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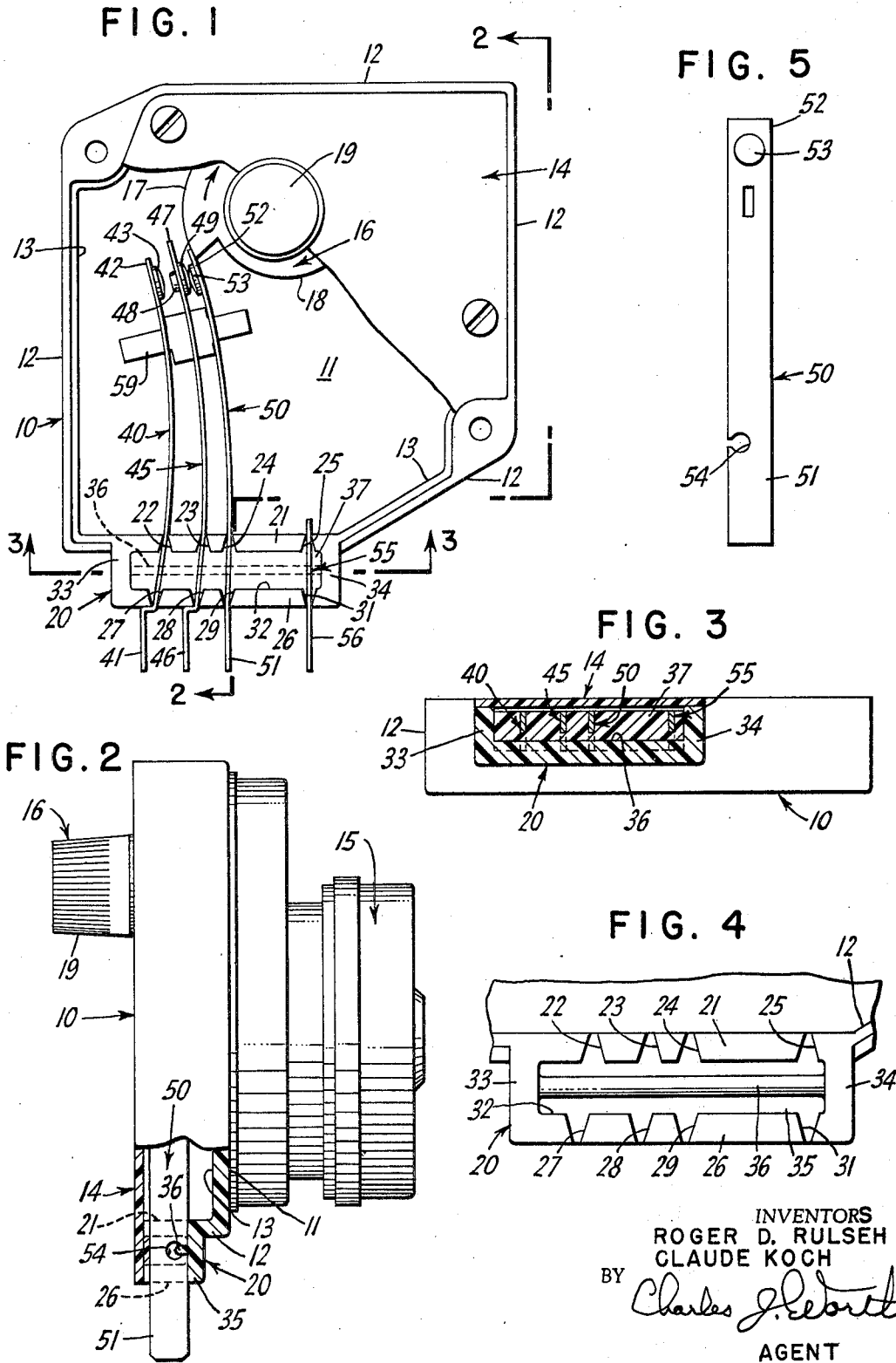
R. D. RULSEH ET AL

