March 17, 1942. N. C. SCHELLENGER 2,276,673

SWITCH CONSTRUCTION

Filed April 27, 1939

Fig. 1.

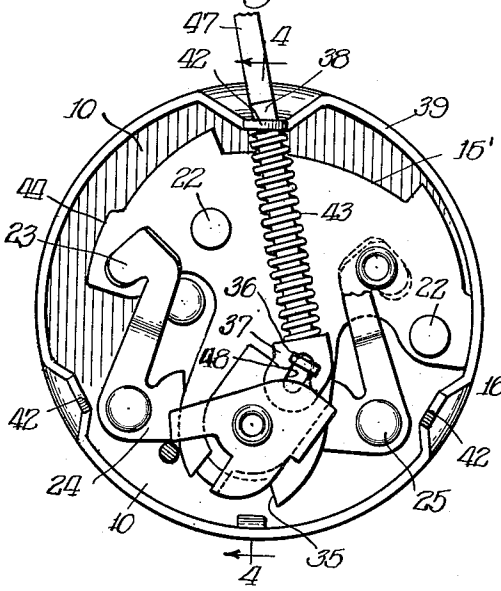


Fig. 2.

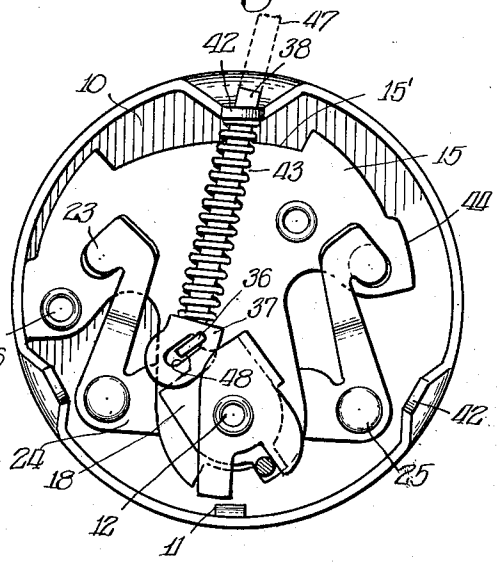


Fig. 3.

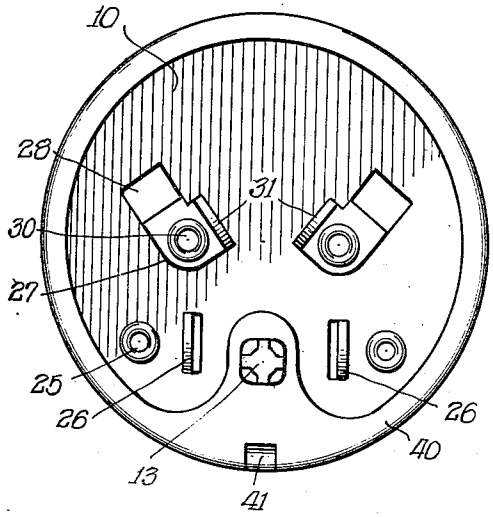
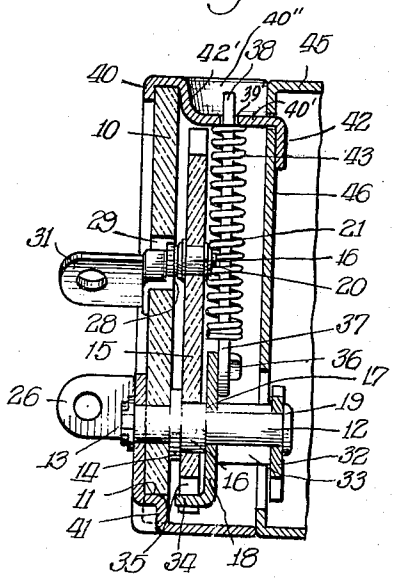


Fig. 4.



