Aug. 25, 1964 L. E. COOPER 3,146,329

SNAP-ACTING ELECTRICAL SWITCH

Filed July 5, 1960 4 Sheets-Sheet 1

Fig. 1.

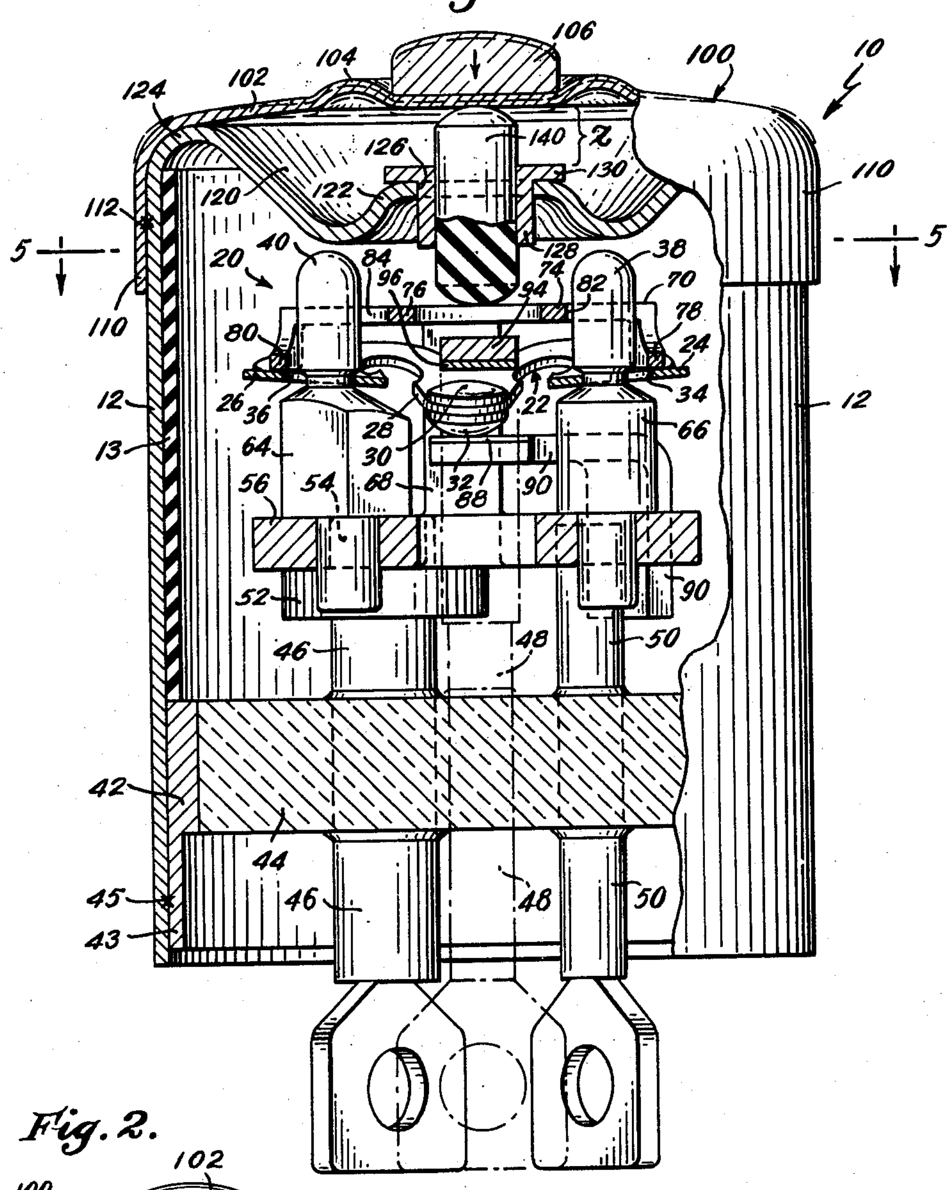

Fig. 2.

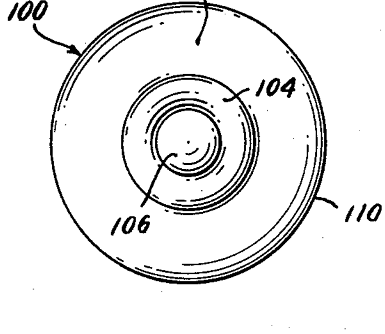

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Fig. 3.

