United States Patent

Berenbaum et al.

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[54] **MEANS FOR INDICATING THE POSITION OF A SWITCH**

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[52] **U.S. Cl.** ..... **200/167 R**

[51] **Int. Cl.** **H01h 9/16**

[58] **Field of Search** ..... 200/167 R

[56] **References Cited**

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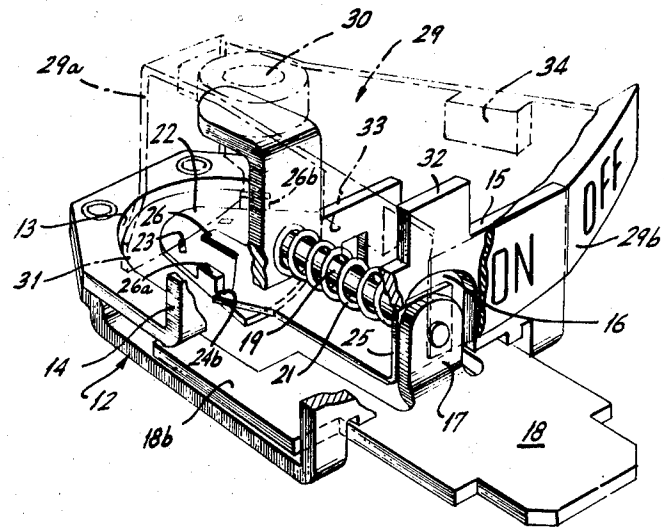
Primary Examiner—H. O. Jones

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[57] **ABSTRACT**

Switching apparatus of the so-called "push-push" type in which a manually operable switch control member occupies the same position regardless of the position of adjustment of the switch. The apparatus includes an indicating member driven, alternately, between two positions in correspondence with the adjustment of the contacts of the push-push switch, and indicating the position of such contacts in terms of desired functions of associated equipment.

3 Claims, 5 Drawing Figures



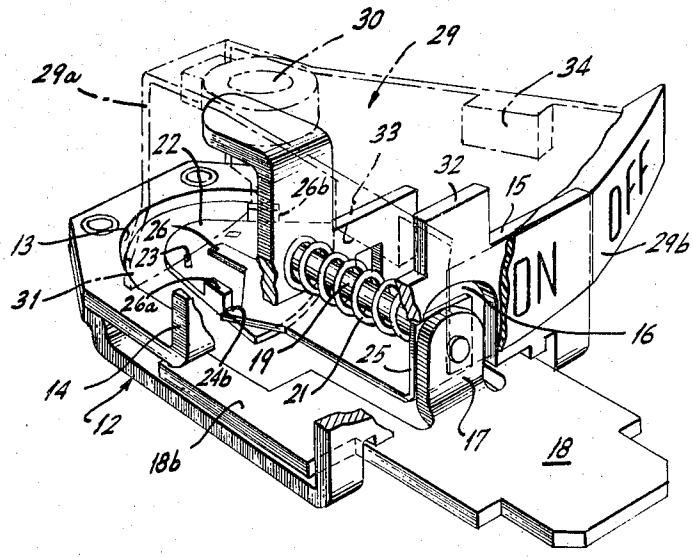


FIG. 1.

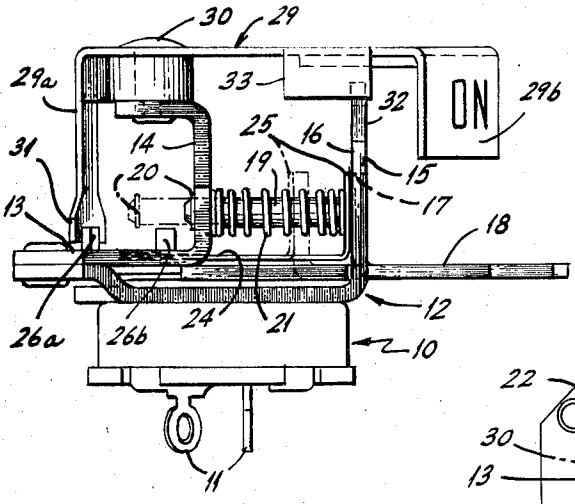


FIG. 2.

FIG. 3.