3,501,608

SWITCH CONTACT ARM MOUNTING MEANS

Filed June 4, 1968

2 Sheets-Sheet 1



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FIG. 6

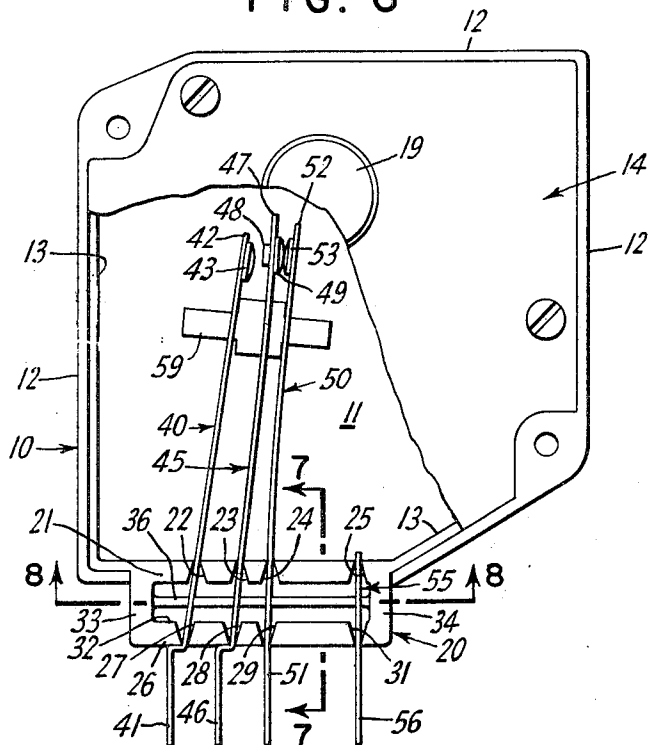


FIG. 7

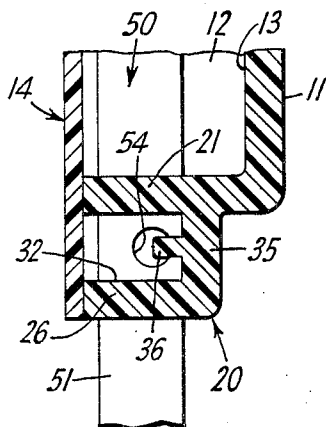
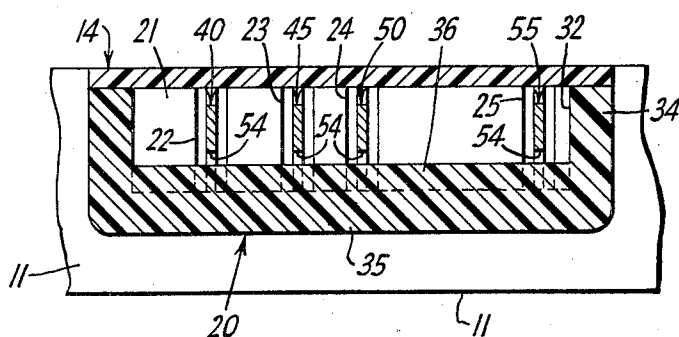


FIG. 8



INVENTORS
ROGER D. RULSEH
CLAUDE KOCH
BY *Charles J. Rebert*
AGENT

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SWITCH CONTACT ARM MOUNTING MEANS
Roger D. Rulseh and Claude V. Koch, Two Rivers, Wis.,
assignors to American Machine & Foundry Company,
a corporation of New Jersey

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10 Claims

ABSTRACT OF THE DISCLOSURE

A through wall construction for an electrical device comprising a dielectric support means and one or more conductive elements extending through said means each being positioned, supported and retained thereby.

This invention relates generally to the construction of electrical devices and more particularly to terminal connectors and supports of dielectric material therefor.

The present invention finds utility in a wide range of electrical devices which have means of dielectric material for supporting one or more sheet metal type of conductor connectors which extend therethrough to provide a blade type of connector/terminal. This type of connector/terminal may be a part of a plug-in connection or a terminal to which a conductor is connected by winding, soldering, a threaded fastener therethrough or any other means for electrically connecting a device in a circuit.

