May 18, 1948. J. H. HORMAN 2,441,633

RELAYS WITH INTERLOCKING ARMATURES

Filed Sept. 5, 1946 2 Sheets-Sheet 1

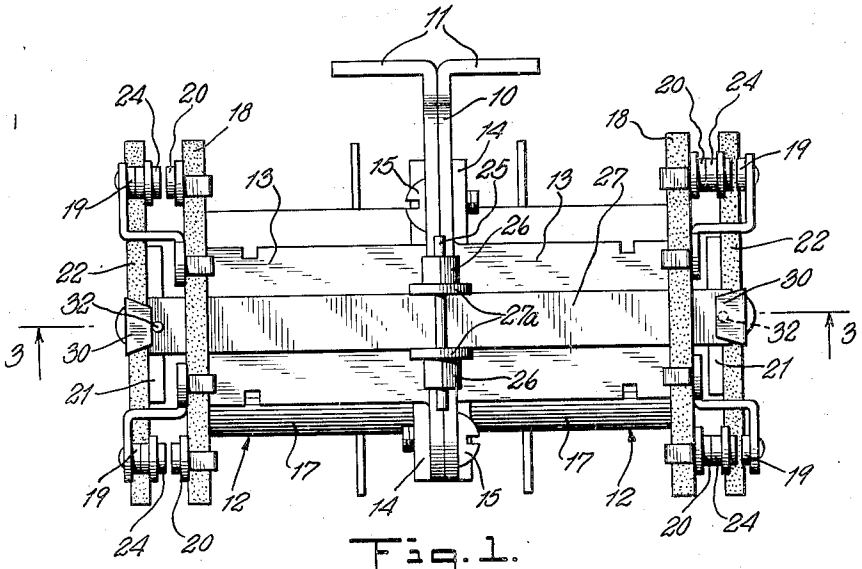


Fig. 1.

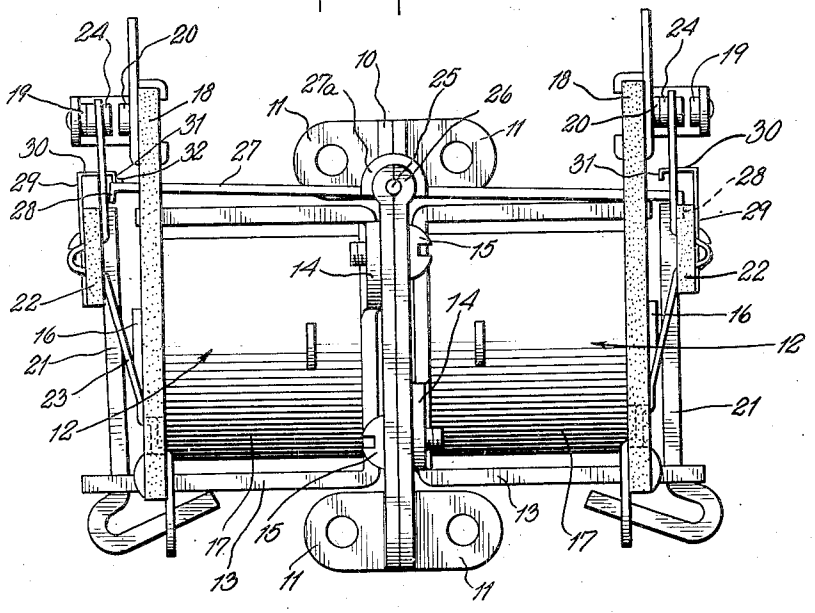


Fig. 2.

