May 2, 1944. H. J. NICHOLS ET AL 2,348,088

DETACHABLE RELAY

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Fig. 1.

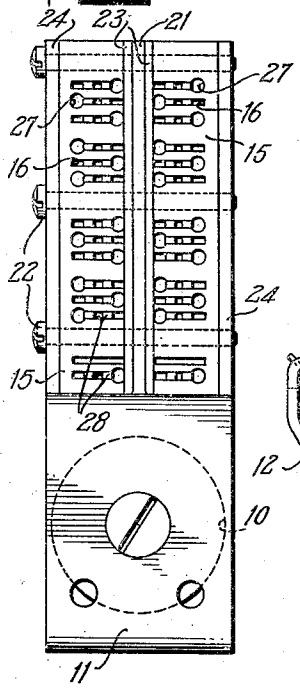
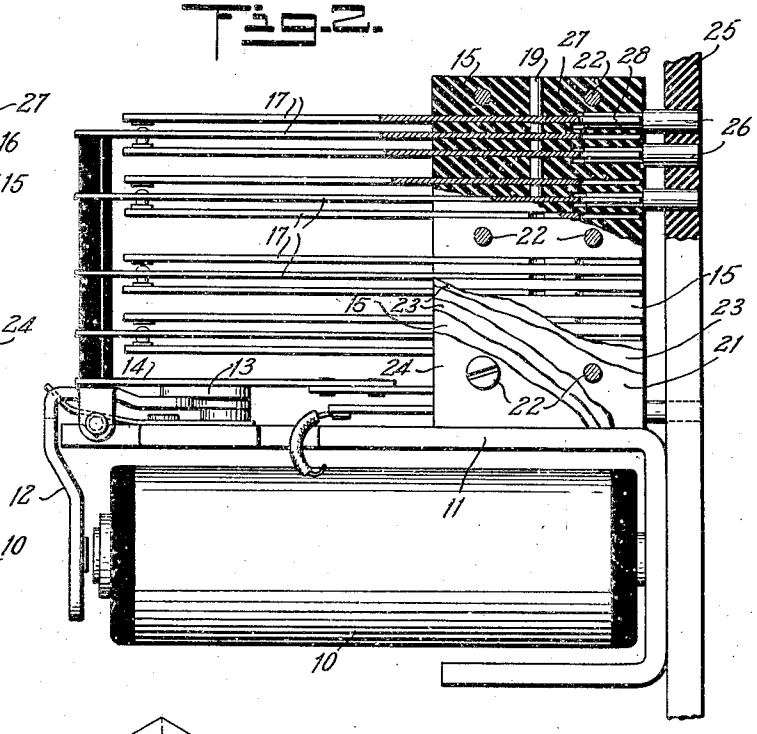



Fig. 2.



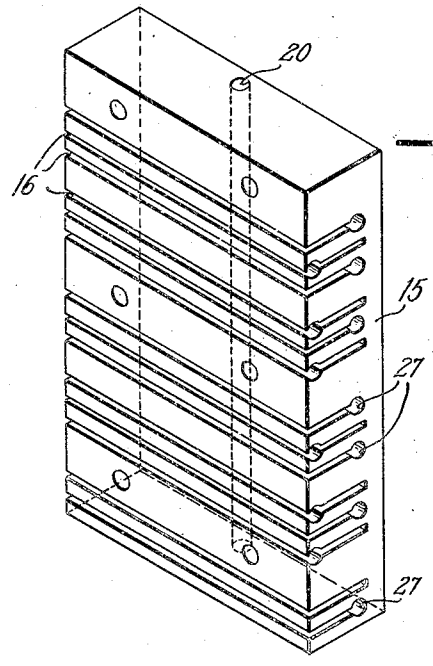




Fig. 3.

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Fig. 5.

