Nov. 19, 1968 G. ROGERS ETAL 3,412,225

SWITCH WITH HINGED SWITCH BASE AND COVER

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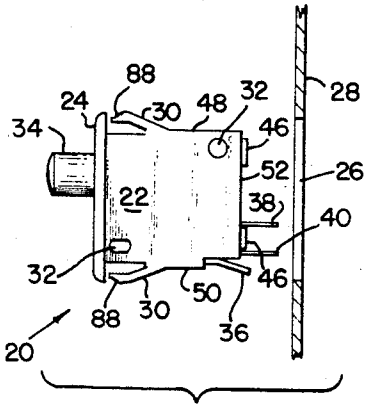



FIG.-1

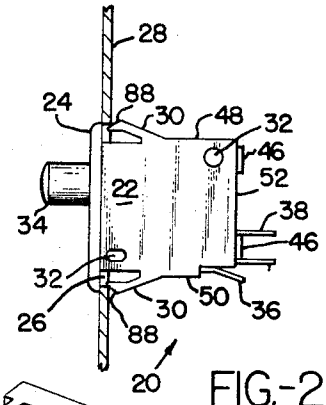



FIG.-2

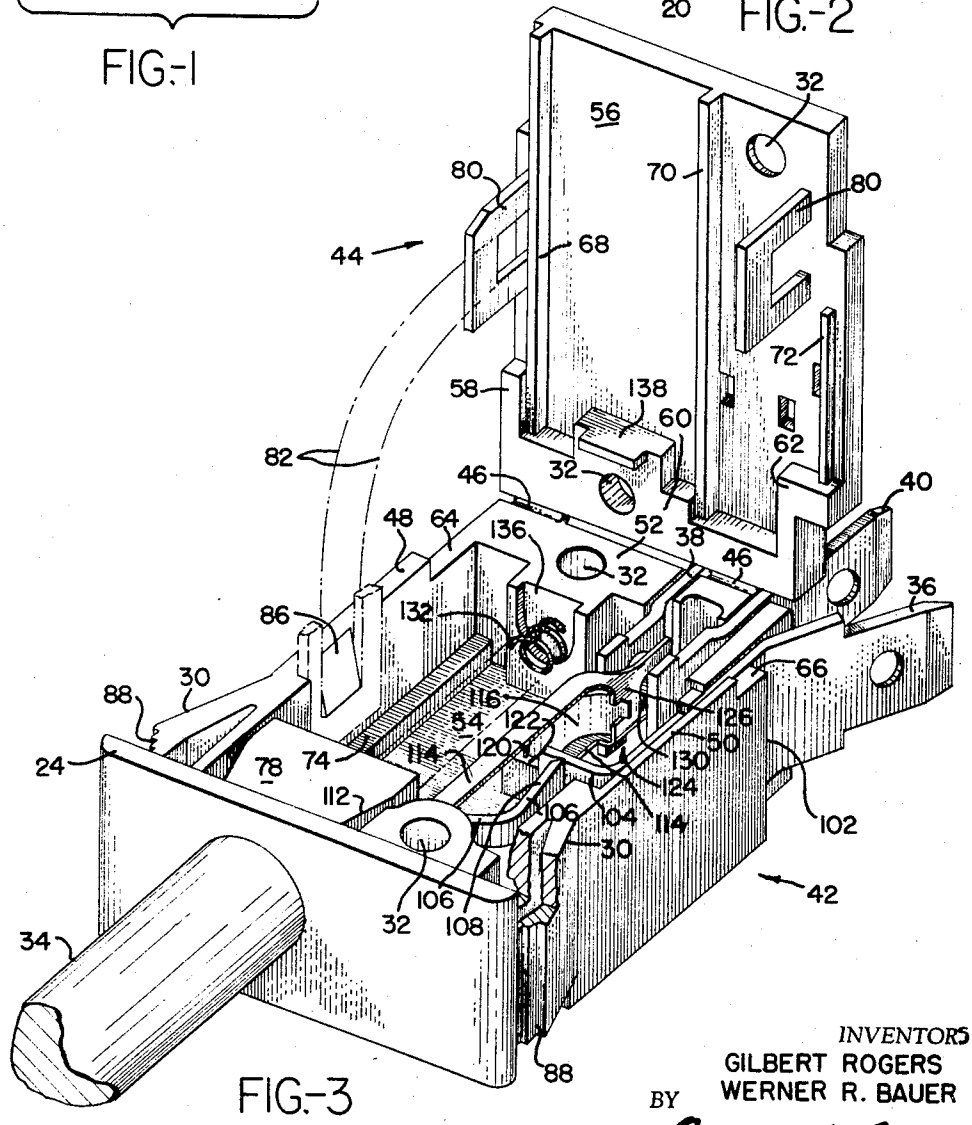



FIG.-3

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SWITCH WITH HINGED SWITCH BASE AND COVER

