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Reynolds et al.

[11] **3,854,018**

[45] **Dec. 10, 1974**

[54] **MULTIPLE CIRCUIT SELECTOR SWITCH ASSEMBLY HAVING MOVABLE CONTACT MEANS ADAPTED TO RETAIN ITSELF IN CLOSED CIRCUIT POSITION**

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[73] Assignee: **AMP Incorporated**, Harrisburg, Pa.

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[52] **U.S. Cl.** ..... **200/5 A**, 200/5 E, 200/16 R, 200/16 D, 200/159 B, 200/275, 200/284

[51] **Int. Cl.** **H01h 13/74**, H01h 15/02

[58] **Field of Search** ..... 200/1 R, 5 R, 5 A, 5 E, 200/5 EA, 5 EB, 6 R, 6 B, 16 R, 85 R, 86 R, 86 A, 61.54–61.57, 159 B, 259, 260, 275, 284, 16 C

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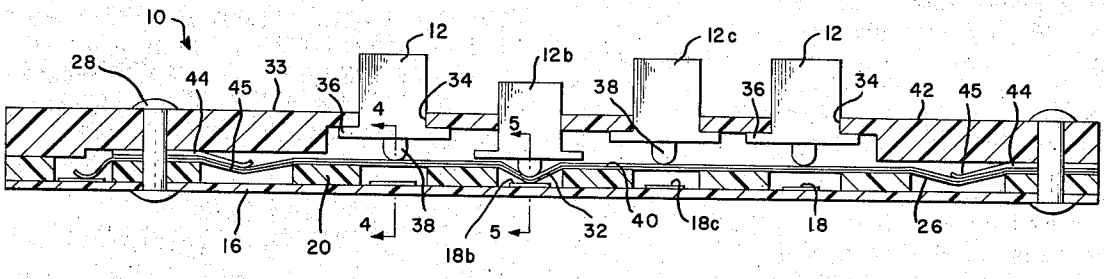
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Primary Examiner—James R. Scott

[57] **ABSTRACT**

A switch assembly has an apertured grate superimposed upon a contact board on which a plurality of independent electrical contacts are located. The apertures in the grate are respectively associated with the contacts to expose the contacts through the grate. A cross-curved elongated contact strip is operatively connected to the grate on the side thereof opposite the contacts in a predetermined position and configuration such that the strip is flexed between its points of connection to the grate in order to form a single projection which extends into one of the apertures and engages the contact associated therewith. The cross-curved contact strip flattens at the projection within the aperture because of the flexing of the strip, and thus holds the strip in that aperture until the strip is urged through another aperture in the grate, either manually or by a pushbutton or the like, thereby causing the projection in the strip to occur at the other aperture and relieving the projection at the aperture in which it was previously formed.

