United States Patent

Lincoln et al.

[15] **3,655,925**

[45] **Apr. 11, 1972**

[54] THUMBWHEEL SWITCH STRUCTURE WITH IMPROVED U-SHAPED FASTENERS FOR MULTIPLE GAUGED SWITCH HOUSING ASSEMBLY

[72] Inventors: **Thomas C. Lincoln; Andrew Voge,** both of Arcadia, Calif.

[73] Assignee: **Becton Dickinson Electronics Company,** Pasadena, Calif.

[22] Filed: **Apr. 13, 1971**

[21] Appl. No.: **133,602**

[52] **U.S. Cl.**.....**200/11 TW,** 200/168 K

[51] **Int. Cl.**.....**H01h 19/58,** H01h 9/26

[58] **Field of Search**.....200/11 TW, 168 K

[56] **References Cited**

UNITED STATES PATENTS

3,089,923	5/1963	Wright	200/11 TW
3,303,296	2/1967	Scott	200/168 K
3,306,993	2/1967	Lien	200/11 TW
3,566,049	2/1971	Wright	200/11 TW

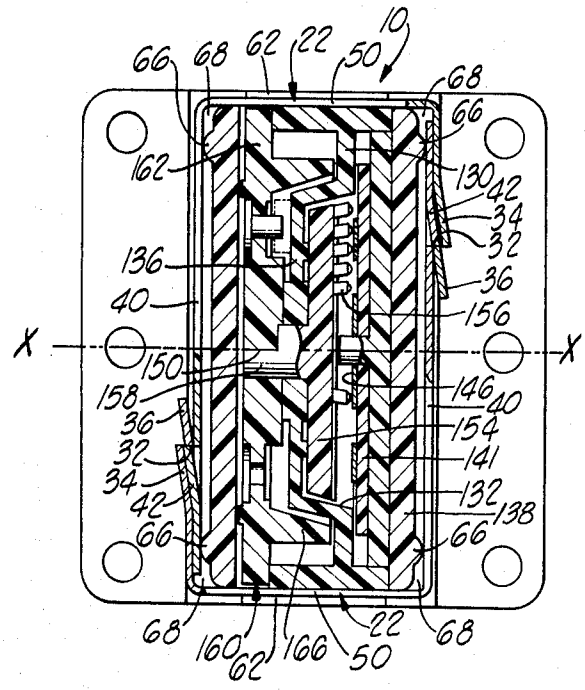
Primary Examiner—J. R. Scott

Attorney—Reed C. Lawlor

[57] **ABSTRACT**

A switch structure or assembly that includes one or more modular switch units is formed with a recess around its top wall, bottom wall, and end plates. Two ridges are formed on each end plate, which ridges extend the full width of the recess but which are narrow compared with the height of the end plates. Two identical U-shaped bands lie within the recessed portion and together embrace the switch structure or assembly. One leg of each band is shorter than the other leg of each band, the longer leg of each band being adapted to extend over both ridges of one end plate and the shorter leg being adapted to extend over only one ridge of the opposite end plate. Tongues are lanced near the ends of the longer legs of each band and slots are lanced near the ends of the shorter legs of each band. The tongue of a first band engages the slot of the second band on one side of the switch structure or assembly while the tongue of the second band engages the slot of the first band on the other side of the switch structure or assembly. The bands are securely hooked together by engagement of their respective tongues and slots and thereby hold the switch structure together.

7 Claims, 4 Drawing Figures



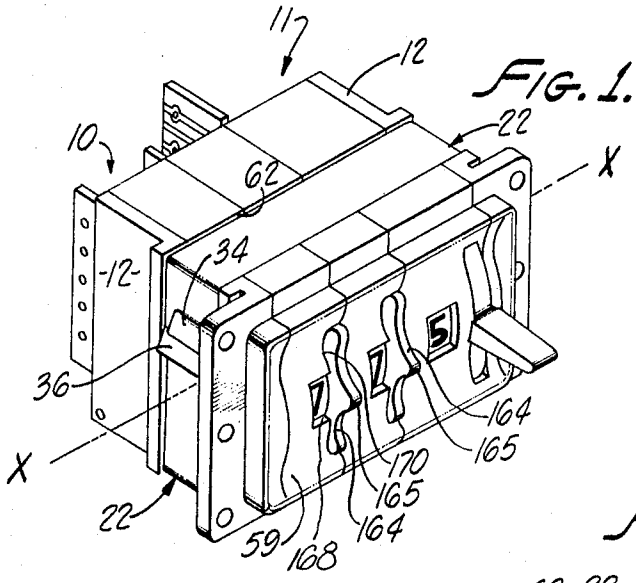


FIG. 1.

