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MULTI-POLE RELAY SWITCHES

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Fig. 1

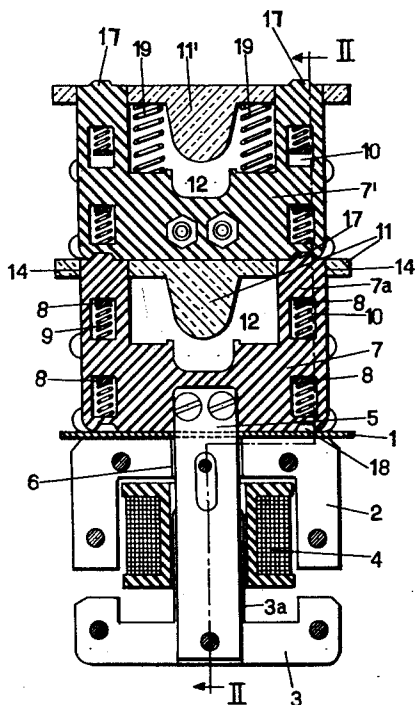


Fig. 2

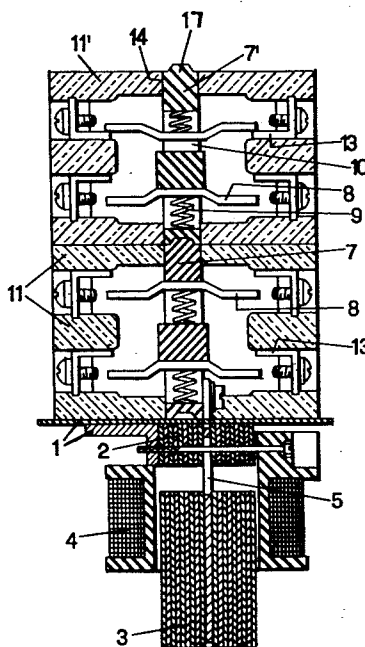


Fig. 3

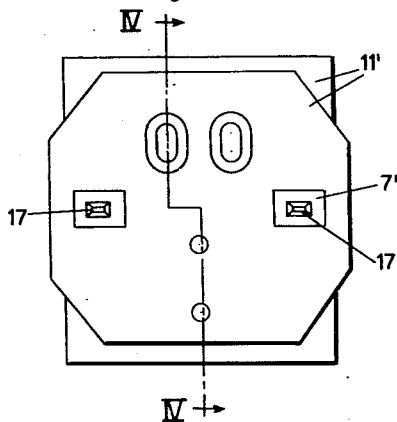
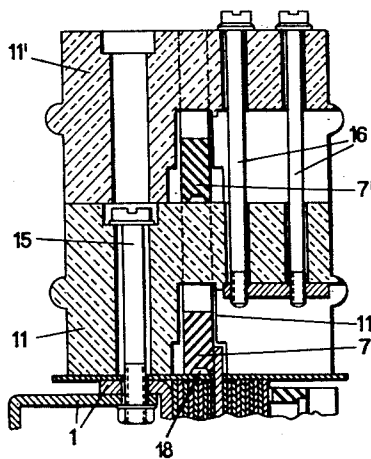


Fig. 4



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MULTI-POLE RELAY SWITCHES

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3 Claims. (Cl. 200—104)

This invention relates to a multi-pole relay switch which is of simple and compact construction and with which a comparatively large number of contacts is arranged on a small space, the switch being composed of a variable number of contact carrying elements adapted to be assembled to form a switch with four, eight, twelve or more contacts which are operated by a single relay.

According to the invention, the relay switch comprises a solenoid consisting of a coil, a magnet embracing the coil and a plunger having a stem portion adapted to reciprocate axially in the hollow of the coil, a tongue fastened on the stem of the plunger and extending through a slot of the magnet, a U-shaped piece of insulating material fastened to the free end of the said tongue and carrying in its legs in vertically spaced relation the movable switch contacts, and a block of insulating material rigidly connected with the solenoid, this block carrying in horizontally and vertically spaced relation the fixed switch contacts and having a recess wherein the U-shaped carrier of the movable contacts is received and guided for allowing same to enter into and out of touch with the fixed contacts in the reciprocating movement of the plunger.

In a preferred embodiment of the invention the recess in the block is open at the bottom side of the block and forms a pair of holes in the upper part of the block which open on the top side of the block and constitute guides for the legs of the U-shaped carrier of the movable contacts, the block and the U-piece being of the same height so that in the withdrawn position of the plunger the bottom face of the U-piece lies flush with the bottom side of the block and the end faces of the legs of the U-piece lie flush with the top side of the block.