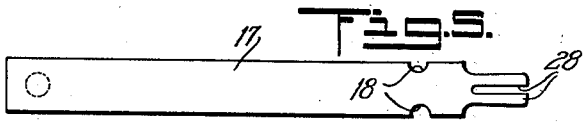



Fig. 4.

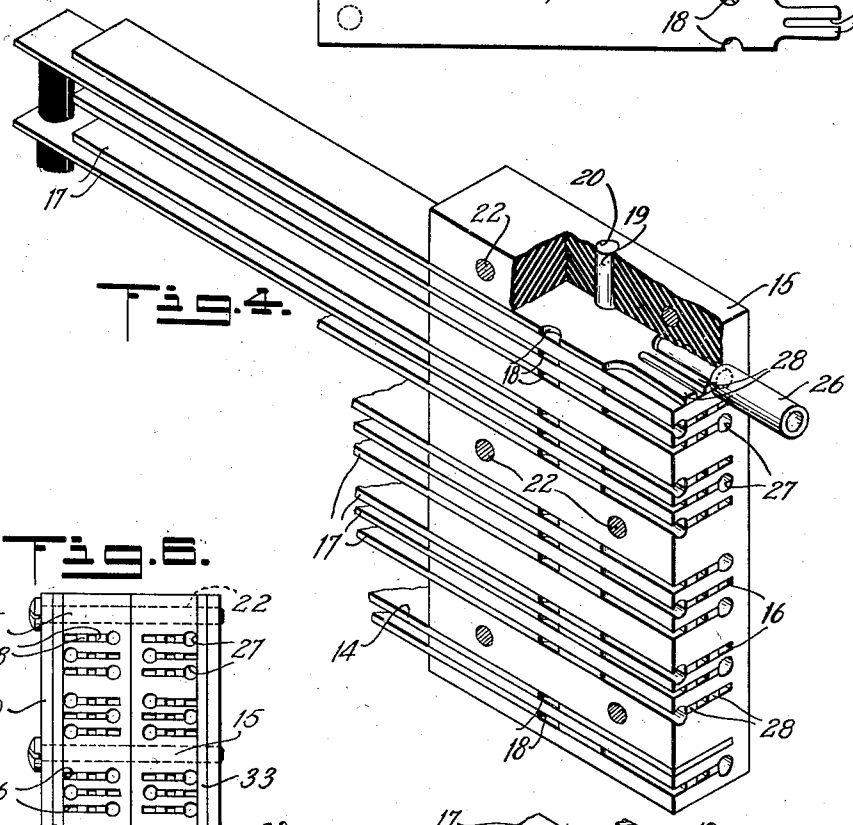



Fig. 6.

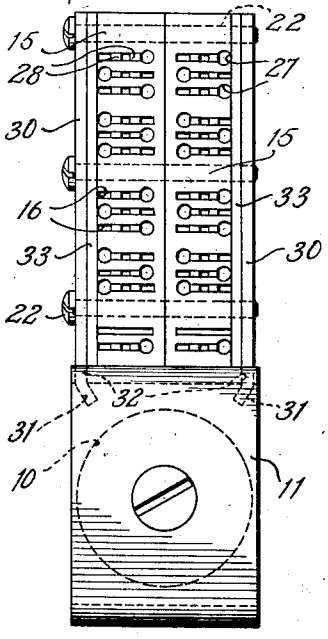
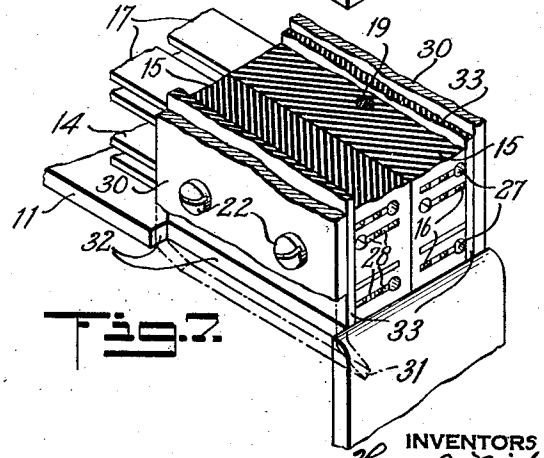



Fig. 7.