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SWITCH CONSTRUCTION

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Application April 27, 1939, Serial No. 270,280

8 Claims. (Cl. 200—67)

This invention relates to a new and improved switch, and more particularly to a switch especially adapted for association with a volume control for joint operation.

The requirements of present day radio sets, particularly small house sets and automobile sets, necessitates the use of switches and volume controls that occupy a minimum amount of space. It is important therefore that the switch assembly be of small size and that it also be capable of ready association with an equally small volume control to form a compact unit. To economize space, it is desirable to have the switch and volume control of the same diameter and in a small switch where the number of component parts has been reduced, it is important that the operating mechanism be protected from mechanical interference with adjacent parts.

With usual types of switches enclosed in a housing having metal side walls with depending ears for engagement with the top wall of a variable resistance housing, it is necessary to have the switch housing smaller than the variable resistance housing in order that the ears may pass through the top wall of the latter housing. Since switches are made in comparatively small sizes, this has presented no difficulties with the usual variable resistance devices. The present tendency, however, is for the variable resistance to be the smallest possible size and the present invention provides means whereby the switch may be readily mounted on a variable resistance of no greater diameter than that of the switch.

Devices of this character are made in large quantities and sold at low prices so that the cost of a unit must be kept to the minimum. Further, the devices are often subjected to hard usage. Consequently, it is important to keep down the number of parts required, both to keep down the cost and to simplify the structure to reduce possible structural failure under heavy and continued use.

In many uses of such devices the switch carries current which may transfer hum or undesirable disturbances to the associated variable resistance. For this reason it is desirable to ground the switch cam so that it cannot assist in such transfer, but on the contrary will serve, in part at least, to block the opening in the variable resistance housing through which it extends.

It is an object of the present invention to provide a new and improved switch construction.

It is a further object to provide a switch for association with a volume control to form a compact unit.

It is also an object to provide a switch having a new and improved pitman mounting which has the additional function of grounding the switch cam.

It is an additional object to provide improved means for jointly mounting a switch and a volume control unit.

It is another object to provide a switch which may be readily mounted in association with a volume control having the same diameter.

It is a further object to provide novel means for limiting the movement of the switch arm.

Other and further objects will appear as the description proceeds.

I have shown certain preferred embodiments of my invention in the accompanying drawing, in which—

Figure 1 is a plan view of the switch with one of the spring contacts broken away and with the actuating cam and switch arm at their clockwise limit of movement;

Figure 2 is a view similar to Figure 1 but showing the actuating cam and switch arm at their counterclockwise limit of movement;

Figure 3 is a view of Figure 1 as seen from below; and

Figure 4 is a vertical section taken through the switch on line 4—4 of Figure 1.

The switch comprises a base 10 which, in the form shown, is a flat disc having a locating notch 11 formed in its periphery to receive an indentation 41 in the housing 39. This base will normally be formed of non-conducting materials, such as sheet fibre, Bakelite or other synthetic resinous material. The pivot post 12 passes through aligned holes in the base and an inturned portion of the cover 40 and has a shoulder or flange 14 engaging the inner face of the base. The outer end of this pivot post is upset or swedged so that the base and the portion 40 are clamped between the shoulder and the upset or swedged end of the post. As a consequence the base is secured to the cover at this point, and the pivot post is electrically connected to the cover. The enlarged shoulder or flange 14 also serves as a seat for the switch arm 15. The shoulder 14 is of a thickness equivalent to the height of the exposed ends of the contact rivets 16 so that the switch arm is maintained parallel with the base member 10. The pivot 12 is formed with an intermediate shoulder 17 which serves as a pivot for the arm 15 and as a seat for the lower portion 18 of the actuating cam. The

various parts are held in place by the enlarged head 19 of the pivot 12, which is formed after the parts are assembled on the pivot.

The switch arm 15 in the form shown carries a pair of contact members 16 comprising rivets having rounded contact faces 20 surrounded by shoulders 21 which secure them to the arm.