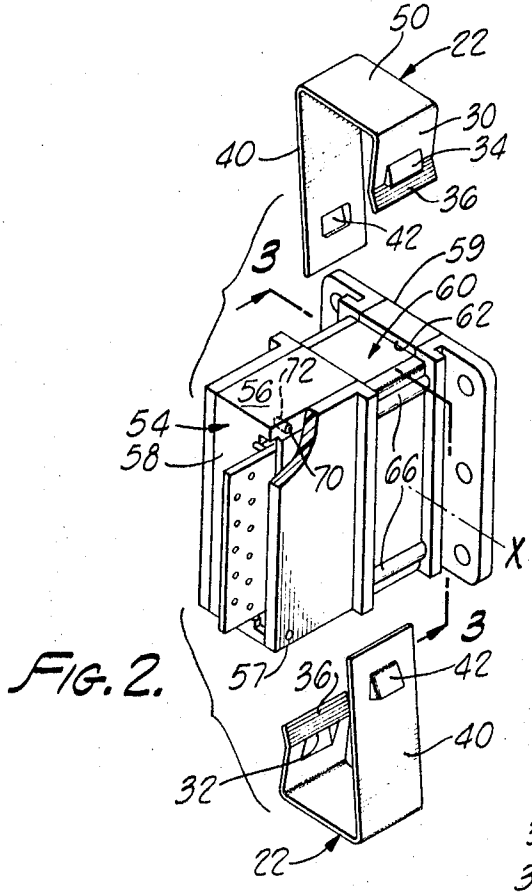


FIG. 2.

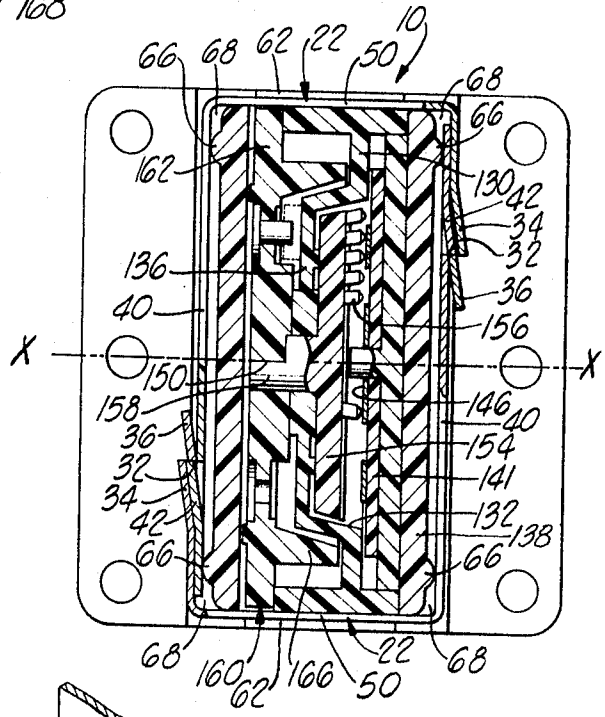


FIG. 3.

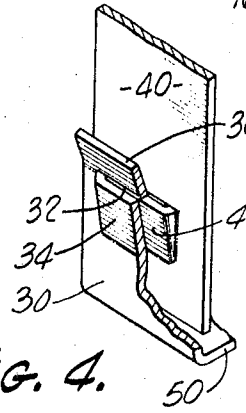


FIG. 4.

THOMAS C. LINCOLN
ANDREW VOGE
INVENTORS.
BY
ATTORNEY

THUMBWHEEL SWITCH STRUCTURE WITH IMPROVED U-SHAPED FASTENERS FOR MULTIPLE GAUGED SWITCH HOUSING ASSEMBLY

CROSS REFERENCES TO RELATED APPLICATIONS

U.S. Pat. application Ser. No. 133,279, filed Apr. 12, 1971.
U.S. Pat. application Ser. No. 133,633, filed Apr. 13, 1971.

BACKGROUND OF THE INVENTION

This invention concerns means for securing an assembly of modular switch units and, more particularly, means for fastening together the detachable parts of a switch structure or an assembly of modular switch units.

