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H. R. SEARING
INDICATOR FOR RELAYS

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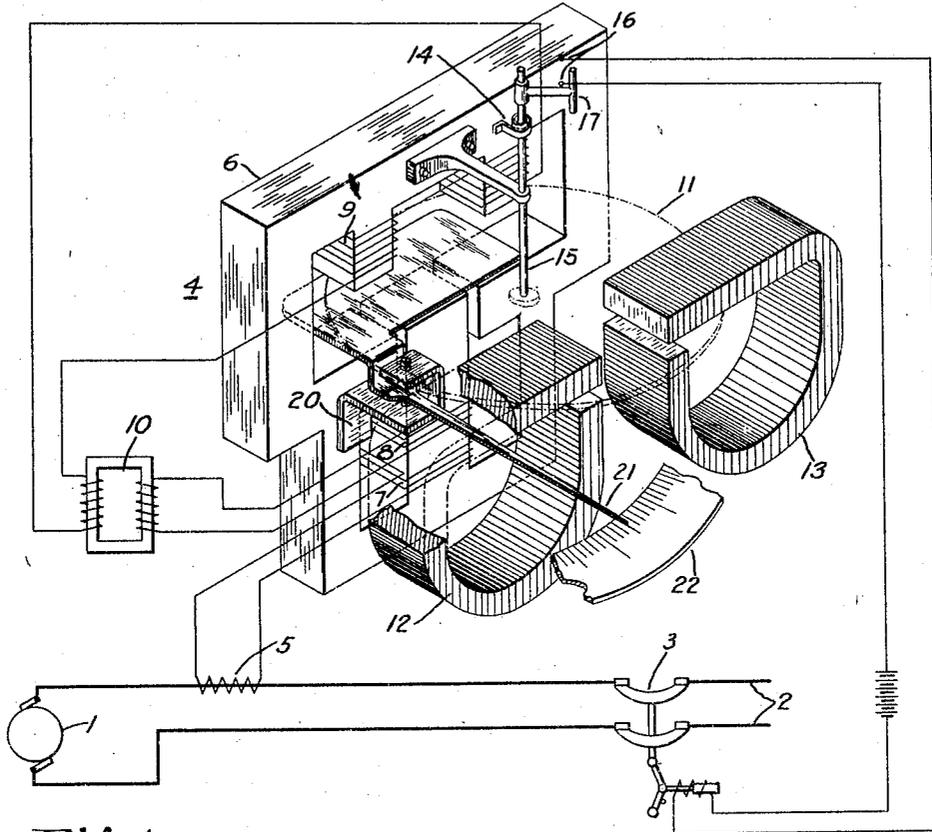


Fig. 1

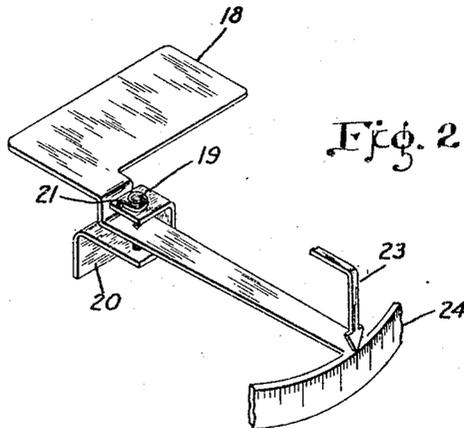


Fig. 2

WITNESSES:

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INDICATOR FOR RELAYS.

Application filed February 26, 1921. Serial No. 448,184.

To all whom it may concern:

Be it known that I, HUDSON R. SEARING, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented a new and useful Improvement in Indicators for Relays, of which the following is a specification.

My invention relates to relays and particularly to devices for indicating the energized or operative condition of relays.

One object of my invention is to provide means for indicating the value of the current traversing a relay.

Another object of my invention is to provide means for indicating when a relay is in an energized condition.

