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MULTIPLE TOGGLE SWITCH

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Fig. 1

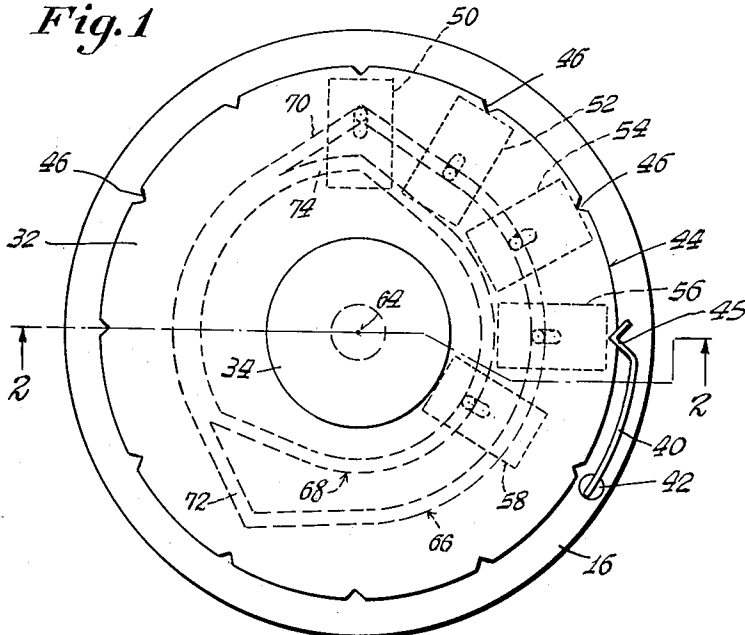
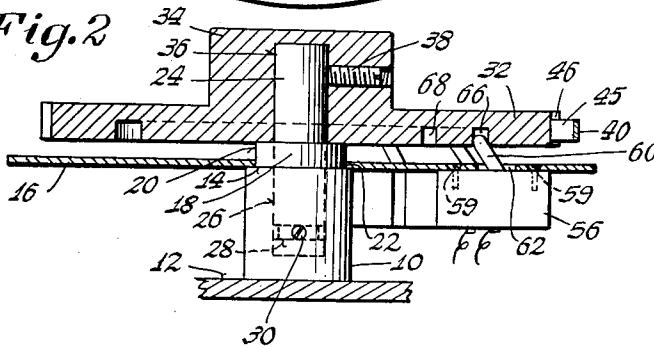


Fig. 2



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1

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MULTIPLE TOGGLE SWITCH

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This invention relates to improvements in switches and particularly to a multiple toggle switch having a variety of uses including for example use in circuits requiring a multiple number of switches for control purposes.

A switch constructed in accordance with the instant invention may be provided in controller circuits where a combination or multiple number of switches are necessary for the control of several related circuits and particularly where simultaneous or sequential control is necessary for multiple circuits.

Switches are oftentimes provided in groups of ten. These switches having multiples of ten sets of individual switches are very often referred to as decade switches. The instant invention has for one of its purposes the provision of a novel form of compact decade switch having readily available parts which can be easily assembled and which is adapted to be used in compact installations for extended periods without failure.

Knife blade type decade or multiple position switches are used on the tuning apparatus of television sets, and comprise wipers and the like. Such switches often become affected by moisture and dust unless enclosed in special cases. The many contacts and connections involved require separable case parts as well as other removable or detachable structure for holding the parts together. This not only increases the initial cost of the switches but also the maintenance and inspection costs. Accordingly another object of the instant invention is to provide a multiple switch and operating mechanism therefore whereby the switch contacts or equivalent structure are fully enclosed at all times without requiring any special case for enclosing the whole decade unit. With the structure of this invention connection and disconnection of the switches as well as inspection and testing is facilitated.

Another object of the instant invention to provide a multiple switch such as a decade switch as illustrated in the embodiment disclosed herein wherein it is possible to use switch operating mechanisms in such a manner that a greater number of switch operations can be performed than there are switch mechanisms involved, yet independent switch units can be used. For example, in the illustrated embodiment disclosed herein a decade switch is provided but only five toggle type switches are used which would not be possible with the usual switch.