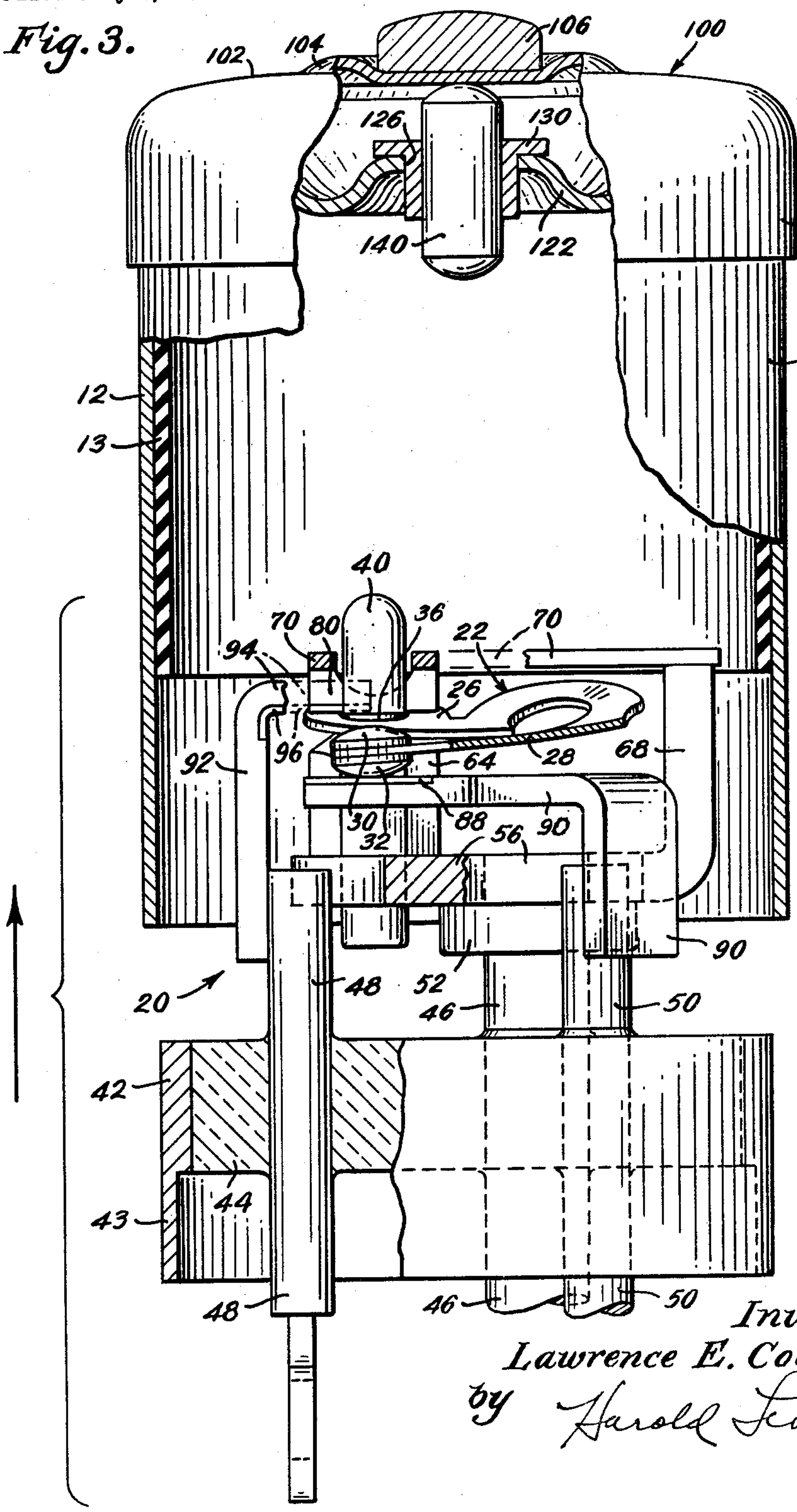

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Fig. 5.

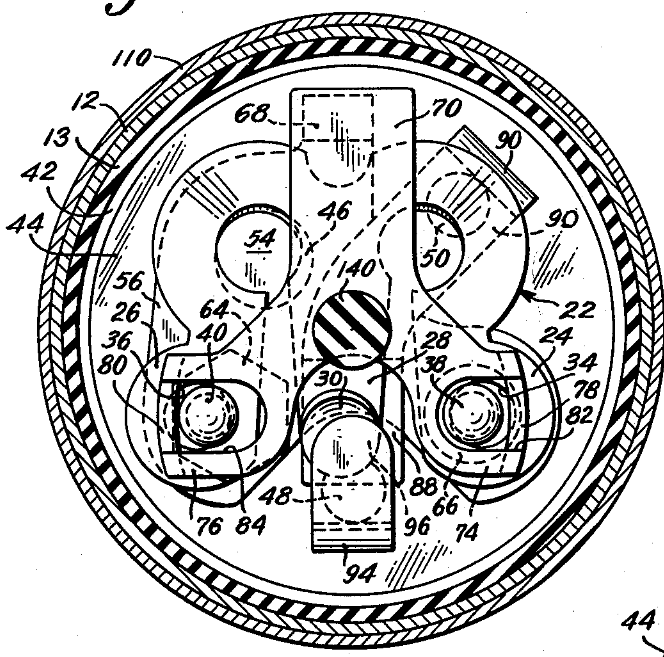


Fig. 4.