Another object of my invention is to provide means for indicating the operative condition of a relay of the induction type comprising a primary energizing winding and a secondary winding inductively related to and energized from the primary winding.

Another object of my invention is to provide a device, of the above indicated character, that may be applied economically to the standard induction-type relay without affecting the structure thereof.

United States Patent No. 1,286,239, issued to the Westinghouse Electric & Manufacturing Company December 3, 1918, upon an application filed by A. W. Copley and B. H. Smith, discloses a relay comprising a magnetizable member and a rotatable disc member that controls the engagement or disengagement of a pair of contact members for controlling an external circuit. The disc member is prevented from moving, by a suitably adjusted spring, until the magnetizable member is energized beyond a predetermined degree. So long as the current traversing the relay is less than the predetermined value, there is no indication as to whether or not the relay is energized or in an operative condition.

Since the relay is depended upon to disconnect the associated circuit when abnormal conditions occur therein, it is imperative that the relay be in operative condition.

Since the movable controlling member is operated only after the occurrence of abnormal conditions, a station attendant has no means whereby he may ascertain the operativeness or non-operativeness of a relay. The indication of an ammeter in the circuit with the

relay is not positive enough. The increasing power capacities of large stations and the corresponding increase of possible damage that may be effected render a positive indication of the operativeness of a protective relay absolutely necessary.

A relay of the induction type comprises in addition to the main energized winding a secondary winding that is inductively related to and energized from the former. The actuation of the main controlling member is dependent upon the co-operation of the fluxes developed by both windings. If the secondary winding be in faulty or inoperative condition, the relay will be inoperative. Such inoperative condition cannot be readily ascertained by observing the main controlling member since it is normally adjusted to operate only when the relay is energized in excess of a predetermined degree. However, by providing a member to indicate a co-operative relation between the fluxes developed at all degrees of energization, the operativeness of the relay may be always directly indicated.

In view of this fact, I provide an auxiliary disc member disposed adjacent to, and in plane parallel to, the main disc member of the relay. The auxiliary disc member is subjected to, and influenced by, the same flux that controls the movement of the main disc member but is controlled by a spring that is weaker than that controlling the main disc member. The auxiliary disc member is provided with means for indicating the value of current that traverses the relay. Thus, although the current that traverses the relay may be less than the value that is necessary to operate the same, the indicating means controlled by the auxiliary disc member will serve to indicate that the relay is in an operative condition and also the value of current that is traversing the same.

Figure 1 of the accompanying drawings is a diagrammatic view of an electrical circuit and a perspective view of a relay embodying my invention connected thereto.

Fig. 2 is a perspective view of a modified form of indicating device controlled by the auxiliary disc member shown in the relay in Fig. 1.

An electrical translating apparatus 1 receives energy from a source 2 of electro-

motive force through a circuit interrupter 3. An overload relay 4 is provided to protect the apparatus 1 from overload by tripping the interrupter to disconnect the same from the source 2. The relay 4 is energized, in accordance with the current traversing the circuit, by a current transformer 5.

The relay 4 comprises a magnetizable core member 6 having a plurality of windings 7, 8 and 9 disposed upon various portions thereof to produce a rotating magnetic flux. A saturated current transformer or torque compensator 10 is connected between the windings 8 and 9. The winding 7 inductively energizes the winding 8 which energizes the winding 9 through the saturated transformer 10.

The relay 4 further comprises a rotatable disc member 11 having a portion thereof subject to the magnetic flux set up by the windings 7, 8 and 9 of the magnetizable core member 6. Another portion of the disc member is subject to the magnetic flux of two permanent magnets 12 and 13 that serve to control the movement thereof. A spring 14 disposed about the shaft 15 of the rotatable disc member 11 so controls that member as to prevent the operation thereof until a current of predetermined value traverses the relay to produce a magnetic flux of predetermined strength.

