

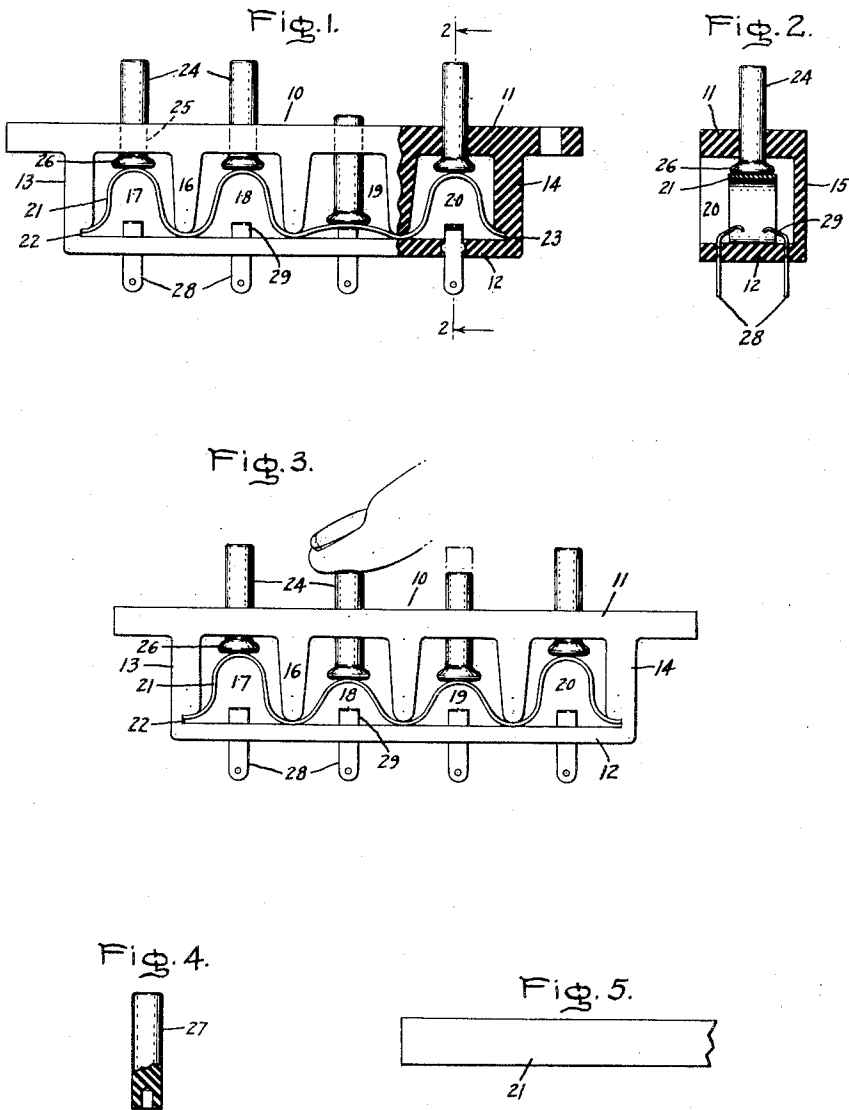
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MULTIPLE SWITCH AND THE LIKE

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MULTIPLE SWITCH AND THE LIKE

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The present invention relates to multiple contact switches and like articles having a plurality of contacts or like elements and means for actuating the contacts or elements one at a time and precluding the actuation of a second contact or element at the same time.

The general object of my invention is to provide an improved multiple contact switch or like article of the type above specified which is simple in design and can be produced at relatively low cost.

For a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto in connection with the accompanying drawing.

In the drawing Fig. 1 illustrates a multiple contact switch embodying my invention; Fig. 2 is a section along line 2—2 of Fig. 1; Fig. 3 shows the switch in a different operating position; and Figs. 4 and 5 show two elements of the switch prior to assembly.