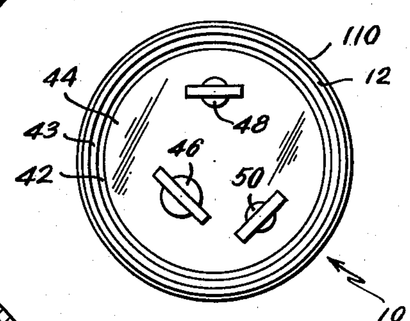
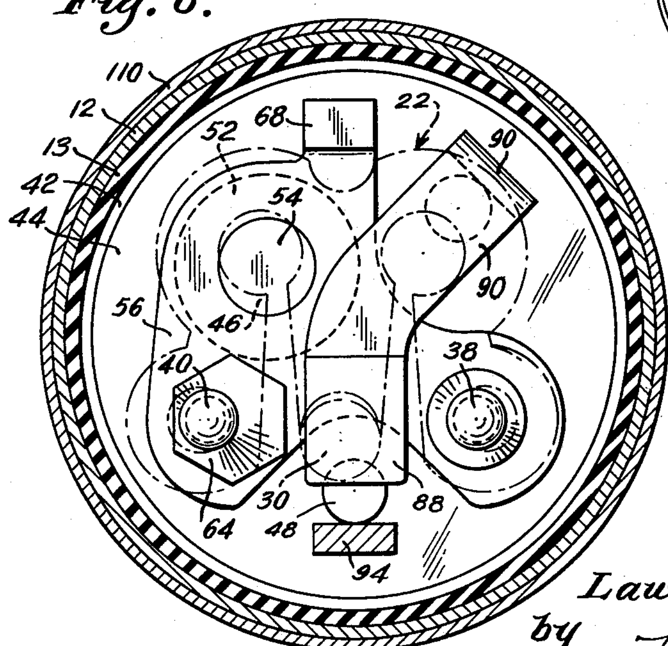


Fig. 6.



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SNAP-ACTING ELECTRICAL SWITCH

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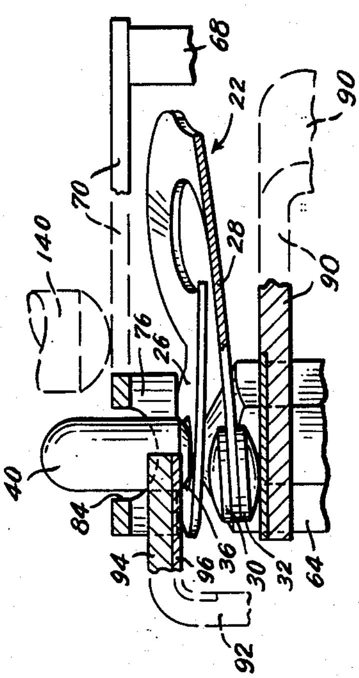

Fig. 8.

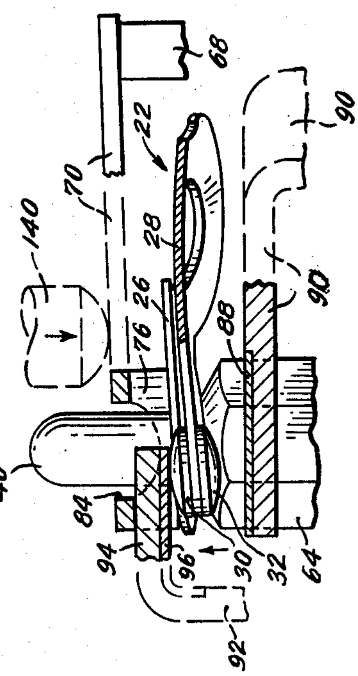

Fig. 10.

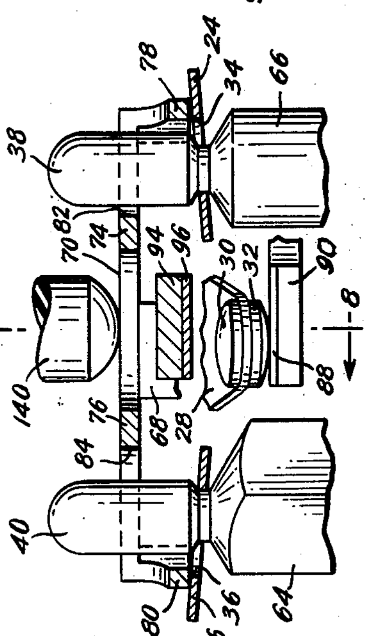

Fig. 7.

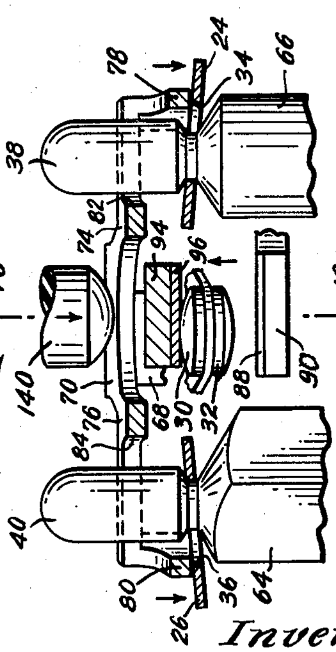

Fig. 9.

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United States Patent Office

3,146,329
Patented Aug. 25, 1964

3,146,329

SNAP-ACTING ELECTRICAL SWITCH

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Filed July 5, 1960, Ser. No. 40,933
13 Claims. (Cl. 200—168)

The instant invention relates to electrical switching devices, and in particular, to hermetically sealed, miniaturized switching devices.

It is one object of the instant invention to provide a new and improved miniaturized electrical switch.

It is another object of the instant invention to provide such a switch which is hermetically sealed.