Previous methods of securing together the parts of a single switch structure of the switch units of a switch assembly have employed screws inserted through the corners of the parts to be secured together. Such a construction may be seen in U.S. Pat. No. 3,566,049, issued Feb. 23, 1971. A more recent method of securing the switch units of a switch assembly together involves two identical elongated U-shaped bands which have outwardly turned hooks on each end thereof. The legs of each band are slanted inwardly prior to assembly so that, when assembled, the cross member bows inwardly at its mid-section and engages the walls of the recessed portions formed in top and bottom walls of the case. These identical bands each encircle less than one-half of the switch structure assembly, one band extending from one side of the assembly across the top of the assembly to the other side while the other band extends in a similar manner across the bottom of the assembly. In that prior art structure, each side wall of the switch assembly includes a pair of parallel spaced apart U-shaped bars which extend outwardly from the side wall of the switch assembly and have their ends secured to the side walls. One end of each band passes between the cross member of one U-shaped bar and the side wall and then engages the cross member of this bar with the outwardly turned hooked portion at the end of the band. Thus, the bands are secured at their ends to bars on the side walls of the switch assembly.

Both of the above mentioned methods of securing together switch assemblies or the parts of a switch structure are relatively difficult to assemble. Furthermore, the disassembly of such a configuration is difficult and time consuming. In the latter prior art method, the bands must be formed to close tolerances in order to function at all. All of this increases the cost, both of the parts of the switch structure itself and of the labor which is required to assemble and to disassemble the switch structure.

We have invented an improved means for securing a switch structure or a switch assembly together which is easy to assemble and to disassemble and which does not require close tolerances and therefore which is more economical than prior devices of this type.

In our invention, a pair of identical U-shaped bands are provided which hook onto each other at their ends rather than hooking onto any other part of the switch structure. A tongue is lanced at one end of each band and a slot is lanced at the other end of each band. These tongues and slots are adapted to engage each other and are easily engaged and disengaged. The bands lie in a recessed portion provided around the exterior of the switch structure. A pair of ridges are formed in the recessed portion on each end plate of the switch structure. The shorter legs of each band extend over only one of the ridges while the longer legs of each band extend over both ridges. The cooperation of these ridges with the short legs of each band introduces a spring resilience which aids in accepting variations in the lengths of the bands. Therefore, these bands do not require close tolerances in the lengths of the bands. Also, differences in the thermal expansion and contraction of the metal bands and the plastic case are provided for by the spring resilience of the short leg and long leg acting in cooperation with the ridges. This compensation for differences in thermal coefficients of expansion and contraction

reduces distortions in the appearance and alignment of the switch structure parts. This construction also allows the use of low strength plastics, such as acronitrile butadiene styrene — 89140 (ABSON) which has a heat distortion temperature of 175° F. at 264 psi, for the case material rather than higher strength plastics, such as polycarbonate plastics which typically have a heat distortion temperature of 270° F. at 264 psi.

The longitudinal edges of the bands bear against the sides of the recessed portion. Also, the parts of the switch structure are provided with mating or interlocking protrusions and recesses, such as corresponding pins and holes, which are adapted to engage each other. The engagement of the edges of the band with the sides of the recessed portion and the engagement of the mating portions of the parts of the switch structure with each other provide, when the bands are in place and secured together, a very rigid assembly or structure that is of relatively low manufacturing cost and that is easily assembled and disassembled.

SUMMARY OF THE INVENTION

This invention provides fastening means for securing together the detachable parts of a switch structure. The switch structure comprises a case having walls which define an electrical parts chamber. Fixed first electrical contacts are mounted adjacent to the electrical parts chamber. Movable second electrical contacts are mounted adjacent to the electrical parts chamber in cooperative relation with the first contacts for making and breaking circuits. A rotary switch wheel, having a drum with indicia on its periphery, is provided. Actuating means are adapted to rotate the wheel. The wheel is coupled to the second contacts for driving the second contacts with respect to the first contacts. The fastening means embraces the switch structure. The fastening means has a tongue formed in one end thereof, which tongue extends away from the switch structure. The fastening means also has an aperture formed in the other end thereof. The tongue and aperture are adapted to engage each other thereby holding the fastening means together around the switch structure.