The switch has a casing 10 which comprises two parallel walls, in the present instance a top 11 and a bottom 12 united by side walls 13, 14 and a rear wall 15. The casing is made of insulating material by a molding process. The upper wall or top 11 is formed with a plurality of substantially uniformly spaced projections or partitions 16 which have lower ends in close proximity to the lower wall or bottom 12. These projections or partitions together with the side walls 13, 14 form a plurality of row of chambers or compartments 17, 18, 19 and 20. A flat metallic spring 21, as shown in Fig. 5, is inserted into the chambers 17 to 20 with its ends projecting into recesses 22 and 23 formed in the side walls 13 and 14 respectively near the bottom 12. Spring 21 is of such length that upon insertion into the chambers it assumes the shape shown in Fig. 1 which, generally speaking, is corrugated or sinusoidal. In all but one of the compartments the spring forms a corrugation or loop. In the present instance such corrugations or loops are formed in the compartments 17, 18 and 20. In one of the compartments, in the present instance in the compartment 19, the spring is substantially flat. The lower portions of the loops or corrugations engage the projections or partitions 16. The upper portions of the loops or corrugations engage separate pins 24 yieldably projecting through openings 25 in the top 11. Lower end portions 26 of the pins are enlarged to prevent them from sliding out of the casing 10. During the process of manufacture the pins are inserted

in plastic condition in cylindrical form 27, as shown in Fig. 4. They are then pressed downward to a flat surface to enlarge the lower ends until they assume the shape shown in Fig. 1. A row of contact means or like elements to be actuated by the spring is supported on the casing. In the present instance I have shown a pair of contacts 28 secured to or molded into a central bottom portion of each compartment. Each contact has a flexible portion 29 projecting into a compartment in cooperative relation with the spring 21. In the position shown in Fig. 1 the contacts 28 in the compartment 19 are closed or bridged by the metallic spring 21. In the present example a pair of contacts are provided for each compartment so that there will be always one pair of contacts bridged by the spring 21. If during operation it is desired to open the contacts 28 in the compartment 19 and to close, for example, the contacts for the compartment 18, the pin 24 projecting into the compartment 18 is forced downward, causing displacement of the spring and in the present instance forcing it into the compartment 19. Fig. 3 illustrates this operation in an intermediate position of the spring in the compartments 18 and 19. As the pin for compartment 18 is pressed slightly further downward the spring in the compartment 18 snaps down or flattens while the spring portion in the compartment 19 snaps upward, assuming the shape of a loop as in the compartments 17 and 20. In the position of Fig. 3 in which the loops in compartments 18 and 19 are of substantially equal size the horizontal forces of the spring below the projection 16 between said compartments are about equal. The spring in this position, however, is unstable. A slight downward force on the pin for compartment 18, sufficient to overcome the friction of the spring with the partition between compartments 18, 19, causes the spring to snap into a stable position in which the spring portion in the compartment 18, as stated above, is substantially flat and the spring portion in the compartment 19 forms a loop with the top thereof biasing the pin in the compartment 19 upward against the top 11.

Thus, with my invention I have accomplished an improved construction of multiple contact switches and the like in which only one of a row of contacts or like elements may be actuated at a time and whereby an actuated element or closed contact is automatically released or opened upon the actuation of another contact or element. An arrangement according to my invention comprises a casing or support having two

equally spaced walls with a plurality of uniformly spaced partitions or like stops or abutments, secured to one wall and having free ends slightly spaced from the other wall. A flat spring is assembled with the casing with its ends fixed on the casing and with intermediate portions engaging the free ends of the partitions. When so assembled, the spring assumes a waved or corrugated shape with a waved or corrugated portion located between each pair of abutments but one. Between one pair of abutments or partitions the spring assumes a substantially flat shape. A plurality of elements, such as contacts, is secured to portions of one wall substantially in the center between pairs of partitions. Pins or like actuating members are secured to portions of the other wall substantially in the center between the pairs of partitions. From another viewpoint, the spring, when assembled in the casing, assumes a sinusoidal shape with trough portions of the spring engaging the free ends of the partitions and the crests of the spring engaging pins or like actuating members. If a pin is forced against a crest of the waved spring, the wave or loop in the particular compartment is being deformed, assuming a flattened shape, and a portion of the spring is forced out of the compartment into that compartment in which the spring previously assumed a flattened shape.

