

Aug. 15, 1939.

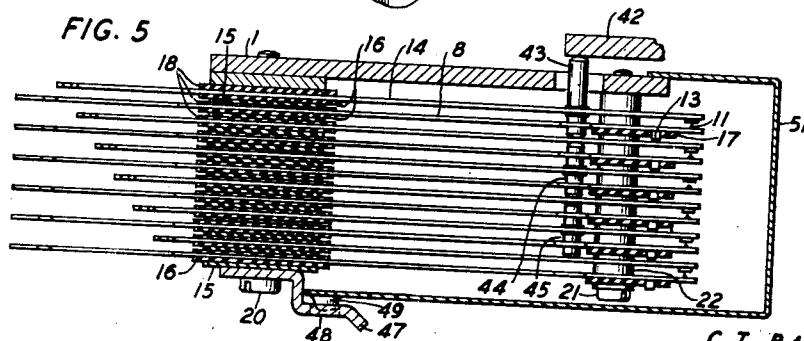
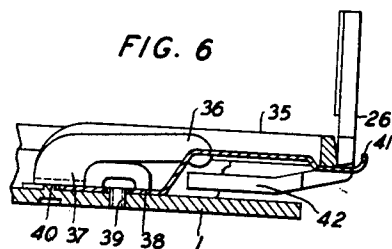
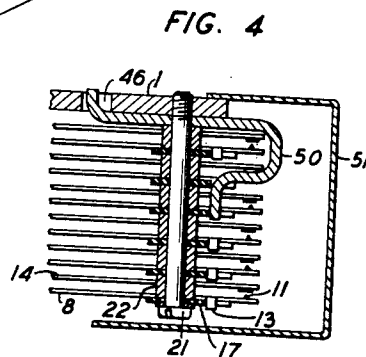
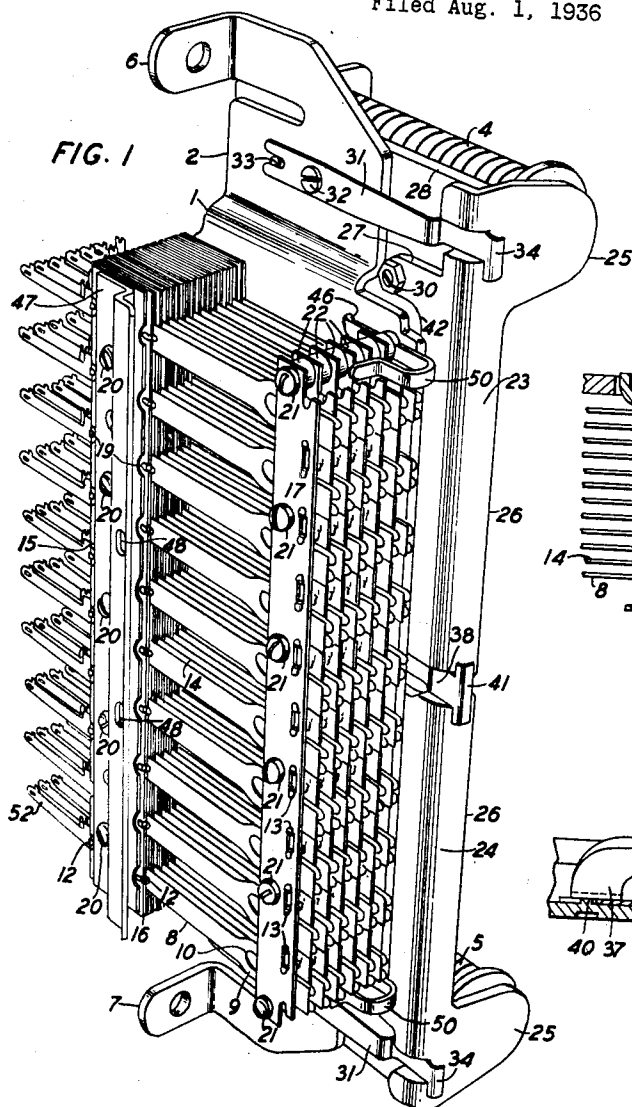
C. I. BAKER ET AL