14 Claims, 11 Drawing Figures



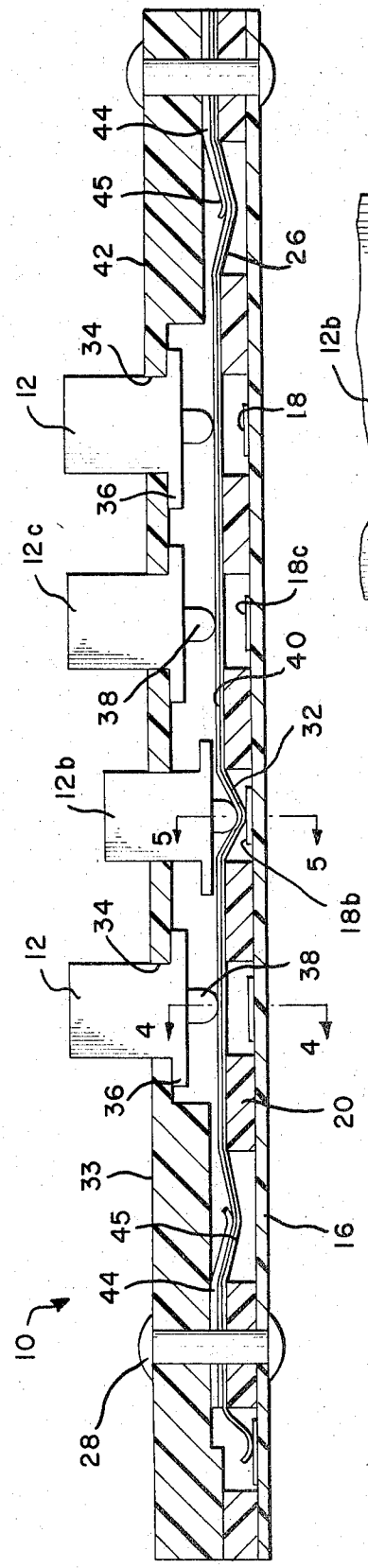


FIG. 3A

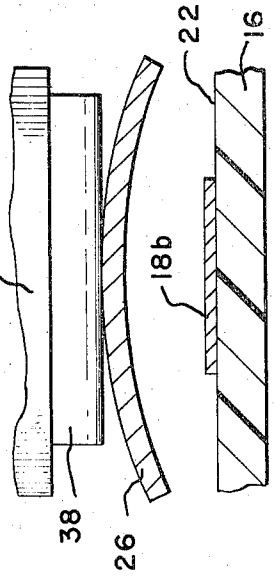


FIG. 4

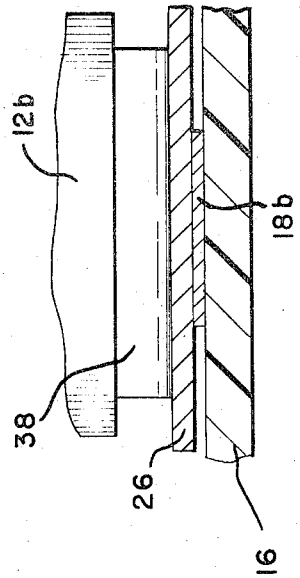


FIG. 5

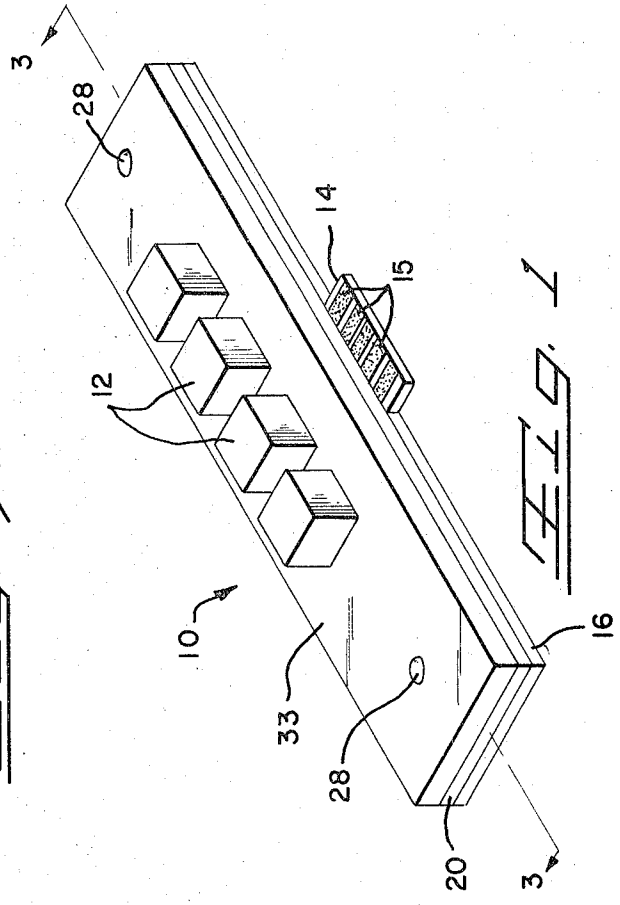


FIG. 1

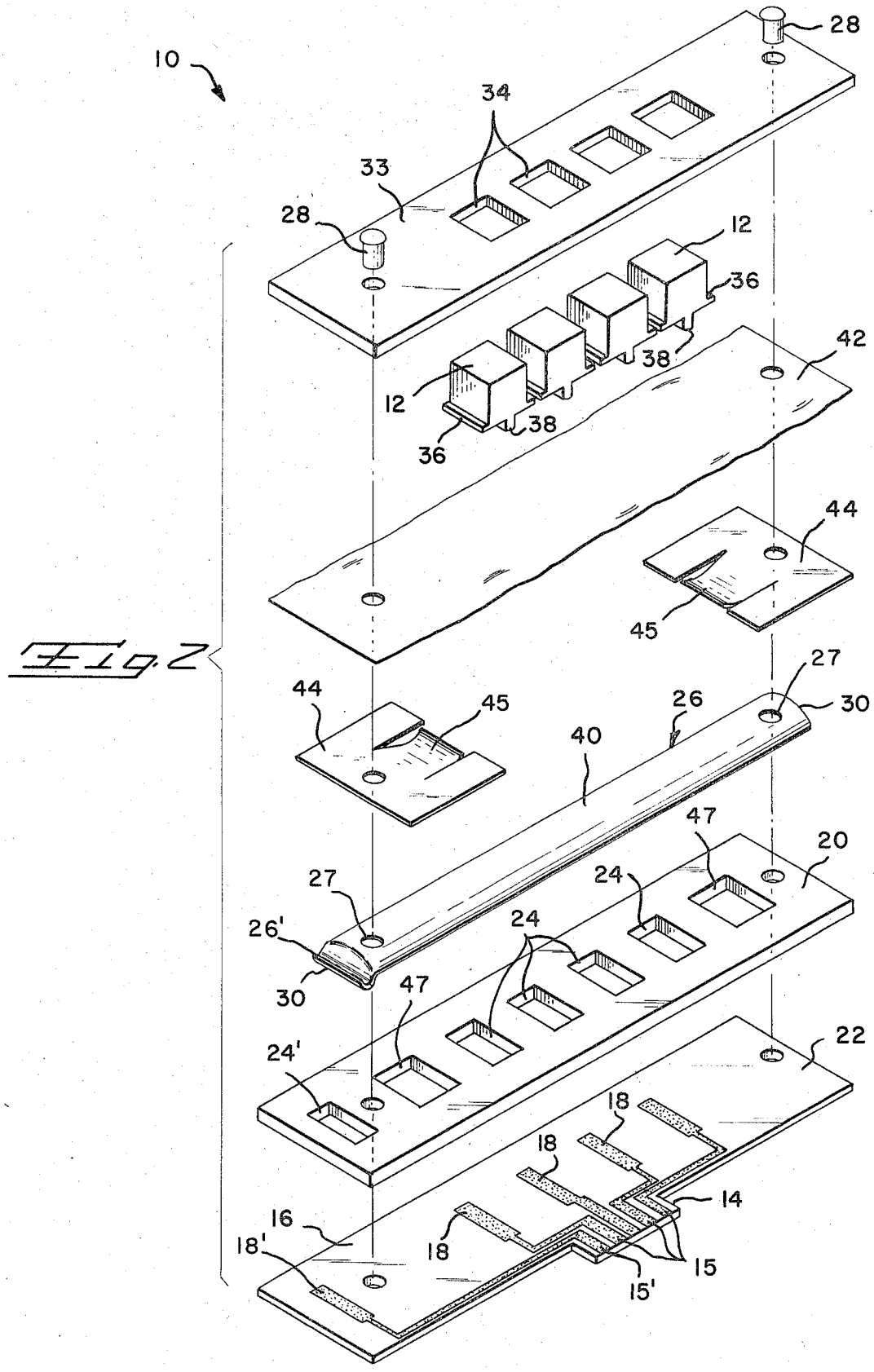

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Fig. 2

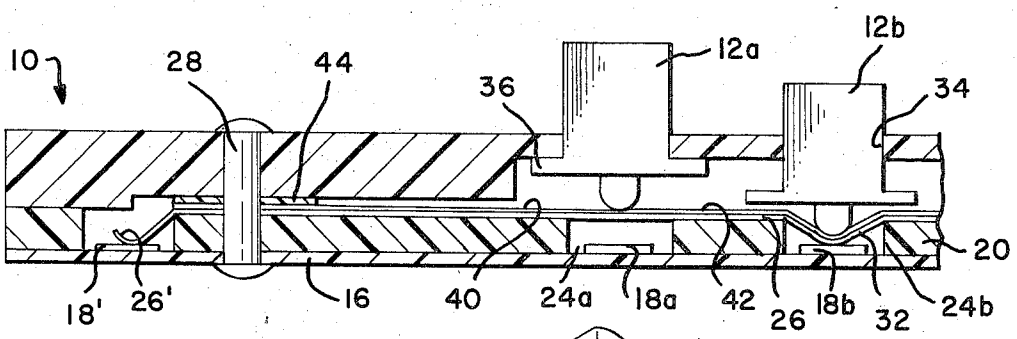


Fig. 3b

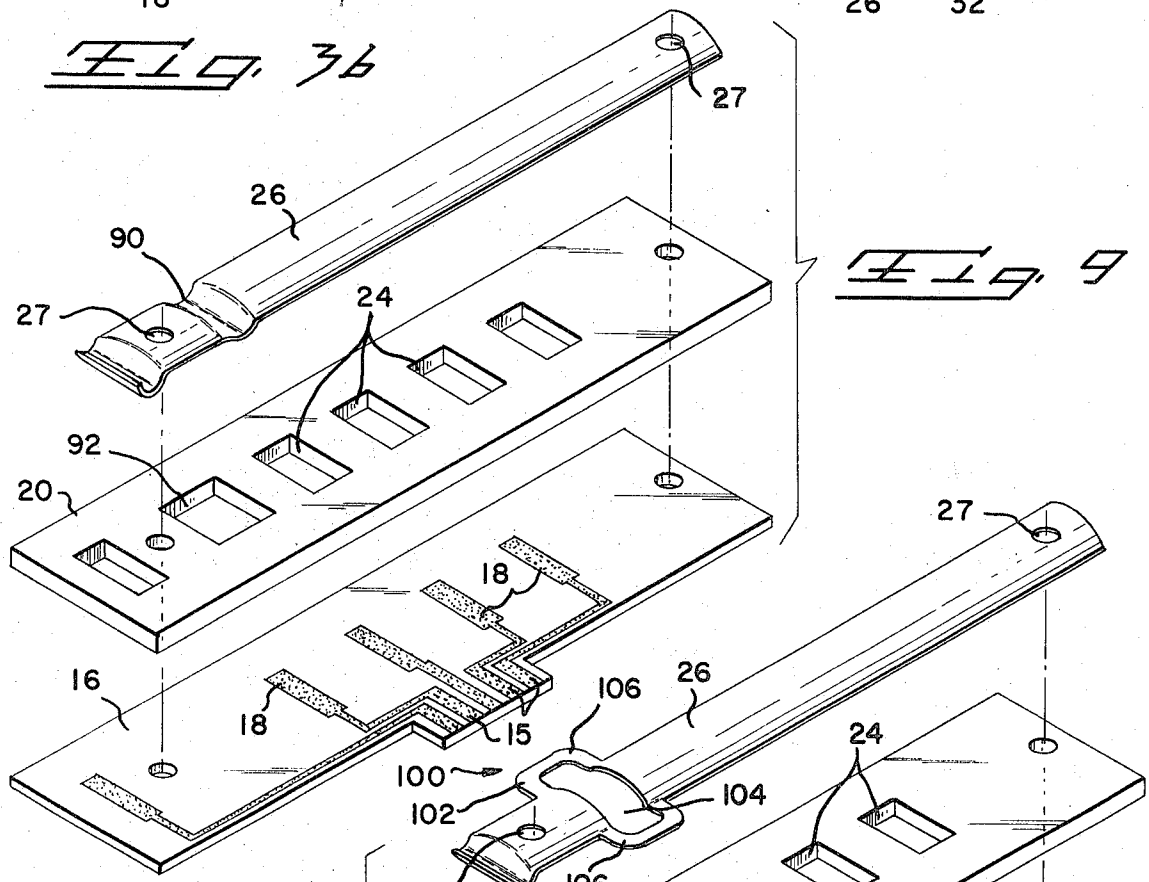


Fig. 9

Fig. 10

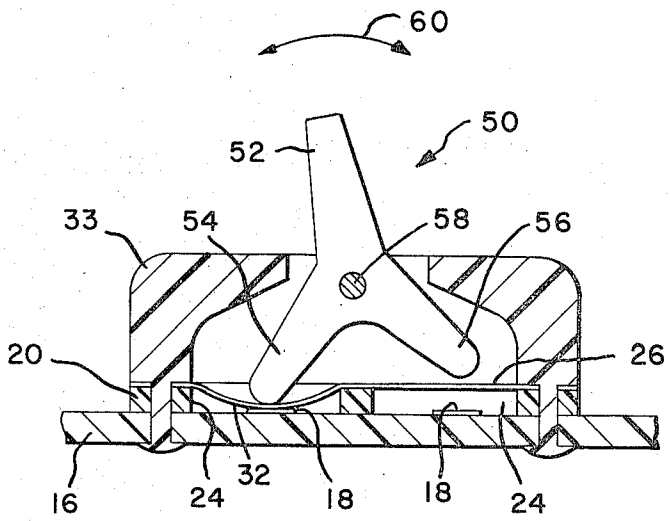


Fig. 6

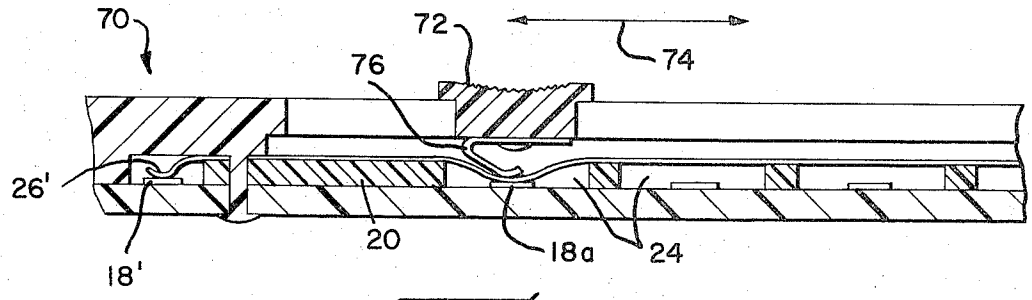


Fig. 7

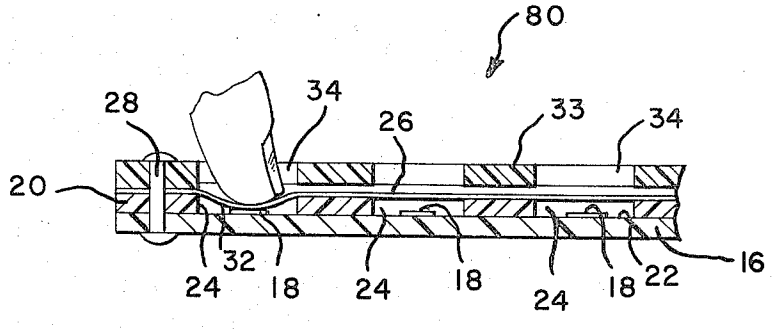


Fig. 8

MULTIPLE CIRCUIT SELECTOR SWITCH ASSEMBLY HAVING MOVABLE CONTACT MEANS ADAPTED TO RETAIN ITSELF IN CLOSED CIRCUIT POSITION

The present invention relates to electrical switches, and more particularly to a selector switch which permits one circuit to be selected from a group of circuits.

Selector switches of various types have been previously proposed which will enable an operator to select one circuit from a group of circuits in order to perform a desired operation. Typically, such selector switches are provided with a plurality of pushbutton control members that are movable between two operative positions and interconnected with each other such that as any one of the control members is moved to one of its operative positions a control member previously in that operative position is returned to its other operative position. The problem with such pushbutton selector switches is that they require relatively complex arrangements of springs, plates or levers for interconnecting the respective control members in order that they operate in the desired manner. Moreover, the number of control members or pushbuttons which can be operatively associated with each other in the control device is usually limited because of the complexity of the interconnections required to control the positions of the pushbuttons. Also, because of the complexity of such previously proposed pushbutton selector switches, it is relatively difficult to assemble the components in their housings and thus a relatively large amount of hand labor is required in order to complete the assembly. As a result, it is not possible to obtain a rapid production rate in the manufacture of such selector switches.