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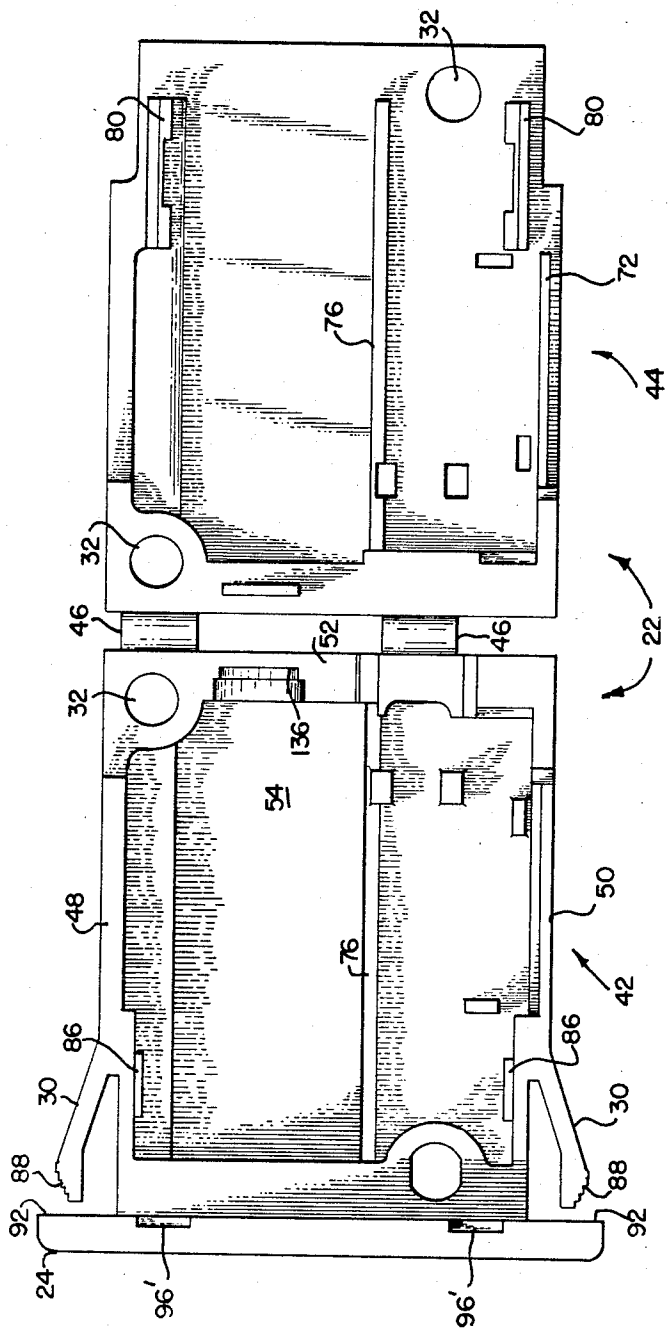