This invention, however, is particularly adapted for use in a switch having a plurality of spring contact blades with terminals therefor extending through the switch case, and a rotatably driven cam for positioning the blade contact ends as disclosed in U.S. Patent 2,979,580 which was granted Apr. 11, 1961 to Timm et al., and is assigned to the same assignee as is the present application. As shown in this patent, the switch is provided with three spring contact arms each having a separate terminal member extending through a support wall, and being connected with its terminal member to the wall by a fastener. A separate terminal member also extends through and is similarly connected to the wall. In U.S. Patent 3,281,547 which was granted Oct. 25, 1966 to J. J. Everard and also is assigned to the same assignee as is the present application, a similar switch means is provided with the spring contact blades each being integral with its exposed terminal but is still connected to a wall by a fastener.

The present invention contemplates a support means of a dielectric material having a base wall portion and two pairs of opposed wall portions extending from said base wall portion wherein each of the opposed walls is spaced from the other of each pair thereby defining a cavity with an opening on one side; each wall of one of the pairs having at least one slot therethrough; an elongated electrically conductive element being disposed in the slots and extending through the cavity, and having a recess disposed adjacent the base wall; the base wall having an abutment extending into the cavity between the pair of slotted walls, extending from one to the other of the other pair of walls and engaging the recess in the electrically conductive element, and a non-conductive material disposed in the unoccupied portions of the cavity to fill the cavity and retain the conductive element in position.

The foregoing and other objects and advantages will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawing wherein one embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawing is for

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illustration purposes only and is not to be construed as defining the limits of the invention.

FIGURE 1 is an elevational view of a switch with a portion of the cover removed to more clearly show the present invention,

FIGURE 2 is an end view partly in section taken on line 2—2 of FIGURE 1,

FIGURE 3 is a sectional view through the supporting end of the switch as taken on line 3—3 of FIGURE 1,

FIGURE 4 is a fragmentary elevational view of the case supporting end of the switch of FIGURE 1,

FIGURE 5 is a plan view of one of the spring contact arms of the switch of FIGURE 1,

FIGURE 6 is a view similar to FIGURE 4 with the conductor members inserted into the casing,

FIGURES 7 and 8 are sectional views taken on lines 7—7 and 8—8 respectively, of FIGURE 6.

It should be understood that while the present invention is disclosed in a particular environment, this environment is not to be construed as defining the limits thereof.

Referring now to the drawings, a switch made in accordance with the present invention is provided with a housing or enclosure formed by a hollow case 10 made of a dielectric material and a cover 14 connected thereto by any suitable fastening means well known in the art. The case 10 has a main wall 11, which is spaced from and parallel to the cover 14, with a peripheral flange or wall 12 extending therefrom to ward the cover to define a switch chamber 13 therein.

A motor 15, of the type provided in timers or electric clocks, is mounted on the outside of the wall 11 and has an output shaft (not shown) which extends therethrough to engage and rotatably drive a cam 16 disposed in the chamber 13. The cam 16 has an annular or primary cam face 17, a recessed or secondary cam face 18 and a knob 19 which extends therefrom away from the motor 15 and through the cover 14 for manual positioning.

At one end of the casing 10, the peripheral wall 12 is formed to provide a support means or portion 20. As shown, the support means 20 is formed by an inner wall or wall portion 21 and an outer wall or wall portion 26 which are spaced from each other and connected together by a pair of end walls or wall portions 33 and 34 to define a cavity 32 closed on one side by the cover 14 and on the opposite side by a base wall or base wall portion 35.

The cavity base portion 35 is provided with an enlargement or rib 36 which extends into the cavity 32 and from one to the other of the end wall portions 33 and 34, and is spaced between the inner wall portion 21 and the outer wall portion 26. As shown, the inner wall 21 is provided with four open ended slots 22, 23, 24 and 25 spaced from one another between the end walls 33 and 34, and the outer wall 26 similarly is provided with corresponding open ended slots 27, 28, 29 and 31. The support portion 20 is an integral part of the molded dielectric case 10 in this instance but, in other embodiments, could be provided as an independent supporting member to be used, for example, as the supporting member of the aforementioned Timm et al. Patent 2,979,580. In effect, the walls or wall portions 21, 26, 33, 34 and 35 provide an enlarged hollow dielectric structure 20 which is of a U-shape in cross-section, both longitudinally and laterally, to define an elongated cavity 32 which is open on one side and closed by a cover, in this instance the cover 14.