Accordingly, it is an object of the present invention to provide a selector switch which has a minimum of movable components.

Yet another object of the present invention is to provide a selector switch by which one circuit can be conveniently selected from a series of circuits.

Another object of the present invention is to provide a selector switch which is relatively inexpensive to produce and is durable in use.

Another object of the present invention is to provide a pushbutton device which requires a minimum of force in order to make the selected contact, and yet has sufficient strength to maintain the contact at all times until another circuit is selected.

In accordance with an aspect of the present invention a selector switch assembly is provided by which individual circuits can be selected by the engagement of a contact strip with contact elements positioned on a printed circuit board. The switch includes a contact or printed circuit board having electrical contacts located thereon and an apertured grate which is operatively connected to the contact board on the side thereof containing the electrical contacts. The grate has a plurality of apertures formed therein which are respectively associated with each of the individual electrical contacts on the contact board, thereby to expose the contacts through the grate. A resilient electrically conductive common contact strip is operatively connected to the grate at the opposite end portions thereof. The contact strip is cross-curved about its longitudinal axis and its length between the points of connection thereof to the

grate is greater than the distance between the points of connection so that the strip is thus flexed into a projection which extends towards and enters one of the apertures in the grate. As a result, the projection engages the contact member associated with the aperture in which it has entered.

