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RELAY

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FIG. 1

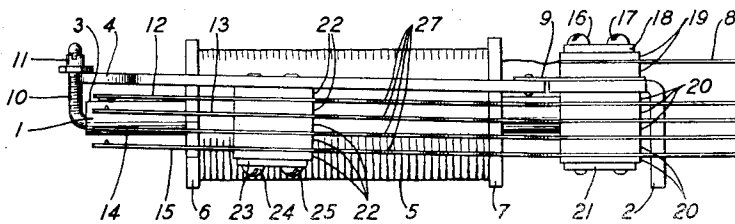
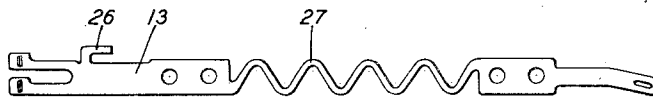


FIG. 2



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RELAY

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7 Claims. (Cl. 200—104)

This invention relates to relays and more particularly to relays for use in the circuits of telephone systems.

In electric circuits generally and in telephone circuits particularly, relays are employed in large numbers for performing numerous and varied circuit switching functions. It is often very essential that relays employed in such circuits shall positively make and break the circuits controlled over their contacts. If the contacts of a relay do not make firmly or break cleanly, or in other words, if the contacts have a tendency to chatter when they make or break, false operation in the circuits controlled thereover will result.

It has been found that one of the factors which contributes to the tendency of relay contacts to chatter is the length of the springs which carry the contacts. Obviously, the amplitude of vibration of the free end of a spring or reed, fixed at one end, increases with the increase in the free length of the spring. If, therefore, the contact springs of a relay are shortened, the amplitude of vibration of their free or contact carrying ends will be reduced and their tendency to chatter by vibrations imparted thereto through the operation and release of the relay armature will be materially reduced. However, it is essential that the contact springs shall have sufficient flexibility to enable the relay to be efficiently operated. It is therefore the object of the present invention to provide a relay with effectively short contact springs whereby their tendency to chatter is reduced without reducing the efficiency of the relay.

The object of the invention is attained by providing a relay with contact springs of the usual length, that is, which extend forwardly from their rear support on the relay mounting bracket or heel-piece to a point beyond the front spoolhead of the energizing coil, but which are supported at a point between their free ends and their rear support by attachment to the relay armature. The effective free length of the contact springs is thereby reduced to that portion which extends forwardly from their support on the armature. To add flexibility to the springs so that they may be readily flexed by the movement of the armature and so that the armature may have freedom of movement, the portion of the springs extending between their rear and armature supports is reduced in width and made sinuous.

The invention will be more clearly understood from the following description taken in connection with the accompanying drawing in which:

Fig. 1 is a side elevational view of a well-known

type of relay modified in accordance with the invention; and

Fig. 2 is a plan view of one of the contact springs of the relay shown in Fig. 1.

The relay is in general of a well-known type having a core 1 secured at its rear end to a mounting bracket or heel-piece 2 and having a pole face 3 upon its forward end with which the forward end of the armature 4 cooperates. An energizing coil 5 having front and rear spoolheads 6 and 7, respectively, surrounds the core 1 and has its winding terminals connected to terminal lugs 8. The armature 4 is hinged to the heel-piece 2 by reed hinges 9 which are riveted to the rearwardly extending arms of the armature. For limiting the releasing movement of the armature and for adjusting the normal air-gap between the forward end of the armature and the pole face 3 of the core, a back stop screw 10 having a back stop nut 11 threaded thereon is attached to the forward end of the core 1. In its normal position the forward end of the armature engages beneath the back stop nut 11.

Positioned on each side of the coil 5 is a spring pile-up each comprising any desired combination of contact springs. For convenience of illustration, each spring pile-up has been disclosed as comprising four springs 12, 13, 14 and 15. The springs of each pile-up are clamped near their rear ends, together with the terminal lugs 8 and reed hinges 9, to the bracket 2 by screws 16 and 17 which pass through the clamping plate 18, insulating strips 19, the reed hinges 9, the bracket 2, the springs 12 to 15, inclusive, and insulating strips 20 into threaded holes in the clamping plate 21. The terminal lugs 8 and contact springs are insulated from each other and from the bracket 2 by the interposed insulating strips 19 and 20.

The springs of each pile-up are, in addition, insulatedly supported on the armature 4 near the front spoolhead 6. The front support for the springs comprises superimposed blocks 22 of insulating material, which insulate the springs from each other and from the armature 4, and a clamping plate 23 through which screws 24 and 25 pass into threaded holes in the side arms of the armature 4. The forward contact bearing ends of springs 12 and 14 extend freely beyond their support on their armature, but their mate springs 13 and 15 are restrained by the usual tangs such as tang 26 shown in Fig. 2, engaged in notches in the front spoolhead 6.