The switch arm 15 is preferably formed of sheet material similar to that of which the base 10 is formed, and has non-conducting raised portions 22 which engage the spring contact portions 23 of the contact springs 24 when the arm 15 is in "off" position, thereby preventing looseness of the arm in that position.

The spring contacts 24 include end portions which are held to the base 10 by rivets 25, and connecting or soldering lugs 26 which extend to the outer face of the base through slots, as shown in Figure 3.

The fixed contact members 27 and their contact portions 28 fit into perforations 29 formed in the base member 10. These contact portions are substantially in the plane of the inner face of the base member 10. The outer portions of the contact member 27 are secured to the outer face of the base member 10 by means of rivets 30. The contacts 27 are also preferably formed with integral connecting lugs 31.

The actuating cam comprises a lower portion 18 and upper portion 32 which have separate bearings on the pivot 12. These portions 18 and 32 are preferably integrally connected by the lateral portion 33. The lower portion 18 is provided with a downwardly extending lug 34 which fits in a notch or opening 35 formed in the end of the switch arm 15 opposite to that on which the contact rivets 16 are carried. The opening 35 is materially greater in size than the lug 34 so that the switch arm is moved with a quick, snap action when the parts pass the dead center position.

The portion 18 of the cam also carries the upwardly extending T-head 36, upon which is fitted the slotted end 37 of the pitman 38. The opposite end of the pitman 38 passes through a perforation 39' formed in the bottom of an indentation 40' in the side wall of the tubular housing 39.

Two other similar indentations 40'' are also formed in the side wall 39 at points so located that the three indentations are substantially equi-spaced about the circumference of the housing. All of these indentations extend from the open edge of the side wall 39 to the inner face of the base where they form shoulders 42' which clamp the base down onto the flange 40.

At their innermost portions, or the bottoms of the pockets formed thereby, the indentations have attaching ears or tongues 42 projecting therefrom. These ears 42 provide for the attachment of the switch to a volume control no larger in diameter than the switch.

The coil spring 43 is carried by the pitman 38; one end engages the shoulder of the slotted end 37 of the pitman, and the opposite end engages the bottom wall of the pocket 40' at the inside of the housing 39 adjacent the aperture 39' through which the end of the pitman 38 passes. It will be noted that the pocket 40' is deep enough so that when the cam is in a dead center position, the end of the pitman does not extend beyond the normal outline of the housing 39, and consequently the operation of the switch is protected from mechanical interference by adjacent parts. The engagement of the pitman 38 and spring 43 with the wall serves to ground the actuating cam.

It will be noted that the slot 48 in the end of the pitman 37 is sufficiently large to easily pass over the T-head 36. To facilitate the assembly operation the slot 48 is set at an angle substantially corresponding to that of the T-head when it is at either its limit of clockwise or counter-clockwise movement. By using a pitman which is longer than the spring 43 when not compressed, the spring may be slipped over the pitman and the end of the pitman 38 passed through the perforation 39'. The protruding end 38 may be grasped and the spring 43 compressed to a point where the slot in the end of the pitman 37 may be slipped over the T-head 36. The excess length of the pitman extending through the side wall, represented in dotted lines in Figure 2, may then be broken off. In order to facilitate the break and insure it occurring at the proper point, the pitman is notched at the desired finished length. This construction makes it possible to assemble the pitman and spring in the last operation after the other parts of the switch have been assembled.

The switch arm 15 is provided with oppositely projecting portions 44, one of which abuts the side wall of the housing 39 when the switch arm is in the "on" position, as shown in Figure 1, and the other abuts the side wall when the switch arm is in the "off" position, as shown in Figure 2. These projections serve as stops, and having a relatively small contact area with the side wall, there is a very little starting friction when the arm is moved away from the side wall; they also lessen the possibility of the arm becoming wedged against the side wall when at the limit of either a clockwise or counter-clockwise movement.