2,169,551

ELECTROMAGNET FOR SWITCHING DEVICES

Filed Aug. 1, 1936

2 Sheets-Sheet 1



INVENTORS: C. I. BAKER
E. C. MUELLER JR.
F. J. REDMOND

BY

P. C. Smith
ATTORNEY

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FIG. 2

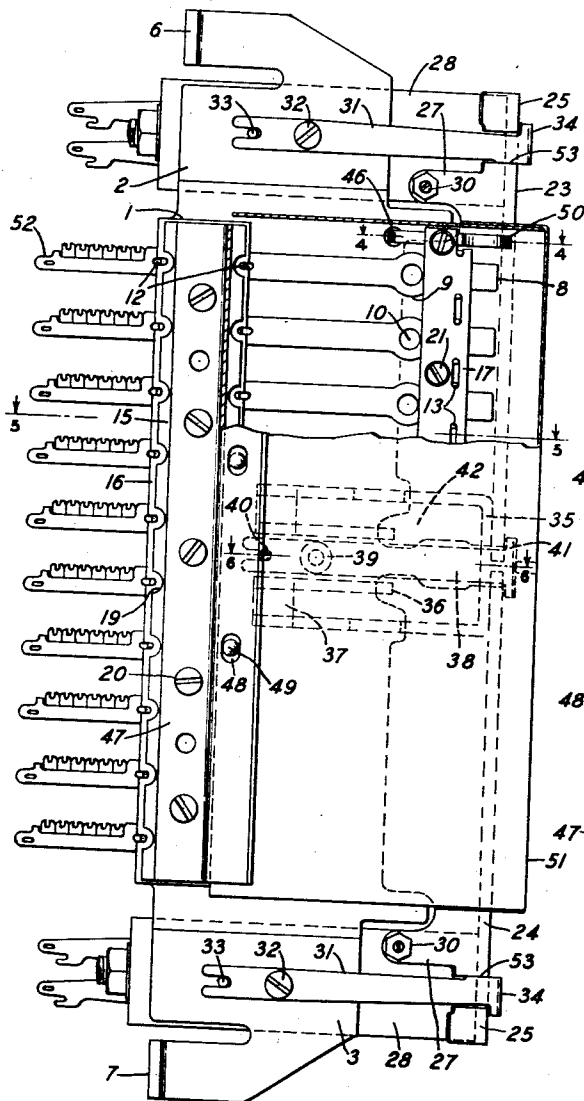
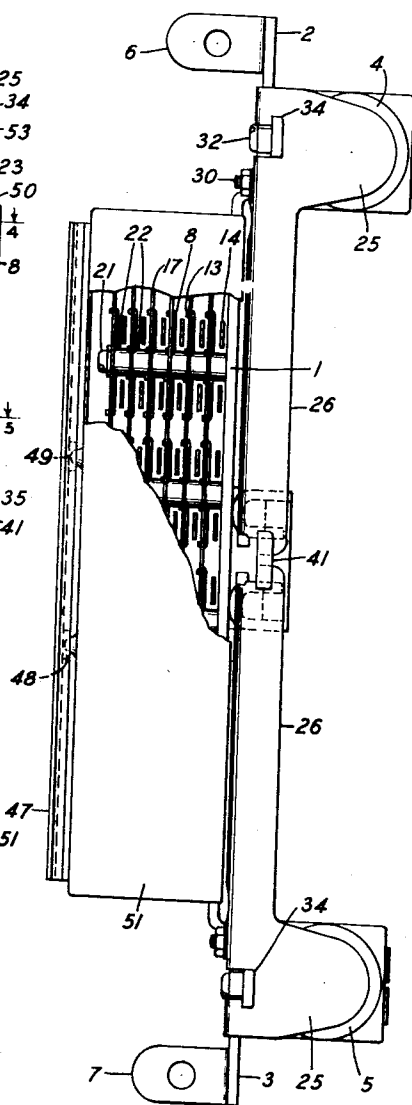


FIG. 3



INVENTORS: C. I. BAKER
E. C. MUELLER JR.
F. J. REDMOND
BY

P. C. Smith
ATTORNEY

UNITED STATES PATENT OFFICE

2,169,551

ELECTROMAGNET FOR SWITCHING
DEVICES

Clarence I. Baker, Elizabeth, Emil C. Mueller, Jr.,
Cranford, and Frederic J. Redmond, Arlington,
N. J., assignors to Bell Telephone Laboratories,
Incorporated, New York, N. Y., a corporation of
New York

Application August 1, 1936, Serial No. 93,890

2 Claims. (Cl. 175—345)

This invention relates to switching devices, and more specifically to a type of switching device in which a plurality of switch springs are operated simultaneously under control of the motor magnet.