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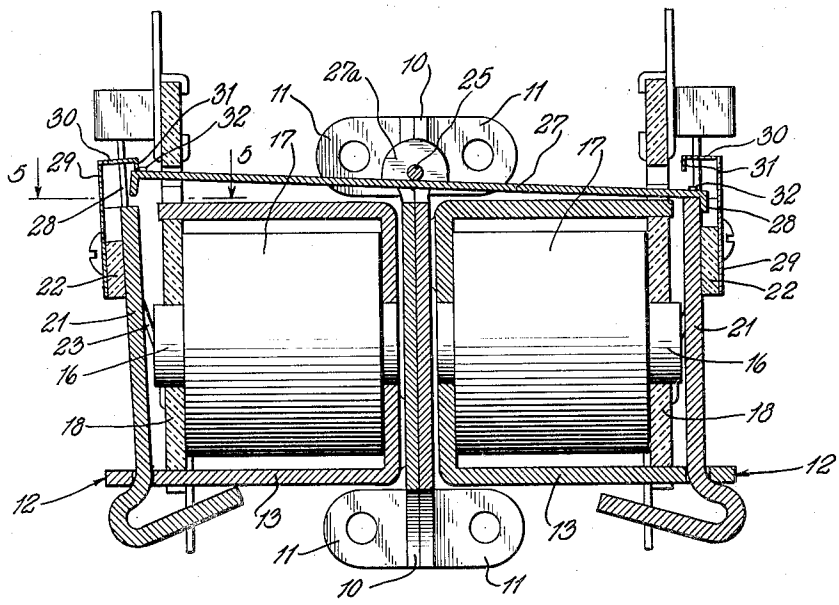


Fig. 3.

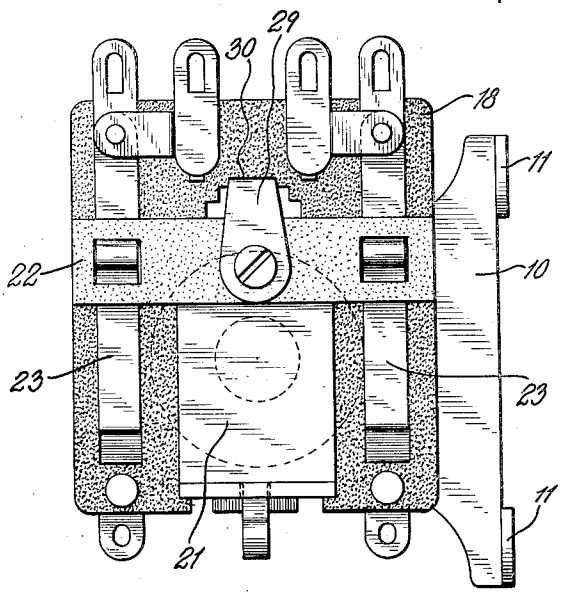


Fig. 4.

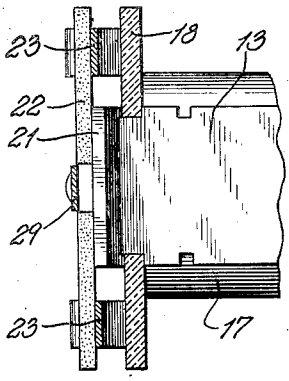


Fig. 5.

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UNITED STATES PATENT OFFICE

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RELAYS WITH INTERLOCKING ARMATURES

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Application September 5, 1946, Serial No. 695,019

2 Claims. (Cl. 175—337)

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This invention relates to relays.

In certain types of relays, two armatures are used to control two different sets of electrical circuits. It is often desirable that one set of circuits be kept closed and the other set of circuits kept open with the relay de-energized and that the closed circuits be opened prior to the closing of the open circuits upon energization of the relay.

An object of this invention is a simple, inexpensive and efficient two-armature relay in which, with the relay de-energized, one armature is locked in closed position and the remaining armature is locked in open position and in which upon energization of the relay to close the open armature, the locking means for both armatures are released and subsequently the armature locking arrangement is first reversed upon movement thereof until the relay is again energized.

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

Fig. 1 is a plan view of a relay embodying the invention;

Fig. 2 is a front elevation of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is an end view of Fig. 2, and

Fig. 5 is a section on the line 5—5 of Fig. 3.

A supporting bracket 10 is composed of two non-magnetic metal plates formed with feet 11 having apertures in which attaching bolts or screws may be located. The bracket 10 supports two relays 12, each of which is of the construction shown and claimed in the co-pending application of Kircher et al., Serial No. 677,661, filed June 19, 1946, now abandoned. Each relay 12 includes a substantially U-shaped frame 13, the base of which is formed with attachment lugs 14 which engage the bracket 10 and have tapped apertures receiving bolts 15 passing through the bracket 10 to attach the frame to the bracket. Each frame 13 supports a magnetic metal core 16 around which is arranged an energizing coil 17. A plate 18 of insulating material is supported by each frame 13 and is provided with an aperture receiving the end of the core 16. The plate 18 also supports one or more pairs of spaced contacts 19 and 20. A magnetic metal armature 21 is pivotally supported by each frame 13 in overlying relation to the end of the core 16. Each armature 21 carries a bar 22 of insulating material and resilient metal arms 23 are fixed at one end to the insulating material plate 18 and at their other ends are provided with contacts 24

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located between the contacts 19 and 20. The arms 23 engage the bar 22 to bias the armature 21 away from the core 16.

