Dec. 17, 1946. J. H. HORMAN 2,412,580

RELAY

Filed Oct. 23, 1943 2 Sheets-Sheet 1

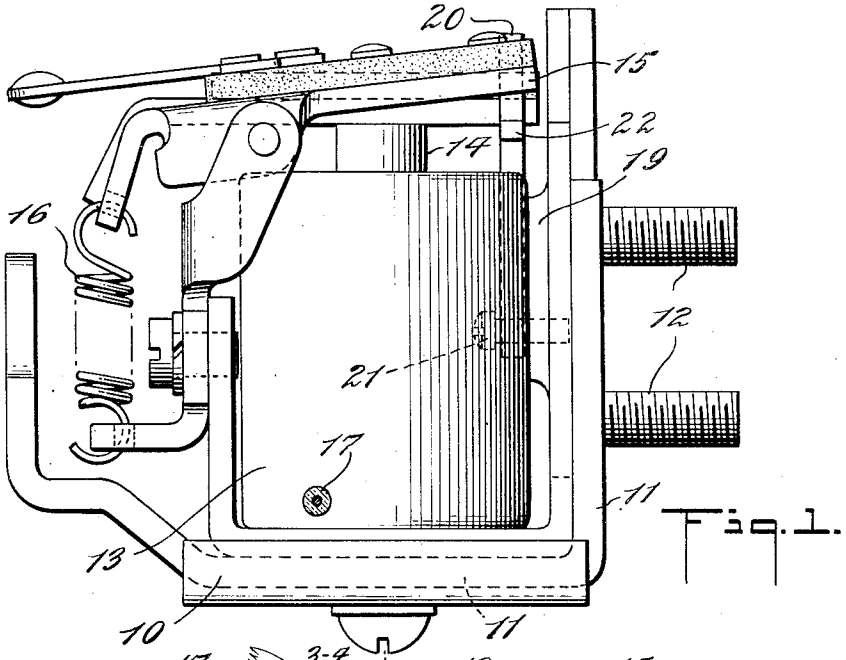


Fig. 1.

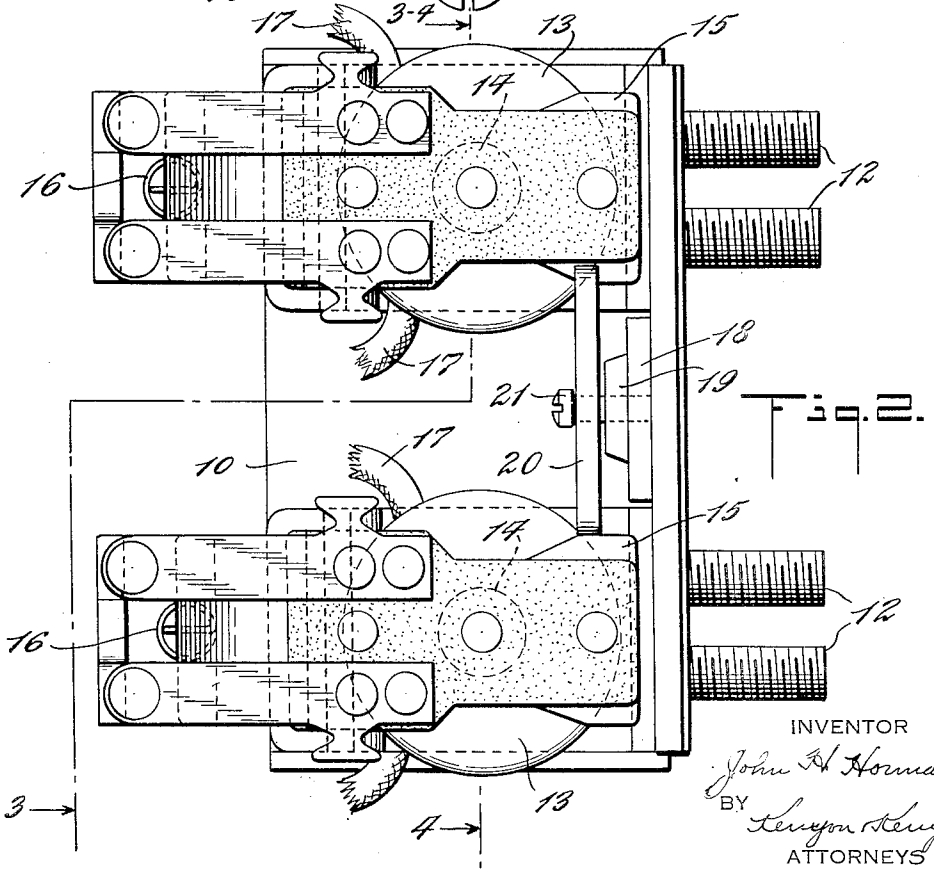


Fig. 2.

