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H. M. KNAPP

2,491,272

PROTECTIVE DEVICE FOR RELAY CONTACTS

Filed March 28, 1947

FIG. 1

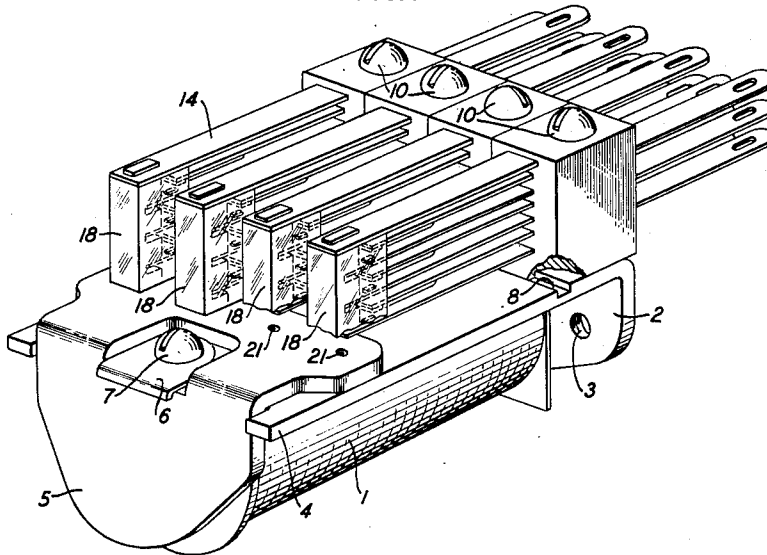


FIG. 2

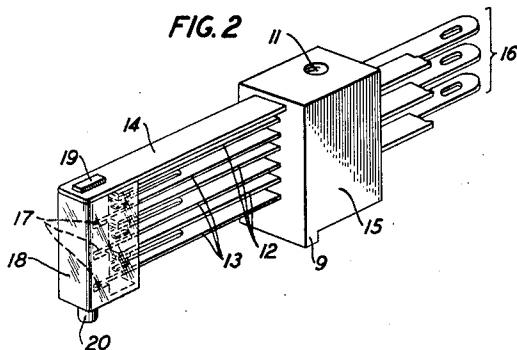


FIG. 3

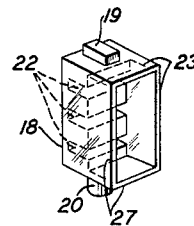
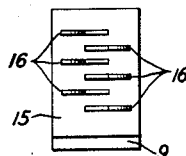


FIG. 4



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PROTECTIVE DEVICE FOR RELAY
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7 Claims. (Cl. 200-104)

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This invention relates to dust excluding devices for protecting electrical switching elements from dust and the like.

A well-known source of constant maintenance trouble in the field of electrical switching, such as the relay and analogous arts, is the ever present problem of dust and dirt accumulation on electrical contacts, which accumulation is manifested in incorrect operation of said contacts. In the past such problems have been solved by enclosing whole switches or merely the contacting elements thereof in hermetically or otherwise sealable chambers for the purpose of excluding dust and dirt. Whenever the contacting elements only have been enclosed in such chambers these chambers have been generally either of a flexible type to enable an element acting member or mechanism to operate said elements or the said chambers have been of a rigid type in those types of switching structures wherein an external magnetic influence is used to actuate the contacting elements and no mechanical linkage is required between said elements and the actuating means.

In the field of open or uncovered switches, which do not have the aforementioned flexible hermetically or otherwise sealable chambers surrounding the contacting elements thereof, dust covers have been known but these dust covers either have been supported by a contacting element pileup assembly independently of said elements and of the member or mechanisms actuating same or they have been supported by one of said elements independently of the actuating means.

It is one of the objects of the present invention to provide a dust cover for the contacting areas of contacting elements, which cover is part of the member or mechanism which actuates said elements.

It is another object of the invention to provide a combined relay contact spring actuating member and dust cover to thereby solve, by means of a simple, easily manufactured and readily replaceable structure component, a large portion of the dust and dirt problem attendant to such relay structures.

According to the invention, the drawings and subsequent detailed description thereof disclose a relay whose contact springs are actuated by well-known cards, which cards are adapted to perform the functions of a dust cover as well as of a contact spring actuating member. In the particular embodiment disclosed herein by example, the card comprises one molding of a transparent plastic material formed into a box structure. When the said card is in its engaging position on the ends of a group of contact springs

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controlled thereby the box-like structure thereof confines the contact carrying ends of said springs on five of their six sides. The box-like structure extends back along the contact springs to further confine the contacting areas so as to substantially prevent dust and lint, etc., from becoming blown or otherwise deposited on said areas.

A brief discussion of the subject-matter and some of the objects of the present invention having been set forth above, a detailed description of the disclosed embodiment thereof is provided below in connection with the various figures of the drawing, the general descriptions of which are as follows:

Fig. 1 shows a general purpose electromagnetic relay in perspective and which is provided with the invention;

Fig. 2 shows a replaceable contact spring assembly of the relay of Fig. 1 and having said invention adapted thereto;

Fig. 3 is a perspective of the disclosed embodiment of the invention; and

Fig. 4 is a view of the wiring terminal end of the assembly of Fig. 2.