The series or set of slots 22, 23, 24 and 25 through the inner wall or wall portion 21 and the series or set of corresponding slots 27, 28, 29 and 31 through the outer wall 26 each may be provided as an equally spaced series of slots or may have any other spacing therebetween as will be determined by the requirements of the environ-

ment of the support means 20. Similarly determined, the slots of one of such series or sets may be axially aligned with the corresponding slots of the other series or set, or one or more pairs of corresponding slots may have a predetermined degree of lateral offset.

A plurality of elongated and electrically conductive blade or plate elements 40, 45, 50 and 55 are inserted edgewise into the corresponding pairs of slots 22 and 27, 23 and 28, 24 and 29, and 25 and 31, respectively, each edgewise into the corresponding pairs of slots 22 and 27, and outer walls or wall portions 21 and 26. In this instance, elements 40, 45 and 50 are spring contact blades while the element 55 is a terminal connector.

The middle or common spring contact blade 45 extends outwardly from the support means 20 to provide an exposed terminal end portion 46, and extends inwardly therefrom terminating in a free end portion 47 having a pair of contact faces 48 and 49 on opposite sides of the blade. The spring contact blades 40 and 50, which are disposed on opposite sides of the common blade 45, also extend outwardly from the support means 20 to provide exposed terminal end portions 41 and 51, respectively, and extend inwardly therefrom terminating in respective free end portions 42 and 52 having contact faces 43 and 53, respectively. The contact faces are so aligned to permit face 43 to engage face 48 and, alternately, face 53 to engage face 49. The connector terminal 55 extends outwardly of the supporting means 20 to provide an exposed terminal end portion 56.

As shown in FIGURE 5, the spring contact blade 50 is provided with a recess 54 in one edge thereof which engages the enlarged portion, abutment or rib 36 of the base wall portion 35 to axially position the blade 50 in a desired position when inserted in slots 24 and 29, as shown in FIGURES 2 and 7, and to prevent axial movement thereof. The spring contact blades 40 and 45, and the terminal element 55 also are each provided with a similar recess (not shown) corresponding to recess 54.

Prior to insertion of the cam 16 into the switch chamber 13, as shown in FIGURE 6, the electrically conductive elements 40, 45 and 50 extend inwardly from the supporting means 20 along converging planes as determined by the lateral offset between the slots 22, 23 and 24 and the corresponding slots 27, 28 and 29, respectively. Thus, the lateral offset between the slots of any cooperating pair will determine the angular position of the conductive element received thereby. The slots 27, 28 and 29 are not equally spaced. To provide equally or adequately spaced exposed terminals 41, 46 and 51 which are disposed normal to the outer wall 26, blade 50 is provided with a slight bend for alignment, and offset bends or jogs are formed in the blades 40 and 45 as they emerge from the slots 27 and 28, respectively. The slots 25 and 31 are axially aligned so that the exposed terminal portion 56 is normal to the wall 26 and the terminal member 55 requires no forming for alignment.

With the conductive elements 40, 45, 50 and 55 set in place in the support means 20, the cavity is filled with an electrically non-conductive plugging or filler material 37. The filler material 37 may be one or more plugs of a relatively hard material such as a formed plastic, or may be a fluid or semi-fluid hardenable material which sets in situ such as an epoxy resin. The material 37 which fills the cavity 32 makes the supporting means 20 substantially solid and locks or retains the conductive elements 40, 45, 50 and 55 in position.

The spring contact arms 40, 45 and 50 are suitably slotted and a spacer 59 is provided as taught in the aforementioned Timm et al. Patent 2,979,580, and with the cam 16 in place in the switch chamber 13 the spring contact arms 40, 45 and 50 are deflected as shown in FIGURE 1.