With the relay switches according to the invention it is possible to mount two or more contact-carrying blocks with U-pieces of the kind stated one on top of the other, in which case the several blocks are rigidly connected with each other and with the solenoid and superimposed in such a manner that the U-pieces carrying the movable contacts are vertically aligned and adapted to be moved together in the blocks by the plunger of the relay.

These and other features of the invention will be more readily understood from the following description taken in connection with the accompanying drawing, which illustrates by way of example an embodiment of the relay switch according to the invention.

Fig. 1 is a diagrammatic vertical section of the relay switch,

Fig. 2 is another vertical section on the line II—II of Fig. 1,

Fig. 3 is a plan view of the relay switch, and

Fig. 4 is a vertical section on the line IV—IV of Fig. 3.

The relay switch comprises a conventional solenoid which is carried by a frame 1 and consists of the magnet 2, the armature or plunger 3 and the coil 4. The plunger 3 has a stem 3a which is adapted to axially reciprocate in the hollow of the coil 4. Fastened between the laminae

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of the plunger 3, 3a is a tongue 5 which passes through a slot 6 of the magnet 2. The free end of the tongue 5 is screwed to a substantially U-shaped piece 7 which serves as carrier for the movable contacts 8. These contacts 8 are under the action of springs 9 and mounted together with same in recesses 10 of the legs 7a of the U-piece 7. The contacts 8 project with both ends beyond the opposite sides of the piece 7, as may be seen from Fig. 2. The piece 7 is encased in a block 11 of insulating material, such as steatite, and is mounted for vertical reciprocating movement in a recess 12 of the said block. This block carries in a vertically and horizontally spaced relation the fixed contacts 13 to which the leads (not shown) may be connected by means of screws or otherwise. The recess 12 is open at the bottom side of the block and forms a pair of holes 14 in the upper block portion, which holes open on the top side of the block and form guides for the legs 7a of the U-piece 7.

The block 11 and the U-piece 7 are of the same height so that in the withdrawn position of the plunger, illustrated by the several figures of the drawing, the bottom face of the U-piece lies flush with the bottom side of the block and the end faces of the legs 7a lie flush with the top side of the block.

One or more other blocks 11' with U-pieces 7' of substantially the same configuration as the block 11 with piece 7 may be placed on block 11 one on top of the other. The blocks 11, 11' etc. are rigidly connected with the frame of the solenoid by screw bolts 15 and with one another by screw bolts 16, as shown in Fig. 4. In a composite relay switch of this kind the movable contact carriers 7, 7', as may be seen from Figs. 1 and 2, are seated one on the other in such a manner that when the solenoid is energized the lower contact carrier 7 through its connection 5 with the plunger 3, 3a is lifted and itself lifts the contact carrier 7' and any further carriers of superimposed elements, whereby the contacts 8 and 13 are brought into or out of touch according to their relative arrangement.

In order to hold the carriers 7, 7' in proper alignment and engagement in their reciprocating movements they may be provided at their upper and lower faces with interengaging protrusions 17 and depressions 18, respectively.

In the uppermost switch element springs 19 are interposed between the block 11' and the movable contact carrier 7', which in cooperation with the gravity act to return the carriers 7, 7' and the plunger 3 to their lowermost position or position of rest.

Having now described my invention, what I claim is:

1. A multi-pole switch, comprising a reciprocating tongue, a U-shaped piece of insulating material fastened to the free end of the said tongue and carrying in its legs in vertically spaced relation movable switch contacts, a block of insulating material carrying in horizontally and vertically spaced relation fixed switch contacts and having a recess wherein to receive for vertical reciprocating movement the U-piece carrying the movable contacts, the said recess being open at the bottom side of the block and forming a pair of holes in the upper portion of the block which open on the top side of the block and constitute guides for the legs of the said U-piece, said U-piece and the block being of the same height so that in the withdrawn position of the tongue the bottom face of the U-piece lies flush with the bottom side of the block and the end faces of the legs of the U-piece lie flush with the top side of the block, at least one further block with fixed contacts and a U-piece with movable contacts of the same configuration being mounted on the first-said block, the several blocks being rigidly connected with each other and with the reciprocating tongue and seated one on top

of the other so that the U-pieces lie in vertical alignment and are adapted to be moved together in the blocks.

2. A multi-pole switch as claimed in claim 1, in which springs are arranged in the uppermost block acting on the U-piece contained therein in a direction to force it and the other U-pieces downwardly when the reciprocating tongue is moved downwardly.

3. A multi-pole switch as claimed in claim 1, in which each U-piece has protrusions on the end faces of its legs and corresponding depressions in its bottom face adapted to snugly receive the protrusions of another U-piece.

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