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SWITCH STRUCTURE WITH INTERLOCKING ROTATIONAL AND  
AXIAL MOVEMENT PREVENTION MEANS  
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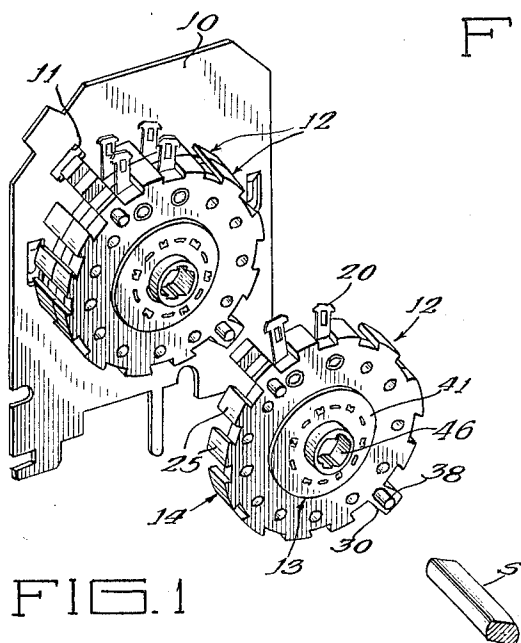


FIG. 1

FIG. 2

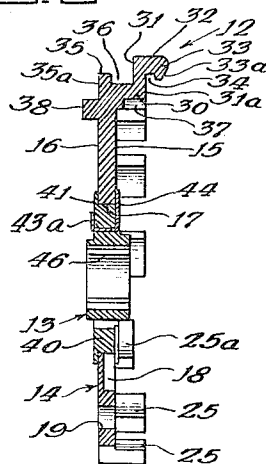


FIG. 3

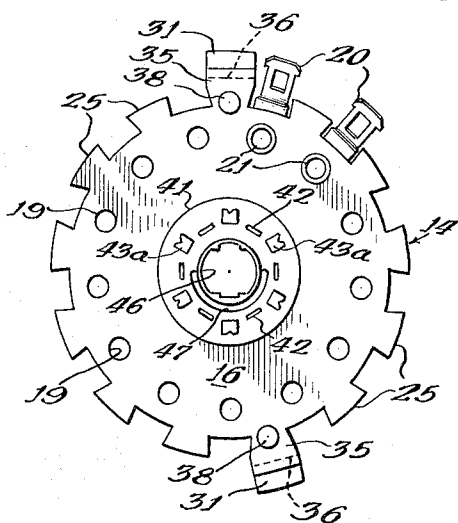
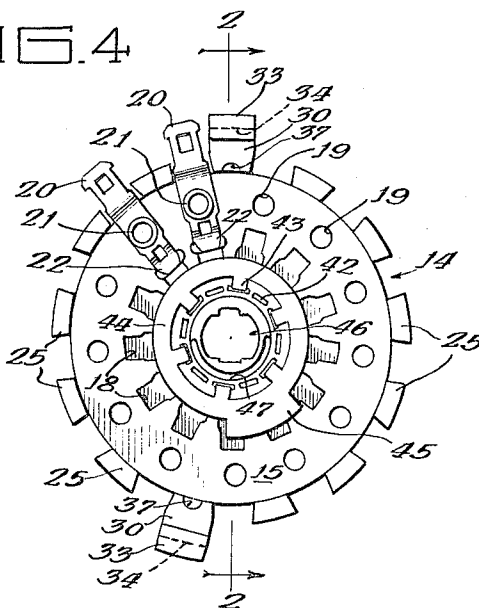


FIG. 4



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## SWITCH STRUCTURE WITH INTERLOCKING ROTATIONAL AND AXIAL MOVEMENT PREVENTION MEANS

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13 Claims. (Cl. 200-14)

The present invention relates in general to an improved rotary switch, and more particularly, to an improved switch section of a multi-section rotary switch.