The object of this invention is to improve the construction and operation of such switching devices.

According to the invention, a supporting plate is provided with means for mounting electromagnets and for pivoting their armatures in position for engaging sets of movable contacts with associated sets of stationary contacts disposed in a common pile-up arrangement on the supporting plate. The stationary contacts are secured at their contacting ends to insulating strips, which are disposed in parallel and spaced relation by spacer members and the whole secured to the supporting plate by means of screws. Latching springs carried by the mounting plate are provided for holding the armatures in adjusted relation with respect to their knife-edge pivots. A plate on the spring pile-up cooperates with means carried by a cover for yieldably holding the cover in position on the supporting plate and guiding members protect the contacts when removing or replacing the cover.

Other novel features of the invention and advantages will appear from the following description and by the claims appended thereto, reference being had to the accompanying drawings, in which:

Fig. 1 shows a perspective view of the relay with the cover removed;

Fig. 2 shows a top view of the relay with the cover in place but partially broken away;

Fig. 3 shows a front view of the relay with the cover in place but partially broken away;

Fig. 4 shows a section through the relay looking along the arrows at the line 4—4 of Fig. 2;

Fig. 5 shows a partial section through the terminal pile-up along the line 5—5 of Fig. 2; and

Fig. 6 shows a section through the mounting bracket along line 6—6 of Fig. 2.

The switching device of the invention comprises a substantially rectangular mounting plate terminating at its ends in slightly offset portions 2 and 3 on which the yokes of magnets 4 and 5 are mounted and in right angle lugs 6 and 7 by which the device may be attached to a mounting rack.

A spring pile-up comprising layers of fixed and movable contact springs 8 and 14 is positioned on the face of plate 1. Each spring is provided at one end with a pair of contact points 11 and terminates at the other end in a soldering termi-

nal 52. Each layer of springs is positioned between two strips 16 and 18 of insulating material which extend transversely across the springs near their terminal ends, each spring being attached to the insulating strip 16 by a pair of lugs 12 struck up therefrom and bent over the edges of the strip. Interposed between adjacent insulating strips 18 and 16 are metal strips 15 notched along each edge as shown at 19 to give clearance to the bent-over lugs 12.

The entire pile-up assembly is secured to the plate 1 by screws 20 which pass through aligned holes in the outside clamping strip 47 and strips 15, 16 and 18 into threaded holes in plate 1. Since the screws are positioned intermediate the springs of the layers, they are effectively insulated from the springs by the insulating strips 16 and 18.

The springs 8 of each layer of fixed springs are clamped, adjacent their contact ends, to a transversely extending strip 17 of insulating material by pairs of lugs 13 which are struck up from the springs, extended through slots in the strip 17 and then bent over on the strip. The strips of the several layers of fixed springs are held in fixed relationship to each other and to the plate 1 by spacing washers 22 and are secured in assembled position on the plate 1 by screws 21 which extend through holes in the strips and through the spacing washers into threaded holes in plate 1. The layers of fixed springs are thus rigidly supported near each end to the plate 1.

The contact end of each movable spring 14 is bifurcated and each section thereof carries a contact point for engagement with one of the contact points on the adjacent fixed spring 8. Each movable spring 14 of alternate layers of movable springs has attached thereto near its free end an operating stud of insulating material, these studs 43, 44 and 45 being in axial alignment as most clearly shown in Fig. 5 and passing freely through holes 10 in enlargements 9 of adjacent fixed springs 8. The axial displacement of stud 43 moves the spring 14 to which it is attached and also moves the spring 14 with which its end engages thereby transmitting the motion to stud 44. The displacement of stud 44 moves the spring 14 to which it is attached and also the spring 14 with which its end engages, thereby pressing on stud 45 to move the spring to which it is attached and which its end engages. In this manner the displacement of the studs 43 causes the movement of all of the movable springs into engagement with the cooperating fixed springs.

For moving the studs 43, two angle bars 23 and 24 are provided. Each bar is pivoted at its outer

end on a knife edge formed on the end of the yoke 23 of one of the magnets and at its inner end on a knife edge formed on the bracket 35 secured to plate 1 as disclosed in Figs. 2 and 6.

5 In order to secure the bars in place on the knife edges a latching spring 31 is associated with the outer end of each bar and a common latching spring 38 is associated with the adjacent inner ends of both bars.