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# UNITED STATES PATENT OFFICE

2,348,088

## DETACHABLE RELAY

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Application November 20, 1940, Serial No. 366,414

3 Claims. (Cl. 175—298)

This invention relates broadly to relays, and more particularly refers to a relay of the telephone type which is provided with means permitting quick detachments of the relay proper from its external wire connections.

The well known commercial type of telephone relay employs flat spring contacts to which external circuit connections are made by soldering wires directly to the spring contact terminals. Inasmuch as these relays must be removed from time to time for maintenance or replacement purposes, considerable difficulty and delay is experienced in removing such wires and making the necessary new soldered connections.

In view of these facts, it is proposed in accordance with the present invention to provide an improved relay which may be removed readily from service without disturbing the external circuit connections to such relay, thereby eliminating the recited inconveniences.

It has also been determined by experimentation that the detachable features referred to can be obtained by a novel multispring contact assembly, wherein one or more insulating blocks are provided with a plurality of suitably disposed slots which are adapted to receive and retain the individual spring contacts. The terminals of the individual spring contacts are arranged preferably to be flush with one end of the insulating block, so that suitable connecting members or plugs can be inserted into receiving apertures formed in the said end of the block and formed so as to be immediately adjacent to the terminals of the spring contacts disposed in the slots. The insulating block assembly is then arranged to be suitably secured to the supporting member or heel piece of the relay.

Accordingly, an object of the present invention resides in a novel and improved relay assembly adapted to effect savings in the cost of manufacture and assembly of a detachable type relay.

Another object of the present invention resides in the provision of means adapted to receive and retain a plurality of spring contacts which in turn permit an immediate and positive engagement of external connections therewith.

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 an end view of the relay assembly.

Fig. 2 is a side and partial sectional view of the assembly shown in Fig. 1.

Fig. 3 is a detail perspective view of a slotted insulating block.

Fig. 4 is a perspective view of a block assembly.

Fig. 5 is a detail plan view of a contact spring.

Fig. 6 is an end view of a modification of the contact assembly mounting.

Fig. 7 is a detail view of the relay supporting member.

Referring now to Figs. 1 to 5 one embodiment of the present invention, which was found to be suitable for the purposes set forth hereinabove, is shown. The relay generally comprises the conventional magnet 10 mounted on a supporting member, such as the heel piece 11, and armature 12, pivotally attached to the heel piece, having an arm 13 disposed in operable relation with one or more springs 14 for effecting switching connections in a well known manner.

In Fig. 3 one of the insulating blocks 15 is shown provided with a plurality of slots 16 which can be machined in the block so as to receive an individual actuating spring 14 or contact spring 17. In Fig. 4, an insulating block assembly is shown with the various springs inserted in the different slots. It is to be noted that an effective portion of each spring means is inserted in the related slots in the insulating block so that the latter can support suitably the said spring means. Each actuating spring 14 and contact spring 17 is provided with at least one notch 18 adapted to be engaged by a vertical fiber aligning pin 19, which pin is inserted in the vertically formed through-hole 20 in the block 15, after the said springs have been inserted in the slots, to effect proper alignment of the springs along their lengths.

In Fig. 1, two spring assemblies or pile-ups are shown disposed in a pair of insulating blocks, each block holding one spring pile-up, and the two blocks being identical in construction as shown in Figs. 3 and 4. In the said Fig. 1, one manner of mounting the block assemblies to the heel piece 11 is shown. A fixed and centrally positioned supporting plate 21 is provided and formed integrally with the heel piece and provided with holes (not shown) permitting the insertion of through bolts or screws 22 therethrough. Suitable spacer blocks 23 of insulating material are inserted between the supporting plate 21 and blocks 15. To hold the said assembly blocks and spacer blocks fixed to the central supporting plate, two side plates 24 are provided

with suitable holes for the insertion of the screws 22 extending through the named assembly.