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Filed Oct. 23, 1943 2 Sheets-Sheet 2

Fig. 3.

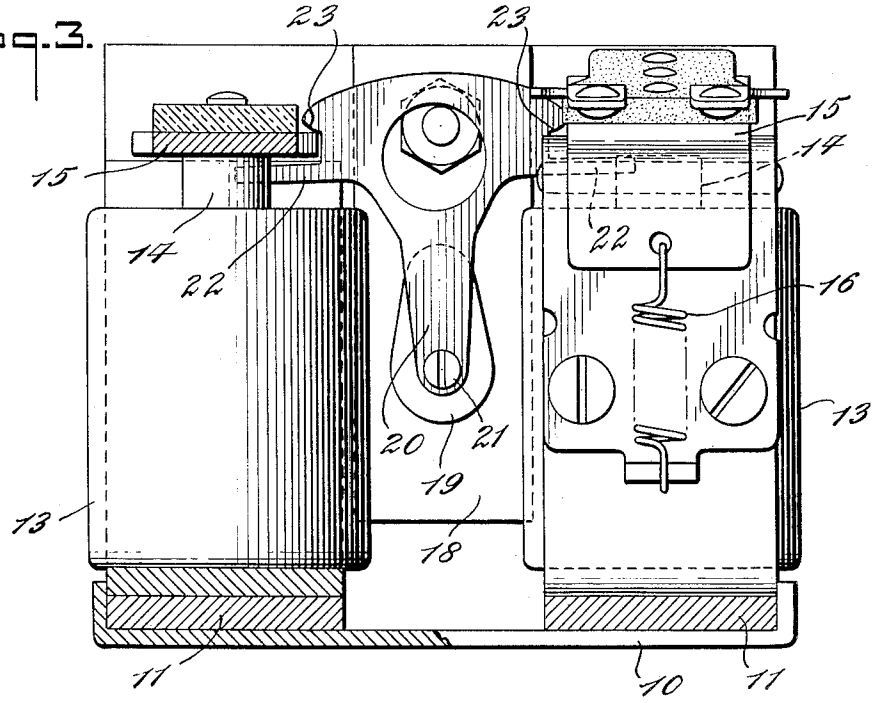
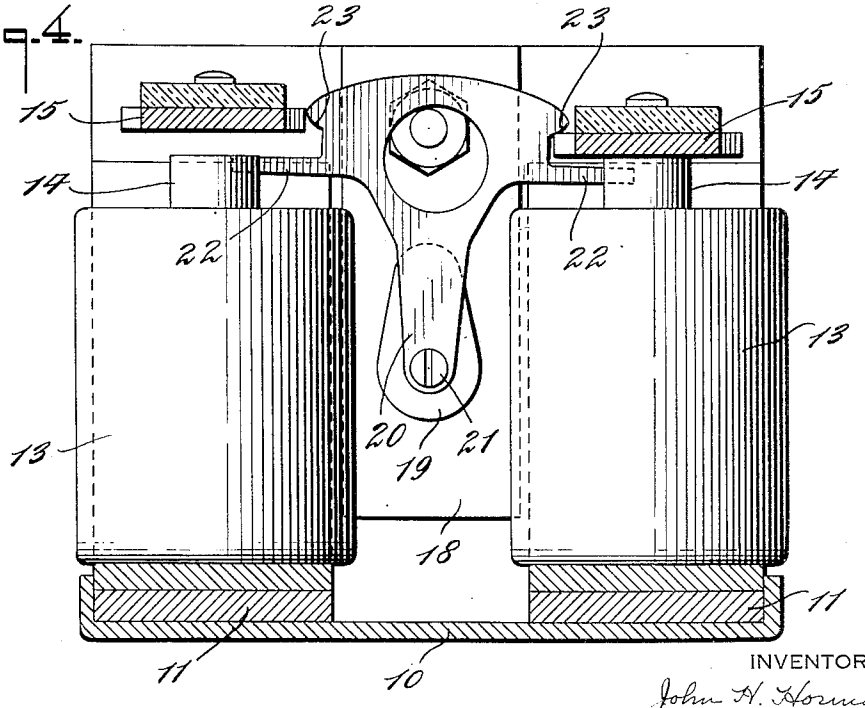


Fig. 4.



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UNITED STATES PATENT OFFICE

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RELAY

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Application October 23, 1943, Serial No. 507,363

2 Claims. (Cl. 175—337)

1

This invention relates to relays and has for its object a simple and efficient balanced locking relay.

