

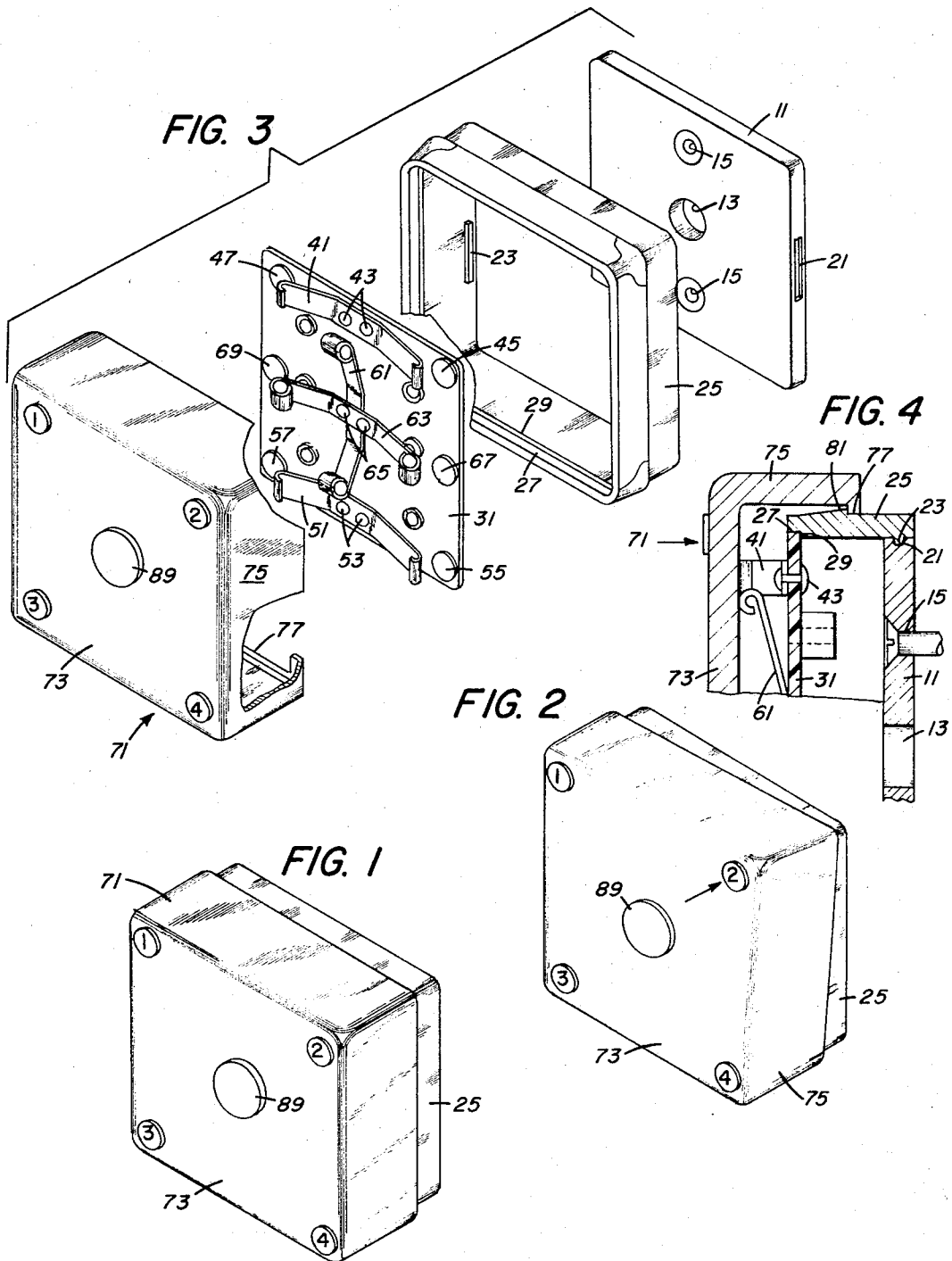
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1

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DECODER SWITCH FOR CODED ELECTRIC CIRCUITS

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ABSTRACT OF THE DISCLOSURE

There is disclosed an electric switch assembly comprising a plurality of electrical switches with the contact members of at least one switch being constructed and arranged for actuation only by the rearward tilting movement of a cover member relative to a relatively stationary support structure, and with the contact members of at least another switch being constructed and arranged for actuation only by the straight axial rearward movement of the cover member relative to the support structure.