A pin 25 is supported between lugs 26 formed on the bracket 10 and is located above the frames 13. A magnetic metal rocker 27 is provided with ears 27a through which a pin 25 passes to pivotally support the rocker. Each end of the rocker 27 is turned downwardly to form a flange 28 and the location of each flange 28 relative to the pin 25 is such that the end of the corresponding armature lies in the path of movement of the flange 28 when the armature is in its open position but lies nearer to the pin 25 than the path of the flange 28 when the armature is in its closed position. A resilient clip 29 is attached to the bar 22 with an inwardly extending portion 30 overlying the end of the armature in spaced relation thereto and terminating in a downwardly extending flange 31. A projection 32 is provided at each end of the rocker 27 for engagement by the flange 31 under the conditions hereinafter pointed out. In mounting the rocker 27 on the pin 25, one armature 21 is held in closed position to permit the corresponding flange 28 to overlie the outer face thereof as shown in Figs. 2 and 3.

Assuming the relay is in the condition shown in Figs. 2 and 3, the right-hand armature 21 is locked in closed position by the right-hand flange 28 with the contact 24 engaging contact 20. The left-hand armature is held in open position by engagement of the flange 31 of the left-hand clip 29 with the left-hand projection 32 and the left-hand contacts 24 engage the left-hand contacts 19. The rocker 27 cannot be rotated counterclockwise a sufficient extent to release the right-hand armature 21 because the left-hand armature 21 is in the path of the left-hand flange 28. This condition prevails without continued energization of the right-hand coil 17. Energization of the left-hand coil 17 with the right-hand coil 17 de-energized swings the rocker 27 counterclockwise to disengage the left-hand projection 32 from the left-hand clip flange 31 and then engage the bottom end of the left-hand flange 28 with the top edge of the left-hand armature 21 without releasing the right-hand armature 21 from engagement with the right-hand flange 28. Energization of the left-hand coil 17 also swings the left-hand armature 21 clockwise with the result that after a predetermined time interval, the top edge of the left-hand armature 21 moves out of engagement with the left-hand flange 28 thereby permitting further counterclockwise rotation of the rocker 27 to disengage the right-hand

flange 28 from the right-hand armature 21 allowing the latter to open. After opening of the right-hand armature 21, the flange 31 of the right-hand clip 29 engages the right-hand projection 32 to hold the right-hand armature in open position. Upon closing of the left-hand armature 21, the left-hand flange 28 overlies the left-hand armature 21 to lock it in closed position. The closing of the left-hand armature 21 disengages the left-hand contacts 24 from the left-hand contacts 19 and engages the left-hand contacts 24 with the left-hand contacts 20 while the opening of the right-hand armature 21 disengages the right-hand contacts 24 from the right-hand contacts 20 and engages the right-hand contacts 24 with the right-hand contacts 19. The right-hand armature 21 is not released until after the left-hand armature 21 has moved sufficiently to disengage the left-hand contacts 24 from the left-hand contacts 19. This condition prevails without continued energization of the left-hand coil 17 until the right-hand coil 17 is energized with the left-hand coil 17 whereupon reverse operation is effected.

I claim:

1. A relay of the character described comprising a non-magnetic metal bracket, a pair of opposed electromagnets supported by said bracket, a pivoted armature associated with each electromagnet, a magnetic metal rocker supported by said bracket in overlying relation to said magnets and armatures, and a flange at each end of said rocker engageable with the edge of the corresponding armature when in open position to limit rotation of said rocker and engageable with the face of said armature when in closed position to lock the armature in closed position.

2. A relay of the character described comprising a non-magnetic metal bracket, a pair of opposed electromagnets supported by said bracket, a pivoted armature associated with each electromagnet, a magnetic metal rocker supported by said bracket in overlying relation to said magnets and armatures, a flange at each end of said rocker engageable with the edge of the corresponding armature when in open position to limit rotation of said rocker and engageable with the face of said armature when in closed positon to lock the armature in closed position, a projection at each end of said rocker, and a clip carried by each armature for engagement with a rocker projection in the open position of the armature.

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