Because of the cross-curved construction of the common contact strip, the strip has an unstable column strength and thus flattens across its width at the projection in an aperture; the flattening of the strip in this manner holds the strip in that aperture until the strip is urged through another aperture in the grate, either manually or by a pushbutton, thus causing the projection to occur at the other aperture and relieving the projection of the strip at the first aperture. As a result, the first contact is broken and a new contact is made.

In one embodiment, means are provided for automatically relieving the projection when manual pressure is removed, whereby the switch can be used to make intermittent contacts.

The above, and other objects, features and advantages of this invention, will be apparent in the following detailed description of illustrative embodiments thereof which are to be read in connection with the accompanying drawings, wherein:

FIG. **1** is a perspective view of a selector switch constructed in accordance with one embodiment of the present invention;

FIG. **2** is an enlarged exploded perspective view of the selector switch illustrated in FIG. **1**;

FIG. **3***a* is a sectional view taken alone line **3—3** of FIG. **1**;

FIG. **3***b* is a partial sectional view similar to FIG. **3***a* of another embodiment of the invention;

FIGS. **4** and **5** are sectional views of the contact strip used in the present invention taken along lines **4—4** and **5—5** respectively in FIG. **3**a;

FIG. **6** is a sectional view, similar to FIG. **3**, of another embodiment of the present invention;

FIG. **7** is a sectional view similar to FIG. **6**, of yet another embodiment of the present invention;

FIG. **8** is a sectional view of still another embodiment of the present invention; and

FIGS. **9** and **10** are partial exploded perspective views of two additional embodiments of the invention.