It is another object of the instant invention to provide a new and improved diaphragm member which is particularly advantageous for use with a hermetically sealed miniaturized electrical switch of the class described.

Among the further objects of the instant invention are included the provision of a miniaturized, hermetically sealed electrical switch which is precise, relatively simple in construction and economical to manufacture, simple to calibrate, and parts of which can be mass produced and quickly and easily assembled into operative, fixed, calibrated relation.

Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which one of the various possible embodiments of the invention is illustrated:

FIG. 1 is a front elevational view, with parts broken away, of a switch according to the instant invention;

FIG. 2 is a top plan view of the switch shown in FIG. 1;

FIG. 3 is a view similar to FIG. 1, showing certain parts in exploded relation;

FIG. 4 is a bottom view of the switch shown in FIG. 1;

FIG. 5 is a sectional view taken on line 5—5 of FIG. 1;

FIG. 6 is a view similar to FIG. 5, with parts omitted for purposes of clarification;

FIG. 7 is an enlarged view of a portion of the switch (the switch shown in FIG. 1, with certain parts omitted for clarity) to illustrate the parts in one operative position;

FIG. 8 is a cross sectional view taken on line 8—8 of FIG. 7;

FIG. 9 is a view similar to FIG. 7, showing the parts in a second operative position; and

FIG. 10 is a sectional view taken on line 10—10 of FIG. 9.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Dimensions of certain of the parts as shown in the drawings have been modified for the purposes of clarity of illustration.

In the provision of miniaturized, electrical switches, and particularly snap-acting miniaturized switches, considerable difficulty in fabrication and calibration has been encountered because of inherent dimensional tolerances. These problems are particularly accentuated with hermetically sealed, miniaturized switches. Such switches, particularly snap-acting switches, generally permit very small actuating movement or movement differential, making calibration and manufacture exceeding difficult

and expensive. By movement differential is meant the distance traveled by an actuating member between the point of actuation and deactuation of the switch. It is thus difficult to provide a switch which will operate dependably and yet be miniaturized and also hermetically sealed.

The instant invention successfully solves these problems and provides a switch which can be easily fabricated, assembled into final operative position, and calibrated in spite of its miniaturized size and close dimensional tolerances.

Referring now to FIG. 1, there is shown a hermetically sealed, electrical switch embodiment of the instant invention which is generally referred to by numeral **10**. Switch includes a cylindrical shaped, open-ended housing or can **12**, which may be formed, for example, of stainless steel. Disposed within can **12** is an electrical switching subassembly generally designated by numeral **20**. Electrical switching subassembly **20** is of the type which is adapted to be actuated upon the application of a force thereto. Illustrated in the drawings is an exemplary snap-acting switching mechanism of the type which is disclosed and claimed in a copending application, U.S. Serial No. 40,845 of Hadley K. Burch and Malcolm K. Parkhurst, filed on July 5, 1960, and entitled "Snap-Acting Mechanisms" now Patent No. 3,105,886. Reference may be had to this copending application for details of construction of this exemplary electrical switching mechanism.

Switching mechanism **20** includes a snap-acting element in the form of a W-blade **22** of the type shown and described in U.S. Patent No. 2,777,032, issued on January 8, 1957, and also described in the above-mentioned copending application. W-blade or element **22** includes a pair of outer legs **24** and **26** and a central leg **28**. Central leg **28** carries, on its free end, a pair of contacts **30** and **32**. Legs **24** and **26** are provided respectively with apertures **34** and **36** for mounting said legs respectively on a pair of supporting pins **38** and **40**. As more fully described in the above-referenced copending application, mounting pins **38** and **40** are so spaced as to force legs **24** and **26** toward each other and to stress the element **22** into a dished configuration whereby central leg **28** is urged out of the plane formed by legs **24** and **26**. Central leg **28** thus can assume either of two positions on opposite sides of the plane formed by legs **24** and **26**. It is to be understood that either one or both of these positions of opposite configuration may be relatively stable, depending on restraints to movement of leg **28** which are provided.

It should be understood that casing **12**, although shown in cylindrical form, is tubular and may also have a rectangular or polygonal shaped cross section if desired. The word "tubular" describing the casing **12** as employed variously throughout the specification and claims, is intended to include cylindrical, as well as rectangular and other polygonal, cross sectional shapes.

Switch subassembly **20** includes a base comprising a flanged metallic ring **42** in which is infused a glass filler or header **44** with electrically conductive terminals **46**, **48** and **50** embedded in and fused to the glass and projecting therebeyond in mutually insulated relationship. As clearly shown in the drawings, electrically conductive terminal **46** extends through the header **44** and on its inner end is provided with an enlarged shoulder or flange **52** and a neck **54**. Switch **20** includes an electrically conducting switch support plate **56** fixedly secured to electrically conducting terminal **46** at collar **52**. Support plate **56** is mounted on neck **54** and secured to terminal **46** and flange **52** in electrically conducting relation therewith. Supporting pin **40** is eccentrically mounted on a supporting post 64 which in turn is mounted on support plate 56 for relative rotatable adjustment. Mounting pin 38 is mounted on and carried by a post 66 which in turn is mounted on and supported by switch plate 56, as clearly shown and more fully described in the above-referenced copending application. Posts 64 and 66 have chamfered surfaces adjacent mounting pins 38 and 40 to permit legs 24 and 26 of W blade element 22 to flex thereabout and snap center leg 28 to actuate contacts 30 and 32, upon the application of a force to the outer portions of legs 24 and 26, adjacent their respective apertures.