BRIEF DESCRIPTION OF THE DRAWINGS

The presently preferred form of the invention is disclosed in the accompanying drawings wherein:

FIG. 1 is a perspective view showing an assembly of modular switch units held together by the bands of this invention;

FIG. 2 is a partially exploded perspective view showing a switch structure with the bands of this invention in exploded relation;

FIG. 3 is a sectional elevational view taken along the line 3—3 of FIG. 2 but with the bands in engaging relation with each other; and

FIG. 4 is a partial sectional perspective view showing the bands in engaging relation with each other.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 there is shown an assembly of modular switch units 10 and 11 adapted to be mounted on a switch panel and to form a switch structure assembly. The switch structure assembly includes end plates or backets 12 which close the two ends of the switch assembly.

As may be seen in FIG. 1, the switch securing or fastening means of this invention may be employed with various types of switch units. In FIG. 1 a lever-type switch unit 11 and two thumbwheel type switch units 10 are represented. A rotary switch axis X—X extends through each switch unit of the switch assembly, as will be more fully explained hereinafter. A lever-type switch unit 11 is described and shown in U.S. Pat. application Ser. No. 855,226, filed Sept. 4, 1969. A thumbwheel-type switch unit 10 is described and shown in U.S. Pat. No. 3,306,993, issued Feb. 28, 1967. The interior mechanism of another type of thumbwheel switch, described and shown more fully in copending U.S. Pat. applications Ser. Nos. 133,279, filed Apr. 12, 1971, and Ser. No. 133,633, filed

Apr. 13, 1971, will be described briefly hereinafter in connection with FIG. 3. Only the switch unit 10 will be referred to hereinafter in the description of this invention.

As may be seen in FIGS. 1, 2, and 3, the fastening or securing means of this invention is composed of two identical U-shaped bands 22. Each of the bands 22 is composed of a resilient flexible material, such as stainless steel or the like. In the best embodiment of this invention, the band 22 is about three-eighths of an inch wide and about one sixty-fourth of an inch thick. The length of each band will depend upon the size of the switch structure or the length of the assembly to be secured together by the two bands.

Each U-shaped band 22 comprises a short leg 30, a long leg 40, and a cross member 50. Each short leg 30 of each band 22 has a slot 32 lanced near the end of the short leg 30. The lanced portion of the short leg 30 forms a three-sided ramp 34 which slopes outwardly away from the end of the short leg 30. The highest part of the ramp above the short leg 30 is equal to or greater than the thickness of the band 22. The end 36 of the short leg 30 beyond the ramp 34 is bent outwardly.

As may be seen in FIG. 2, prior to assembly of the bands 22, the short leg 30 of each band 22 is bent inwardly towards the switch structure and bears against one side wall of the switch structure to form a spring which holds the switch structure parts together when only one band is assembled on the switch structure. As is shown in FIGS. 1 and 3, when assembled, the short leg 30 of each band 22 is bent so that it is approximately perpendicular to the cross member 50. In this position, the ends 36 of the bands 22 slope outwardly away from the switch structure so that the long legs 40 may be inserted under the ends 36 as will be explained more fully hereinafter.

The long legs 40 are also bent inwardly prior to assembly. When the bands are assembled on the switch structure, they are about parallel to each other, thus causing the cross member 50 to bow inwardly at its central part or mid-section. The edges of the inwardly bowed section of the cross member 50 engage the walls 62 of the recessed portion 60 of the switch case, as will be explained hereinafter.

A portion near the end of each long leg 40 of each band 22 is also lanced. This lanced portion forms a tongue or a three-sided ramp 42 which projects outwardly and which slopes inwardly towards the end of the long leg. The distance between the top of the ramp and the band is equal to or greater than the thickness of the band itself.

The ramp 34 is wider than the ramp or tongue 42 in order that the tongue 42 may easily fit or rest underneath the ramp 34 when the ends of the bands engage each other, as will be explained more fully hereinafter. The ramps 34 and 42 also provide for an easy assembly of the bands by providing a sloping surface on which the short legs ride up over the long legs. The cross member 50 forms a tie between the short leg 30 and the long leg 40 of each band 22.

In order to hook the bands 22 onto each other and to secure the switch structure together, one band is mounted on the switch structure with its cross member 50 on the top or bottom side of the switch structure. In this position, the long leg of this first band will extend almost the full length of one end plate while the short leg of this first band will extend about one-third of the way down the opposite end plate. The end of the short leg will bear against end plate 12. The second band is then mounted on the other side of the switch structure with the legs of the second band oppositely positioned to the legs of the first band, as may be seen in FIGS. 2 and 3. That is, the second band is positioned on the switch structure so that the end of the long leg 40 of one band 22, when mounted on the switch structure, projects under the sloped portion 36 of the short leg 30 of the other band. The ramp or tongue 42 will nest within the ramp 34 when the bands are pushed together (see FIG. 4). The tongue 42 of the long leg snaps into and engages the edge of the slot 32 of the short leg of the other band. A similar relationship exists on the opposite side of the switch structure. This nesting engagement of tongues in slots secures the two bands together at their ends and thus holds the switch structure together.