In the past, the individual sections of a multi-section rotary switch have been held together by longitudinally extending strut screws or tie rods which impaled each of the switch sections. It has been conventional to provide spacers on the strut screws between adjacent switch sections to properly space the sections relative to one another. The end portion of the strut screws have usually been threaded for reception of a nut to retain the stack of sections together. This type of switch construction has proved to be unsatisfactory in several important respects. The mounting hardware which was heretofore thought necessary to hold the switch sections together has added an additional element of cost to the switch, and has made the switch difficult and time-consuming to assemble. Also, in the past, each of the individual switch sections has been symmetrical, so there has always been a possibility of incorrectly angularly orienting the switch sections during assembly. Additionally, in known types of switches the engagement of the rotor contacts and the stator contacts has taken place in a relatively open and unprotected area so that dirt and other contaminants have accumulated upon the contact surfaces.

Accordingly, the general purpose of the present invention is to provide a switch construction which is made up of a plurality of novel switch sections and which obviates the problems noted above.

An object of the invention is to provide a switch section with means for interlocking the switch section with adjacent switch sections in a multi-section switch, so as to eliminate the necessity of providing mounting hardware to secure each of the switch sections together.

Another object of the invention is to provide an improved switch section with means for preventing the incorrect angular orientation during assembly of adjacent switch sections into a multi-section switch.

A further object of the invention is to provide a switch section which may be assembled to an adjacent switch section with a minimum expenditure of time and effort.

A still further object of the invention is to provide a switch section as defined in the preceding paragraph with resilient hook means by which the switch section may be snapped onto an adjacent switch section.

Still another object of the invention is to provide a novel switch section wherein the switching engagement of the rotor and stator contacts takes place in a protected area.

These and other objects of the invention will hereinafter become more fully apparent from the following detailed description taken in connection with the accompanying drawing, in which:

FIG. 1 is an exploded front perspective view illustrating a preferred embodiment of the invention;

FIG. 2 is a sectional view taken substantially as shown along line 2-2 of FIG. 4;

FIG. 3 is an enlarged rear plan view of a switch section; and

FIG. 4 is an enlarged front plan view of a switch section.

While this invention is susceptible of embodiment in

many different forms, there is shown in the drawing, and will herein be described in detail, one specific embodiment, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

The individual switch sections of the multi-section switch are adapted to be mounted on a plate 10, such as that found in a television tuner, with the locking means on the endmost switch section in the switch stack cooperating with a pair of openings 11 (only one of which is shown) in the plate 10.

Each of the individual switch sections 12 includes a rotor 13 and a stator 14. Stator 14 is defined by a planar, generally circular disc having a front face 15 and a rear face 16. The stator 14 includes a central bore 17 in which the rotor 13 is rotatably mounted. A plurality of recesses 18 are provided in the front face 15 of the stator, and each recess 18 extends radially outward from bore 17 and communicates therewith. A plurality of apertures 19 are provided in rotor 14, with each aperture 19 being spaced radially outwardly from a recess 18. Each recess 18 and aperture 19 cooperate to define a switch station for reception of a stator contact 20. Rivets 21 pass through the contacts 20 and through the apertures 19 to securely fasten the contacts 20 to the stator 14. The inner end portions 22 of contacts 20 are positioned over the respective recesses 18, where they are engaged by the rotor contact to be hereafter described.

Means are provided for spacing adjacent switch sections 12 when the sections are stacked together into a multi-section switch, and in the present invention include a plurality of legs 25 extending axially forwardly from the front face 15 of stator 14. In the illustrated embodiment, legs 25 are provided around the periphery of stator 14, and are positioned between adjacent apertures 19. It will be readily understood that when the switch sections 12 are assembled to one another, the legs 25 will abut against the rear face 16 of an adjacent stator, to space one stator from another. Legs 25 are sufficiently long so that the rotors 13 are free to rotate without engagement with an adjacent rotor. One or more of the spacing legs 25 may be shorter than the other legs, as is shown in 25a in FIG. 2, to clear a spring or other element which may be present upon mounting plate 10.

Means are provided for interlocking adjacent switch sections, and includes a pair of longitudinally extending lugs 30 positioned at the periphery of the stator 14 and extending forwardly from face 15. Each lug 30 includes a radially outwardly extending portion 31 which is substantially parallel with stator faces 15 and 16, and disposed at substantially right angles to the axis of rotation of the rotor. Lugs 30 further include axially extending portions 32 which extend forwardly from the outer end of portion 31. Another lug portion 33 extends radially inwardly from the outer end of portions 32 and cooperates with the spaced parallel lug surface 30a to define an inwardly opening hook 34. A finger 35 extends radially outwardly from the rearward end of lugs 30, and is spaced from lug portion 31.