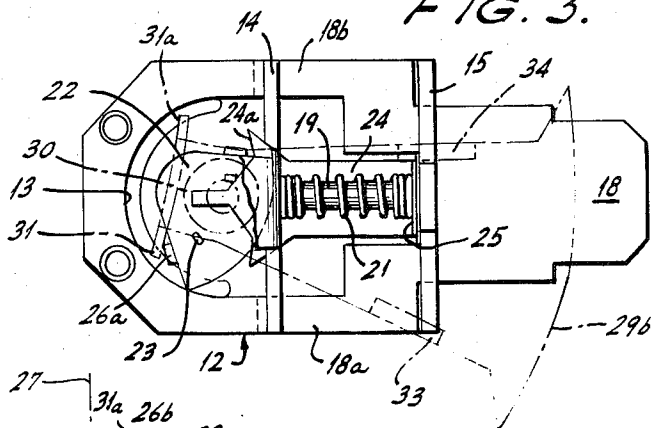
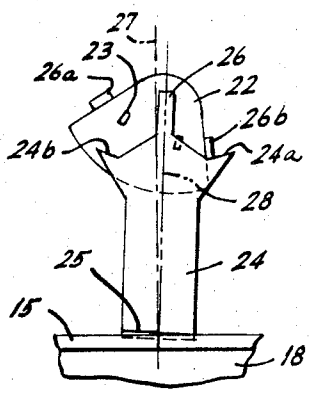


FIG. 4A.



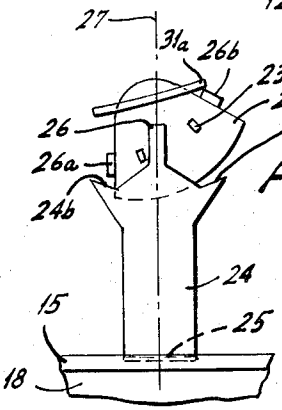


FIG. 4B.

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MEANS FOR INDICATING THE POSITION OF A SWITCH

BACKGROUND OF THE INVENTION

In certain types of electrical apparatus, particularly television receivers, it is common to provide instrumentation which includes one or more switches movable, alternately, between two positions which control the functions of the receiver, for example, the energization of the receiver circuits, initiation of an automatic tuning function, or the like. When use is made of push-push switches of this type, it has proven inconvenient to indicate to the operator the position of adjustment of the switch which, in turn, determines the operating condition of the receiver. This is the case because the manually operable member which controls such a switch is in the same position regardless of the adjustment of the switch contacts.

SUMMARY AND OBJECTIVES OF THE INVENTION

It is the general objective of our invention to provide push-push switches having mechanical indicating means which are extremely simple and low cost, and the indications of which are readily observable by those operating the associated equipment. In achievement of this general objective, we provide, in novel combination, a switch of the kind including a plate-like member rockable to establish the position of the contacts and means for indicating such position, including a device pivoted to provide for swinging movements of a portion thereof to positions indicative of the switch position or function, and which device has a portion disposed in resiliently driven engagement with the plate-like switch actuating member. The device is swingable from one position to another, in accordance with the position occupied by said plate-like member, thereby indicating adjustment of the switch contacts.

It is a further feature of our invention that apparatus constructed in accordance therewith includes arcuate indicia-bearing indicating means movable in extremely rapid fashion past a position where it is observable by the operator, for example a viewing aperture or window. Since the indicating means bears resiliently against the switch actuating means, to be driven thereby, the indicator always stops in the desired position without overshoot or backlash and thereby provides accurate and positive indications.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating switch and indicator apparatus embodying this invention;

FIG. 2 is a side elevational view of the apparatus illustrated in FIG. 1;

FIG. 3 is a plan view of the switch apparatus, with the indicator means shown in phantom in the interest of clarity of illustration; and

FIGS. 4A and 4B are views of a rockable switch actuator and manually operable means for rocking the same, these two elements being shown disassociated from the overall apparatus and illustrated in two different positions of adjustment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Making more detailed reference to the drawing, and first to FIGS. 1 to 3 thereof, the illustrated indicator switch comprises a generally cylindrical housing **10** enclosing the switch contacts (not shown). This housing appears in FIG. 2 and is provided with a pair of terminals **11**, which are adapted for connection to associated circuitry, for example the power supply of a television receiver. The upper surface of this housing is fixed in any convenient means to frame structure **12** which has an upper, generally ring-like portion **13** (FIGS. 1 and 3) terminating in an upstanding flange portion **14**. Toward the opposite end of the frame structure, that is toward the right end of the structure as seen in the drawing, there is provided a second upstanding flange **15** which is apertured at **16** (FIG. 1) to accommodate a bracket **17** carried by a manually operable slide member **18** which would normally carry a button (not shown) and may be pushed toward the left, as viewed in FIGS. 2 and 3. The bracket **17** has secured therein a shaft or stud **19** which is mounted to pass freely through the flange **14**, as is indicated at **20** in FIG. 2. When the manually operable push-button member **18** is moved toward the left, the end portion **20** of shaft **19** extends through the bracket **14**, to a left hand position illustrated in broken line. Since the bracket **17** is then approaching flange **14**, the spring **21** is compressed. The force of the latter returns the slide member **18** to its illustrated, rest position when the operator releases said member.

