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ELECTROMAGNETIC RELAY CONTACT

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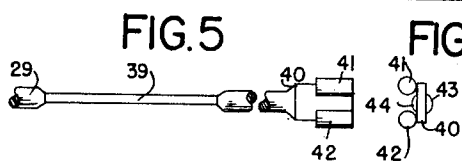
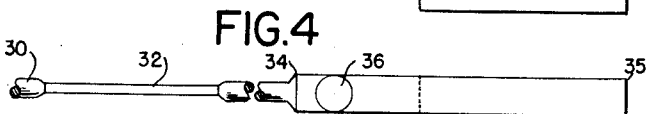
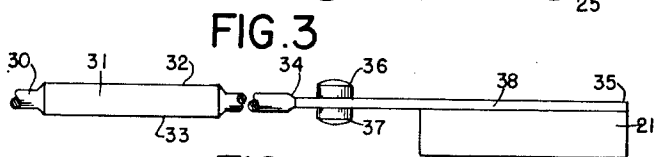
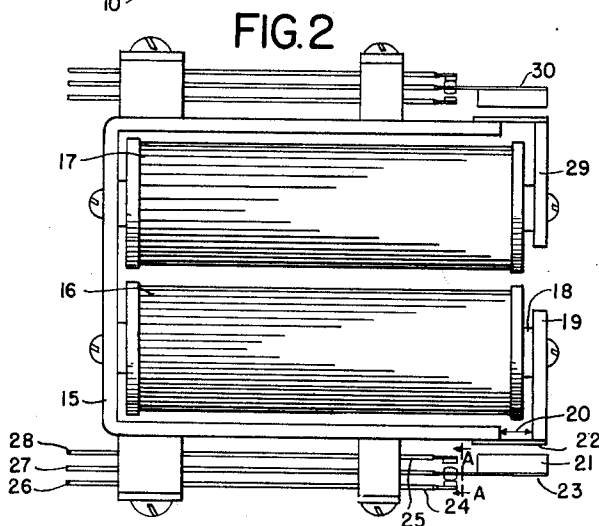
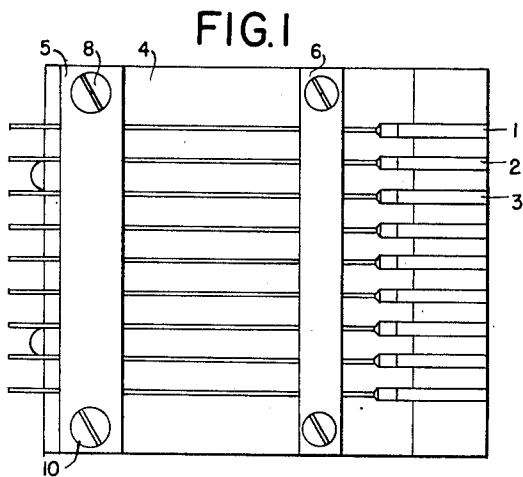
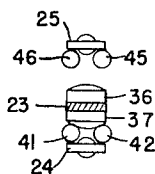


FIG. 6

FIG. 7



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ELECTROMAGNETIC RELAY CONTACT

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1 Claim. (Cl. 200—166)

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The present invention relates to relays and more particularly to electromagnetic relays with wire springs, both single coil types and the gang or multiple contact type, for use in telephone work.

It is an object of the present invention to provide in an electromagnetic relay an improved method of self-alignment of the metal contacts.

Another object of the present invention is to provide in a single or multiple contact relay, wire springs with a plurality of types of contact metal arranged in such a manner that adjacent springs will be equipped with different types of contacts to assure the self-alignment thereof when these contacts are brought together to close an electrical circuit.

Another object of this invention is to provide an improved relay of the type mentioned, in which round wire springs are employed instead of the conventional flat type springs. These springs being swedged along that portion of their length which is clamped between insulators, to prevent twisting or rolling of the springs thus assuring their proper alignment.

Another object of this invention is to provide a relay of the type mentioned, in which the armatures which close the air gap in the magnetic circuit when the relay is energized, comprise a plurality of pieces of magnetic iron, one armature attached to each one of the moveable springs.

Another object of this invention is to reduce contact vibration to a minimum.

The structural details and operation of this improved relay construction in accordance with the invention will be readily understood from the description which follows, of one embodiment of the invention, with the accompanying drawings.

Fig. 1 is a top view of a gang type relay equipped with nine sets of round wire springs.

Fig. 2 is a sectional view through a gang type relay equipped with a plurality of coils and a plurality of round wire contact springs.

Fig. 3 is a side view of a movable spring showing the magnetic iron armature, two rounded metal contacts and the widest part of the swedged portion.

Fig. 4 is a top view of a movable spring showing the flattened portion, on the underneath side of which the magnetic iron armature is attached, a top view of one rounded contact and the narrowest part of the swedged portion.

Fig. 5 is a top view of a stationary spring showing the two parallel pieces of round contact metal wire.

Fig. 6 is an end view of the wire spring of Fig. 5.

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Fig. 7 is a cross-sectional view on the line A—A of Fig. 2.

Fig. 1 is a top view of a gang relay. This view shows only nine sets of springs, such as 1, 2, 3 etc., however a maximum of thirty-six sets of break-make springs may be provided. Also this type relay may be equipped with from one to eight separately energized coils. The swedged portion of the springs, which will be explained later, are held firmly with their insulators (not shown) onto the top plate 4 by the clamping plate 5 and the clamping screws 8 and 10. Another plate 6, is provided with an insulator (not shown) as a back-stop for the top spring in each set, to maintain these springs in proper relation with the movable springs. The springs are however, not attached in any way to the clamping plate 6, its insulator (not shown) or the relay top plate 4.