Referring now to the drawing in detail, and initially to FIGS. **1** and **2** thereof, it is seen that a selector switch **10**, constructed in accordance with the present invention, includes a plurality of pushbuttons **12** slidably mounted therein (as described more fully hereinafter) with which an operator may select any one of a series of electrical circuits connected to the switch assembly along its contact edge **14**. The switch is constructed so that only one of the circuit connections **15** along edge **14** is selected at any given time by the depression of one of the pushbuttons **12** in the assembly.

As seen most clearly in FIG. **2**, switch assembly **10** includes a printed circuit board element **16**, also referred to hereinafter as a contact element or contact board, on which a plurality of contacts **18** are formed or otherwise positioned in any conventional manner in electrical contact with circuit connections **15**. A grate plate **20**, preferably formed of an electrical insulation material, is superimposed on the side **22** of contact board **16** on which contacts **18** are printed. The grate

is provided with a plurality of independent apertures **24** which are located in the plate to be directly above and associated with individual contact members **18**, so that those contacts are exposed through the grate.

A common contact element **26** in the form of an elongated electrically conductive strip is provided in the switch assembly **10** in order to allow an operator to make selective contact with the contacts **18**, thereby to select the desired electrical circuit. As would be apparent to those skilled in the art, the common connector strip may be connected in any convenient manner through external circuits to a source of current so as to form a complete electrical circuit with the circuits to which connectors **15** are connected when the contact between the connector strip **26** and the respective contacts **18** is made, in the manner described hereinafter. However, in the embodiment of the invention illustrated in the drawing, connector strip **26** is provided with a permanent bend or corrugation **26'** adjacent one end **30** thereof, which corrugation extends through an opening **24'** in grate **20** into permanent contact with a contact **18'** which is connected through a connector **15'** on the printed circuit board to a source of current. Alternatively, corrugation **30** can be eliminated and strip **26** connected to the current source by a wire lead or the like in any convenient manner.

Contact strip **26** is connected to grate plate **20** and to contact board **16**, in any convenient manner, and preferably by rivets **28**, as illustrated in FIGS. **1** and **2**, at the opposite ends thereof. The contact strip is provided as a cross-curved metallic element (preferably of thin spring steel), i.e. an element which is curved about its longitudinal axis, transversely of its width. This is most clearly illustrated in the sectional view of FIG. **4**, wherein it is seen that in the normal relaxed configuration of the strip **26**, the strip maintains a curved configuration in cross-section.

In accordance with the present invention, the length of the strip **26** between the points of connection **27** thereof to grate **20** is selected to be somewhat longer than the distance between rivets **28**. As a result of this differential in length, the strip **26** will be flexed between its ends **30**, i.e. between the rivets **28**, so as to form a projection **32**, as seen in FIG. **3**. The difference in length between the length of the strip **26** and the distance between the rivets **28** determines the size of projections **32** and that difference is selected so that projection **32** will contact one of the contacts **18** through its associated aperture **24** in grate plate **20**. The selection of which contact **18** is engaged by projection **32** is made by depressing one of the buttons **12**, as described hereinafter. It is noted that formation or movement of projection **32** does not effect corrugation **26'** since the latter is located on the other side of rivet **28'**; thus the contact between corrugation **26'** and contact **18'** is always "made." In addition, strip **26** may have gold strips or the like plated or otherwise secured thereto at the locations on its lower surface with which it engages contacts **18**. Such strips will allow the switch to accommodate heavy current flows therethrough.

Superimposed above grate **20** and contact strip **26** is a cover plate **33** connected to the switch assembly by rivets **28**. Cover plate **33** has a plurality of apertures **34** formed therein which slidably receive pushbuttons **12**. The latter have a complementary configuration in plan to the configuration of apertures **24** and are provided with laterally extending flanges **36** which prevent the buttons from being inadvertently withdrawn from the assembly. The buttons are freely slidably mounted in the apertures **34**, except as limited by the flanges **36**, and have projection portions **38** which are located to engage the upper surface **40** of contact strip **26**, as seen most clearly in FIG. **3**. In addition, an insulating pad **42** is positioned between the projections **38** of pushbuttons **12** and the upper surface **40** of contact strip **26**. The insulator pad **42** is preferably formed of a waterproof material such as nylon or silicon rubber and it serves to protect against inadvertent contacts with the strip **26** through plate **33** which may cause shorting in the circuits connected to connectors **15**. However, in certain applications this strip may be eliminated.

In the illustrative switch of the present invention, as shown in FIGS. **1–3**, the switch is adapted to be operated intermittently, that is contact of the strip **26** with a contact **18** is maintained only as long as a button **12** is held depressed. When the button is relieved, the strip will automatically return to a position out of engagement with the contact board. This is accomplished by the provision of a pair of spacers **44** located at the opposite ends of the switch assembly. These spacers hold cover plate **33** sufficiently above grate plate **20** to accommodate the curved cross-sectional configuration of contact strip **26** and have downwardly bent ends **45** which engage strip **26**. The bent ends **45** of spacers **44** bend strip **26** downwardly slightly into opening **47** in board **20** and hold the strip bent at these locations thereby normally taking up the extra length of the strip between rivets **28** so that the strip normally remains straight above grate **20**. Thus, when one of the buttons, e.g. **12*b***, is depressed, it forms the projection **32** and causes it to engage its associated contact **18*b***, as seen in FIG. **3**, thereby urging strip **26** at its ends upwardly against bent ends **45** of the spacers. However, as soon as the pressure on button **12*b*** is relieved, the spring force of the bent ends of the spacers will overcome the tendency of strip **26** to maintain projection **32** and thus will bend the strip into opening **47**, relieve projection **32**, and return the strip to its straight configuration over opening **24**. On the other hand, where it is desired that the strip **26** maintain its contact with a contact **18** for extended periods, i.e. not be intermittently operated, then the bent ends **45** of spacers **44** are eliminated. In that case, as described hereinafter, the strip **26**, because of its configuration, will hold projection **32** in contact with the selected contact until another button **12** is pushed.

