

May 5, 1942.

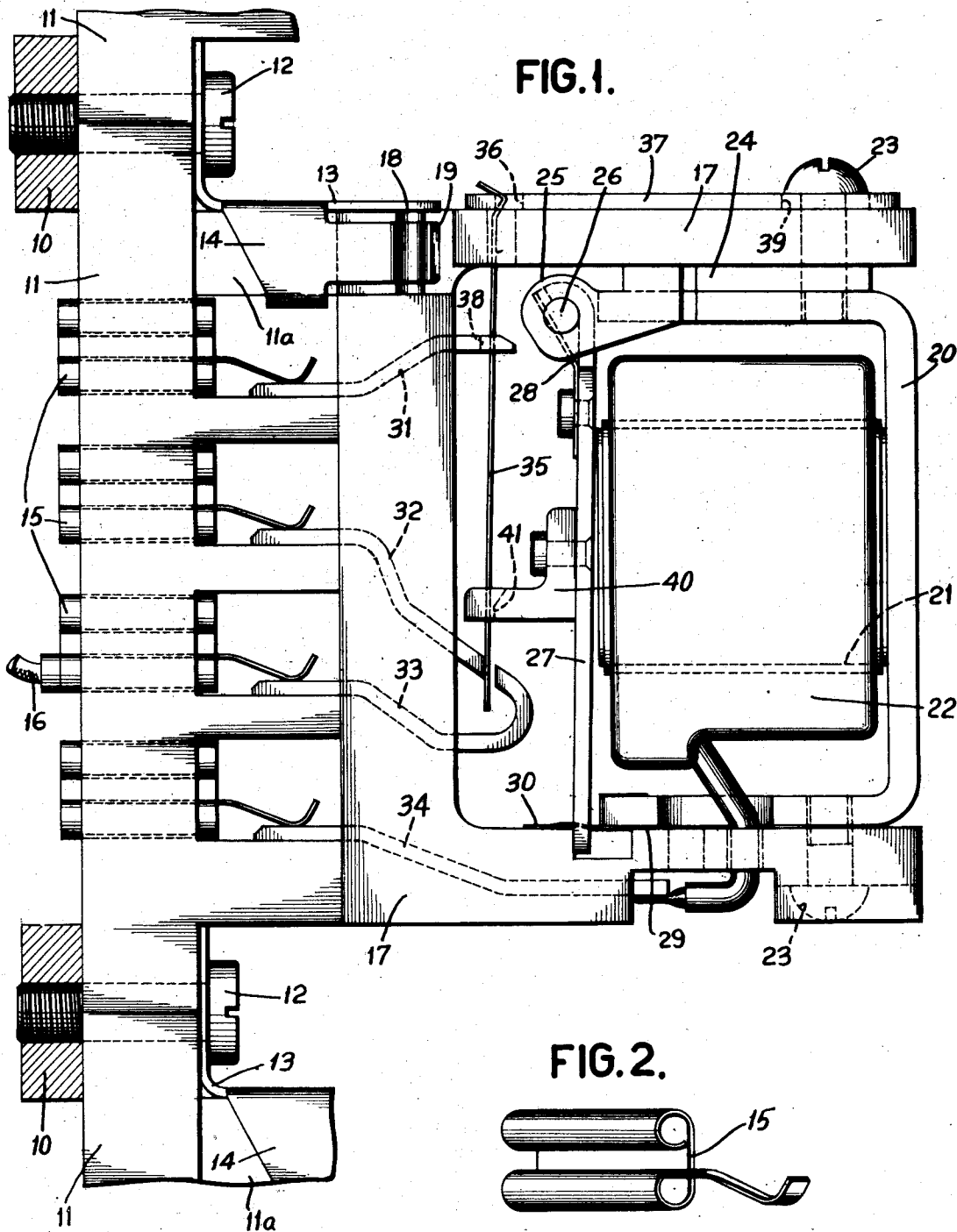
C. D. LAKE ET AL

2,282,066

RELAY

Filed Sept. 8, 1939

2 Sheets-Sheet 1



INVENTORS
Blair H. Lake
Weaky P. Jeff
BY
W. M. Wilson
ATTORNEY

May 5, 1942.

C. D. LAKE ET AL

2,282,066

RELAY

Filed Sept. 8, 1939

2 Sheets-Sheet 2

FIG. 3.