When a current exceeding a predetermined value traverses the relay for a predetermined interval of time, depending upon the value of the current, the disc member 11 is caused to turn to effect the engagement of a plurality of contact members 16 by a bridging member 17. Upon the engagement of the contact members by the bridging member 17, an auxiliary circuit is completed to trip the interrupter 3.

Beneath the disc member 11 adjacent thereto and in a plane parallel thereto, is disposed an auxiliary disc member 18 that is so disposed with respect to the magnetizable core member 6 as to be subjected to the same magnetic flux that affects rotation of the disc member 11. The auxiliary disc member 18 is mounted on, and supported by, a shaft 19 that is supported by a bracket 20. A spring 21 co-operates with the shaft 19 and the bracket 20 to control the movement of the auxiliary disc member 18.

In Fig. 1 is shown one modification of the indicating means controlled by the auxiliary disc member 18 which comprises a movable hand or pointer 21^a that co-operates with a stationary dial or scale 22 that is suitably calibrated to indicate either the actual value of current that traverses the relay or the percentage of the full-load value of current traversing that relay. The modification that is illustrated in Fig. 2 comprises a stationary pointer 23 that

co-operates with a movable dial 24, the movement of which is controlled by the auxiliary disc member 18.

The auxiliary disc member 18 and the indicating member controlled thereby thus serve to indicate the value of current that traverses the relay and also to indicate that the relay is in an operative condition while the value of that current is less than the predetermined value that is necessary to produce a turning torque for the main disc member 11.

Although I have illustrated the device embodying my invention as applied to an overload relay, it is obvious that analogous devices embodying my invention may be applied to other types of relays, such as watt, voltage, current or temperature relays, to indicate the degree of energization of such relays prior to the degree required for the operation thereof.

My invention is not limited to the specific structure that is illustrated, since various modifications may be made therein within the spirit and scope of the invention, as set forth in the appended claims.

I claim as my invention:—

1. In a relay, the combination with a movable element adapted to be actuated only when the current traversing the relay exceeds a predetermined value, of an auxiliary movable element actuated under all conditions of energization of the relay to indicate the normal operation thereof, said elements being electromagnetically and independently actuatable.

2. In a relay, the combination with a movable element adapted to be actuated only when the current traversing the relay exceeds a predetermined value, of an auxiliary movable element for indicating the value of the current traversing the relay, said elements being simultaneously energized.

3. The combination with a relay normally energized but adapted to be operated only under predetermined conditions, of means for indicating the energization of the relay before the occurrence of such conditions, and a single means for controlling the operation of the relay and of the indicating means.

4. The combination with a relay comprising means normally energized but adapted to be operated only under predetermined conditions, of means for indicating the normality of the relay before the occurrence of such conditions to operate the aforementioned relay means, both said means being electrically and mechanically independent.

5. The combination with a normally energized relay adapted to be actuated only when a current of predetermined value traverses the relay, of means simultaneously energized with the relay for indicating the operativeness of the relay.

6. The combination with a relay compris-

ing means normally energized and adapted to be actuated only when a current of predetermined value traverses the relay, of means for indicating the value of the current traversing the relay.

7. The combination with an overload relay normally energized and adapted to be actuated only when a current of predetermined value traverses the relay, of a movable member actuated in accordance with the current traversing the relay to indicate the operativeness thereof.

8. The combination with a relay comprising means normally energized and a movable member adapted to be actuated thereby only when the relay is energized above a predetermined degree, of means for indicating the operative energization of the relay.

9. The combination with an induction relay having a movable member normally energized but adapted to be actuated only when the relay is energized above a predetermined degree, of means actuated while the relay is energized below the predetermined degree of energization.

10. In a relay, the combination with a movable member and means for actuating the same only under predetermined conditions of energization, of indicating means actuated by said means under all conditions of energization to indicate the operativeness of the relay.

11. In a relay, the combination with a movable member and means normally energized but operative to actuate the movable member only under a predetermined degree of energization, of indicating means actuated when the relay is energized to any degree.

