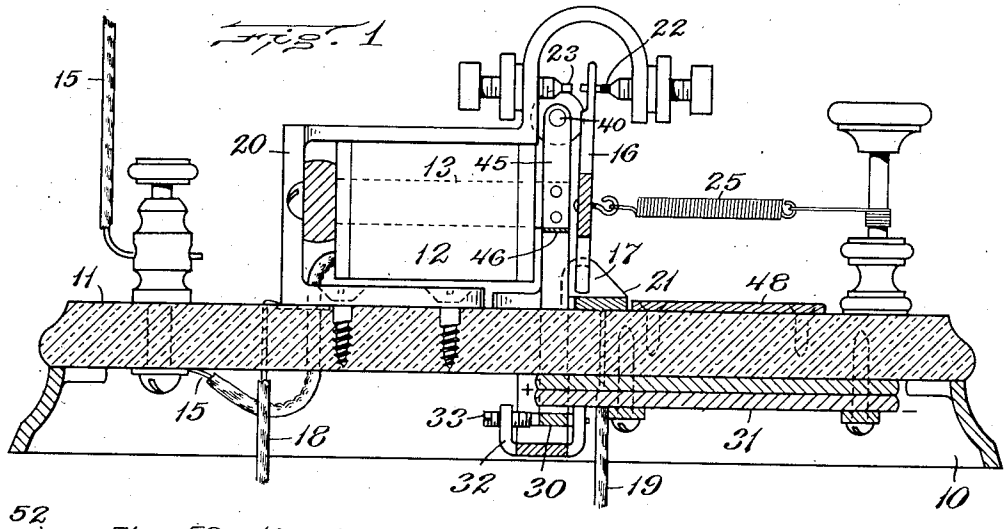
T. W. GLEESON.

RELAY.

APPLICATION FILED JAN. 29, 1908.

941,709. Patented Nov. 30, 1909.

Fig. 1



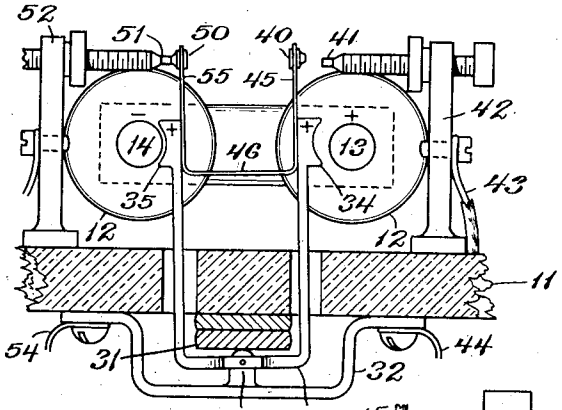


Fig. 3

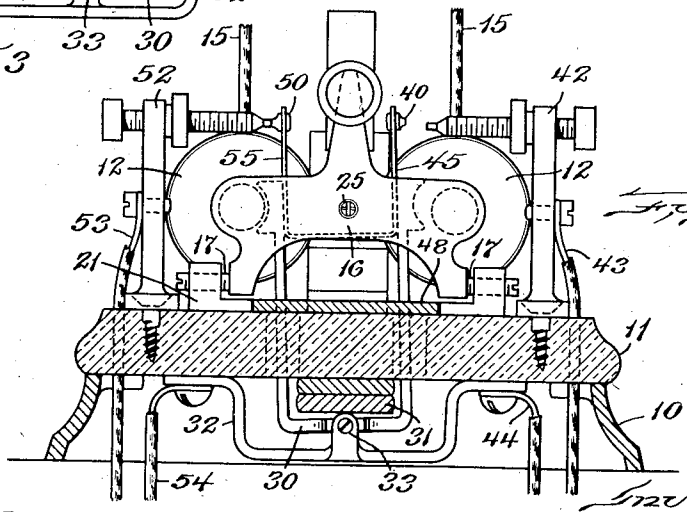


Fig. 2

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UNITED STATES PATENT OFFICE.

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RELAY.

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To all whom it may concern:

Be it known that I, THOMAS W. GLEESON, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Relays, of which the following is a specification.

This invention relates to electromagnetic relays and has for its object the provision whereby a relay, such as the standard type of electrical relay, may be combined with or supplemented by the combination therewith of a polar relay.

Ordinarily a telegraphic relay has for its only object the opening or closing of a local or extension circuit in response to the opening and closing of the actuating circuit. In so far as this object is concerned, the polarity of the actuating circuit is of no consequence, but a polar relay on the other hand operates to open or close an independent circuit only when a reversal of polarity occurs in the actuating circuit.

In consequence of combining a simple relay and a polar relay in the manner to which this invention relates, one independent local or extension circuit may be opened and closed by intermittent pulsations of current in the actuating circuit, a second independent circuit may be closed so long as the polarity of the pulsations does not become reversed, and which may be opened when a reversal of polarity does occur, and a third independent circuit may be opened when the second circuit is closed, and closed when the second circuit is opened. After the polar relay is actuated by a reversal of polarity in the actuating circuit, it is not thereafter actuated by subsequent pulsations of the same polarity, but remains in one position through such pulsations until there occurs one of opposite polarity, whereupon the polar relay moves to its other position. In other words, the polar relay is moved selectively to either of two positions by current of positive or negative polarity in the actuating circuit, and by nothing else.

Referring to the drawings forming a part of this specification,—Figure 1 represents a longitudinal sectional view of an electromagnetic relay and polar relay combined. Fig. 2 represents a cross section thereof on the line 2—2 of Fig. 1. Fig. 3 represents in a similar way the polar relay alone.

The same reference characters indicate the same parts wherever they occur.