Switch support plate 56 is provided with an upturned tab 68 which serves to support one end of a T-shaped actuating arm 70. T-bar or actuating arm 70 includes two leg portions 74 and 76, each of which respectively includes a downturned tab 78 and 80. Each of arms 74 and 76 and portions of their respective tabs are provided with slots 82 and 84 for freely mounting actuator bar 70 respectively about mounting pins 38 and 40 in a position for tabs 78 and 80 to respectively engage the outward portions of legs 24 and 26 for actuation of the W blade element 22, as described in greater detail in the aforementioned copending application.

Switch 20 further includes a stationary contact 88 carried by one leg of an L-shaped contact arm 90 which is secured and in electrically conductive relation to terminal 50 (see FIG. 3) as by welding. Stationary electrical contact 88 is engageable with electrical contact 32. It is to be understood that legs 24 and 26 are in electrically conductive relation with mounting pins 38 and 40, the latter of which are connected in electrically conductive relation with switch plate 56. Switch 20 also includes a second L-shaped contact arm 92 which is electrically connected to electrical terminal 48, as by welding or brazing. L-shaped contact arm 92 provides a bent-over portion 94 which includes a contact portion 96 which is adapted to mate with electrical contact 30 carried by leg 28 of W blade 22.

Referring now to FIGS. 7–10, upon the transmission of a force to actuating T-bar 70, the latter will depress tabs 78 and 80, which in turn exert a twisting motion or turning moment against the marginal edges of legs 24 and 26. The turning moment imparted to the ends of legs 24 and 26 will cause center arm 28 to snap upwardly from the contacts 32, 88 closed position, as shown in FIG. 7, to a position in which these contacts are open and contacts 30 and 96 are closed, as shown in FIG. 9. Release or sufficient abatement of the downwardly extending force transmitted to T-bar 70 will permit the center leg 28 to snap back from the FIG. 9 position to the FIG. 7 position. It is to be understood that center leg 28, when in the FIG. 7 position, is in a position of relative stability. However, due to the spacing of portion 94 (see FIG. 9) of L-shaped member 92, the FIG. 9 contacts 30, 96 closed position of leg 28 is not one of relative stability, and upon removal of the force applied to the T-bar actuator, leg 28 will snap back to the contacts 32, 88 closed position shown in FIG. 7.

Switch 10 includes a diaphragm member generally referred to by numeral 100, as best seen in FIGS. 1 and 2. Diaphragm member 100 includes a first or main body portion 102 which is adapted to deflect under an applied force. Main body portion 102 is substantially circular in shape, as best seen in FIG. 2, and preferably includes at least one convoluted portion 104. Convolution 104, in addition to advantageously increasing the deflection of the diaphragm under an applied force, serves additional functions to locate an actuating button 106 and to stiffen the area of the diaphragm encompassed by the annularly extending convolution to facilitate welding of button or abutment 106 thereto. By stiffening this weld area, welding of the button 106 to the diaphragm can take place without incurring substantial deformation of the diaphragm at this area. Further, this stiffening advantageously obviates the necessity of a backing member for welding in spite of the fact that the diaphragm is ordinarily formed of very thin gauge material. In practice, main body portion 102 of the diaphragm member 100 is preferably dished upwardly, as shown, to increase the amount of its useful deflection. It is to be understood that such dishing is only preferable and that the diaphragm could also be flat.

Diaphragm member 100 further includes a circumferentially, peripherally and transversely extending flange 110. Flange 110 is formed integrally with main body portion 102 of diaphragm 100 to form a cup-shaped member which is adapted to be slidably inserted about the closed end 120 of can 12, as shown in FIGS. 1 and 3. Flange 110 advantageously permits securement of diaphragm member 100 to casing 12 by means of welding as at 112 (see FIG. 1). The welding at 112 may, for example, conveniently be a seam weld. It is preferred that the welding of flange 110 to can 12 takes place adjacent the free end of the flange, remote from the main diaphragm portion 102, to advantageously permit maximum utilization of the entire diaphragm area of portion 102 for maximum deflective movement under a given applied force. The unique construction and arrangement of flange 110, when secured to can 12, permit the peripheral edges of the diaphragm to deflect radially outwardly and to flex about its weld point or weld line to can 12 to permit even greater deflection or center travel of the diaphragm under a given force.

The unique miniaturized switches according to the instant invention can be produced in extremely small sizes. For example, switches according to the instant invention have been made as small as 0.320" in diameter and 0.440" in length, with a total weight of approximately $\frac{1}{28}$ of an ounce or one gram. In view of the relative dimensions of the can and diaphragm, the cup-shaped diaphragm advantageously facilitates welding thereof to the can and advantageously permits locating the weld in an isolated, non-critical area, where weld and heat stresses do not present any adverse effects to calibration and performance of the diaphragm and switching mechanism. Further, flange 110, although it advantageously permits welding at a convenient location and permits maximum utilization of the diaphragm main body 102, uniquely does not necessitate any substantial increase in diameter of the diaphragm or in overall size of the switch 10.