A switch of this kind includes a plate-like, preferably arcuate, actuating member **22** coupled by any convenient means, as for example by the small pins shown in FIG. 1 at **23**, to the contacts disposed within enclosure **10**. The contacts within housing **10** are driven by the pins **23** to be moved alternately between their two positions in response to rocking movement of such arcuate plate **22**. The manually operable slide member **18** has leg portions **18*a*** and **18*b***, slidable with respect to the frame **12**, and carries a pawl **24** which comprises a flat plate portion lying generally in the plane of the slide **18** and an upstanding flange portion **25** through which extends the rod **19** and against which the spring **21** reacts. This arrangement may be understood clearly from consideration of FIG. 2, taken with FIGS. 4A and 4B. It is to be understood that the outer end of the pawl, that is the end which is flared to provide a pair of cam surfaces **24*a*–24*b***, and a nose projection **26**, closely overlies the rockable switch actuating plate member **22**. The pawl is used to impart rocking motions to the plate as the pawl is advanced by pressure exerted against the slide member **18**.

Switches of this general kind are known in the art and include tabs or projections **26*a***, **26*b*** which may be struck upwardly from the plane of the rockable plate **22** and through the agency of which the pawl **24** is enabled to impart swinging movement to the switch actuating plate **22**. The initial movement of the pawl **24** is along a line passing through the approximate center of rocking movement of the switch actuating plate **22**, as is apparent from inspection of FIGS. 3 and 4B. This line appears in those Figures at **27**. Referring now to FIG. 4A, it will be seen that as the pawl is moved toward switch actuating position, in response to inward sliding

movement of the manually operable member **18**, and consequent displacement of the pawl, rod and spring toward the left as viewed in FIGS. **1–3**, the pawl cam surfaces **24***a* and **24***b* are brought into a position, as the pawl moves along line **27**, in which one or the other of said surfaces makes contact with the closer of the two driving tabs **26***a* and **26***b*. FIG. **4A** illustrates the cam **24***a* making contact with the tab **26***b*, this figure showing the parts just after the pressure of said cam surface against tab **26***b* has shifted the outboard end of the pawl **24** to the right of the line of centers **27**, so that the direction of thrust of the pawl lies along a line **28**, displaced somewhat to the right of line **27**. Continued movement of the pawl, which results from continued inward pressure against the slide **18**, rotates the switch actuating plate **22** to the position shown in FIG. **4B**, that is to a position in which the tab **26***b* has rocked forwardly and the tab **26***a* rearwardly, closely approaching cam surface **24***b*. When this position is attained and the button **18** is released, the spring **21** returns the pawl **24** to its rest position shown in FIG. **4B**, in which it is realigned with line of centers **27**, and its cams are out of contact with either of the tabs **26***a* or **26***b*. The above-mentioned rocking movement of plate **22** has, of course, moved the switch to one of its two positions, thereby adjusting its contacts appropriately, for example to either the ON or the OFF position. As will be understood without further detailed description, repeated movements of the slide **18** and of the pawl **24** carried thereby, result in alternation of the switch actuating plate **22** between the position shown in FIGS. **4A** and **4B**, with consequent repetitive operation of the switch.