The invention comprises a base 10 on which is mounted an insulating block 11 which carries the several instrumentalities. 12, 12 represent the windings which surround the cores 13, 14 of an electromagnet. The said windings are in series with the conductors 15 of an actuating circuit, and are adapted to energize the cores primarily for the purpose of attracting an armature 16 mounted on pivots 17. This much of the instrument is nothing more than a standard relay such as is employed in telegraphic systems for the purpose of interrupting the current in an independent circuit, comprising the conductors 18 and 19, the supporting frame 20 of the electromagnet, the armature 16 and its base 21, and contact points 22 and 23. The armature is normally held by a light spring 25 against the contact 22 which is illustrated as a back stop of insulating material.

Intermittent current in the actuating circuit causes the armature 16 to intermittently engage the contact 23 and so relay the pulsations to an extension circuit through the conductors 18 and 19. Current of either polarity in the actuating circuit causes actuation of the relay armature 16 and a reversal of polarity has no effect upon the actuation. The essential feature of the present invention is, as formerly stated, to combine with the telegraphic relay, a polar relay which shall be actuated by a reversal of polarity in the main circuit, for the purpose of selectively closing either of two independent local or extension circuits. To this end, the instrument is provided with a polarized armature 30 which so coöperates with the electromagnet as to respond to reversals of polarity of the latter, and to remain in one position until there is a subsequent reversal. While the magnetic polarity of the armature might well be made permanent, it is, in the form of the invention illustrated, induced by a separate source of magnetism in the form of a laminated bar magnet 31. The style of polarized armature shown is of U-shaped formation pivoted midway between its ends upon a bridge 32 by means of pintles 33. The magnet 31, of which the laminæ are arranged so that like poles are adjacent, is clamped to the base 10 so that one pole thereof lies in close proximity to the bend of the armature 30. This arrangement causes magnetic induction in the U-

shaped armature of which the extremities are thereby rendered of like polarity. The said extremities are formed as pole pieces 34 and 35 which are adapted to coöperate respectively with unlike poles of the electromagnetic cores 13 and 14. As a result of this arrangement, one of the constant pole pieces is of the same polarity as its adjacent electromagnetic pole, while at the same time the other constant pole piece is of an opposite polarity with relation to its adjacent electromagnetic pole. It therefore follows that when the polarity of the actuating current is such as to effect magnetic attraction between the core 13 and the pole piece 34, it also effects repulsion between the core 14 and the pole piece 35, and vice versa, with the result that the attraction and repulsion at different points coöperate to move the polarized armature in one direction or the other.

The center of gravity of the polarized armature at the pintles 33 is such that the armature remains of its own gravity in either of its two extreme positions. For the purpose of utilizing this movement of the polarized armature to open and close independent circuits, the armature is provided with contact studs 40 and 50 which are adapted to engage respectively the terminals 41 and 51. A single contact stud on the armature would be the equivalent of two if the terminals could conveniently be brought closer to each other or if the movement of the armature were great enough to move it from one terminal to the other.

The terminal 41 is mounted in a binding post 42 to which is connected the conductor 43 of an independent circuit. The other conductor 44 of said circuit is grounded on the bridge 32 which supports the armature 30, and together with that armature completes electrical connection between the conductor 44 and the contact stud 40. The terminal 51 is similarly mounted in a binding post 52. One conductor 53 of another independent circuit is connected to the binding post, while the other conductor of that circuit is grounded on the bridge 32. Connection between the bridge and the terminal 51 is likewise by means of the polarized armature and the contact stud 50.

The contact studs are preferably mounted as illustrated upon resilient fingers 45 and 55 of conducting material. The latter, as herein shown, are formed integrally with a connecting strap 46 which is secured to the pole-pieces 34 and 35 to maintain them the right distance apart. The base also carries a soft iron plate 48 which intervenes between the distant pole of the magnet 31 and the several coöperative magnetic poles. This plate serves to dissipate stray magnetic lines of force emanating from the distant pole.

I claim:—

1. The combination with an electromagnetic relay having a pair of normally neutral operative poles whose polarity, when established, is opposed one to the other, and a neutral armature arranged so as to be actuated by said poles, of a polarized armature having a pair of constant like poles each in coöperative relation with one of said electromagnetic poles, and so arranged that magnetic attraction between one couple of adjacent poles tends to move the polarized armature in the same direction as does repulsion between the other couple of adjacent poles, and vice versa when the polarity of the electromagnetic poles is reversed.

2. The combination with an electromagnetic relay of an armature having a pair of similar and constant magnetic poles movable in unison and arranged so that each is adapted to coöperate with one of two opposite poles of the electromagnet, two independent stationary terminals, and means carried by the armature for closing a circuit through either of said terminals.

3. An electromagnetic relay having a pair of poles, windings arranged to effect opposite magnetic polarity in said poles, the said polarity being reversible with the polarity of the energizing current, and a relay armature adapted to be actuated by said poles, in combination with a supplemental armature having a pair of poles each arranged to cooperate with a pole of the electromagnet, a permanent magnet arranged so as to induce constant and like polarity in the poles of the independent armature, whereby one pole thereof is attracted by its coöperative electromagnetic pole while the other is repelled by the other electromagnetic pole, and vice versa when the energizing current is reversed, two independent terminals, and means carried by the polar armature for closing a circuit through either of said terminals.

4. The combination with an electromagnet, of a magnetically inductive armature having pole pieces adapted to coöperate with the electromagnet, a permanent magnet arranged so that one pole lies adjacent said armature, and the other pole relatively distant therefrom, and a soft iron member arranged between the electromagnet and said distant pole, substantially as set forth.

In testimony whereof I have affixed my signature, in presence of two witnesses.

THOMAS W. GLEESON.

Witnesses:

C. F. Brown,

P. W. Pezzetti.