Each spring is reduced in width between its front support on the armature and its rear sup-

port on the heel-piece or bracket 2 and is made sinuous in the manner shown at 27 in Fig. 2 to give the spring flexibility in a direction along its axis and in a direction at right angles to its axis.

5 With the relay constructed and assembled in the manner described, when the armature 4 is attracted toward the pole face 3 of the core in response to the energization of the coil 5, the forward support of the contact springs carried 10 by the armature depresses the contact ends of the springs. The ends of springs 12 and 14 follow the movement of the armature, but since the tangs of the mate springs 13 and 15 are engaged in the notches of the front spoolhead 6, the move- 15 ment of the front spring support depresses that portion of springs 13 and 15 lying between the front spoolhead and the rear support of the springs thereby causing the front ends of these springs to pivot about their support on the front 20 spoolhead 6 and to move toward and into engagement with the contact ends of springs 12 and 14. The contact springs 12 and 14 thus have an effective free length extending only from their front support on the armature to their contact ends and springs 13 and 15 have an effective free 25 length extending only from their engagement with the front spoolhead. Being thus of short length the springs do not have an inherent tendency to vibrate to such an extent as to cause 30 them to chatter when engaged or disengaged in response to the attraction or release of the armature. Furthermore, since the springs are made very flexible between their rear and front supports, the freedom of movement of the arma- 35 ture is not curtailed.

As an alternative construction the portions of the springs between their front support on the armature 4 and their rear support on the heel-piece 2 could function as reed supports for the 40 rear end of the armature, in which case the reed hinges 9 would be eliminated and replaced with a ledge member against which the rear end of the armature would normally rest.

What is claimed is:

45 1. In a relay, a supporting bracket, a core attached thereto, an armature hinged to said bracket and cooperating with said core, and contact bearing springs insulatedly supported at one end on said bracket and insulatedly supported inter- 50 mediate their ends on said armature whereby cooperation between the contacts of said springs is controlled by the movement of said armature.

2. In a relay, a supporting bracket, a core at- 55 tached thereto, an energizing coil on said core having a front and a rear spoolhead, an armature hinged to said bracket and cooperating with said core, and contact springs insulatedly supported on said armature adjacent to said front

spoolhead and having contacts on their free ends, certain of said springs being engaged in notches in said front spoolhead whereby cooperation between the contacts of said springs is controlled by the movement of said armature. 5

3. In a relay, a supporting bracket, a core at- 10 tached thereto, an energizing coil on said core having a front and a rear spoolhead, an armature hinged to said bracket and cooperating with said core, and contact springs insulatedly supported 15 adjacent said front spoolhead on said armature and having contacts on their free ends, certain of said springs being engaged in notches in said front spoolhead whereby cooperation between 15 the contacts of said springs is controlled by the movement of said armature.

4. In a relay, a supporting bracket, a core at- 20 tached thereto, an armature hinged to said bracket and cooperating with said core, and contact springs insulatedly supported at one end on said bracket and insulatedly supported intermediate 25 their ends on said armature, said springs having the portions thereof between their supports on said bracket and on said armature rendered flex- 25 ible to enable said armature to move freely.

5. In a relay, a supporting bracket, a core at- 30 tached thereto, an armature hinged to said bracket and cooperating with said core, and contact springs insulatedly supported at one end on said bracket and insulatedly supported inter- 30 mediate their ends on said armature, said springs having the portions thereof between their sup- ports on said bracket and on said armature made flexible axially and at right angles to their axes 35 to permit the armature to move freely.

6. In a relay, a supporting bracket, a core at- 40 tached thereto, an armature hinged to said bracket and cooperating with said core, and contact springs insulatedly supported at one end on said bracket and insulatedly supported intermediate 40 their ends on said armature, said springs having the portions thereof extending between their sup- ports on said bracket and on said armature re- 45 duced in cross-sectional area to render them sufficiently flexible to enable said armature to move freely.

7. In a relay, a supporting bracket, a core at- 50 tached thereto, an armature hinged to said bracket and cooperating with said core, and contact springs insulatedly supported at one end on said bracket and insulatedly supported inter- 50 mediate their ends on said armature, said springs having the portions thereof between their sup- ports on said bracket and on said armature re- 55 duced in width and made sinuous to render them flexible axially and at right angles to their axes.

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