An embodiment of this invention comprises a pair of electromagnets having vertical pole pieces with pivoted armatures extending across the upper ends of the pole pieces in combination with means biasing said armatures away from the ends of said pole pieces. A latch member is pivoted on an axis below its center of gravity and is arranged centrally with respect to such armatures. The latch member has a projection extending therefrom toward each armature with each projection being adapted to overlie the edge of one armature with the other projection out of overlying relation to the remaining armature in one of two different positions of the latch member. In either position, the latch element is subject to a force developed therein by a flow of magnetic flux through it from the electromagnet, the armature of which is engaged by a projection of the latch element. Upon de-energization of such electromagnet and energization of the other electromagnet, the latch element is swung into overlying relationship to the armature of the last-mentioned electromagnet by flow in the latch element of magnetic flux through it from said last-named electromagnet. Thus, the latch element is effective to maintain in contact with its pole piece the armature of an energized electromagnet against the effect of vibration or shock.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawings, wherein:

Fig. 1 is a side elevation of a relay embodying the invention;

Fig. 2 is a plan view thereof;

Fig. 3 is a section on the line 3—3 of Fig. 2, and

Fig. 4 is a section on the line 4—4 of Fig. 2.

A supporting plate 10 has attached thereto two relays of the type shown and claimed in the patent to Joseph F. Ebert, No. 2,329,036, issued September 7, 1943, each of which includes an L-shaped member 11 carrying screws 12, by means of which the assembly may be mounted on a support with the coils 13 and pole pieces 14 vertically arranged. The pivotally supported armatures 15 extend across the ends of the pole pieces 14 and are biased away therefrom by springs 16. Energizing current is supplied to the coils 13 through the lead wires 17.

The members 11 support a non-magnetic plate

2

18 having a raised portion 19 to which is pivoted a magnetic metal latch member 20 by a bolt 21. The latch member 20 extends upwardly from the bolt 21 somewhat beyond the level of the armatures so that its center of gravity is above its pivot. The latch member is provided with two oppositely extending arms 22 which project beneath the armatures 15 and with two shoulders 23 upwardly spaced from the arms 22. The arms 22 underlie the armature at all times whereas a shoulder 23 can overlie the edge of an armature only when the armature is pulled toward its pole piece. The width of the latch element between the outer ends of the shoulders 23 is such that when one shoulder 23 fully overlies an armature, the remaining shoulder 23 lies completely out of the path of the remaining armature.

Fig. 3 illustrates the latch member 20 in operative relation to the left armature 15, it having been brought to this position by energization of the left magnet. Some of the magnetic flux developed in the left electrode magnet passes through the latch element 20 and exerts a counter-clockwise pull on the latch element. In this position, the latch element serves to prevent movement of the armature 15 away from the pole piece under the influence of vibration or shock, thus maintaining the contacts carried by the armature in a predetermined circuit relationship. Upon de-energization of the left magnet and energization of the right magnet, the latch member 20 moves clockwise from the position shown in Fig. 3 to the position shown in Fig. 4 simultaneously with the movement of the right armature 15 into engagement with the right pole piece 14. The movement of the latch element 20 from the position in Fig. 3 to the position in Fig. 4 is effected by a clockwise force developed therein by a flow of magnetic flux through it from the right electromagnet. Such movement of the latch element frees the left armature 15 and brings the right shoulder 23 into overlying engagement with the edge of the right armature 15 to maintain it in contact with the pole piece 14 against the effect of vibration or shock.

In the event that the force developed by the magnetic flux flowing through the latch element 20 is insufficient to swing it from one position to the other, engagement of an arm 22 of the latch element by an armature 15 effects tilting of the latch member. Ordinarily, however, the effect of the magnetic flux is sufficient to tilt the latch element.

It is of course understood that various modifications may be made in the structure of the re-

lay above described without in any way departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In a relay, a pair of electromagnets having pole pieces and pivoted armatures extending across the ends of said pole pieces, means biasing said armatures away from the ends of said pole pieces, and a latch member of magnetic material pivoted on an axis below its center of gravity and centrally arranged with respect to said armatures in position to receive magnetic flux from each electromagnet, said latch member having an integral projection extending therefrom toward each armature whereby upon energization of either electromagnet the latch member is urged toward the armature of the energized electromagnet, each projection being adapted to overlie the edge of an actuated armature with the other projection out of overlying relation to the unactuated armature in each of two different positions

of said latch member and retain the actuated armature in actuated position during energization of the corresponding electromagnet.

2. In a relay, a pair of electromagnets having pole pieces and pivoted armatures extending across the ends of said pole pieces, means biasing said armatures away from the ends of said pole pieces, a latch member pivoted on an axis below its center of gravity and centrally arranged with respect to said armatures, said latch member having a projection extending therefrom toward each armature with each projection being adapted to overlie the edge of one armature with the other projection out of overlying relation to the other armature in one of two different positions of said latch member, and an arm extending from said member toward each armature in underlying relation thereto in all positions of said latch member.

JOHN H. HORMAN.