It is to be understood that although only one convolution has been illustrated, diaphragm 100 may include two or more convolutions, if desired. Diaphragm 100, as thus far described, is adapted to be deflected under an applied force. Such an applied force may, for example, be a mechanical force or be due to pressure exerted by gases, etc. It is to be understood that diaphragm 100 may also exert a downward deflection in response to thermal changes. For example, diaphragm member 100 could be formed of a thermally responsive bimetal or trimetal, and may also be deformed or dished to provide a thermally responsive, snap-acting element. The operation of such a thermally responsive, snap-acting element is similar to that described in the U.S. Patent 1,448,240 to J. A. Spencer, issued March 13, 1923.

It is to be understood that it is within the purview of the invention to provide a dished diaphragm which is not of the thermally responsive type, and which may be of either the creep-acting or snap-acting type, depending on such variables as the shape and amount of dishing, type and thickness of material employed, etc. Where a mechanically snap-acting diaphragm is employed as a pressure sensitive member, the button 106 and convolution 104 may be omitted, if desired.

Referring now to FIG. 1, the upper closed end portion 120 of can 12 is deformed and includes a raised central portion 122. Depressed or deformed closed end portion 120 extends radially inwardly adjacent the peripheral cylindrical outer surface of can 12, and provides an annularly extending portion 124 upon which diaphragm 100 rests, as best seen in FIG. 1. Raised portion **122** of depressed portion **120** provides an aperture **126** in which is disposed a cylindrical sleeve **128**. Cylindrical sleeve **128** includes an annularly extending flange **130** adjacent the upper surface thereof, as shown in FIG. 1. Flange **130** rests on the upper surface of raised portion **122** and serves as a stop to limit downward deflective movement of diaphragm **100**. Sleeve **128** serves the dual function of (1) a stop member through flange **130**, as described above, and (2) that of mounting and guiding a motion-transfer pin **140** for reciprocal sliding movement therein, as best seen in FIGS. 1 and 3.

Motion-transfer pin **140** is engageable with the underside of the central portion of diaphragm **100** opposite button **106** and also engages the upper surface of actuator bar **70**, as best seen in FIGS. 1 and 3. Motion-transfer pin **140** is adapted to move downwardly upon deflection of diaphragm **100** to move actuator bar **70** to act on W blade **22** to actuate the contacts carried by leg **28** in the manner described above.

The spacing between the upper surface of stop or flange **130** and the lower surface of the center portion of the diaphragm, which distance is designated by the letter Z (see FIG. 1), is important in assuring proper operation of the switching mechanism and the diaphragm member **100**. Deformed sections **120** and **122** of can **12** are so shaped that the distance Z will be great enough to provide adequate center travel of the diaphragm under an applied force for actuation purposes, and yet be small enough to insure desired repeatability of the diaphragm and avoid substantial permanent deformation of the diaphragm under large applied forces. It is to be understood that, if desired, flange **130** and sleeve **128** could be formed integrally with deformed portion **122** of can **12**. The distance between the under surface of diaphragm **100** in the unstressed condition, and the top surface of actuator bar **70**, is also carefully selected so as to insure proper actuation of the switch. As will be described in greater detail below, although proper selection of the distance between the under surface of the diaphragm **100** and the top surface of actuator bar **70** is important, the tolerance dimensions of pin **140** are not critical because of a unique and advantageous method of calibration afforded by the construction of the instant invention.

Ring **42** of the base is provided with an annular and longitudinally extending flange **43**, which is conveniently of a relatively thin gauge. Annularly extending flange **43** is welded to the can **12**, as by seam welding, as at **45**, to hermetically seal the switching subassembly **20** within the can **12** and to fix the switch in final assembled relation within the can **12**.

Referring now to FIG. 3, subassembly **20** is slidably inserted into can **12**, in the direction of the arrow shown in FIG. 3. Assembly of switch **10** is easily accomplished in the following manner:

(1) Insert sleeve **128** into aperture **126** in can **12**;

(2) Slidably mount diaphragm **100** about can **12** and weld diaphragm **100** thereto, in the manner described above;

(3) Insert pin **140** into sleeve **128**;

(4) Insert a sleeve **13** formed of an electrically insulating material into can **12**, as shown; and

(5) Slidably insert switching subassembly **20** into the can **12** in the direction of the arrow shown in FIG. 3.

It is to be noted that during assembly, switching subassembly **20**, can **12** and parts associated therewith, would be oriented in a transverse direction rather than vertically, as shown in FIG. 3.