The switch arm 15 is also provided with a cut-out portion 15' which is of sufficient length and width to permit the arm to move freely without interference with the inset portion 40' of the housing, through which the pitman 38 passes. The switch may be readily mounted upon a volume control unit by inserting the ears 42 in slots in the end wall of the housing for the volume control unit and bending them over. Where the volume control unit is of the same diameter as the switch the inset ears are inside of the plane of the side walls of both units and the slots in the volume control are set inwardly from the side wall. As shown in Figure 4, the side wall of the volume control housing is indicated at 45 and the end wall portion at 46; the ear 42 extending through a slot in the end wall is shown bent over in clamping engagement with the under face of this wall.

This feature of locating the attaching ears in from the periphery of the casing to enable the switch to be mounted on a control unit no larger in diameter than itself is covered in a divisional application, Serial No. 372,085, filed December 28, 1940.

While I have shown certain preferred embodiments of my invention, these are to be understood to be illustrative only as it is capable of variation to meet different conditions and requirements and I contemplate such modifications as come within the spirit and scope of the appended claims.

I claim:

1. A switch comprising: a substantially circular flat base; a substantially cylindrical metal side wall extending up from the periphery of the base to coact therewith in the formation of a sub-

stantially cup-shaped enclosure, said side wall having an integral portion thereof indented a substantial distance into the enclosure directly over the adjacent face of the base with the bottom of said indentation having an opening providing a bearing lying between the axis of the cylindrical side wall and the periphery of the enclosure formed thereby; a toggle type snap switch mounted on the inner face of the base so as to be substantially within said enclosure; a spring for said snap switch; and a guiding pitman for the spring having the spring mounted thereon and having one end connected with the switch and its other end portion slidably journalled in the bearing provided by the opening in said indented portion of the side wall so as to be constrained to motion between defined limits in a plane substantially normal to the axis of the enclosure, the radial distance of said bearing for the pitman from the axis of the enclosure being so related to the length of the pitman and its extent of motion that the extremity of the slidably journalled end of the pitman is at all times maintained between the cylindrical periphery of the side wall and the bearing for the pitman.

2. A switch of the type to be mounted on the back of a small radio control instrumentality of the rheostat type comprising: an insulating base; a metal side wall encircling the base and having an integral instruck portion overlying the base to provide a pocket opening to the outside the bottom of which is apertured to provide a bearing located a substantial distance inwardly of the adjacent portions of said side wall; a toggle type snap switch mounted on the base inside the side wall and including a movable switch arm constrained to motion across the inner face of the base; a toggle spring for the switch; and a spring guiding pitman having one end operatively connected with the movable switch arm and its other end slidably journalled in the bearing at the bottom of said pocket, the toggle spring being mounted on the pitman and said pitman being of such length that in its position of maximum projection the projecting outer end portion is substantially no longer than the depth of the pocket.

3. A switch of the type adapted to be mounted on the back of a small radio control instrumentality of the rheostat type comprising: a substantially cylindrical metal side wall having an integral instruck portion providing a pocket opening to the outside, the bottom of said pocket having a hole therethrough to provide a bearing spaced inwardly from the cylindrical periphery of the side wall; an insulating base closing one end of the side wall and coacting therewith to form a substantially cup-shaped enclosure; a toggle type snap switch mounted on the base inside said enclosure and including a pivot fixed to the base about which the movable elements of the switch oscillate; a spring guiding pitman having one end connected to one of the movable members of the switch and its other end slidably journalled in the bearing at the bottom of the pocket formed by said instruck portion; and a coil spring on said pitman confined between the inner face of the instruck portion and a shoulder near the connection of the pitman to said movable switch member for yieldingly holding the movable switch parts in either of two predetermined positions, the pitman moving out through the bearing in the bottom of the pocket as its connection to said movable switch member crosses dead center, and said pitman being of such length and the pocket having such depth that in its position of maximum projection, the end portion of the pitman projecting through the bottom of the pocket is substantially no longer than the depth of the pocket.