In order to disassemble the fastening means and the switch structure, the outwardly sloped portion 36 of the short leg 30 of one band is pried up and away from the switch structure, thus disengaging the tongue 42 from the edge of the slot 32 on one side of the switch structure. The long leg and the short leg are then moved slightly apart in a vertical direction. A similar operation is performed on the other side of the switch structure. The two bands are then removed entirely from the switch structure.

Thus, two identical bands are employed which hook onto each other around the switch structure and hold the switch structure and its parts together.

The case 54 of each switch unit 10 has a top wall 56 and a bottom wall 57. Angular end brackets or end plates 12 are provided to close each end of the switch structure or an assembly of switch units. A recessed portion 60, shown in FIG. 2, is formed in the top and bottom walls and end plates of the switch structure. The recessed portion 60 thus extends around the entire switch structure or assembly. Walls or flanges 62 of the recessed portion 60 also extend around the entire switch structure. The walls 62, in cooperation with the bands 22, give extra horizontal stability and rigidity to the switch structure, as will be explained more fully hereinafter.

A pair of ridges 66 are formed on each end plate 12. Each ridge 66 is formed near one end of the end plate 12 and extends the full width of the recessed portion 60. The ridges 66 are about one sixty-fourth of an inch high and are positioned about one-sixteenth of an inch from the ends of the end plates.

As may be seen in FIG. 3, the long leg 40 of each band 22 extends over and rests upon both ridges 66 of one end plate 12. The short leg 30 of each band 22 extends over upon only one ridge 66 of one end plate 12 and rests on the long leg 40 underneath the short leg. The positioning of the legs 30 and 40 on the ridges 66, together with the inward bend of the legs 30, provides a spring tension which holds the switch assembly together while at the same time the legs 30 or 40 bear only on the ends of the switch end plates. This eliminates pressure on the central portion of the end plates which could bind the interior mechanism of the switch by bowing the end plates inwardly against the interior mechanism.

As may be seen in FIG. 3, hollow spaces or cavities 68 are formed between the corners of the bands 22 and the corners of the end plates 12. These cavities 68, together with the distance provided between a ridge 66 and the end of a short leg 30, provide bands 22 which accept variations in the lengths of the bands so that the tolerances in the length of the bands are not as exacting as they would be if the corners of the bands 22 bore directly on the corners of the end plates 12. That is, the bands may be elongated somewhat by bending them at the corners and over the ridges 66 instead of by attempting to stretch the bands longitudinally. Furthermore, this construction of the bands 22, with an inwardly bent short leg and a long leg, provides a band which when mounted on the switch structure will temporarily hold the switch structure or assembly together by itself while the other band is being mounted in place.

Interengaging members, such as mating pins 70 and holes 72, shown in FIG. 2, are provided on the sides of the case walls and on the interior of the end plates. These pins and holes provide for easy alignment of adjacent switch units into a switch assembly, as is shown in FIG. 1, and for easy alignment and mounting of end plates on a switch unit to form a switch structure, as is shown in FIG. 2. Pins 70 and holes 72 also prevent any substantial horizontal or vertical motion of switch units with respect to each other and of the end plates with respect to the switch unit about the X—X axis. The pins and holes cooperate with the interlocked band members to provide a very rigid switch structure or switch assembly.

More particularly, the switch structure or assembly is held against bending in the horizontal direction by the coaction of the web of the bands 50 with the walls 62 of the recessed portion 60, which web and walls bear against each other. Any such bending is also resisted by the web of the band itself. At the same time, the alignment of the switches about the rotary

axis X—X of the switch is preserved by the interengaging pins **70** and holes **72**.

Thus, a low cost means of fastening the parts of a switch structure or switch structure assembly together is provided which is easily assembled and disassembled so that the user may have ready access to the individual switch units for repair, replacement, or the like. Furthermore, since the ridges **66** provide a spring resilience and the bands **22** engage each other rather than the case and are free to bend at the corners of the switch assembly, the tolerances for the lengths of the bands are less rigid and therefore the cost of the switch fastening means is reduced. Since the two bands **22** are identical, tooling costs are also reduced.