FIG-4

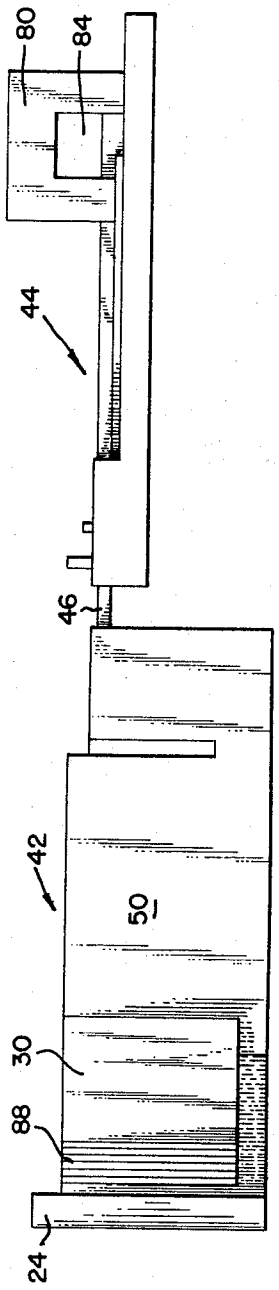


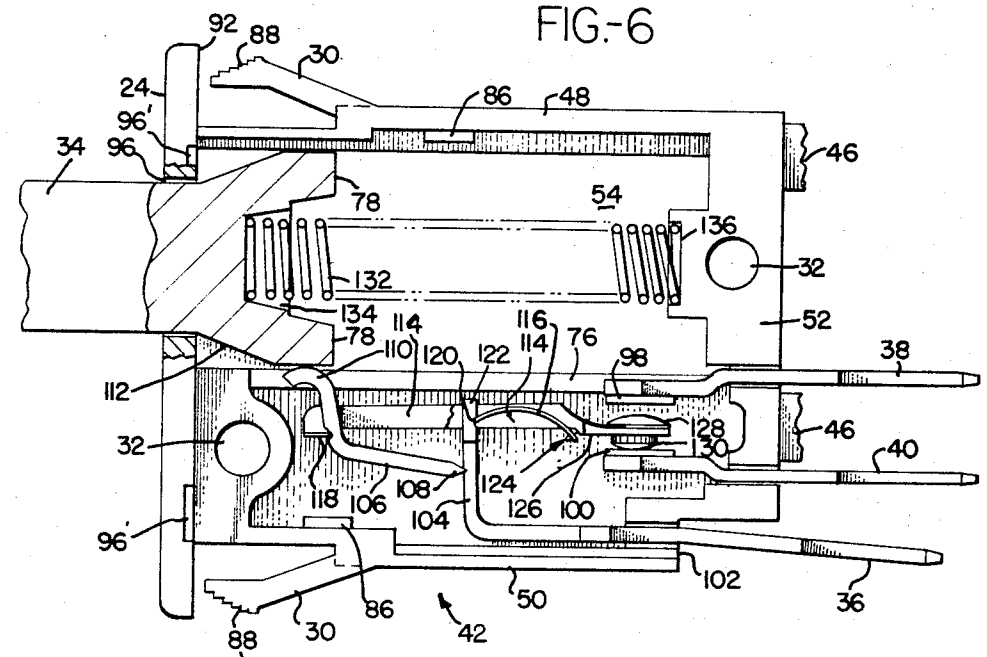

FIG-5

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SWITCH WITH HINGED SWITCH BASE AND COVER