Finger 35 and the facing surface on lug portion 31 cooperate to define an outwardly open hook 36. As can be best seen in FIG. 2, the rearward surface 35a of finger 35 is generally coplanar with the rearward face 16 of stator 14. The inwardly facing surface of each lug 30 is provided with a longitudinally extending generally semicircular bore 37. Longitudinally extending pins 38 are positioned in radial alignment with lugs 30 adjacent the periphery of stator 14, and extend outwardly from the rear face 16 of the stator. Each of pins 38 is positioned

in axial alignment with a bore 37, and the diameter of each pin 38 is substantially the same as the diameter of bores 37. As can be best seen in FIGS. 3 and 4, while the lugs 30 are positioned generally on diametrically opposed sides of the stator 14, they are not positioned in exact diametrical alignment, and one lug 30 is offset from the other lug 30 by a predetermined angular amount. Because of the angular offset of lugs 30, it will be impossible to assemble adjacent switch sections except in one position. Thus, alignment means are provided to prevent incorrect angular orientation of adjacent switch sections.

Rotor 13 includes a disc 40 which is positioned within the bore 17 of stator 14. An enlarged flange 41 on the rear side of disc 40 cooperates with the rear face 16 of stator 14 to prevent axial movement of the rotor in one direction. A plurality of axial openings 42 are provided in rotor disc 40, and are adapted to receive therethrough the mounting tabs 43 of the rotor contact 44. As can be best seen in FIG. 3, the end portions 43a of tabs 43 are bent over rearwardly to fix the contact 44 to the rotor 13. The diameter of contact 44 is larger than the diameter of bore 17, so that the contact 44 cooperates with the front face 15 of the rotor 13 to retain the rotor against axial movement relative to the stator. Contact 44 includes an enlarged portion 45, which engages the portions 22 of contacts 20 upon rotation of rotor 13. It will be readily apparent that the switching engagement of rotor contact portion 45 with the stator contact portions 22 takes place over a recess 18, so that the contact surfaces are protected against dirt and other contaminants. An axial bore 46 is provided in disc 40 for reception of a rotor shaft 8, as is well known in the art. An arcuate semicircular passage 47 is provided in disc 40 adjacent bore 46 to facilitate insertion of the rotor shaft within the bore.

When it is desired to assemble a multi-section switch, a pair of individual switch sections 12 are positioned adjacent one another, with their respective lugs 30 in axial alignment. The switch sections are positioned such that the front face of one switch section faces the rear face of the adjacent switch section. An axial force is then applied to move the switch sections toward one another, and the inwardly opening hooks 34 will snap over the outwardly opening hooks 36. The forward face 33a of lug portion 33 is tapered so as to facilitate its snapping over finger 35. When the adjacent switch sections are snapped together, the pins 38 on one section will be received in bores 37 in the other section to prevent relative rotation between the two adjacent sections. The stator 14 is preferably formed of a thermoplastic polycarbonate resin, such as Lexan which is available from General Electric Company. These resins possess an unusual combination of toughness, impact strength, dimensional stability, and resistance to normal soldering temperatures so as to be ideally suited for the present use. Such resins have sufficient flexibility to enable one adjacent switch section to be snapped over another without difficulty. It should also be understood, that because the mating surfaces of hook portions 34 and 36 are disposed at generally right angles to the axis of the switch, axial pullout between adjacent switch sections will be resisted with great force. When the desired number of switch sections have been assembled together into a stack, the rearmost switch section is secured to mounting plate 10. One of the openings 11 in the mounting plate 10 is angularly offset an amount corresponding to the offset of lugs 30, so that the rearmost switch section in the stack may be fixed to the mounting plate.

The switch section may be utilized to provide additional switching functions in a switch assembly, without a complete redesign or reconstruction of the assembly. For example, where a VHF television tuner is to have provision for operation with a UHF tuner, additional switching functions are necessary. The switch section

may be snapped on the end panel of the VHF tuner housing (as plate 10) and the rotor connected with the tuner switch shaft for operation thereby.