Fig. 2 is a cross section through a gang relay showing two of the coils 16 and 17, of a plurality of coils. It will be noted that the magnetic circuit for each coil includes the usual core, such as 18, a heel piece 15 and another member 19 (or 29) a pole piece, leaving an air gap 20 to be closed by the armature 21 which is a small piece of magnetic iron attached to the movable spring 23. Across the air gap 20, a thin strip 22, of brass or other non-magnetic material is provided which performs the usual function of preventing sticking of the armature 21 to the heel piece 15 or the pole piece 19. The conductors (not shown) of the circuits to be controlled by the stationary and movable springs are soldered to the terminal ends 26, 27 and 28 of the round wire springs. When coil 16 is energized, armature 21 moves upwards closing the air gap 20 between heel piece 15 and the pole piece 19 and at the same time raising spring 23 causing the contact between springs 23 and 24 to open and, to close the contact between springs 23 and 25.

Fig. 3 is a side view of a portion of a movable spring, such as 30, as seen Fig. 2. It will be noted that a section 31 of this round wire spring 30 has been flattened forming a top rib 32 and a bottom rib 33, this is termed the swedged section, a process of squeezing the wire between tooled jaws resulting in reducing the diameter of the wire from side to side, at this swedged section, and increasing its diameter from top to bottom, thus forming the extended ribs or wings 32 and 33. These wings are clamped between insulators when the wire springs are assembled and thereby rendering them rigid and firm against rotation or twisting. From the point 34,

on the wire spring 30, to its forward end 35, the wire is flattened so that its thickness is reduced to almost half the diameter of the original wire of which the spring is made and a width of approximately double the diameter of the original wire. On this flattened portion the metal contact or contacts are mounted, such as 36 and 37. When the particular combination requires only one make or one break contact, then either contact 36 or 37 would be fitted, but for a wire spring to be used in a break-make combination, then both contacts 36 and 37 would be supplied. Finally the small piece of magnetic iron 21 is attached to the lower side of the flat portion 38 of the wire spring and it is then ready for assembly into various combinations, to a maximum of thirty-six break-make sets per relay.

Fig. 4 is a top view of a movable wire spring showing top rib 32 of the swedged portion of wire spring 30 and the metal contact 36. This view also shows the width of the flattened portion from point 34 to 35, in comparison with the diameter of the original wire.

Fig. 5 is a top view of one of the stationary springs, as 24 or 25 in Fig. 2, showing the narrowest part 39 of the swedged section, the flattened portion 40 of the forward end and the round elongated contact metal pieces 41 and 42, these could be spot welded to the flat portion 40 of the wire spring or suitably attached by some other method. It will be noted that these pieces 40 and 41 are short lengths of round contact metal wire, their lengths being approximately two and one-half times their diameter. Their length also is approximately thirty percent greater than the diameter of the metal contact 37, on the adjacent spring, through which contacts 41 and 42 complete the electrical circuit. These differences provide the means for causing a rubbing action, at the time of closing and opening said contacts, which result in burnishing said contacts.

Fig. 6 is an end view of spring 24, as shown in Fig. 5. Two parts, 43 and 44, of the round section of the wire may be seen, also the flattened portion 40 and the round wire metal contacts 41 and 42.

Fig. 7 is a cross sectional view on the line A—A in Fig. 2 and indicates the unique method of obtaining perfect alignment of the contacts. For example, contact 37 on the movable spring 23 is resting on and is aligned with contacts 41 and 42 on spring 24. When spring 23 is carried up by the armature 21 (shown in Fig. 2) as a result of the relay coil being energized, contact 36 may touch both contacts 45 and 46 simultaneously or it may touch one of these before it touches the other, but in any case when the armature completes its upward movement it carries wire spring 23 and likewise metal contact 36 to its highest point, during which movement contact 36 has pressed against contact metal 44 and

45 and carried these contacts to their highest point. It should be remembered that the wire springs 23, 24 and 25, etc., can easily shift from right to left or vice versa, as well as up and down, and this feature has the distinct advantage of aligning the contacts 36, 45, 46, etc., and this shifting also has the advantage of burnishing the contact surfaces each time the armature operates to close or to open the contacts, as previously mentioned. Thus when the armature has completed its upward stroke and rounded contact 36 is at its highest point, contact 36 is, in a sense, wedged between the elongated contact metal pieces 45 and 46 which has the effect of preventing any side to side movement of spring 23 in relation to spring 25 and thereby reducing contact vibration to a minimum.

Having described my invention, what I consider to be new and desire to have protected by Letters Patent will be pointed out in the appended claim.

What is claimed is:

A switching device comprising an active round bare spring wire, a flattened section of said bare wire spring forming two sides, an oval contact member mounted on one side or mounted on both sides of said flat section, a passive round bare spring wire, a flattened section of said passive wire forming two surfaces, a pair of round wire contact-metal elements mounted on one of said surfaces, said elements being of short lengths and mounted spaced apart with their axes parallel with the axis of said passive spring wire, and movement of said oval contact member to make contact with said pair of contact-metal elements causing the top of said oval contact member to first enter the space between said pair of elements after which engagement is made between said oval contact and one or other of said pair of metal elements on said passive spring and as the movement of said active spring continues said oval metal contact makes contact with the other one of said pair of metal elements whereby the active and the passive springs are aligned one with the other.

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