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FIG.-6



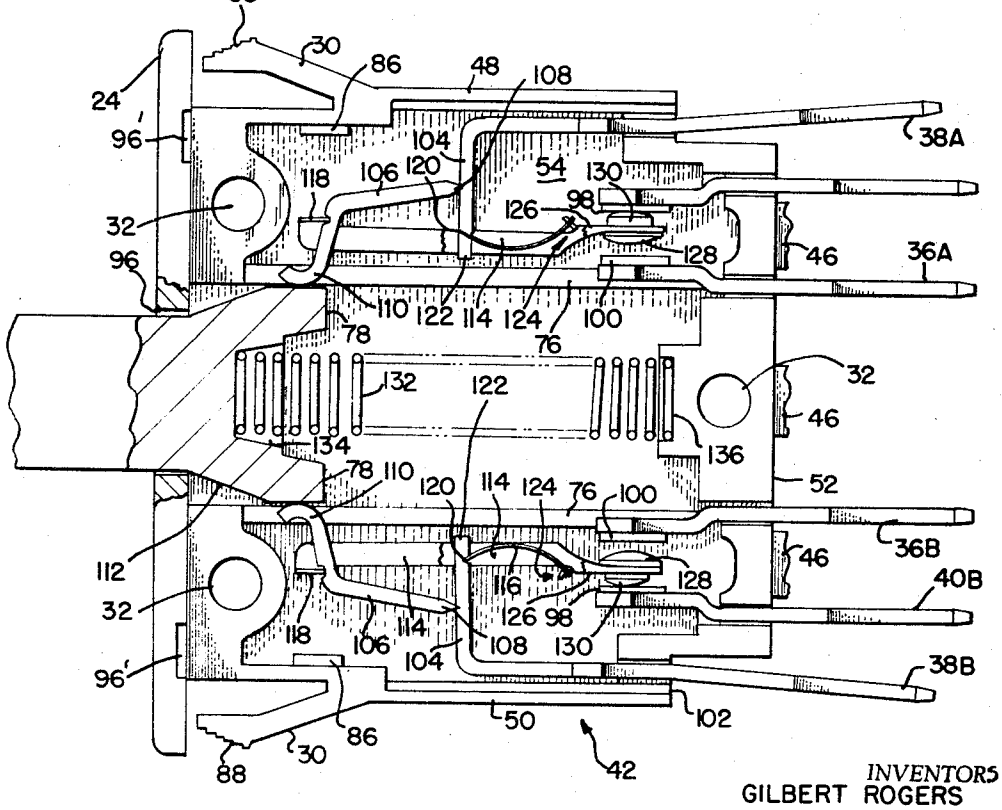




FIG.-7

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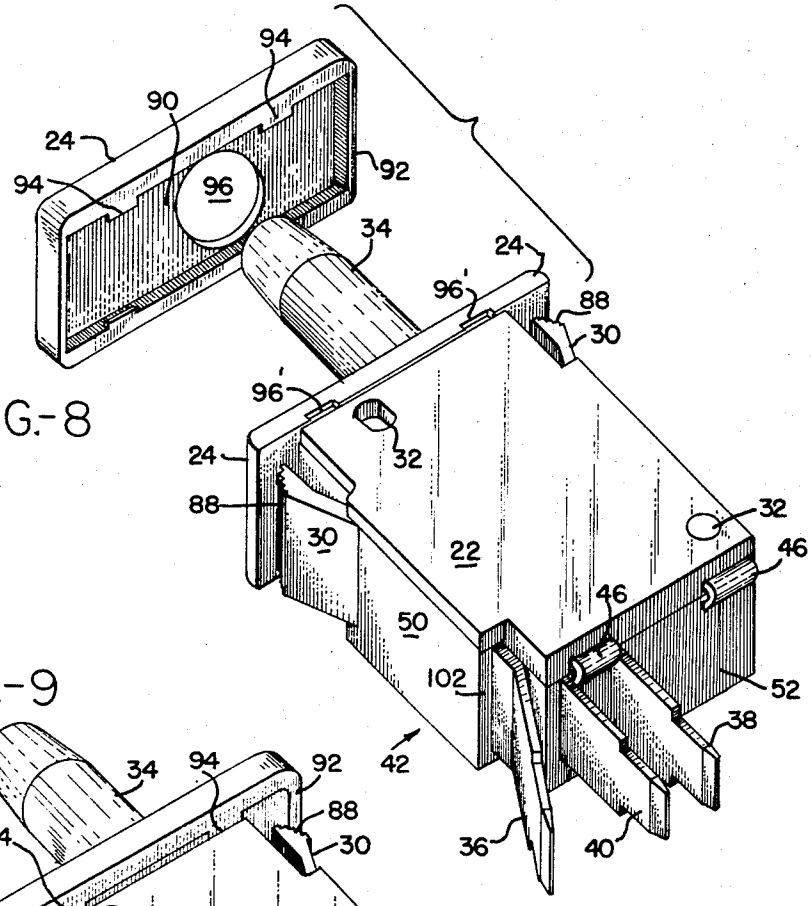