The interior mechanism of one type of switch unit which may be employed in this invention is shown in FIGS. **2** and **3**.

Switch unit **10** comprises a case **54**, preferably cast or molded of an electrically insulating material, such as any appropriate well-known thermosetting plastic resin. Case **54** is molded with a top wall **56**, bottom wall **57**, a back wall **58**, and a front wall **59**. A transverse partition wall **130** is formed between these four walls.

An electrical parts chamber or well **132** is formed in the transverse partition wall **130** and a corresponding cylindrical protrusion **136** is formed on the opposite side of the partition wall **130**. A rotary brush holder **154**, is positioned in the well **132**. Rotary electrical contacts or fingers **156** are mounted on brush holder **154** and engage the fixed electrical contacts **146** on printed circuit board **141**, thereby providing for circuit making and breaking. Printed circuit board **141** is mounted adjacent to well **130** with contacts **146** facing the well **130**. The electrical contacts **146** are connected to terminals (not shown) at the back end of the printed circuit board **141** which extends rearwardly beyond the back wall **58** of the case **54**. Fingers **156** are resiliently compressed against circuit board **141**, thereby maintaining brush holder **154** against partition wall **130**.

Cover plate **138** is secured over the outside of printed circuit board **141** so that the printed circuit board **141** is held in position against the partition wall **130**.

Bore **150** is provided in the center of the well **132** and receives shaft **158**. Brush holder **154** is mounted on one end of the shaft **158** for rotation with shaft **158** in well **132**. Axis X—X is parallel to the front wall **59** of the case and forms the rotary axis for the wheel **160**, shaft **158**, and brush holder **154**.

The operation of brush holder **154** is effected through shaft **158** by indicia carrying wheel **160** which is mounted on the other side of transverse wall **130** about cylindrical protrusion **136**. Wheel **160** is mounted on the other end of shaft **158**. Indicia wheel **160** includes a peripheral radially extending flange **162** which has arcuate notches **164** providing finger lugs **165** to be engaged by the operator's finger for rotation of the wheel **160** by a tangential finger movement.

The inner side of wheel **160** is provided with a concentric inwardly directed cylindrical rim or flange **166** which carries various digits, such as **0** to **9** of the decimal system, or other indicia. The front wall **59** of the unit **10** is provided with a window **168** through which various indicium on the cylindrical rim **166** of the wheel **160** may be viewed from the front of the switch. The finger lugs **165** extend beyond the front wall through aperture **170** formed in front wall **59** for engagement by the finger of an operator.

Although only one specific embodiment of the invention has been described herein, it will be obvious that the invention is not limited thereto but is capable of being embodied in many other forms. Various changes which will suggest themselves to those skilled in the art may be made in the material, form, and details of the construction and arrangement of the parts without departing from the invention. Similarly, the invention may be applied to switches incorporating other modifications and to switches of various types. It is therefore understood that the invention is applicable to numerous modifications, all within the scope of the appended claims.

The invention claimed is:

1. A switch structure comprising:

a case having walls defining an electrical parts chamber;

relatively fixed first electrical contact means mounted adjacent to said electrical parts chamber;

relatively movable second electrical contact means mounted adjacent to said electrical parts chamber in cooperative relation with said relatively first contact means for making and breaking circuits;

a rotary switch wheel having a drum with indicia printed on the periphery of the drum;

actuating means adapted to rotate the wheel;

means coupling said relatively movable second contact means to said wheel for driving said second contact means with respect to said relatively fixed first contact means; and

fastening means for holding parts of the switch structure together, said fastening means embracing the switch structure and having a tongue formed in one end thereof, said tongue extending away from said switch structure, said fastening means having an aperture formed in the other end thereof, said tongue being adapted to engage said aperture thereby holding the ends of the fastening means together around said switch structure.

2. A switch structure as comprised in claim **1** wherein said case has top and bottom walls, said switch structure further comprising:

a pair of side walls; and

stabilizing means adapted to aid in aligning the front and rear portions of the case and side walls with each other and to prevent movement of the switch case and side walls with respect to each other about a horizontal axis through said case and parallel to the front of said case.