4. In a switch of the character described: an enclosure including a base and a side wall extending up from the base, said side wall being indented a substantial distance into the enclosure to provide a pocket opening to the outside with the bottom wall of the pocket integral with said side wall and having a hole therethrough facing the opposite side of the enclosure; a toggle type switch mechanism mounted on the base within the enclosure including a pivoted switch arm and an actuating cam; a toggle spring for yieldingly holding the actuating cam and consequently the switch arm at either of its positions; a spring guiding pitman; and a connection between one end of the pitman and the actuating cam, said connection being detachable in a predetermined relative position of the pitman and actuating cam, the opposite end of the pitman being slidably projected through the hole in the bottom wall of the pocket, whereby said pitman may be grasped exteriorly of the switch enclosure to facilitate its attachment to the actuating cam; and said extending end portion of the pitman being readily severable after assembly of the parts, at a point such that the remaining projecting end portion of the pitman when in its maximum position of projection is substantially no longer than the depth of the pocket.

5. In a switch of the character described: an enclosure including a base and a side wall extending up from the base, said side wall being indented a substantial distance into the enclosure to provide a pocket opening to the outside with the bottom wall of the pocket integral with said side wall and having a hole therethrough facing the opposite side of the enclosure; a toggle type switch mechanism mounted on the base within the enclosure and including a pivoted switch arm and an actuating cam; a toggle spring for yieldingly holding the actuating cam and consequently the switch arm at either of its positions; a spring guiding pitman; a connection between one end of the pitman and the actuating cam, said connection being detachable in a predetermined relative position of the pitman and actuating cam, the opposite end of the pitman being slidably projected through the hole in the bottom wall of the pocket, whereby said pitman may be grasped exteriorly of the switch enclosure to facilitate its attachment to the actuating cam; and means on the extended end portion of the pitman forming a weakened area, whereby the end portion may be readily broken off, said means being so located that the remaining projecting portion is substantially no longer than the depth of the pocket when the pitman is on dead center.

6. In a switch of the character described: a housing including a substantially cylindrical side wall and a base adjacent to one end of the side wall; toggle type switch mechanism mounted on the base within the housing and including a pivoted switch arm adapted to be swung from one position to another and an actuating cam; a toggle spring for yieldingly holding the actuating cam and consequently the switch arm in either of its positions; a spring guiding pitman having one end slidably supported by said cylindrical side wall of the housing; and means detachably connecting the opposite end of the pitman with said actuating cam, said means comprising an undercut lug and

a slot, the major axes of which are inclined to the longitudinal axis of the pitman so that assembly of said pitman and actuating cam necessitates lateral displacement of one of said parts with relation to the other from the normal position of said parts maintained by the toggle spring.

7. In a switch of the character described: a housing including a substantially cylindrical side wall and a base adjacent to one end of the side wall; a switch arm pivoted on the base and adapted to be swung from one position to another; an actuating cam for the switch arm; a substantially T-shaped lug projecting laterally from the actuating cam; a toggle spring for yieldingly holding the actuating cam and consequently the switch arm in either of its positions; and a spring guiding pitman slidably supported at one end by said cylindrical side wall of the housing and having an elongated slot in its opposite end engaging said T-shaped lug, said slot having its major axis disposed at an angle to the longitudinal axis of the pitman so that connection of the pitman and actuating cam necessitates lateral displacement of the pitman from its normal position to which it is urged by the spring when the pitman is connected to the actuating cam.

8. In a snap switch: a housing having a metal side wall adapted to be electrically grounded; an insulated base; toggle type switch mechanism mounted on the base including a pivoted switch arm and a pivoted actuating cam drivingly connected with the switch arm; a spring guiding pitman having one end slidably received in a hole in the metal side wall and the other end connected to the actuating cam by means of an undercut lug and slot; a shoulder on the pitman adjacent to said connection; and a toggle spring on the pitman bearing against said shoulder and the side wall so that said spring maintains said connection with one edge of the slot bearing securely against the lug to thus electrically ground the actuating cam to the housing side wall in addition to yieldingly thrusting the actuating cam and consequently the switch arm to one or the other of its two positions.

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