FIG.-8

FIG.-9

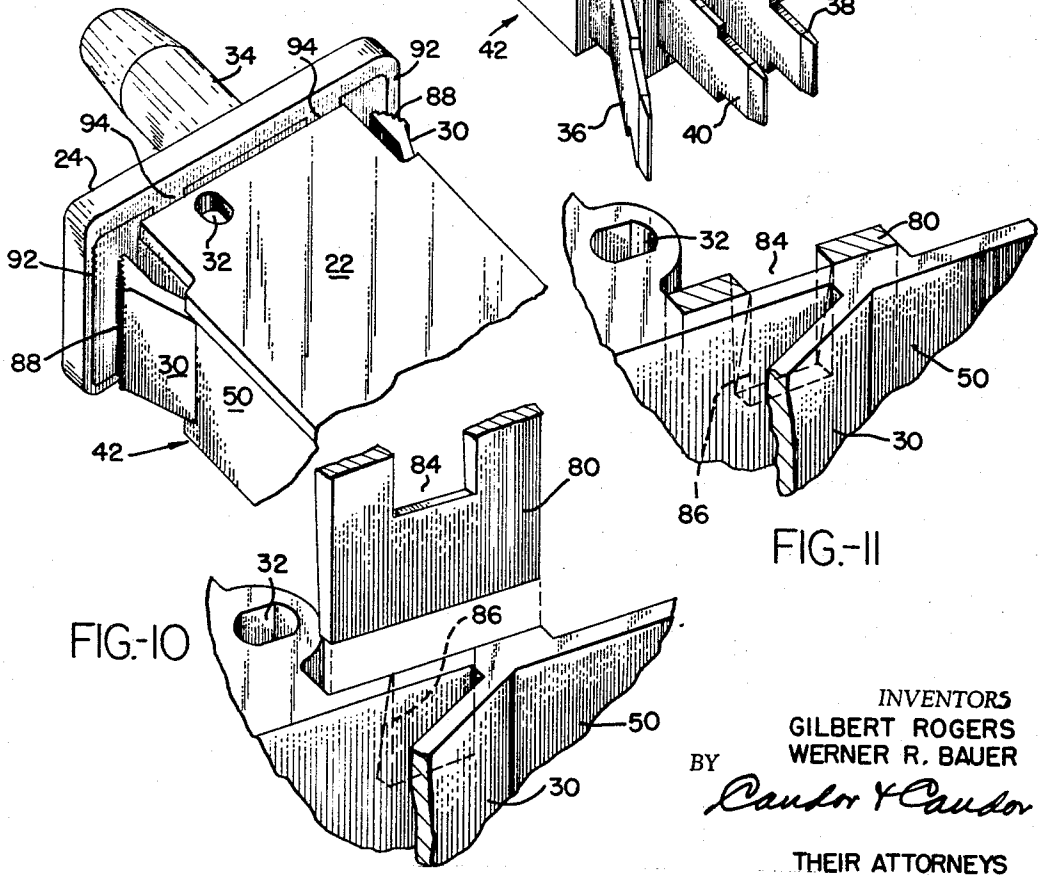



FIG.-11

FIG.-10

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United States Patent Office 3,412,225 Patented Nov. 19, 1968



3,412,225

# SWITCH WITH HINGED SWITCH BASE AND COVER

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4 Claims. (Cl. 200—168)

This invention relates to a switch base and cover.

One of the features of this invention includes a small switch construction which may be pushed into a panel opening with the front wall of the switch engaging the front surface of the panel and with snap end mounting means on the body of the switch construction holding the switch on the panel, and with means for mounting the body of the switch construction on a surface mount.

Another feature of this invention includes a one piece, homogeneous, switch casing including a one piece cover and a one piece base homogeneously connected by flexible dividing hinge means, so that the cover and base may be closed on each other by the hinging action provided by the flexible hinge means.

Another feature of this invention includes hooking means for holding the casing parts in closed condition after the parts have been moved to closed position by action of the hinging means.

Another feature of this invention includes a snap-on panel bezel, which may be snapped on the front wall of the casing.

Other features of this invention become apparent from this description, the appended claimed subject matter, and/or the accompanying drawings in which:

FIGURE 1 is a plan view of a swich construction about to be applied to a panel opening, drawn substantially to actual scale.

FIGURE 2 is a view similar to FIGURE 1 with the switch construction applied to the panel.

FIGURE 3 is a perspective view, in enlarged scale, of the switch construction of FIGURE 1 with the casing partially open.

FIGURE 4 is a plan view of another embodiment of the switch casing in fully open position, before any switch parts are installed.

FIGURE 5 is a side view of FIGURE 4.

FIGURE 6 is a plan view of the switch receiving base of FIGURE 3 with switch parts for a single pole switch.

FIGURE 7 is a view similar to FIGURE 6 but showing a larger casing with switch parts for a double pole switch.

FIGURE 8 is a perspective view of a completed single pole switch construction of FIGURES 3 and 6, with a snap-on front panel ready to be applied to the front of the switch construction.

FIGURE 9 is a view of a portion of FIGURE 8 with the snap-on front panel snapped in place.

FIGURE 10 is a perspective view of a portion of the base of the casing with the latch portion of the cover about to be snapped in place.

FIGURE 11 is a view similar to FIGURE 10 showing the latch portion snapped in place.

In FIGURES 1 and 2, a switch construction **20** may have a main casing body **22**, which has a front wall **24**. The main casing body **22** may be insertable in the opening **26** in a panel **28**. The front wall **24** may engage the front surface of the panel **28**, after the main body **22** has been inserted through the opening **26**. Snap-in mounting means or flexible casing arms **30** may be provided on the main body **22**, which flex inwardly toward the casing **22** while the main body is being pushed into the opening **26**, and then snap outwardly, as shown in FIGURE 2, to engage the panel **28** and hold the switch construction **20** securely mounted on the panel **28**.



Additionally, the main casing body **22** may be provided with surface mounting means in the form of screw hole openings **32**. Screws may be inserted through these openings **32** and into a surface mount or board, so that the switch construction may be securely mounted on such board by the screws which pass through the openings **32**.

The switch construction may have switch actuating means, or plunger **34**, which may be resiliently outwardly biased, and may be pushed in, to actuate the switch within the casing body **22**.

Electric circuit connecting means may be provided on the casing body, and such means may take the form of a common rod connector **36** and branch rod connectors **38** and **40**, so that the common connector **36** may be selectively connected to the branch rod connectors **38** and **40** in response to the inward and outward movement of the plunger **34**.