A further object of the instant invention is to provide a switch mechanism of the decade type formed of readily available self-contained switch elements which can be assembled in many different arrangements to effect different switching sequences.

An additional object of the instant invention is to provide a decade type switch having a rotatable operator wherein the individual switch or contact elements are sequentially operable but the sequence is not governed by the relative positions of the elements concentric of the operator.

A further object of the invention is to provide a switch mechanism constructed of a number of independent switching devices independently operable and a control means associated therewith for controlling the operation of the switch mechanism as desired.

Still another object of the invention is to provide a switch control-operator structure whereby the switch op-

2

eration can be altered by a simple, readily accomplishable, change of the operator structure. Thus a different switch operation sequence, or a changed operative or inoperative time, for the switches or any of them can be easily achieved.

A feature of the present invention is the provision of a simple cam structure adaptable for use with a multiple number of toggle switches for controlling the latter in a sequential operation.

Another feature of the invention is the provision of the cam structure as part of a simple dial mechanism usable in visually determining the operation of the switch.

Still another feature of the invention is the provision of a switch mechanism involving very few parts which can be readily assembled, which is compact, which is not subject to rapid deterioration, and which can be altered readily so as, for example, to add additional functions.

Other objects and advantages will become apparent from the following description and the accompanying drawings wherein:

FIGURE 1 is a plan view of a switch constructed in accordance with the invention; and

FIGURE 2 is a sectional view taken along lines 2—2 of FIGURE 1.

Referring particularly to the drawings:

The switch mechanism constructed in accordance with the invention comprises a post 10 which may be of cylindrical shape. The post has a lower surface 12 and a ledge 14. A mounting plate 16 is supported on post ledge 14. The mounting plate can be attached to the post by any suitable type of fastening means such as screws, rivets or the like. In the illustrated embodiment the post 10 is provided with a concentric projection 18 extending upwardly from the ledge 14 to form a peripheral shoulder 20. The plate 16 has a central opening 22 fitting onto the shoulder 20 in such a manner as to fix the position of the plate laterally of the post 10. It will be understood that the projection 18 may be cylindrical or square, or of any other configuration, and that the opening 22 may be formed accordingly.

An operating shaft 24 is rotatably supported in an opening 26 extending through the post 10 and projection 18. The shaft has a peripheral slot or channel 28. A set screw 30, supported in the post 10, is adapted to be moved radially into channel 28 to prevent undesired withdrawal of the shaft.

A control dial 32 has a central hub 34 provided with a longitudinal bore 36 which receives the shaft 24. Another set screw 38 secures the dial to the shaft and prevents relative rotational or sliding movement of the dial with respect to the shaft. The shaft and dial may, however, be easily rotated by hand through manipulation of the hub 34 since the shaft is free to rotate in opening 26.

A dial position detent means is provided to maintain the dial in selected positions corresponding to the desired switch condition. The detent means comprises a leaf spring 40 which is supported in a slotted post 42 mounted on the plate 16. The leaf spring extends tangentially of the dial and has a notch portion 45 which resiliently bears against the periphery 44 of the dial 32. A series of indentations 46 are provided at intervals along the periphery of the dial, and are adapted to cooperate with the notch portion 45 of the leaf spring 40. Obviously other forms of detent means may be employed if desired other than the detent specifically shown in the drawings.

A series of lever operated switches 50, 52, 54, 56 and 58 are secured on the bottom of plate 16 by screws 59. For illustrative purposes, toggle switches have been utilized each having a toggle 60. The plate 16 is provided with slots 62 through which the toggles project. The toggles extend above the plate and the slots are elon-

gated in order that the toggles may be moved back and forth to operate the switches.

In the instant embodiment of the invention the switches 50, 52, 54 and 56 are arranged in a common arc concentric with respect to the axis 64 of the plate and dial 32. However, the switch 58 is positioned at a different radius from the axis 64. The toggles are all substantially radially movable with respect to the latter axis.