This invention relates to a switch for use with what is called a coded electric circuit. Such circuits are known in various fields; for example, electrically operated door locks, or electrically operated garage door openers, or various types of machinery. The electric circuit may take many different forms, well known in the art, and the details of the circuit are unimportant so far as the present invention is concerned. The invention relates only to the switch which is used to operate the circuit to decode it to obtain the desired result. The coded circuit as a whole involves several individual circuits which have to be closed in a predetermined sequence in order to obtain the desired operation. For example, assuming that there are four separate circuits designated by the numerals 1, 2, 3, and 4, the coding mechanism may be so arranged that the circuits must be closed in the order 1, 3, 4, 2, or for example in the order 4, 1, 3, 2, or any other selected permutation, in order to cause the desired operation or actuation of the control mechanism, for example to release a door lock, or operate a garage door opening mechanism, or whatever else is to be accomplished by the control mechanism.

An object of the invention is the provision of a generally improved and more satisfactory switch which may be used for closing a plurality of separate electric circuits in a selected sequence.

Another object is the provision of improved switch mechanism of simple and compact construction, and not likely to get out of order.

Another object is the provision of a switch contained within a plain or decorative cover, which can perform the functions of a cluster of five separate push-button switches.

Still another object is the provision of a switch assembly which, although of a very compact size, may function effectively both as a doorbell switch and as a decoder switch.

A further object is the provision of a switch which is substantially weatherproof and watertight, at least so far as rain and snow are concerned.

A still further object is the provision of a switch which is easy to install, and difficult to tamper with or take apart once it has been installed.

Another object is the provision of a decoder switch which may be operated entirely by pressure applied to the cover of the switch assembly.

These and other desirable objects may be attained in the manner disclosed as an illustrative embodiment of

2

the invention in the following description and in the accompanying drawings forming a part hereof, in which:

FIG. 1 is a perspective view of the switch assembly in fully assembled condition and in normal rest position;

5 FIG. 2 is a view similar to FIG. 1, showing the switch assembly actuated to close one of the circuits controlled by the switch;

FIG. 3 is an exploded perspective view illustrating various component parts of the switch assembly; and

10 FIG. 4 is a fragmentary cross section taken longitudinally through the switch, on an enlarged scale.

Referring first to FIGS. 3 and 4, the switch in its preferred form comprises a mounting plate or base plate 11, molded preferably from comparatively rigid plastic material, and having typical dimensions, for example, of about 1½ inches square and ¼ inch thick, although these dimensions, and any others that may be mentioned in this application, are given only as typical examples and not as limitations upon the invention.

20 This base plate contains a central hole 13 of rather large size, through which the various electric circuit wires may enter the space within the switch, and also, on diametrically opposite sides of the opening 13, two screw holes 15, countersunk as shown, to receive flat head screws for fastening the base plate 11 to any suitable structure on which it is mounted, such as a doorpost or doorjamb.

Two opposite edges of the plate 11 also have grooves 21, extending through only part of the length of the edges in which they are respectively located, as seen in FIG. 3. These grooves 21 are engaged by small inwardly extending ribs 23 formed on the hollow rectangular body member 25 molded from rigid plastic material and of a size to fit snugly around the four edges of the base plate or mounting plate 11, and to extend forwardly from this plate 11 for a suitable distance, such as ½ inch. Although the member 25 has been described as being molded from rigid plastic material, there is actually enough resilience in this member so that the ribs or projections 23 can be sprung or snapped into the grooves 21 of the plate 11, and will remain therein to anchor the member 25 firmly onto the plate 11, until rather considerable force is used to spring the projections out of the grooves and separate the parts.

45 At its forward edge, the inner face of the member 25 is slightly rabbeted or recessed at 27, to form a slight shoulder 29 which serves as a seat for holding the edges of the insulating plate 31 on which the switch contact parts are mounted. The plate 31 is held frictionally in position in its mounting recess 27, 29.

The switch contact members comprise flexible metallic strips of copper or other suitable flexible metal of good electric conductivity. For example, there may be an upper horizontal strip 41 (using the word "horizontal" only for convenience of description when the parts are oriented as illustrated in FIG. 3, since obviously the switch assembly may be mounted in any desired position of orientation). This first strip 41 is held by rivets 43 which pass through the insulating plate 31, and the rear ends of one or both of the rivets 43 are connected to an electric circuit wire which goes out through the hole 13 in the base plate 11. If the right hand end of the strip 41 is depressed (that is, moved rearwardly) it makes electric contact with a metallic stud 45 which extends through the insulating plate 31. If the left end of the strip 41 is depressed rearwardly, it makes contact with another metallic stud 47 which likewise extends through the insulating plate 31. The rear ends of the studs 45 and 47 are connected to separate electric circuit wires or conductors which pass out through the hole 13.