In particular accordance with the present invention, we provide novel means for indicating the position of adjustment of such a push-push switch. Broadly, the indicating means comprises a member pivoted to provide for swinging movements of a portion thereof to positions indicative of the position of adjustment of the switching means, said member having another portion disposed in driven engagement with the switch actuating plate, whereby to provide for swinging of said indicating member in response to rocking of the plate. As will be understood from consideration of FIGS. **1** to **3**, the indicating means comprises a plate **29** of approximate sector shape, and having an intermediate portion mounted on the flange or bracket **14** through the agency of suitable pivot means, for example the stud shown at **30**. The indicator means **29** is preferably made of resilient material of any suitable type, for example of suitable resilient plastic material, and is generally U-shaped when viewing from the side, in which connection see particularly FIG. **2**. One leg **29***a* of the U extends down into driven engagement with one or the other of the tabs **26***a*, **26***b* depending upon the position of adjustment of the switch. The other leg portion **29***b* is formed arcuately, as appears in FIG. **3**, and carries indicia which may readily be observed by an operator of the equipment. As shown in FIG. **1** this indicia may, for example, comprise the words ON and OFF, and swinging of the indicator **29** serves to bring either word into position to be viewed through a window or aperture which is not illustrated but which normally would be provided in the associated equipment.

In operation, the over-center swinging of pawl **24** snaps the actuating plate **22** between its two positions and in such manner that the indicator **29** is swung rapidly and alternately between its corresponding positions, that is, between the positions shown in FIGS. **1** and **3**. The result is that the indicia appear in viewable position (centered on the axis **27**, in the present embodiment) virtually instantaneously, upon operation of the push-button slide member **18**. It is particularly to be noted that the leg portion **29***a* of indicator **29** terminates in a pair of outwardly turned projections (one is shown at **31** in FIG. **1**), which projections bear resiliently against one or the other of the tabs **26***a* and **26***b* depending upon the position of adjustment of the switch. Another such projection is shown at **31***a* in FIG. **4B**. This projection is illustrated as being warped slightly, out of the plane of leg **29***a*, by reason of the resilient pressure exerted against tab **26***b*. The result is that the indicia-bearing leg portion **29***b* of the indicator is biased toward the proper position in which the desired indicia, for example the word ON, in centered in proper position for observation. Stop means is provided to prevent any overshoot, under the influence of the resilient pressure created by the projections **31***a* bearing against the tabs. This stop means takes the form of a lug **32** which projects upwardly from frame flange **15** (see FIGS. **1** and **2**) and cooperates with a pair of stops **33–34** which depend from the indicator body **29**. In the position of the apparatus shown in FIG. **3**, for example, the resilient pressure exerted between projection **31** and tab **26***a* urges the indicator toward the left, and the movement of the indicator toward said left hand position is limited by engagement of downturned stop **34** against the lug **32**. In the particular embodiment illustrated, this position corresponds to display of the word OFF in its observable position on the center line **27**.

In summary, this invention provides low cost indicator apparatus cooperable with conventional push-push switches visibly and prominently to display the setting of such switches. The apparatus is especially useful in television receivers, for line-switch and automatic frequency control applications.

We claim:

1. In switching apparatus of the type including adjustable switching means, actuating means comprising a generally flat plate drivingly coupled to said switching means and rockable between two positions for controlling the position of adjustment of said switching means, and manually operable means for alternately moving said generally flat plate between its two positions, the improvement which comprises means for indicating the position of adjustment of said switching means, including: a member mounted to provide for swinging movements of a first portion thereof to positions indicative of the position of adjustment of said switching means; said generally flat plate being provided with spaced tabs alternately engageable by said manually operable means for alternately moving the generally flat plate between its two positions; and said member having a second portion alternately contacted and moved by said tabs as said generally flat plate moves between its two positions.

2. In switching apparatus of the type including adjustable switching means, actuating means comprising a generally flat plate drivingly coupled to said switching means and rockable between two positions for con-

trolling the position of adjustment of said switching means, and manually operable means for moving said plate between its two positions, the improvements which comprise: means for indicating the position of adjustment of said switching means comprising a member mounted for swinging movements of a portion thereof to positions indicative of the position of adjustment of said switching means, said plate being drivingly coupled to said indicating means to control the position of the latter, said manually operable means being contactable with spaced portions of said plate, for alternately moving the plate between its two positions, and said manually operable means further being characterized by the inclusion of a pawl initially movable along a line passing through the center of rocking movement of said plate and into the stated contact with said plate, said pawl being displaceable, selectively, to either side of said line in accordance with the position occupied by said plate when it is contacted by said manually operable means.

3. Apparatus in accordance with claim 2, in which said plate includes a pair of spaced tabs, and said pawl includes a pair of spaced cam portions engageable with said tabs as said manually operable means is actuated, whereby to establish the position of said pawl with respect to said line.

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