In Fig. 1 is shown an electromagnetic relay having a core (not shown) carrying a winding 1, a heel piece 2 attached to the core (not shown) and provided with mounting holes 3. A forward extension 4 of heel piece 2 provides a well-known knife edge type of bearing for an L-shaped armature 5, which armature 5 is confined in its oscillatory motion by leaf spring 6 held to heel piece extension 4 by screw 7. A lateral groove 8 is provided across and on the rearward part of heel piece extension 4. This groove or slot 8 is adapted to have positioned therein the ridges or shoulders 9 of a group of replaceable molded contact spring assemblies as illustrated in Fig. 2. Said assemblies are then attached to the heel piece extension 4 by means of screws 10 passing through clearance holes 11 in said assemblies. As more clearly shown in Fig. 2 these contact spring assemblies comprise several relatively fixed contact springs 12 in cooperative relationship with several relatively movable contact springs 13 and a retainer spring 14 all molded in superimposed relation in a block of insulating material 15. The rearward ends of said contact springs 12 and 13 are formed into terminals 16 and are staggered, as shown in Fig. 4, to facilitate wiring.

The forward contact carrying ends of movable contact springs 13 are extended beyond the forward contact carrying ends of the cooperating fixed springs 12 and these extensions 17 of said movable springs 13 are engageable by a combined card and dust cover 18. The cards 18 are pro-

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vided with rectangular projections 18 on the top, which are engaged by retainer springs 14 as shown, and are provided with cylindrical projections 20 on the bottom, which are adapted to fit into suitable holes 21 in armature 5. The retainer springs 14 are arranged to hold cards 18 in holes 21 by reason of self-tension in said retainer springs 14.

In Fig. 3, card 18 is shown as an integral molding of transparent plastic or like material. It need not be transparent but the transparency affords obvious advantages. There are provided, as is well known, several steps or shoulders 22 on card 18 for the purpose of engaging and actuating the extended ends 17 of the movable springs 13. The side, top and bottom walls 23 of the box-like structure extending back from said steps 22 are of sufficient length to enclose the contacting areas of said movable and fixed springs 13 and 12, as will be apparent from Figs. 1 and 2. It is of course true that these card and dust cover members 18 need not be made of one integral molding of plastic. It is entirely possible to construct such a member having a card structure with steps 22 to which may be attached by adhesive, springs, rivets, screws, or any well-known fastening means, such side plates or inspection windows as 23 of Fig. 3. It is not intended that the disclosure of one embodiment will preclude the scope of the invention from extending to other structures which will suggest themselves to those skilled in the art.

The movable springs 13 of the relay of Fig. 1 and of the assembly of Fig. 2 are pretensioned before assembly such that, when card 18 is not in the position shown in Fig. 1, all cooperating pairs of fixed and movable springs will be normally closed. The card 18, when in position between retainer spring 14 and armature 5 as shown in Fig. 1, will engage movable springs 13 and deflect same to open positions. When armature 5 is operated card 18 will be moved so that movable springs 13, by reason solely of their own tension, will make contact closure with respective fixed contacts. This type of spring control, preferably referred to as "card release," has many advantages as are set forth in Patent 2,472,709 to H. M. Knapp of June 7, 1949, wherein is disclosed and claimed the above-mentioned "card release" arrangement.

Since the invention disclosed and described herein is not intended to be limited in scope to the particular embodiment shown I append claims which alone describe the scope of said invention.

What is claimed is:

1. A contact spring assembly comprising relatively fixed contact springs having contacting areas, relatively movable contact springs having contacting areas cooperating with contacting areas on said fixed springs and a card for actuating said movable springs, said card having shoulders for engaging and moving said movable springs and having a box structure for enclosing the contacting areas of all of said springs.

2. A contact spring assembly comprising relatively fixed contact springs carrying contacts on the free ends thereof, relatively movable contact springs carrying contacts on the free ends thereof, the other ends of all of said springs being clamped in an insulated support, and a card having shoulders adapted to engage the free ends of said movable springs to actuate same, the said card having integral therewith side, top and bottom plates extending back along said springs

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to provide a dust cover for the contacts on said springs.

3. A contact spring assembly comprising relatively fixed contact springs carrying contacts on the free ends thereof, relatively movable contact springs carrying contacts on the free ends thereof, the other ends of all of said springs being clamped in an insulated support, and a card having shoulders adapted to engage the free ends of said movable springs to actuate same, said card comprising a single transparent molding of said shoulders and an integral box structure adapted to extend around said contacts for protection thereof from dust and the like.

4. A relay having a core, an energizing winding thereon, an armature pivoted to said core, contact spring assemblies mounted on said core and a card actuated by said armature and adapted to control said springs, said card comprising a molded part having shoulders for engaging and controlling some of said springs and other parts forming an enclosure adapted to provide a dust protective enclosure for portions of said springs.

5. A relay having a core, an energizing winding thereon, an armature pivoted to said core, contact spring assemblies mounted on said core and a card actuated by said armature and adapted to control said springs, said card comprising a molded part having shoulders for engaging the free ends of said movable springs to thereby control same and other parts forming an enclosure adapted to provide a dust protective enclosure for the free ends of all said springs.

6. A relay having a core, an energizing winding thereon, an armature pivoted to said core, contact spring assemblies mounted on said core and a card actuated by said armature and adapted to control said springs, said card comprising a single molded box structure having therein shoulders for engaging and controlling the free ends of said movable springs and having confining walls within which the free ends of all of said springs are freely housed to protect same from dust and dirt, etc.

7. A relay having a core, an energizing winding thereon, an armature pivoted to said core, contact spring assemblies mounted on said core and a card actuated by said armature and adapted to control said springs, said card comprising a single transparent molded structure of insulating material having four sides and a back, said back comprising shoulders adapted to engage the free ends of said movable springs insertable into said card, the sides of said card enclosing for dust protection thereof the free ends of all of said springs upon which contacting areas are provided.

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