Near the bottom of the insulating plate 31 is a second

3

horizontally extending flexible contact strip 51 similar to the strip 41 and similarly held by rivets 53. When the right hand end of this strip is depressed rearwardly, it makes electric contact with a stud 55, and when the left end is depressed it makes contact with a metallic stud 57, similar to the studs 45 and 47 above mentioned. As with the other studs, electric circuit wires pass rearwardly from these studs, out through the hole 13, and there is also a circuit wire operatively connected to the rivets 53, although this may be the same circuit wire connected to the rivets 43, depending upon the particular circuit arrangement employed.

In addition to the two contact strips 41 and 51, there are two other resilient metallic strips 61 and 63 mounted together at approximately the center of the insulated plate 31, by means of rivets 65, so that these two strips 61 and 63 form a cross. If they are depressed rearwardly, the free arms of the strip 61 will come down on top of but cannot make electric contact with the rivets 43 and 53, because the tops of these rivets are coated with insulating paint or lacquer. However, the free arms of the other strip 63 will make electric contact with and establish a connection between the studs 67 and 69 which are mounted on the insulating plate 31. Suitable circuit wires or conductors lead rearwardly from these studs 67 and 69, out through the hole 13.

Enclosing the switch contact members and forming a front cover for the entire assembly, is a cover member 71, somewhat cup-shaped. It has a front wall 73 and integral side walls 75 which extend rearwardly therefrom, all molded from rigid plastic material which, however, has sufficient resilience so that a very slight inwardly extending rib or flange 77, extending all the way around the inner faces of the side walls 75 at the rear edge thereof, can snap over an external projection 81 extending peripherally around the circumference of the member 25 and seat behind this projection 81, as seen especially in FIG. 4. This holds the cover member 71 in place on the tubular body member 25, preventing removal therefrom unless considerable force is used to pry it off the member 25. The external face of the tubular body member 25 is slightly tapered as seen in FIGS. 3 and 4, so that as the cover member is thrust rearwardly onto the tubular body, the taper will slightly expand the rear end of the cover member 71 until the rib 77 snaps over the shoulder 81.

Although the cover 71 is held against forward movement by engagement of the rib 77 with the shoulder or projection 81, yet it can freely move axially rearwardly in telescopic relation to the body member 25, and the fit is sufficiently loose so it can also tilt with respect to the body member. It is normally held in its forward position (determined by engagement of the parts 77 and 81 with each other) by the springy contact strips 61 and 63, the free ends of which engage the inner face of the front wall 73 of the cover member and tend to push it gently forwardly away from the insulating plate 31.

It will be noted especially from FIG. 3 that the free ends of all four of the strips 41, 51, 61, and 63 have enlargements, formed for example by curling or rounding the ends as illustrated. The curled ends of the strips 61 and 63 are of larger diameter than those on the strips 41 and 51. All the curled ends normally engage the flat rear face of the front wall 73 of the cover. When the cover is pressed straight rearwardly, without cocking or tilting, the strip 63 will make contact with and close the circuit between the studs 67 and 69, but the other strips 41 and 51 do not make contact with their respective studs 45, 47, 55, and 57, because the larger size of the curls or enlargements on the ends of the strips 61 and 63 prevents the cover from moving far enough back to close the other contacts. It is only when the cover tilts, and pivots on two adjacent ones of the curls on the strips 61 and 63, that a corner contact can be closed.

Preferably the corners of the cover member 71 carry numbers 1, 2, 3, and 4 designating the individual corners,

4

as shown in FIGS. 1-3, and preferably also the front face of the cover is provided with a small projection at its center, as seen at 89, to simulate the appearance of a doorbell push button and to indicate to a stranger where he should push in order to ring the doorbell. Also any desired decoration, design, or color effect may be embodied in or carried by the cover.