The switch construction, as shown in FIGURES 1 and 2, may be of a size, such as actually shown in FIGURES 1 and 2 of the patent application. However, in order to provide a more detailed construction of the switch construction, the other figures show the parts in enlarged scale.

For example, FIGURES 4 and 5 show, in general, a casing construction which may be cast or formed of homogeneous plastic material. Such a switch casing may include a homogeneous, plastic material, relatively rigid first casing part or base **42**, and a homogeneous, plastic material, relatively rigid second casing part or top **44**. These parts are joined together by flexible, homogeneous, plastic material, hinge means **46**. These parts may be cast or molded together, as indicated in FIGURES 4 and 5, with the supporting parts of the base **42** and cover **44** being rigidly formed, to retain their shape under ordinary pressures, and with the hinge means or flexible connectors **46** homogeneously connected to the base and top, whereby the top can be hingedly moved under control of the hinge means **46** into closed position against the base portion **42**.

Certain words are used in this specification and claimed subject matter indicating direction, relative position, and the like. However, such words are used for the sake of brevity and clearness of description, and apply only to the relative position, and direction shown in the drawings. In actual use, the parts so described may have entirely different direction, relative positions and the like. Examples of such words are "top," "base," "upper," "lower," etc.

The words "homogeneous" and "homogeneously" as herein used in the specification and claims are intended to define a construction in which all of the parts which are indicated to be homogeneous or homogeneously formed are made and connected as a single, continuous structure from a plastic or flowable material.

The parts and general construction shown in FIGURES 4 and 5 are only diagrammatically shown, and are intended to show that the parts may be cast or formed in the mold or the like in flat condition, so that later the switch parts may be inserted in the base **42** and/or top **44**, and then the parts may be hinged together about the hinge means **46** and locked together in a manner to become more readily apparent elsewhere. In the other figures, the casing parts are shown of substantially the same shape, but are varied slightly in detail, so that they can accept the switch parts which are specifically disclosed therein.

Referring now more particularly to FIGURES 3 and 6, the parts so far described in connection with FIGURES 1, 2, 4 and 5 are marked with similar numbers in FIGURES 3 and 6, wherever applicable. In FIGURE 3, the top **44** is shown moved upwardly, on the hinges **46** on its way to be closed upon the base **42**, after the switch

parts have been installed in the base section **42**. Some of the shapes and parts shown in FIGURES 4 and 5 have been slightly changed, to accept the switch parts of FIGURES 3 and 6.

The first casing part, or base **42**, in FIGURES 3 and 6, may have a relatively rigid front wall **24**, two relatively rigid side walls **48** and **50**, a rear wall **52** and a bottom wall **54**. All of these walls **24**, **48**, **50**, **52** and **54** may be homogeneous, plastic material, walls which are relatively rigid, and resist normal forces which are applied to such a switch construction.

The second casing part, or top **44**, may be a homogeneous, plastic material casing part, and may have a formation to engage and close behind the front wall **24** and on the side and rear walls **48**, **50**, and **52**, as the top **44** is closed upon the bottom or base **42**. For example, the top **44** may include relatively rigid flat plate **56** with thickened rear parts **58**, **60**, and **62** to engage the lower level surfaces of the rear wall **52** and the lower level offsets **64** and **66** of the side walls **48** and **50**. The top plate **56** may also have longitudinal ridges **68**, **70** and **72** to aid in rendering the plate **56** rigid. Also ridges **68** and **72** engage the inside surfaces of the side walls **48** and **50**. Thus means are provided which substantially lock the top **44** against substantial forward and sidewise movement relatively to the base **42** when the top **44** is closed down on the base **42**. Such means also subtantially lock the top **44** against backward movement of the top **44** relatively to the base **42** by the action of the notch **136** and tongue **138**, as elsewhere described. The ridges **68** and **70** cooperate with correspondingly upward ridges **74** and **76** on the bottom wall **54**, to guide the upper and lower edges of the enlarged head **78** of the plunger **34**.

The top **56** may have two downwardly directed snap together flexible fasteners **80**, which move downwardly, as indicated by the dotted lines **82**, so that the opening **84**, FIGURES 10 and 11, of each fastener **80** engages the bottom of a respective wedge shaped lower snap fastener **86**, as more clearly shown in FIGURES 10 and 11. In FIGURE 10 the downward snap together fastener **80** with its opening **84** is moving downwardly to engage the wedge shaped lower fastener **86**. In FIGURE 11 the engagement has taken place, with the bottom of the opening **84** engaging the bottom of the wedge **86** to lock the parts together. The fasteners **86** are secured or integral with the side walls **48** and **50** of the base **42**.