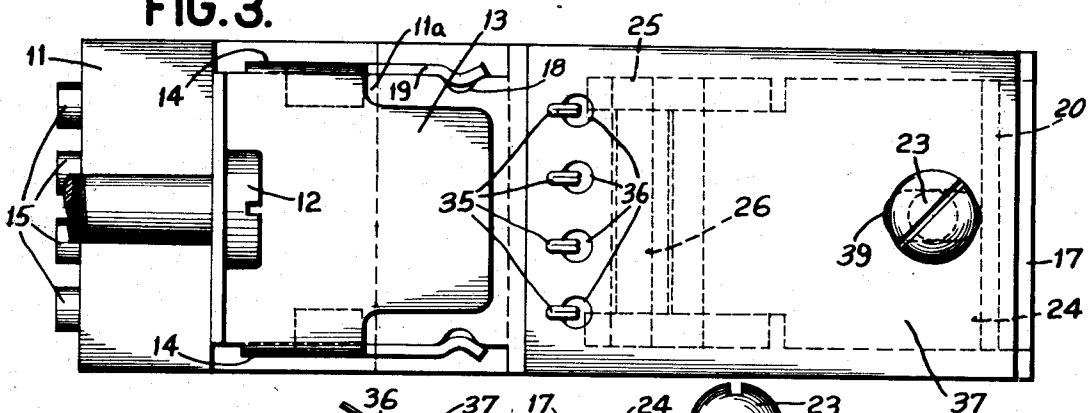


FIG. 4.

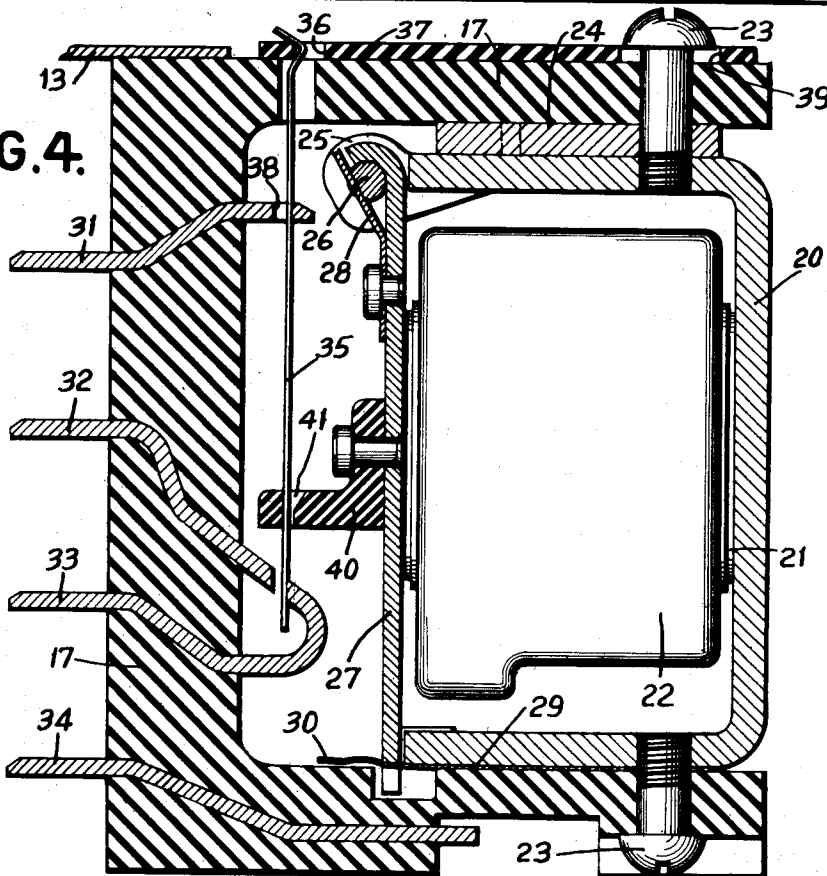


FIG. 5.

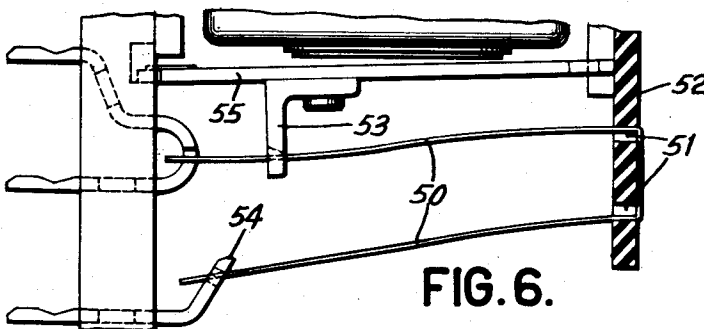
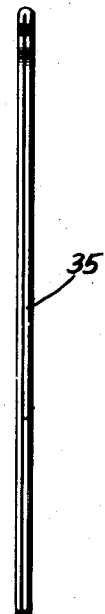


FIG. 6.