3. A switch structure comprising:

a case having walls defining an electrical parts chamber;

relatively fixed first contact means mounted adjacent to said electrical parts chamber;

relatively movable second contact means mounted adjacent to said electrical parts chamber in cooperative relation with said relatively fixed first contact means for making and breaking circuits;

a rotary switching wheel having finger engaging means to rotate the wheel and having a drum with indicia printed on the periphery of the drum;

said switch case having a front wall structure providing an aperture through which said finger engaging means project and providing a window for viewing a selected indicium;

means coupling said relatively movable second contact means to said wheel for driving said second contact means with respect to said relatively fixed first contact means;

said switch case having top, bottom, and side walls, said walls having a recessed portion extending around the outside of the switch case; and

a band for holding the parts of the switch unit together, said band embracing the switch structure and having a tongue formed in one end thereof, said tongue extending away from said switch structure, said band having an aperture formed on the other end thereof, said tongue being adapted to engage one side of said band aperture thereby holding the ends of the band together around said switch structure.

4. A switch structure comprising:

a case having top, bottom and side walls and a recessed portion extending around the outside of said walls;

two ridges formed on each side wall of said case in said recessed portion and spaced from the ends of said side walls, said ridges extending the full width of said recessed portion but being narrow compared with the height of said side walls;

two identical U-shaped bands adapted to lie within said recessed portion and together to encircle said switch structure case, one leg of each band being shorter than the other longer leg, the longer leg of each band being adapted to extend over both ridges on one side of said

case and the shorter legs being adapted to extend over only one ridge on the opposite side of the case;

said shorter legs having their ends sloped away from said case in order that the longer leg of the other band may be easily inserted under said sloped end of the shorter leg;

the shorter legs having slots lanced near the ends of said legs;

each said longer leg having an outwardly extending tongue portion lanced near the end of said longer leg, one end of said tongue portion being raised from said band by an amount at least equal to the thickness of said band and which ramp slopes towards the end of said longest leg;

said slot of one band providing an edge for hooking engagement by said tongue of the other band; and

said hands being mounted on the switch structure case in said recessed portion so that the longer leg of the first band slides under the shorter leg of the second band on a first side of the case and so that the longer leg of the second band slides under the shorter leg of the first band on the second side of the case, said longer and shorter legs being securely hooked together by engagement of their respective tongues and slots thereby holding the switch structure and its parts together.

5. A switch structure comprising:

a case having front, top, and bottom wall members and defining an electrical parts chamber;

relatively fixed first contact means mounted adjacent to said electrical parts chamber;

relatively movable second contact means mounted adjacent to said electrical parts chamber in cooperative relation with said relatively fixed first contact means for making and breaking circuits;

at least one of said first and second contact means including resilient contact means maintained in compression during said circuit making and breaking;

a rotary switching wheel having finger engaging means to rotate said wheel and having a drum with indicia on the periphery thereof;

rotatable shaft means coupling said relatively movable second contact means and said wheel for driving said second contact means with respect to said relatively fixed first contact means;

said case front wall providing an aperture through which said finger engaging means project and providing a window for viewing a selected indicium;

said switch structure having a pair of end plates closing the two sides of said switch structure, said top and bottom walls in said end plates having a recessed portion extending around the outside of said switch structure;

two ridges formed spaced from each end plate in said recessed portion, said ridges extending the full width of said recessed portion but being narrow compared with the height of said end plates;

two identical U-shaped bands adapted to lie within said recessed portion and together to encircle said switch structure, one leg of each band being shorter than the other leg of each band, the longer leg of each band being adapted to extend over both ridges of one end plate and the shorter leg being adapted to extend over only one ridge of the opposite end plate, the corners of the bands being spaced from the corners of the switch structure;

said shorter legs having their ends sloped away from the end plates in order that the longer legs may be easily inserted under the sloped ends of said shorter legs;

the shorter legs having slots lanced near their ends, a portion of each shorter leg between the slot and the cross member being in the form of a ramp raised in the direction away from the case by an amount at least equal to the thickness of the band and which ramp slopes away from the end of said shorter legs;

each said longer leg having an outwardly projecting tongue lance near the end of said longer leg, said tongue being in the form of a ramp which is raised in the direction away from said case by an amount at least equal to the thickness of the band and which ramp slopes towards the end of the longest legs, the ramps on the long legs being narrower than the ramp on the short legs; and

said bands being mounted on the switch structure in said recessed portion so that the edges of the bands bear against the edges of the recessed portion and so that the longer legs of the first band slide under the shorter leg of the second band on a first side of the switch structure and so that the longer leg of the second band slides under the shorter leg of the first band on the second side of the switch structure, said slot of each band providing an edge for hooking engagement by said tongue of the other band, and said ramps of said longer legs nesting within the ramps of said shorter legs, said longer and shorter legs being securely hooked together by engagement of the respective tongues and slots thereby holding the switch structure together.