In FIGURES 6 and 7, it will be seen that the flexible arms **30** are provided with a series of ridges **88**, which are adapted to engage the edge of the opening **26**, in FIGURES 1 and 2, after the switch construction has been inserted in the opening **26**.

Referring to FIGURE 8, a snap-on bezel **90** may be made of metal or plastic material and may have a rim **92**, with upper and lower flexible tongues **94**, which are adapted to snap into notches **96'** in the front wall **24**. An opening **96** may be provided in the bezel **90** to receive the plunger **34**. Ths bezel may be snapped over the wall **24** to provide an ornamental or informative front member for the switch construction.

Any suitable switch means may be mounted within the switch casing **22**.

For example, as shown in FIGURES 3 and 6, the relatively rigid branch connectors or flat bars **38** and **40** may extend inwardly into the casing and may support stationary contacts **98** and **100**. The common connector rod or flat bar **36** may extend into the casing, through the offset portion **102**. The flat rod **36** may be pressed into a slot as shown in FIGURE 6. In actual construction the slots at the rear of the base **42** may be sufficiently tight fitting to hold the connectors **36**, **38** and **40** in place. The slots are shown with a clearance for clear illustration only.

The rod **36** may have a right angled rod pivot extension **104**. An actuating lever **106** may have a pivot end **108**, which engages the pivot extension **104**, in a suitable notch, if desired. The lever **106** may have a plunger actuated curved end **110**. The lever **106** is pivoted or rocked on the pivot end **108** by the plunger head **78**, which has its wedge shaped thick part engaging the lever end **110**, in FIGURE 6. When the plunger **34** is pushed in, the slanting wall **112** on the plunger head **78** allows the lever end **110** to rise upwardly, in FIGURE 6, to produce the pivoting action of the lever **106**.

A snap blade construction has two arms **114** which straddle the narrow end tongue **122** of the pivot extension **104**. The two arms **114** also straddle the lever **106**, and the snap spring **116**. The two arms **114** are shown broken in FIGURES 6 and 7 to display both arms **114** one above the other. The two parallel arms **114** join together at their left ends, and form a pivot ridge **118**, the edge of which engages a suitable notch in the lever **106**, so that the rightward pull on the arms **114**, which is produced by the snap spring **116**, hold the ridge **118** of the snap blade construction firmly against the lever **106**. This construction exerts a rightward pulling action on such lever **106**, to hold it in place at pivot **108**.

The snap spring **116** may be of usual leaf steel construction, with one end **120** engaging a notch in the tongue **122** of the rod extension **104**. The tongue **122** is narrow enough to be straddled between the two parallel snap blade arms **114**. The other end of the spring **116** has a tongue and slot engagement **124** with the end flat bridge **126** which joins the two arms **114** of the snap blade at their right ends. The bridge **126** carries the movable contact means or movable contacts **128** and **130**.

A compression spring **132** engages the cupped end **134** of the plunger head **78** at one end. The other end of the spring **132** engages a spring receiver notch **136** in the rear wall **52**. The upper end of the notch **136** receives the tongue **138**, FIGURE 3, which extends downwardly from the top plate **56**. The tongue **138** holds the top **44** against backward endwise movement with relation to the base **42**, since the tongue **138** prevents rearward movement where the tongue **138** engages the notch **136**.

The spring **132** returns the plunger **34** outward, after it has been pushed in and released.

The switch structure of FIGURES 3 and 6 is a single pole switch construction. The principles thereof may be duplicated to produce a double pole switch construction, as is shown in FIGURE 6.

In FIGURE 6, there are two common mirror image connectors **36A** and **36B**. Also, there are two mirror image pairs of branch connectors **40A–38A**, and **40B–38B**. The single pole construction of FIGURE 6 may be duplicated in mirror form, the connectors **36B**, **40B** and **38B** corresponding to the connectors **38**, **40** and **36** of FIGURE 6 whereas the connectors **36A**, **40A** and **38A** are mirror images of connectors **36**, **40** and **38**. The other mirror parts in FIGURE 7 are believed to be obvious, and it is believed unnecessary to describe them in detail, since those skilled in the art will recognize the mirror construction. It is believed unnecessary to add other reference characters, since the parts are obvioius from FIGURES 3 and 6.

It is to be seen that the switch construction of this invention may be produced by homogeneously forming the casing which includes the plastic base **42**, top **44** and hinges **46**. The homogeneous additional casing parts herein disclosed are also formed at the same time. Thereafter the switch ports may be assembled in the casing construction. For example, such switch parts may be assembled in the base **42** of the casing, and then the top **44** may be folded over on the hinges **46**. The top **44** and base **42** may then be snapped together and held in closed condition by the snap together means **80** and **86**.