Having described the method of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A multiple switch and the like comprising a casing having first and second spaced walls, a plurality of spaced elements to be actuated held on the first wall, a plurality of actuating members held on the second wall, each of the actuating members being located opposite of one of the elements to be actuated, a plurality of abutments held on the casing and slightly spaced from portions of said first wall and centrally located between the elements to be actuated, and a spring having ends fixed on the casing, portions of the spring forming corrugations, each having a crest in cooperative relation with one of the actuating members and a trough engaging one of the abutments, one portion of the spring being substantially flat and engaging one of the elements to be actuated.

2. A multiple switch and the like comprising a casing having a first wall and a second wall spaced from the first wall, a plurality of spaced contacts secured to the first wall, a plurality of actuating pins spaced on the second wall with each pin located opposite one of the contacts, abutments secured to one of the walls, each abutment having an end portion closely spaced with the first wall and located between a pair of contacts, and a spring with ends fixed on the casing and forming a plurality of waved portions and a single substantially flat portion, the flat portion engaging one of the contacts, each waved portion having a crest engaging one of the pins and a trough engaging one of the abutments, the application of force by one of the pins on the crest of one of the waved portions causing said portion to flatten and to engage the contact opposite said portion and simultaneously causing

the previously substantially flat portion to assume a waved shape.

3. A multiple switch or the like comprising a casing having a bottom made from insulating material, a top parallel with the bottom and end walls, a plurality of spaced pairs of electrical contacts with flexible end portions held on the bottom, an actuating pin for each pair of contacts loosely held on the top opposite the pair of contacts, a plurality of partitions integrally formed with the top, each having a free end slightly spaced from the bottom and located centrally between adjacent pairs of contacts, and means for selectively bridging a single pair of contacts at a time and upon actuation to open such pair of contacts and simultaneously to bridge another pair, said means comprising a metallic spring having ends abutting the end walls near the bottom, and forming a plurality of waved portions and a single substantially flat portion, each waved portion having a crest near a pin and a trough engaging the free end of one of the partitions, said substantially flat portion bridging a pair of contacts.

4. A multiple switch and the like comprising a casing having a first wall, a second wall spaced from the first wall, a plurality of partitions secured to the second wall and having free ends slightly spaced from the first wall to define a plurality of like compartments in the casing, the second wall of each compartment forming a bore, a pin slidably projecting through each bore, elements to be actuated held on the first wall and located opposite said pins, and means for actuating one of the elements at a time and upon actuation to release another element at a time, said means comprising a single flat spring which upon assembling with the casing assumes a corrugated shape in all but one of the compartments and remains substantially flat in said one compartment to engage the element therein, the crest of each corrugation engaging a pin and the trough of each corrugation engaging the free end of a partition.

5. A multiple switch and the like comprising a casing having a bottom and a top, a partition in the casing having a free end near the bottom and defining a first and a second compartment in the casing, the top of each compartment having a central bore, actuating pins slidably projecting through the bores, contact means in the first compartment held on a central portion of the bottom, and a single spring which in each of two end positions forms a waved portion in one of the compartments and a substantially flat portion in the other compartment with the crest of the waved portion engaging a pin and the trough of the waved portion engaging the free end of the partition, downward movement of the pin when engaging the crest of the waved portion causing the latter to flatten and a part of the spring to be displaced into the other compartment, the flat portion when formed in the first compartment engaging the contact.

6. In a multiple switch, walls defining a plurality of spaced pockets, contacts in each pocket, a circuit closing member comprising a flexible element which extends across the pockets and is of a length such that it has a loop in all but one of the pockets, and actuating means associated with the pockets and engaging said loops.

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