I claim:

1. A rotary switch comprising: a plurality of switch sections, each having a stator, and a rotor rotatably mounted with respect to each stator; cooperable means integral with the stators of adjacent sections for securing them against axial movement relative to one another; and cooperable means integral with the stators of adjacent sections for securing them against rotational movement relative to one another.

2. A rotary switch comprising: a plurality of switch sections, each having a stator, and a rotor rotatably mounted with respect to each stator; cooperable means integral with the stators of adjacent sections for securing them against axial movement relative to one another; cooperable means integral with the stators of adjacent sections for securing them against rotational movement relative to one another; and diametrically offset means integral with the stator of each section for aligning the sections relative to their adjacent sections.

3. A switch section for use in a multi-section switch comprising: a stator with front and rear faces and a central bore, and having recesses in said front face extending radially outwardly from said bore and terminating a distance from the periphery of said stator; stator contacts secured to said stator, the inner end portion of each of said contacts overlying one of said recesses; a rotor positioned in said bore and having an enlarged flange engaging the rear face of said stator to prevent axial movement of said rotor in one direction; a rotor contact fixed to said rotor and engaging the front face of said stator to prevent axial movement of the rotor in the other direction, said rotor contact having a portion positioned for engagement with the inner end portions of said stator contacts on rotation of said rotor; a plurality of spacing fingers positioned around the periphery of said stator between said recesses and extending longitudinally outwardly from the front face of said stator; and means for interlocking said stator to the stator of an adjacent switch section including, a pair of lugs positioned at spaced points on the periphery of said stator, each lug having a first portion extending longitudinally outwardly from the front face of the stator, a second portion normal to said first portion and extending radially outwardly, a third portion extending axially forwardly from the outer end of said second portion, a fourth portion extending radially inwardly from the outer end of said third portion and spaced from said second portion, and a finger extending radially outwardly from the rearmost end of said lug and spaced from said second portion.

4. A switch section as defined in claim 3 wherein said lugs are diametrically offset.

5. A switch section as defined in claim 3 wherein the front face of said fourth portion is inclined toward the front face of said stator.

6. A switch section as defined in claim 3 wherein a pin is positioned in radial alignment with each of said lugs, each pin extending outwardly from the rear face of said stator; and wherein the first portion of each lug includes a semicircular bore positioned in axial alignment with one of said pins.

7. A switch section comprising: a stator having contacts fixed thereon; a rotor mounted for rotational movement with respect to said stator and having at least one contact movable into and out of engagement with said stator contacts; means integral with said stator for axially interlocking said stator with adjacent stators; and means integral with said stator for angularly aligning said stator with adjacent stators.

8. A switch section as defined in claim 7 wherein said stator includes means integral therewith for locking said

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stator against rotational movement relative to an adjacent stator.

9. A switch section as defined in claim 7 wherein said stator is provided with a plurality of recesses, and wherein each of said stator contacts are mounted with the rotor contacting portion thereof overlying one of said recesses. 5

10. A multi-section rotary switch comprising: a mounting plate having a pair of diametrically offset openings; a stack of interlocked switch sections, each having first and second pairs of diametrically offset hooks; each hook of the first pair of hooks on the rearmost switch section engaging one of said openings; and each hook of the first pair of hooks on each of the other switch sections engaging one hook of the second pair of hooks on an adjacent section to interlock each of the switch sections together. 10 15

11. A multi-section rotary switch as defined in claim 10 wherein said hooks are formed of resilient material so that said switch sections can be snapped into engagement with one another.

12. A switch section comprising: a stator; contacts on said stator; a rotor rotatably mounted on said stator and having at least one contact thereon movable into and out of engagement with said stator contacts; means on said stator for interlocking said stator to adjacent stators in a stack of switch sections including, an inwardly opening 20

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hook and an outwardly opening hook, said inwardly opening hook being adapted to engage the outwardly opening hook on one adjacent stator, and said outwardly opening hook being adapted to engage the inwardly opening hook on another adjacent stator, whereby said stator may be interlocked to its adjacent stators.

13. A switch comprising: a housing with a mounting plate having a pair of diametrically offset openings; a switch section having a first and a second pair of diametrically offset resilient hooks; each hook of the first pair of hooks engaging one of said openings; and each hook of the second pair of hooks being positioned to be engaged by one hook of the first pair of hooks on an adjacent section for interlocking the switch sections together.

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