The assembled switch construction may then be installed in the opening **26** of the panel **28** and held in place by flexible arms **30** as shown in FIGURES 1 and 2. Alternatively, the switch construction may be mounted on a flat support surface of a flat panel or the like by

inserting screws through the holes **32** and into such flat panel.

Also, if desired, the bezel **90** may be snapped over the front wall **24** of the base **42**. Such bezel **90** may be of ornamental and/or informative nature, as desired.

A new, useful and unobvious switch construction has thus been provided by this invention.

While the form of the invention now preferred has been disclosed as required by the statutes, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

**1.** In combination: a homogeneous, plastic material, casing base having a front wall, two side walls, a bottom wall, and a rear wall, said walls being relatively rigid; a homogeneous, plastic material, casing top, said top being relatively rigid and having a formation to engage and close upon said front, side and rear walls; homogeneous, plastic material, flexible hinge means homogeneously and hingedly joining said casing base and said casing top; switch means in said casing base having line connector means extending through at least one of said walls; and plunger actuator means actuating said switch means and extending through at least one of said walls and including snap together means on said base and top to snappingly secure said casing base and casing top in closed condition when said base and top are closed together by hinge movement on said hinge means in which said switch means comprises: a common rod connector extending through a supporting slot in one of said walls, having a rearwardly extending outer end, and having a rod pivot extension into said base; an actuating lever having a pivot end on said pivot extension and having a plunger means actuated end; first and second rod connectors extending backwardly through said rear wall and supporting first and second stationary contacts in said casing base; a snap blade means supporting movable contact means to be reciprocated between and against said stationary contacts at one end of said blade and engaging said lever at the other end; a snap spring having one engagement with said rod pivot extension and another engagement with said snap blade means producing a pull on said lever; and lever actuating means on said plunger means actuating said lever in response to inward and outward movement of said plunger means to cause said snap blade to snap said contact means alternately against said first and second stationary contacts; said plunger extending through said front wall.

**2.** In combination: a homogeneous, plastic material, casing base having a front wall, two side walls, a bottom wall, and a rear wall, said walls being relatively rigid; a homogeneous, plastic material, casing top, said top being relatively rigid and having a formation to engage and close upon said front, side and rear walls; homogeneous plastic material, flexible hinge means homogeneously and hingedly joining said casing base and said casing top; switch means in said casing base having line connector means extending through at least one of said walls; and plunger actuator means actuating said switch means and extending through at least one of said walls and including a snap-on panel bezel having an actuator means receiving opening and having snap-on securing means to engage said front wall and including snap together means on said base and top to snappingly secure said casing base and casing top in closed condition when said base and top are closed together by hinge movement on said hinge means in which said switch means comprises:

a common rod connector extending through a supporting slot in one of said side walls and having a rod pivot extension into said base;

an actuating lever having a pivot end on said pivot extension and having a plunger means actuated end;

first and second branch rod connectors extending through said rear wall and supporting first and second stationary contacts in said casing;

a snap blade means supporting movable contact means to be reciprocated between and against said stationary contacts at one end of said blade and engaging said lever at the other end;

a snap spring having one engagement with said rod pivot extension and another engagement with said snap blade means and producing a pull on said lever;

and lever actuating means on said plunger means actuating said lever in response to inward and outward movement of said plunger means to cause said snap blade to snap said contact means alternately against said first and second stationary contacts.

**3.** A combination according to claim **2** in which there is a mirror common rod connector, a mirror actuating lever, mirror first and second conductors, a mirror snap blade means, a mirror snap spring, and mirror lever actuating means on said plunger.

**4.** In combination: switch casing means including a homogeneous plastic material, relatively rigid first casing part, a homogeneous plastic material, relatively rigid second casing part and flexible homogeneous plastic material hinge means homogeneously and hingedly joining said first and second casing parts; switch means in said casing having connector means extending through said casing; and actuating means extending through said casing and actuating said switch means in response to actuating movement of said actuating means;

a common rod connector extending through said casing and having a rod pivot extension into said casing;

an actuating lever having an end pivoted on said pivot extension and having an actuated end actuated by said actuating means;

first and second branch rod connectors extending through said casing and supporting first and second stationary contacts in said casing;

a snap blade means supporting movable contact means to be reciprocable between and against said stationary contacts;

a snap spring having one snap engagement with said rod pivot extension and another snap engagement with said snap blade means;

and snap blade actuating means on said actuating lever actuating said snap blade in response to movement of said actuating means.

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