6. A switch structure assembly comprising a plurality of switch units, each switch unit comprising a stationary switch structure and a rotary switch structure, said stationary switch structure comprising:

a case having front, top, rear, and bottom wall members and a transverse wall member extending between the aforementioned four wall members, said five wall members of said case constituting a unitary rigid structure;

interengaging members being formed in each switch unit which are designed to mate with corresponding interengaging members formed in the adjacent switch units in the assembly in order to accurately align all of the units of the assembly and to prevent movement of the switch units with respect to each other about a horizontal axis parallel to said front wall;

said transverse wall member providing a recessed well on one side thereof and a corresponding cylindrical protrusion on the other side thereof;

said front wall member having an open window section opposite said cylindrical protrusion;

a bore in the center of said well;

a printed circuit plate composed of insulating material mounted opposite said well and having first electrical contacts formed thereon, said plate and first contacts projecting rearwardly from said front wall;

said rotary switch structure comprising:

a rotatable brush wheel mounted in said well and bearing second electrical contacts facing and engaging the first contacts on said plate;

a rotatable indicia wheel encircling said cylindrical protrusion, said indicia wheel being connected to said brush wheel by shaft means extending through said bore whereby said indicia wheel and said brush wheel are adapted to rotate together;

said indicia wheel bearing different symbols on its periphery corresponding respectively to different switch positions, a selected one of said symbols being registered in an indicia indicating position where it is visible through said window when the indicia wheel is moved to one of said different positions;

said indicia wheel also bearing a plurality of radially extending finger lugs on its periphery, successive ones of which are spaced apart by an amount sufficient to receive the distal portion of an operator's finger, at least one lug of said wheel projecting at any one time radially outward through said open window whereby said lug is accessible from the front of said switch for operation by a finger of the user;

said assembly of units having end plates mounted on each end of the assembly to close the sides of the units at opposite ends of the assembly;

the top and bottom walls of each unit and the end plates having a recessed portion extending around the outside of the assembly;

two ridges formed on each end plate in said recessed portion, said ridges being spaced from the end of each plate and extending the full width of said recessed portion but being narrow compared with the height of said end plates;

two identical U-shaped bands adapted to lie within said recessed portion and together to encircle all the units and the end plates of the said switch assembly, one leg of each band being shorter than the other leg of each band, the longer leg of each band being adapted to extend over both ridges of one end plate and the shorter leg being adapted to extend over only one ridge on the opposite side of the assembly, the corners of the bands being spaced from the corners of the assembly;

said shorter legs having their ends sloping away from the end plates of said assembly in order that the longer legs may be easily inserted under the sloped ends of the shorter legs;

the shorter legs having slots lanced near their ends, a portion of the short legs between the slots and the cross member being in the form of a ramp raised in a direction away from the case by an amount at least equal to the thickness of said band and which ramp slopes away from the end of said shorter legs;

each said longer leg having an outwardly projecting tongue lanced near the end of said longer leg, said tongue being in the form of a ramp which is raised in a direction away from said case by an amount at least equal to the thickness of the band and which ramp slopes towards the end of the longest leg, said ramps on said longer legs being narrower than the ramps on the shorter legs; and

said bands being mounted on the switch assembly in said recessed portion so that the edges of the bands bear against the edges of the recessed portion and so that the longer leg of the first band slides under the shorter leg of the second band on a first side of the switch assembly and so that the longer leg of the second band slides under the shorter leg of the first band on the second side of the switch assembly, said slot of one band providing an edge for hooking engagement by said tongue of the other band and said ramps on said longer legs nesting within the ramps on the shorter legs, said longer and shorter legs being securely hooked together by engagement of the respective tongues and slots thereby holding the switch assembly together.

7. A switch structure having detachable parts, said switch structure comprising fastening means for holding said detachable parts together, said fastening means comprising a pair of flexible members which together embrace said switch structure, said flexible members each having a tongue lanced in one end thereof in the form of a three-sided ramp, which tongues protrude away from said switch structure, and each flexible member having a three-sided ramp lanced in the other end thereof to form an aperture, each of said tongues being adapted to engage one side of one of said apertures thereby hooking said flexible members together and holding the flexible members together around said switch structure, one of said flexible members being adapted to bear against the side of the switch structure and to hold the switch structure together while the other flexible member is being assembled on the switch structure.

* * * * *