Calibration of switching mechanism **20** is accomplished by the amount of insertion of switching subassembly **20** into the can until actuator bar **70**, motion transfer pin **140** and diaphragm **100** are in a predetermined desired calibrated relation. Thereafter, relatively thin flange **43** is welded to can **12** as at **45**, to both hermetically seal the electrical switching mechanism **20** within can **12**, and to fix the switching mechanism relative to said can in final, calibrated, operative position. The thin wall flange **43** is relatively thin and flexible, and advantageously serves to localize heat and welding stresses to preclude them from deleteriously affecting the frangible glass header **44**. Further, the unique arrangement of flange **43** permits locating the switching subassembly **20** within can **12** in final adjusted position with the T-bar **70** engaging transfer pin **140**, the latter of which is also in engagement with the lower surface of diaphragm **100**. It is to be understood that the required applied force on the diaphragm and the travel distance necessary for actuation and de-actuation of the electrical switch, can be varied or calibrated by the amount and extent of insertion of switching mechanism **20** into the can **12**, and by the force applied against the pin and consequently against the diaphragm by the switching assembly upon insertion thereof into the can and sealing thereof, as by welding, to the can **12**. Thus, flange **43**, after being welded to can **12** as at **45**, permanently maintains switching assembly **20** within can **12** in final, fixed, assembled, calibrated relation, and also in a hermetically sealed condition. Further, relatively thin flange **43** advantageously provides a convenient area for welding the switching assembly to the can. This is extremely advantageous in view of the relatively small or miniaturized size of the entire switching assembly, and the extremely limited cross sectional area or mass which is available for welding. Further, the unique arrangement of flange **43** permits the convenient welding mentioned above without increasing the mass or overall size of the switch **10**. It should be understood that flange **43** can be secured to can **12** not only by welding, but by brazing, soldering or other convenient means, which will provide a hermetic seal and will maintain the switching assembly **20** in fixed, final adjusted or calibrated relation within the can **12**.

Flange **43** further advantageously provides a convenient means for securement of the entire switch **10** within other enclosures which may be necessary for particular applications. For example, the miniaturized switch **10** can be conveniently inserted into a screw threaded housing and switch **10** can be welded thereto as at flange **43** without upsetting the calibration of the switch or deleteriously affecting the frangible glass seal.

In view of the above, it can be seen that the instant invention provides a miniaturized, hermetically sealed switch which can be easily and quickly produced at low cost. The instant invention provides a hermetically sealed, miniaturized switch which is precise, can be easily, quickly and uniquely calibrated and easily and quickly assembled. Further, the switch of the instant invention includes a diaphragm which affords maximum utilization of the diaphragm area which is permitted by the unique and advantageous mounting thereof on the can **10**.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense, and it is also intended that the appended claims shall cover all such equivalent variations as come within the true spirit and scope of the invention.

It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology and employed herein is for the purpose of description and not of limitation.

I claim:

1. An encapsulation for an electrical switching mech-

anism mounted on a base comprising in combination a tubular housing having a closed end and an open end, means associated with said closed end of said housing for actuating said switching mechanism upon movement thereof in response to a predetermined force, said switching mechanism and base being telescopically inserted into said tubular housing and initially abutting said means, said switching mechanism being inserted within said housing to a predetermined extent different from said initial abutting relation with said means whereby said switching mechanism is positioned in said housing in predetermined calibrated relation to said means; and said base being secured to said tubular housing to thereby fixedly mount said switching mechanism in final calibrated position within said housing.

2. The electrical switch as set forth in claim 1 and wherein said base includes a relatively thin peripherally extending flange portion and said relatively thin base flange portion being secured to said housing as by welding or the like.

3. The electrical switch as set forth in claim 1 and wherein said switch is hermetically sealed.

4. The electrical switch as set forth in claim 1 and wherein said switching mechanism comprises a pair of electrical contacts; and snap-acting means supporting one of said contacts for movement into and out of engagement with the other of said contacts.

5. An encapsulation for an electrical switching mechanism mounted on a base and adapted for miniaturization comprising in combination a tubular metallic housing having a closed end and an open end; said switching mechanism and base being slidably inserted into said tubular housing and secured thereto; means comprising a motion-transfer device associated with said closed end of said housing and engageable with said switching mechanism; said motion transfer device comprising a motion-transfer pin; said closed end of said housing including a guideway mounting said pin for reciprocal movement toward and away from said switching mechanism; a diaphragm member secured to said housing adjacent the closed end thereof and engageable with said motion-transfer device to actuate said switching mechanism upon movement thereof in response to a predetermined force; said housing being substantially of cylindrical configuration; said diaphragm member comprising a diaphragm section of substantially circular configuration, at least a portion of said section including a transversely extending flange portion formed integrally therewith adjacent the periphery thereof; said section including at least one convolution of circular configuration substantially concentric with the circular configuration of said section; said section having a dished configuration; and said flange portion being telescopically disposed about said housing and secured to said housing as by welding or the like.

6. The electrical switch as set forth in claim 5 and wherein said diaphragm member includes an abutment member secured to said diaphragm section and located within the area defined by said one convolution.

7. An encapsulation for an electrical switching mechanism mounted on a base and adapted for miniaturization comprising in combination a tubular metallic housing having a closed end and an open end; said switching mechanism and base being slidably inserted into said tubular housing and secured thereto; means comprising a motion-transfer device associated with said closed end of said housing and engageable with said switching mechanism; said motion-transfer device comprising a motion-transfer pin; said closed end of said housing including a guideway mounting said pin for reciprocal movement toward and away from said switching mechanism; a diaphragm member secured to said housing adjacent the closed end thereof and engageable with said motion-transfer device to actuate said switching mechanism upon movement thereof in response to a predetermined force; said diaphragm member comprising a diaphragm section of substantially circular configuration; said section including a peripherally, circumferentially and transversely extending flange formed integrally therewith; said section including at least one convolution of circular configuration substantially concentric with the circular configuration of said section; said housing being substantially of cylindrical configuration; and said flange portion being telescopically disposed about said housing and secured to said housing as by welding or the like.