12. In a relay, the combination with a movable member and means normally energized but operative to actuate the movable member only upon a predetermined degree of energization, of means for indicating the degree of energization of the relay.

13. In an overload relay, the combination with an electromagnetic actuating means and a movable member energized thereby but actuable only under predetermined current conditions, of an auxiliary movable member also energized thereby but actuable under all current conditions for indicating the operativeness of the relay.

14. In an overload relay, the combination with a circuit-controlling contactive device, an actuating member therefor and electromagnetic means for controlling the actuating member therefor and electromagnetic means for controlling the actuating member, of means for precluding operation of the actuating member while the current traversing the electromagnetic means is less than a predetermined value, and means responsive to the electromagnetic means to indicate the instantaneous degree of energization

thereof and thereby indicate the operativeness of the relay.

15. In an overload relay, the combination with a magnetizable core member and means for energizing the same in accordance with the value of current in a main circuit to be controlled, of a main disc member and an auxiliary disc member subject to the magnetic influence of the core member and means for precluding actuation of the main disc member while the core member is energized less than a predetermined degree, the auxiliary member being actuable under all conditions of energization to indicate the operativeness of the relay.

16. In an overload relay, the combination with means for establishing an operating flux, of a main movable member subject to the influence thereof only under predetermined conditions of energization, and an auxiliary movable member subject to the influence of the same magnetic flux but operative under all conditions of energization of the relay to indicate the operative energization thereof.

17. In a relay of the induction type, the combination with a magnetizable core member, a movable disc member magnetically actuable thereby under predetermined conditions and a contact member controlled by the disc member to control an external circuit, of an auxiliary disc member also controlled by the core member but under other predetermined conditions of energization.

18. A relay comprising a single actuating member, a control member actuable thereby only under predetermined conditions of energization and an indicating member actuable thereby under all conditions of energization to indicate the operativeness of the relay.

19. In a relay comprising a primary winding to be energized from an electric circuit and a secondary winding to be inductively energized from the primary winding, a main movable member actuable by the co-operation of the fluxes developed by both windings in excess of a predetermined degree of excitation of the primary winding, and means for indicating the co-operative relation under all degrees of excitation of the primary winding.

20. In an induction relay, the combination with a primary winding to be energized from an external circuit and a secondary winding inductively related thereto, of a main movable disc member actuable in response to co-operating fluxes developed by both windings when the primary winding is energized in excess of a predetermined degree, and means actuable in response to such co-operating fluxes irrespective of the degree of energization of the primary winding.

21. In an induction relay, the combination with a primary winding to be energized

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from an external circuit and a secondary winding inductively related thereto, of a main movable disc member actuatable in response to co-operating fluxes developed by both windings when the primary winding is energized in excess of a predetermined degree, and means for indicating the proper electrical condition of the secondary winding by indicating an operative flux-developing condition.

22. In a relay, the combination with a plurality of windings inductively related to each other and a controlling member controlled thereby only when one of said windings is energized in excess of a predetermined degree, of means for indicating the operativeness of the relay comprising an element movable under all degrees of energization of said one winding so long as another winding inductively associated therewith is closed circuited.

23. A relay comprising a main winding to be energized from an external circuit, a secondary winding to be inductively energized from the first winding and means for

indicating proper and operative energization of the secondary winding for all degrees of energization of the primary winding.

24. The combination with a relay comprising means normally energized and a movable member actuated thereby only when the relay is energized above a predetermined degree, of an operation indicator that is actuated in accordance with the current traversing the relay, said indicator being operative below said predetermined degree of energization.

25. The combination with a relay comprising means normally energized and a movable member actuated thereby only when the relay is energized above a predetermined degree, of an indicator operative during the energization of the relay at the predetermined degree.

In testimony whereof, I have hereunto subscribed my name this 14 day of Feb., 1921.

HUDSON R. SEARING.