This latter form of the invention is shown in FIG. **3*b*** wherein it is seen that in the assembled configuration of switch **10**, without the bent spacer ends **45**, strip **26** is flexed, due to the differential in length between its ends and the points of connection **28** on grate **20** so that a projection **32** is automatically formed which will enter one of the apertures **24** in the grate and contact one of the contacts **18** on contact board **16**. Thus, for example, as shown in FIG. **3*b***, one of the contacts **18*b*** is engaged by the projection **32**. In that position the button **12*b*** is, in effect, depressed and slides into its lowermost position under the influence of gravity. On the other hand, the remaining buttons **12** remain in their uppermost position resting on the upper surface **40** of strip **26**. In this position the buttons also prevent the projection **32** from forming in a direction away from grate **20**.

As a result of the cross-curved configuration of strip **26**, the strip has an unstable column strength which makes it relatively easy to bend to form projection **32**. However, when the projection is formed, the curved strip tends to flatten out, at the apex of the projection, as illustrated in FIG. **5**. (This occurs in all embodiments of the present invention.) This flattening of the cross-curved band tends to hold the band in the flexed position, i.e. it serves to maintain the configuration of projection **32**, until an outside force is placed on strip **26** at some other location. In effect, the cross-curved band acts as an "over the center member" when the band is flexed into the curved position. That is, at projection **32** the flexure of the strip causes the curved cross-section thereof to flatten out so that the center portion of the band moves downwardly, as seen in FIGS. **4** and **5**, past a position at which the natural resiliency of the band will maintain its curved configuration. Once it has moved past that point, the band will maintain its flat configuration, or possibly even a reverse curved configuration until it is forced back in the opposite direction. This feature of the crosscurved strip enables the strip to maintain the projection **32** at a fixed location during the operation of the switch of FIG. **3***b* until another button **12** is depressed.

It is noted that although the strip **26** is shown in the drawing as being positioned to curve or open towards grate **20** and contact **18**, the strip can be placed in the reverse position to curve or open towards cover plate **33** and will still operate in substantially the same manner, i.e. it will still flatten out at projection **32** to hold the projection in its associated grate aperture **24**.

When it is desired to engage the common contact strip **26** with another contact element, for example contact **18***a* in FIG. **3***b*, pushbutton **12***a* is manually engaged and depressed against strip **26** and into the aperture **24***a* associated therewith. As a result of the manual force applied to the pushbutton **12***a*, band **26** is depressed and projection **32** is formed in the aperture **24***a* associated with contact **18***a*. Because the force on pushbutton **12***a* forms the projection **32** in this aperture, the projection **32** in aperture **24***b* is relieved, and the band returns to its curved and relatively straight configuration beneath pushbutton **12***b*, raising the latter to its uppermost position. Of course, in the embodiment of FIG. **3***a* this occurs automatically when pressure on pushbutton **12***b* is relieved due to the biasing effects of the spring bent ends **45** of spacers **44**. In that case projection **32** is relieved and is not formed again until another pushbutton, e.g. **12***a*, is depressed and held down against the bias of spacers **44**.

Because of the cross-curved configuration of strip **26**, there is a positive snap action in the switch assembly so that the contacts between the strip **26** and the contacts **18** are made rapidly and positively. That is, projection **32** is rapidly snapped and unsnapped at the respective locations of the buttons **12** upon the actuation thereof. Thus, there is a clean, positive action contact in the switch.

In another embodiment of the present invention illustrated in FIG. **6**, a toggle switch element **50** is utilized in lieu of the pushbuttons **12**. As seen therein the toggle switch comprises an inverted Y-shaped member having a stem **52** and a pair of legs **54, 56** respectively. The toggle is pivotally mounted at **58** in the cover plate **33** of the switch assembly, with legs **54, 56** being positioned above respective apertures **24** formed in grate **20**. It is noted for the purpose of simplifying the drawing, only two apertures **24** have been shown in FIG. **6**, however, it is to be understood that the switch shown therein can have multiple toggle switches respectively associated with additional contacts **18** formed on board **16**. In this embodiment of the invention the switch is constructed in a similar manner to the switch **10** in that a contact board **16** is provided with contacts **18** formed thereon. The apertured grate plate **20** is positioned in superimposed relation to the printed circuit board **16**, with the apertures **24** thereof exposing contact elements **18**, and a cross-curved common contact strip **26** is mounted above the grate plate **20** between that plate and the cover **33**. As will be appreciated by a careful consideration of FIG. **6**, by rotating toggle member **50** in opposite directions, as indicated by the arrow **60** in the drawing, legs **54** and **56** will alternately be urged into contact with common contact strip **26**, causing the projection **32** to form in the aperture **24** in which the leg is inserted. The switch operates in substantially the same manner as the previously described switch of FIG. **3***b* in that the cross-curved contact member tends to flatten out in an over-the-center manner, to hold the projection **32** in the selected aperture **24** until the switch **50** is reversed.