INVENTORS
Clarence D. Lake
Wesley P. Gaff
BY *W. M. Wilson*
ATTORNEY

UNITED STATES PATENT OFFICE

2,282,066

RELAY

Clair D. Lake, Binghamton, and Wesley Pfaff,
Union Center, N. Y., assignors to International
Business Machines Corporation, New York,
N. Y., a corporation of New York

Application September 8, 1939, Serial No. 293,932

5 Claims. (Cl. 175—336)

This invention relates to electromagnetic relays and more particularly to the structural arrangement of such type of relay in which precision and fast operating and releasing characteristics are required.

An object of the invention is to provide a small, easily assembled relay employing a small number of parts which are readily replaceable.

A further object relates to an improved mounting arrangement for the relay to make the entire relay itself readily replaceable. Such a relay has practical utility in electrical accounting machines wherein a greater or lesser number of relays may be employed in accordance with the accounting requirements of the machine user, and it is necessary that the relays, where they are added to the accounting machine, be quickly installed and easily maintained. Accordingly, it is proposed to install in an accounting machine a panel or panels on which the maximum number of relays, which it is believed the user can ultimately employ, may be mounted and to attach to the panel only such relays as are required to fulfill the user's present needs. The panel is provided with jacks constituting the terminals of the internal wiring of the machine and the relays are provided with plugs, so that in order to add a further relay it is only necessary to "plug in" the relay in the proper position of the panel. The relay is arranged to be held in place by spring clips, and to replace a damaged or worn relay it is simply a matter of pulling out the old and inserting a new one.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a side elevation of a relay in position against a jack panel of the machine.

Fig. 2 is a detail of one of the panel jacks.

Fig. 3 is a plan view of the relay showing the spring clips which hold it against the panel.

Fig. 4 is a sectional view of the relay showing the parts in operated position.

Fig. 5 is a detail of one of the contact wires.

Fig. 6 is a view of a modified form of the relay.

Referring to Fig. 1, 10 represents the part of the framework of an electrical accounting machine for use in connection with which the relays are especially adapted. Secured to the framework 10 are panels 11 of insulating mate-

rial fastened by bolts 12. Near the upper end of each panel is an L-shaped plate 13 provided with side arms 14 embracing an extension 11a of the panel, the plate 13 being secured to the panel by the bolt 12. Embedded in the panel are a number of jacks 15, one of which is shown in isometric in Fig. 2. From the left side, these jacks are connected to the various mechanisms of the accounting machine by means of plug wires such as indicated at 16, and each jack is provided with a double plugging position for possible multiple connection.

The relay itself is contained in a U-shaped frame 17 of insulating material which is provided with a pair of grooves 18 located so as to be engaged by resilient arms 19 of the plate 13 (see Fig. 3). Within the frame 17 is mounted the yoke 20 to which is welded the core 21 which has a winding 22. A pair of screws 23, one at the top and one at the bottom of the frame, serve to hold the yoke in position. Between the upper surface of the yoke and the frame is a bracket 24 provided with side arms 25 which serve to support the armature pivot pin 26 loosely mounted in the side arms. Armature 27 is hooked at its upper end to partially encircle pin 26 and has riveted thereto a leaf spring 28 which engages a flat section of the pin. Between the bottom of the yoke and the frame 17 is a thin residual element 29 which extends around the left edge of the yoke and also has a resilient extension 30 bowed to engage the lower edge of the armature 27. The extension 30 is biased upwardly so that, when the armature is attracted, the extension will spring upwardly as in Fig. 4 and serve to prevent any possible "bounce" or chatter.

In the construction of the yoke and core the face of the core is arranged in precise alignment with the ends of the yoke, so that the thickness of the residual element provides the necessary air gap and in assembling the parts the residual element is clamped in place by the lower screw 23, while the bracket 24 is similarly clamped in position by the upper screw 23.

Embedded in the frame 17 are contactors 31, 32, 33 and 34 of which the last are connected to the terminal wires of the coil 22.