10 Each latching spring 31 is secured to plate 1 by a screw 32 and is held against lateral displacement by a locating pin 33 struck up from the plate 1 and engaging in the bifurcated end of the spring. The free end of the latching spring

15 31 engages in a notch in the shoulder of the angle bar and is provided with a curved extension 34 which overlies the lateral arm 26 of the bar to hold the bar firmly on the knife edge extension of the yoke 23, while permitting the free rotation

20 thereof and with a lateral projection 53 for holding the angle bar against endwise displacement.

The central knife edge bracket 35, upon which the inner ends of the angle bars 23 and 24 are pivoted, is of substantially U-shape as shown

25 most clearly in Fig. 2, the arms thereof being bent downward at 37 as viewed in Fig. 6 for attachment to the plate 1 and thence upwardly at 36 to provide stops for limiting the movement of the arms 42 of the angle bars. The adjacently

30 disposed ends of the angle bars 23 and 24 rest on the knife edge of the bracket 35 and are held thereon by the latching spring 38 which is secured to plate 1 by screw 39 and held from lateral displacement by the lug 40, struck up from the

35 plate 1. The free end of the spring 38 engages in notches in the shoulders of the angle bars and is provided with a curved extension 41 which overlies the lateral arms 26 of the bars in a manner similar to the extensions 34 of latching

40 springs 31.

The lateral arm 26 of each angle bar is extended at its outer end to form an armature 25, the extension 25 of bar 23 cooperating with the yoke 28 and core of magnet 4 and the armature

45 extension 25 of bar 24 cooperating with the yoke 28 and core of magnet 5. The other arm 42 of each angle bar extends substantially parallel with the plate 1 and engages with the ends of studs 43 which extend through holes in plate 1 as most

50 clearly disclosed in Fig. 5. Each angle bar is also provided near its outer end with an ear 27 which carries a stop screw 30 the end of which engages the magnet yoke 28 for adjusting the air-gap between the armature 25 and the magnet core.

55 Since the arm 42 of angle bar 23 engages with one half of the studs 43 and the arm 42 of angle bar 24 engages with the other half of the studs, the energization of magnet 4 will cause the closure of the upper half of the contacts of the

60 switching device and the energization of magnet

5 will cause the closure of the lower half of the contacts.

In order to protect the contacts of the switching device from mechanical injury and dust, a removable cover 51 is provided. The cover is made of sheet metal, is rectangular in conformation and open on one of its long sides and partially across its back wall. When it is placed in position its upper and lower side walls extend over the ends of the spring pile-up, with the edge of the back wall engaged behind the mounting plate 1 and the edge of its front wall engaged behind the clamping strip 47. For retaining the cover in place bosses 49 are struck up along the edge of its front wall which engage in holes 48 in the clamping strip 47.

In order to protect the contact springs from damage as the cover is removed or replaced, two guiding members 50 are secured to the plate 1 by the end screws 21 and are held against lateral displacement by extensions which engage in holes 46 in the mounting plate 1. These guiding members are so disposed with respect to the upper and lower sets of springs of the pile-up and are of such configuration that the upper, lower and back walls of the cover may not be brought into engagement with the springs when the cover is being removed or replaced.

What is claimed is:

1. In a multicontact relay, a substantially rectangular plate, a support at each end of said plate, a bracket in the form of a reentrant U carried by said plate, a pair of armatures pivoted on each of said supports and on said bracket, the reentrant legs of said bracket limiting the movement of each of said armatures in one direction, and a plurality of latching means secured to said plate and to said supports and engaging said armatures for holding them in position on their pivots.

2. In a multicontact relay, a substantially rectangular mounting plate, a magnet yoke supported on said plate near one end, an armature having a lateral extension in the form of an angle bar extending along said plate, said armature and said extension having slots in the angle thereof, a bracket in the shape of a reentrant U secured to said mounting plate, knife edges on said yoke and said bracket on which said armature and said lateral extension are pivoted, and springs secured to said plate and entering the slots in said armature and said lateral extension, said springs being bent downward at the end and provided with a projection to resiliently hold said armature and said extension in place, the reentrant leg of said bracket serving to limit the motion of said armature and said lateral extension in one direction.

CLARENCE I. BAKER,
EMIL C. MUELLER, JR.
FREDERIC J. REDMOND.