and said relay being adapted to have an electrical circuit connecting said winding and contacts in series whereby a flow of current through said circuit will not
60 operate said electromagnet armature sufficiently to interrupt said contacts but whereby an abnormal flow of current through said circuit will operate said armature and contact thus causing said circuit breaker relay
65 to operate as a buzzer.

Signed by me at Chicago, county of Cook, and State of Illinois, in the presence of two witnesses.

ALFRED H. WEISS.

Witnesses:

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M. R. ROCHFORD.