Yet another embodiment of the invention is illustrated in FIG. **7** of the drawing. The switch **70** shown therein is similar in construction to the switch illustrated in FIG. 3b of the drawing, however, in lieu of the pushbutton members **12** a slide element **72** is mounted for sliding movement in cover **33** between two extreme positions at the right and left side (not shown) of the switch along a straight path, indicated by the arrow **74**, above openings **24** in grate **20**. Slide element **72** has a resilient arm **76** secured thereto which is adapted to slidingly engage the upper surface **40** of the cross-curved common contact strip **26**. As illustrated in FIG. **7**, with leg **76** engaging the contact strip **26** in this manner, it depresses the strip and forms projection **32** therein which engages the contact element **18**a associated with the aperture **24** in grate plate **20** thereabove. When the slide **72** is moved towards the right, the leg **76** thereof causes the projection **32** to be formed in the successive apertures **24** while relieving the projection **32** in a prior aperture by applying sufficient force to the strip to overcome its tendency to hold the projection in the prior aperture.

Another embodiment of the present invention is illustrated in FIG. **8** of the drawing. This embodiment is similar to that illustrated in FIG. **3**, except that the pushbuttons **12** have been eliminated therefrom so that the switch can be directly operated manually. Thus, switch **80** includes a contact board **16** having electrical contacts **18** formed thereon at predetermined spaced locations along its upper surface **22**. A grate **20** is mounted above contact board **16** in superimposed relation with the apertures **24** thereof respectively located above the contacts **18**. In addition, a cross-curved metallic contact strip **26** is mounted above and adjacent grate **20**, with its length being selected to be larger than the distance between the points of connection **28** of the contact element to the grate so contact to form the projection **32** therein. Cover **33** provides a series of apertures **34** through which a finger can be inserted to engage the contact strip **26**. The apertures **34** serve to confine the finger pressure to the proper area over the desired contact element **18**.

In this embodiment of the invention the contact strip **26** may be provided with an insulated coating on its exposed side, i.e. on its side facing the apertures **34.** Alternatively, in certain applications, the contact element need not be insulated. For example, the selector switch **80** may be used in a vending machine wherein the selection is made prior to insertion in a coin in the machine; in that case there is no current through the switch until the coin is deposited. Thus, the purchaser simply makes a selection by inserting a finger in a selected aperture **34** in order to urge the contact strip **26** into engagement with the appropriate contact **18,** thereby moving the projection **32** into the appropriate aperture **24** adjacent the selected contact, and then deposits his coin. At that point, his finger is removed from the switch and the coin activates an additional switch which supplies current to the circuit. Thus, no insulation of strip **26** will be required.

In this embodiment of the invention the cross-curved contact strip operates in substantially the same manner as the embodiments which were previously described in that the curved configuration thereof provides unstable column strength in the strip which permits the strip to be readily flexed in the desired direction and which holds the flexed strip with projection **32** in the appropriate aperture until an outside force is applied to the strip through a separate aperture **24.**

FIGS. **9** and **10** of the drawings illustrate a portion of two additional embodiments of the present invention which are similar in construction to the embodiment of FIG. *3b.* Each of these embodiments is provided with a contact strip compliance means **90, 100,** respectively, formed therein. These compliance means serve to apply a compressive force in the longitudinal direction of their associated contact strip **26,** which aids the strip in maintaining the projection **32** in a fixed position until an outside force is applied to the strip at another location. The compliance members are useful in the switches of the present invention because high tolerances between the respective lengths of the contact strip **26,** between the apertures or points of connection **27** therein, and the distance between the rivets **28,** such as is required to properly form the projections **32,** are sometimes difficult to produce, particularly in mass production operations. More specifically, in the structure of the present invention, particularly in the embodiments described above, the projection **32** is formed by the compression effected upon the contact strip **26** because of the greater length between the apertures or connection points **27** in the contact strip and the distance between the rivets **28.** Thus, the differential in these distances or lengths is highly important in effecting the formation of the projections **32** and small variations in the amount of this difference can seriously effect the operation of the switch. On the other hand, by the embodiments of the invention shown in FIGS. **9** and **10** of the drawings, the compliance members **90, 100,** serve to apply a compression bias to the contact strip **26** so that any variation in the tolerance of the respective lengths of the strip and the distance between the points of connection, is overcome by the compression imposed on the strip from the compliance means.

More specifically, the compliance means **90** shown in the modification of the switch assembly in FIG. **9** of the drawings consists of a preformed and permanent corrugation in one end of the strip **26** on the same side of the opening **27** therein as the projections **32** to be formed. The corrugation **90** is located to enter an opening **92** formed in grate **20** to accommodate the corrugation. By this construction, when the strip **26** is secured in the assembled switch, i.e. secured to rivets **28,** it is held in compression not only by the excess length of the strip between its openings **27,** but also by the corrugation or crimp in the strip provided by the compliance means **90.** Thus, a bias compression stress or force is placed on the strip **26** along its longitudinal axis by the compliance means **90.** This force will hold the projections **32** formed in the switch in a stable configuration until another pushbutton is pushed to form the projection **32** at a different location, i.e. in a different aperture **24.**

The embodiment of the invention illustrated in FIG. **10** of the drawing operates on the same principle as the compliance means discussed above with respect to FIG. **9.** In this case, however, the cross-curved strip **26** is provided with an enlarged portion **102** having a central aperture **104** formed therein in order to define a pair of thin legs or connecting strips **106.** By this construction, when the switch is assembled with strip **26** secured through its openings **27** to the rivets **28,** the strip is compressed to form a projection **32** because of the difference between its length between openings **27** and the distance between the rivets **28.** However, any difference in tolerance is accommodated by the compliance means **100,** since the thin legs **106** thereof apply a longitudinal compressive force to the contact strip in the mounted assembly. Accordingly, the strip is maintained in compression and the projections **32** formed therein will be held in a fixed position even if the relative lengths between openings **27** and rivets **28** are not exactly correct. The legs **106,** since they are formed of the same spring steel material as the strip **26,** have a relatively high spring rate, i.e. they constitute a relatively stiff spring which maintains a substantial compression stress on the strip **26** to insure that the projections **32** when formed hold their position and contact with their associated contact member **18.**

Accordingly, it is seen that a relatively simple and inexpensive switch assembly is provided wherein only a single moving part is utilized to provide a selection between a plurality of different electrical circuits. Moreover, this single moving element, i.e. the flexible cross-curved strip **26,** is constructed so as to maintain the selected position as a result of its own configuration and strength rather than as a result of the application of outside forces by springs, latches or the like as are required in previously proposed devices. As a further result of the relatively simple construction of the invention, the switch assembly is inexpensive to produce and can be manufactured at relatively high production rates.