8. An encapsulation for an electrical switching mechanism mounted on a base and adapted for miniaturization comprising in combination a tubular metallic housing having a closed end and an open end; said switching mechanism and base being slidably and telescopically inserted into said tubular housing and secured thereto; means comprising a motion-transfer device associated with said closed end of said housing and engageable with said switching mechanism; said motion-transfer device comprising a motion-transfer pin; said closed end of said housing including a guideway mounting said pin for reciprocal movement toward and away from said switching mechanism; a metallic diaphragm member secured to said housing adjacent the closed end thereof and engageable with said motion-transfer device to actuate said switching mechanism upon movement thereof in response to a predetermined force; said diaphragm member comprising a diaphragm section; a flange portion extending from said section at an angle thereto; said flange portion being telescopically disposed about said housing and secured to said housing externally thereof as by welding or the like; said closed end portion of said housing being spaced from an interior surface of said diaphragm section by a predetermined amount; and said closed end portion of said housing including stop means engageable with said diaphragm section to limit movement thereof in a direction toward said switching mechanism.

9. An encapsulation for an electrical switching mechanism mounted on a base and adapted for miniaturization comprising in combination a tubular metallic housing having a closed end and an open end; said switching mechanism and base being slidably and telescopically inserted into said tubular housing and secured thereto; means comprising a motion-transfer device associated with said closed end of said housing and engageable with said switching mechanism; said motion-transfer device comprising a motion-transfer pin; said closed end of said housing including a guideway mounting said pin for reciprocal movement toward and away from said switching mechanism; a metallic diaphragm member secured to said housing adjacent the closed end thereof and engageable with said motion-transfer device to actuate said switching mechanism upon movement thereof in response to a predetermined force; said diaphragm member comprising a diaphragm section; a flange portion extending from said section at an angle thereto; said flange portion being telescopically disposed about said housing and secured to said housing externally thereof as by welding or the like; said base including a relativey thin peripherally extending flange portion; and said relatively thin base flange portion extending around and adjacent an interior wall of said tubular housing and also being secured to said housing as by welding or the like.

10. The electrical switch as set forth in claim 9 and wherein said switching mechanism is hermetically sealed within said housing.

11. A hermetically sealed encapsulation for an electrical switching mechanism mounted on a base and adapted for miniaturization comprising in combination, a tubular metallic housing having an open end and a closed end; said base having a relatively thin peripherally extending metallic flange portion and a central portion of electrically insulating glass material in which is mounted an electrically conductive terminal for said switching mechanism, said peripherally extending flange portion extending in a direction away from said insulating glass

portion whereby to minimize the transfer of heat and stresses developed during welding or the like to said glass portion, said switching mechanism and base being slidably and telescopically inserted into said tubular housing with said peripherally extending flange portion disposed around and closely adjacent to an interior wall of said tubular housing, motion transfer means associated with said closed end of said housing and engageable with said switching mechanism for actuating the latter in response to predetermined movement of said motion transfer means; said base and switching mechanism being inserted into said tubular housing to a predetermined extent with said switching mechanism positioned in predetermined calibrated relation to said motion transfer means, and said flange being secured as by welding or the like to said tubular housing to thereby fixedly mount said switching mechanism in final calibrated position within said housing.

12. A hermetically sealed encapsulation for an electrical switching mechanism mounted on a base and adapted for miniaturization comprising in combination, a tubular metallic housing having an open end and a closed end; said base having a relatively thin peripherally extending metallic flange portion and a central portion of electrically insulating glass material in which is mounted an electrically conductive terminal for said switching mechanism, said peripherally extending flange portion extending in a direction away from said insulating glass portion whereby to minimize the transfer of heat and stresses developed during welding or the like to said glass portion, said switching mechanism and base being slidably and telescopically inserted into said tubular housing with said peripherally extending flange portion disposed around and closely adjacent to an interior wall of said tubular housing; a motion transfer pin disposed for reciprocal sliding movement relative to said switching mechanism within an exteriorly communicating guideway provided by said

closed end of said housing, a diaphragm member disposed exteriorly of said motion transfer pin and having a peripherally extending flange telescopically disposed about and secured to said closed end of said tubular housing as by welding to hermetically seal said closed end of said housing and to transmit externally applied forces to said motion transfer pin for actuating said switching mechanism; said base and switching mechanism being inserted into said tubular housing to a predetermined extent with said switching mechanism positioned in predetermined calibrated relation to said motion transfer pin, and said base flange being secured as by welding or the like to said tubular housing to thereby fixedly mount said switching mechanism in final calibrated position within said housing.

13. The electrical switch as set forth in claim 11 and said switch including an insulating sleeve disposed in said housing and intermediate at least a portion of said switching mechanism and said housing.

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