Referring now to Fig. 2, a supporting insulating panel 25 is shown to be provided with a plurality of terminal connectors 26. In order to permit detachable connections between the tips of terminals 26 and the terminals 28 of the contact springs 17, the insulating blocks 15 are provided with individual apertures 27 which are formed at the ends of the slots 16. These apertures are formed at the alternate ends of the adjacent slots, thus permitting close spacing of the contact springs disposed in these slots. The tips of the terminals 26 are thus adapted to be inserted in the apertures 27 and engage the terminals of the corresponding contact springs. To insure proper electrical connection between the tips of terminals 26 and the terminals of the contact springs, the latter are bifurcated as indicated in Fig. 5 by the reference character 28, so that upon insertion of the tips of terminals 26 in the related apertures against the spring action of the bifurcated fingers, the said tips are wedged therein due to the pressure exerted by these fingers.

From the description up to this point, it will become evident to those skilled in the art, that other suitable clamping means and methods can be employed for securing the spring assemblies to the heel piece of the relay. Several modifications of the clamping means will now be explained.

Referring now to Figs. 6 and 7, it is seen that the central supporting plate 21 (Fig. 1) is omitted, and instead the side plates 30 are provided with extensions 31 which are turned or bent inwardly to provide jaws for gripping the heel piece 11 of the relay. The edges of the said heel piece are suitably notched, as indicated by the reference character 32, to receive the related side plates. The insulating block assemblies 15 are disposed back-to-back, and are supported by the through-screws extending through the said side plates. Suitable resilient blocks of insulating material 33 are placed between the blocks 15 and side plates 30.

Another expedient in mounting the block assemblies to the heel piece is to omit the bent extensions 31 and weld one or two of the side plates positioned in the notches 32 in the heel piece thereto. In the event, welding of these plates to the heel piece is not desired, one or both of the plates can be secured to the heel piece by dowel pin connections.

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 a relay, the combination of spring contact means, an insulating block carried by said relay having spaced slots formed therein, each receiving an effective portion of said spring contact means for supporting the latter and disposed therein so that the terminals of said spring contact means are substantially flush with one end of the insulating block, means for maintaining the spring contact means aligned in the block along their lengths, and individual apertures formed in the said end of the insulating block, which apertures are joined with related slots thereby being adapted to receive insertible terminals of external connectors and permit engagement of the last mentioned terminals and the terminals of the contact spring means, said terminals of the contact spring means being bifurcated so that upon insertion of the terminals of the external connectors the bifurcated terminals exert certain pressures thereon to hold the terminals of the external connectors in place in the block.

2. In a relay, spring contact elements, an insulating block having spaced parallel slots therein, one for each of said elements, each of said elements having a shank portion received by the related slot and an extending contact portion, the shank portion of each of said elements having a reduced portion yieldably movable in the plane of the related slot, said insulating block having a plurality of terminal receiving apertures, one for each of said contact elements, each aperture extending along the reduced portion of the related element and opening through one face of said block to receive an insertible terminal of an external connector, the reduced portions of said elements protruding into the related apertures to make contact with, and to be deflected by, the insertible terminals.

3. In a relay, spring contact elements, an insulating support therefor having parallel slots therein, one for each contact element, each of said elements having a shank portion received by the related slot and a contact portion extending from the front face of said support, the shank portion of each of said elements having a spring prong directed toward the rear face of said support and yieldably movable transversely in the related slot, said support having a plurality of terminal receiving apertures, one for each of said contact elements, each aperture extending along the prong of the related contact element and opening through the rear face of said support to receive an insertible terminal of an external connector, the prong of each contact element being positioned so that the side thereof is engaged by a terminal inserted into the related aperture, to deflect the prong and make clamping contact between the prong and the terminal.

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