Extending through a rectangular opening 38 in contactor 31 is a wire contact spring 35 constructed as shown in Fig. 5 in the form of a double strand of music wire. The upper end of this wire is hooked as shown in Figs. 1 and 3 with the hook extending through a hole 36 in a plate 37. Plate 37 is positioned on the top of the frame 17 and held thereto by the upper

screw 23. The plate is provided with an elongated hole 39, so that before the screw 23 is tightened the plate 37 may be moved to the left or right to decrease or increase the pressure against the upper end of the wire 35. With the plate 37 bearing against the left side of the wire and the side of opening 38 in contactor 31 bearing against the right side of the wire, the lower or free end thereof will obviously be biased toward the left with a tension depending upon the position of the plate 37, so that the parts are clamped in the position shown in Fig. 1 with the lower end of the wire engaging the contactor 32. The wire 35 also serves to conduct current between the contactors 31 and 32, the wire 35 and contactor 32 forming a normally made contact with current supplied to the wire through contactor 31.

Riveted to armature 27 is an angle 40 of insulating material which is provided with a suitable opening 41 through which the wire 35 extends and through which the wire, by virtue of its adjusted tension, serves to normally hold the armature 27 in position as in Fig. 1. When the magnet is energized, the parts will shift to the position shown in Fig. 4 where wire 35 breaks contact with 32 and makes contact with 33. Upon deenergization of the magnet, the wire 35 will return the parts to the position of Fig. 1. As indicated in Fig. 3, the relay may include a number of wires 35 spaced as shown and for each such wire there is provided a set of contactors in line therewith. The left ends of the several contactors extend from the frame 17, so that when the relay frame 17 is snapped into position as shown, the contactors engage the companion jacks 15 as shown.

Vertical alignment of the relay is obtained by the engagement of the contactors with the lateral extensions of panel 11 and the upper surface of the plate 13, while the lateral alignment is obtained by the spring arms 19 of plate 13.

It will be noted that the wire 35 is, in effect, suspended within the relay with no special mechanism to hold it in place other than the pressure exerted against it on one side by contactor 31 and on the other side by element 40 near the bottom and plate 37 at the top, so that replacement of a wire can readily be effected by grasping the wire at its upper end and drawing it upwardly, and the insertion of a new wire can be effected by inserting a wire and threading it through the openings 38 and 41 as is quite apparent from the showing in Fig. 4. Disassembly of the relay is a matter of removing the wire or wires 35 and removing the two screws 23, whereupon the yoke 20 and armature 27 may be removed from the frame 17. The armature itself may be separated from its bracket 24 by simply flexing the blade spring 28 and sliding the pin 26 axially through the side arms 25. When it is desired to replace the entire relay, it is simply necessary to grasp the frame 17 and draw it away from panel 11.

In Fig. 6 is shown a modified form of the invention wherein the wire spring 50 is U-shaped and extended through holes 51 in a plate 52 with one leg passing through an opening in insulating element 53 and the other leg anchored by passing the same through a hole in the contactor 54. With this arrangement, the upper leg of the wire is normally biased to bear downwardly on the

armature 55. In this case replacement of the wire is simply a matter of grasping the same at the right end as viewed in Fig. 6 and drawing it out of engagement with the element 53 and contactor 54.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In an electromagnetic relay, an armature, a core, a yoke for said core having a face thereof in alignment with the face of the core, said armature being pivoted to align with the face of the core and yoke, a residual element covering said yoke face to space the armature from the core face, said element having a resilient extension forming a detent, in engagement with the free end of the armature constructed to yieldably oppose its restoration to prevent vibration of the armature.

2. In an electromagnetic relay, an armature, a core, and a supporting structure, said armature having an opening therein, said supporting structure having a pair of spaced openings on the same side of the opening in the armature, with one of said openings lying on the opposite side of a straight line through the other two openings from the core, and a substantially straight spring member for urging the armature away from its core, said spring member being freely insertible through all three openings whereby one side of the central opening will bear against the spring member and cause the member to bear against the opposite sides of the other two openings to urge the armature away from its core, the movement of said armature being limited to obviate full alignment of all three openings.

3. The invention set forth in claim 2 in which the spring member comprises a strand of spring wire having a bend therein at one of the openings, said bend engaging the edges of the opening to prevent inadvertent displacement of the wire.

4. The invention set forth in claim 2 in which the part of the supporting structure containing one of the pair of openings is movable with respect to the remainder of the structure in a direction transverse to the axis of the opening whereby the alignment of the openings may be varied.

5. In a multicontact relay, a coil, an armature and a support therefor, a plurality of freely removable wire springs arranged in parallel alignment, an adjustable member carried by said support, one end of each of said wires being pivoted on said member and the opposite ends of all being engaged with said armature, and means bearing against each of the wires at a point intermediate the ends of each to tension the same and thereby swing the armature away from the coil, said member being adjustable to vary the pivot points of all of the springs concurrently.

CLAIR D. LAKE,
WESLEY PFAFF.