As the motor 15 drives the cam member 16, the free end 52 of the blade 50 will engage the primary cam sur-

face 17. The deflection of the blades 45 and 50 retain the contact faces 49 and 53 in engagement with one another while the spacer member 59 holds the blade 40 to space the face 43 from the face 48. Accordingly, the exposed terminal 51 is electrically connected to the exposed terminal 46 while the exposed terminal 41 is electrically isolated.

As the secondary cam surface 18 moves into alignment, the forces of deflection will cause the blades 40, 45 and 50 to tend to assume undeflected positions. This results in the free end 52 moving into engagement with the secondary cam surface 18 opening the contact faces 49 and 53, the free end 47 moving into engagement with the primary cam surface 17, and the free end 42 moving the contact face 43 into engagement with the contact face 48. The exposed terminal 41 now is electrically to the exposed terminal 46 while the exposed terminal 51 is electrically isolated. The electrical connection of the exposed terminals will not reverse until the cam 16 has rotated sufficiently for the cam surface 18 to move the free end 52 of the blade 50 into substantially the same plane as the primary cam surface 17.

Although but a single embodiment of the invention has been illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. Various changes may also be made in the design and arrangement of the parts without departing from the spirit and scope of the invention as the same will now be understood by those skilled in the art.

We claim:

1. A through wall construction for an electrical device, comprising:

a support means of dielectric material defining a cavity therein which is open on one side thereof and has a pair of wall portions spaced from and substantially parallel to one another,

each of said wall portions having a slot therein corresponding to a slot in the other of said wall portions for each conductive element to be supported, said slots each being open at one end at the open side of said cavity,

at least one conductive element extending through said cavity and a pair of corresponding slots in said wall portions,

said support means within said cavity and each conductive element supported thereby having interengaging means axially positioning each conductive element relative to said support means and preventing axial movement therebetween after said conductive element is positioned thereby, and

a dielectric material substantially filling said cavity and acting to prevent separation of said support means and each conductive element supported thereby.

2. The through wall construction in accordance with claim 1 further comprising:

a cover releasably retained on said support means closing the open side of said cavity and the open ends of said slots.

3. The through wall construction in accordance with claim 1, and

each pair of corresponding slots being aligned with one another along an axis normal to said wall portions.

4. The through wall construction in accordance with claim 1, and

one slot of a pair of corresponding slots being offset from an axis normal to said wall portions and extending through the other slot of said pair.

5. The through wall construction in accordance with claim 4, and

said conductive element extending through said offset slots having a bend so that one end thereof extends from said support means normal to said wall portions.

6. The through wall construction in accordance with claim 1 wherein said support means and each of said con-

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ductive elements provide a pair of adjacent face surfaces, and said interengaging means comprising:

- a recess formed in one of said adjacent face surfaces, and
- a protuberance extending from the other of said adjacent face surfaces and into said recess.

7. The through wall construction in accordance with claim 1, wherein:

said support means has a plurality of pairs of corresponding slots with at least one of such pairs of slots being unequally spaced between the two pairs of slots adjacent thereto,

a plurality of conductive elements extending through said cavity and each through a different one of said pairs of slots,

one end of each of said elements all on the same side of said support means forming a terminal portion, and one of said terminal portions being deformed to provide a jog therein adjacent the wall portion on the same side of said support means as said terminal portions thereby providing an equally spaced series of terminal portions.

8. A through wall construction in accordance with claim 7, wherein:

the ends of the conductive elements opposite from said terminal portions are elongated and extend from said support portion providing spring contact arms for a switch means.

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9. A through wall construction in accordance with claim 8, wherein:

one slot of at least one of said pairs is offset from the other and positions at least two of said conductive elements relative to one another so the spring contact arms provided thereby converge toward the free ends thereof.

10. The through wall construction in accordance with claim 8, and further comprising:

- a switch casing open at one side and providing said support means at one end thereof, and
- a cover releasably connected to close said casing and overlying said support means thereby closing the open side of said cavity and the open ends of said slots.

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HERMAN O. JONES, Primary Examiner

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