With this construction, it is seen that if one pushes rearwardly on any one corner of the cover 71, the cover will move the enlargements on the adjacent ends of the strips 61 and 63 rearwardly as far as they can go, then when they can go no further they will act as fulcrums on which the cover will tilt so that it will close the contact between one or the other of the horizontal strips 41 and 51, and the particular stud which is located at that corner which was pressed rearwardly, thus activating one of the electric circuits. For example, if the code for opening a particular door is 2-3-4-1, a person knowing the code presses rearwardly first at the corner 2, as indicated in FIG. 2 of the drawings. This closes the circuit between the contact strip 41 and the stud 45, without closing any of the other circuits. Then the person operating the switch releases the rearward pressure, and presses next on corner 3, which closes the circuit between the strip 51 and the stud 57. Then the pressure is released again, and the other corners 4 and 1 are pressed in succession, thus completing the closing of the circuits in proper sequence to operate the coded electric mechanism which, as above stated, is well known in the art and is not part of the present invention. This operates the door lock or whatever else it is that is controlled by the particular coded circuit.

A stranger, not knowing the code, would look for a doorbell to press, and would see the projection 89 at the center of the front face of the cover member 71, which has somewhat the general appearance of a doorbell button or plunger. Therefore, he would press rearwardly on the central portion 89 of the cover. This rearward pressure at the center would carry the entire cover rearwardly without tilting or cocking it, thus closing the circuit between the strip 63 and the studs 67 and 69, which are in the doorbell circuit, ringing the doorbell or other appropriate signal in the house. Of course this circuit between the studs 67 and 69 is available as a fifth circuit for a five-digit code, if it is preferred to utilize it in this way, rather than as a doorbell circuit.

The snug fit of the cover 71 around the edges of the tubular body member 25, and the engagement of the internal rib 77 on the cover member behind the external rib or shoulder 81 on the body member 25, makes the construction substantially weatherproof and waterproof so far as ordinary rain and snow conditions are concerned.

The fact that the cover member is approximately 2 inches square, larger than an ordinary push button switch, makes it easy for the householder to operate it even when there are gloves on his hands or packages in his arms. With the back of his knuckles or even with his elbow, he can press the switch cover at the desired corners in proper sequence, to operate the coded mechanism and thereby let himself into his house, without removing the packages from his arms or having to take off his gloves to reach for or manipulate a key.

Another advantage of this construction, in which the decoder switch is operated entirely through the cover member thereof, is that it does not have an appearance likely to give rise to tampering by children of the neighborhood. Coded circuits have sometimes been operated by a series of separate push button switches mounted adjacent each other. A series of push buttons constitute an invitation to youngsters in the neighborhood to try them out and see what happens. But the present switch, with all parts neatly enclosed within a single cover, does not have the fascinating appearance of a series of separate switches and does not attract the particular attention or curiosity of children. Thus the householder is spared a considerable amount of the grief which often

5

arises from having conventional decoder switches of some of the kinds heretofore used.

It is seen from the foregoing disclosure that the objects and purposes of the invention are well fulfilled. It is to be understood that the foregoing disclosure is given by way of illustrative example only, rather than by way of limitation, and that without departing from the invention, the details may be varied within the scope of the appended claims.

What is claimed is:

1. A multiple electric switch assembly comprising a stationary tubular housing member of generally square outline, a cover member also of generally square outline having a tubular flange extending rearwardly in telescopic relation to said housing member, the fit between said housing member and said flange on said cover member being sufficiently loose so that said cover member may tilt with respect to said housing member as well as move in a straight axial direction relative thereto without tilting, an insulating plate mounted in stationary position on said tubular housing member, a plurality of strips of resilient metal mounted on said insulating plate and extending obliquely forwardly therefrom and engaging said cover to urge said cover resiliently forwardly, two of said strips being parallel to each other and extending approximately along two opposite edges of said insulating plate and being mounted on said plate approximately at their mid points, two others of said strips crossing each other at right angles and being mounted with their mid points approximately at the center of said plate and with one of the two last mentioned strips extending parallel to the two first mentioned strips, and a plurality of electric

6

contact studs mounted on said insulating plate in positions respectively underlying the ends of the two first mentioned strips and the ends of that one of the last mentioned strips which is parallel to the first mentioned strips, to make contact with the respective ends of the respective strips when the respective strips are deflected rearwardly by rearward movement of said cover member, the ends of the two strips which cross each other being enlarged to act as stops that limit rearward movement of said cover member to the extent that said cover member cannot deflect either of the two first mentioned strips into contact with any of their respective studs unless and until the cover member is rearwardly tilted in the region thereof, while permitting said cover member to deflect said last mentioned strip into contact with the studs corresponding thereto only when said cover member is moved straight axially rearwardly.

2. A construction as defined in claim 1, in which said housing member and said cover member are both made of molded plastic material and in which they have integrally molded cooperating abutment surfaces limiting forward movement of said cover member relative to said housing member under the influence of said resilient metal strips.

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