The dial 32 has a pair of cam tracks 66 and 68 formed in its lower side. With the dial in the position of relative rotation illustrated in FIGURE 2 the toggle operating levers of switches 50, 52, 54 and 56 are received within track 66, but the lever of switch 58 is received within cam track 68. The cam tracks illustrated are designed to provide one selected sequential operation of the switches. It is to be understood that different tracks and a different positioning of any of the switches will provide other switch operations.

The cam track 66 and the switches 52 through 56 are arranged so that these switches are "Off" throughout most of the travel of the cam. The cam track 66 further has a pair of lobes 70 and 72 which, as they are brought into alignment with the respective toggle of switches 50, 52, 54 and 56 will actuate the respective switch to "On."

Track 68 likewise has a lobe 74 which will snap the toggle of switch 58 to "On." Switch 58 is "Off" throughout the rest of the track 68. The lobe 74 extends for a substantial distance as compared to the lobes 70 and 72, covering in fact, an angle of approximately 150° whereas the lobes 70 and 72 cover only a relatively few degrees.

With the construction shown the lobe 70 will turn the switches 50 through 56 on and off successively. Switch 50 will be switched off as dial 32 is rotated clockwise from the position illustrated in FIGURE 1. Then switch 52 is turned on as switch 50 is turned off. Thereafter switch 54 is turned on as switch 52 is turned off. Finally switch 56 turns on as switch 54 is turned off. When switch 56 is subsequently turned off the cam lobe 74 on track 68 will turn switch 58 on if the rotation of dial 32 is continued. Lobe 74 will as indicated above maintain switch 58 on while the dial is rotated through a substantial arc. During the time switch 58 is maintained on, lobe 72 will, with continued clockwise rotation, successively contact switches 50, 52, 54 and 56, and successively turn them on and off in the same manner in which lobe 70 functions.

The detent means described above comprises ten indentations 46 and functions to releasably lock the dial in the ten separate positions of relative rotation corresponding to the ten switch conditions which can be achieved as described above.

The present invention therefore provides structure whereby it is possible to provide a decade switch using only five switches. This is accomplished by the unique and novel arrangement of the switches and cam tracks. According to this invention all of the switches are off in one position of the dial. However, with this construction, provision is made for operation of each of the four switches 50, 52, 54 and 56 by one track in successive order prior to operation of the fifth switch 58, and then provides for reoperation consecutively of the first four switches in order, while the fifth switch is operated and before the latter is turned off.

It will be understood that a number of different arrangements of switches and cam tracks is possible. The dial and its connected cams can be easily removed from shaft 24 and different operation achieved by substituting a dial having different cams and indents. Further, it is possible with the present invention to alter the position of the switches or attach new switches to plate 16 providing a variety of different arrangements. In addition, double throw switches and multiple pole switches and slide, snap and toggle switches can be used as well as single pole and single throw switches.

While I have shown and described the preferred form of my invention, it will be understood by those skilled in the art that many changes in form and details of construction may be made, without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A multiple toggle switch mechanism comprising a plurality of independent self-contained toggle switching units, a rotatable operator for sequentially operating the switch units, and a dial position detent means for maintaining the operator in selected position corresponding to the desired switch condition, said detent means comprising a leaf spring supported in a slotted post mounted on the plate, said leaf spring having a notch portion resiliently bearing against the periphery of the operator, said operator having a series of indentations adapted to cooperate with the notch portion of the leaf spring, said rotatable operator being interchangeable, some of said plurality of switch units being arranged in a common arc and the remainder being positioned in an arc having a different radius, said operator having a pair of cam tracks formed in its lower side, said cam tracks comprising grooves which are substantially uniform in depth throughout their paths and have lobes at selected portions of the tracks for operating the toggle switches, each track being adapted to operate a plurality of switches in sequence, said cam structure being a part of a simple dial mechanism usable in visually determining the operation of the multiple switch, said switch mechanism comprising a post for mounting said switch elements and operator in fixed axially disposed relationship whereby the toggle operating levers of the toggle switches are received within the cam tracks.

2. A switch mechanism as in claim 1 wherein the tracks are continuous closed loops disposed one within the other.

3. A switch mechanism as in claim 2 wherein portions of the tracks are common to each other.

4. A switch mechanism as in claim 2 wherein the remainder of the switch units comprises a single switch unit controlled by one of the said tracks.

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