It will be apparent from the foregoing description that the cross-curved strip **26** should be of a suitable spring material for best results in the practice of the invention. Spring steel, preferably stainless spring steel, having the physical properties of the strip used to manufacture steel tape measures is a highly satisfactory material for the strip **26.** Other alloys such as berillum copper, phosphor bronze, or a suitable spring brass can be used.

Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodi-

ments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of this invention.

What is claimed is:

1. A switch assembly comprising a contact board having a plurality of electrical contacts positioned thereon, an apertured grate operatively connected to said contact board adjacent said electrical contacts and having a plurality of apertures formed therein respectively associated with each of said electrical contacts to expose said contacts through the grate, and a resilient electrically conductive contact strip having opposite end portions respectively operatively connected to opposite ends of said grate at predetermined points of connection on the side of said grate opposite said contact board, said contact strip being cross-curved about its longitudinal axis, transversely of its width; the distance between said predetermined points of connection on said grate being less than the length of said contact strip between said points of connection whereby a portion of said strip is flexed into a projection extending towards and entering one of the apertures in said grate to engage the contact member associated with said one aperture; said cross-curved contact strip being flattened across its width at said projection by the flexing of the strip thereby holding the strip in said one aperture until the strip is urged through another aperture in said grate, causing said projection to occur at said another aperture and relieving the projection and flattening of the strip at said one aperture; and means for maintaining one portion of said contact strip in electrical connection with an electrical conductor at all times, whereby said strip operates to provide an electrical connection between said conductor and a selected one of said contacts at substantially all times, in accordance with the selected location of said projection.

2. A switch device as defined in claim 1 wherein said grate is formed of an electrical insulating material.

3. A switch as defined in claim 1 including a cover plate operatively connected to said grate, said cover plate being located on the side of said contact strip opposite said grate and having a plurality of apertures formed therein in position to be in alignment with the apertures in said grate.

4. A switch as defined in claim 3 including a strip of insulating material positioned over said contact strip on the side thereof adjacent said cover plate.

5. A switch as defined in claim 3 including a plurality of pushbuttons respectively slidably mounted in the apertures in said cover plate for movement towards and away from said contact board and having first end portions positioned adjacent said contact strip and adapted to be respectively urged into engagement with said strip and into their associated apertures in said grate to flex said strip and form said projection at their associated aperture in the grate to contact their associated contact member with said strip.

6. The switch as defined in claim 3 wherein said contact strip is positioned with one curved side thereof opening towards said grate.

7. The switch as defined in claim 3 including at least one toggle member pivotally mounted in said cover plate above and adjacent a pair of apertures therein; said toggle member including a pair of leg members positioned to respectively enter said pair of apertures in said cover upon pivotal movement of said toggle between first and second positions.

8. The switch as defined in claim 1 including a cover plate operatively connected to said grate, said cover plate being located on the side of said contact strip opposite said grate and having an elongated aperture formed therein in substantially vertical alignment with the apertures in said grate; and an insulative slide member slidably mounted in said cover plate above said contact strip for movement in the aperture of the cover between first and second positions with respect to the apertures in said grate, said slide member having a resilient leg adapted to slidably engage said contact strip, said leg member being adapted to urge said contact strip into the aperture in the grate therebelow to form said projection.

9. The switch as defined in claim 3 wherein said contact strip is formed of thin spring steel.

10. A switch assembly comprising, a contact board having a plurality of electrical contacts positioned thereon, a grate superimposed on and operatively connected to said contact board and having a plurality of apertures therein including apertures respectively located with respect to the contacts for exposing the contacts through the grate, and a cross-curved elongated contact strip operatively connected to said grate on the side thereof opposite said contacts in a predetermined position whereby the strip is flexed between its points of operative connection to the grate to form a projection extending into one of said apertures wherein the cross-curved strip is flattened across its width at said projection by the flexing of the strip thereby to hold the strip in said one aperture until the strip is urged through another aperture in said grate, causing said projection to occur at said another aperture and relieving the projection at said one aperture; and means for maintaining one portion of said contact strip in electrical connection with an electrical conductor at all times, hereby said strip operates to provide an electrical connection between said conductor and a selected one of said contacts in accordance with the selected location of said projection.

11. The switch assembly as defined in claim 10 wherein said contact strip has opposite end portions respectively connected to said grate at predetermined points of connection; the distance between said predetermined points of connection being less than the length of said contact strip between said points of connection whereby upon application of a force in a direction normal to said contact strip and towards said grate, said strip is flexed into a projection extending towards and entering one of the apertures in said grate to engage the contact member associated with said one aperture.

12. The switch assembly as defined in claim 11 including means in said assembly engaging said contact strip for urging the strip into a straight configuration above the apertures in said grate.

13. The switch assembly as defined in claim 11 wherein said distance and said lengths are selected in predetermined relation to each other such that flexing of said strip holds the strip in said one aperture until the strip is urged through another aperture in said grate, causing said projection to occur at said another aperture and relieving the projection at said one aperture.

14. The switch assembly as defined in claim 13 wherein said means comprises means for maintaining said one portion of said contact strip in engagement with one of said electrical contacts on said board at all times.

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