Sept. 2, 1941. F. D. BRYANT ET AL 2,254,729

ELECTRIC SWITCH

Filed July 2, 1938

Fig. 1.

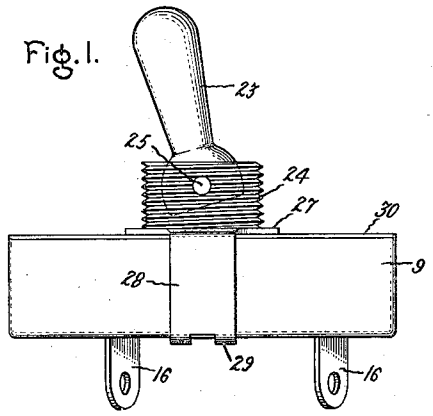


Fig. 2.

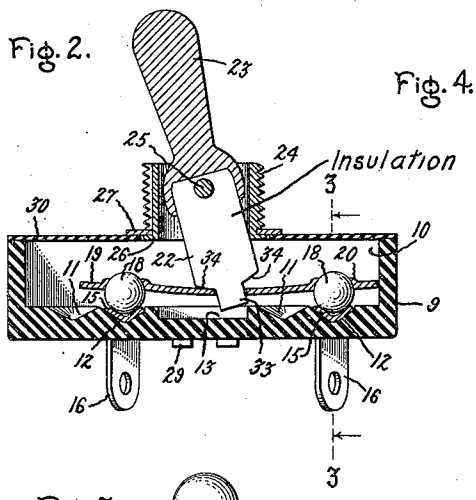


Fig. 3.

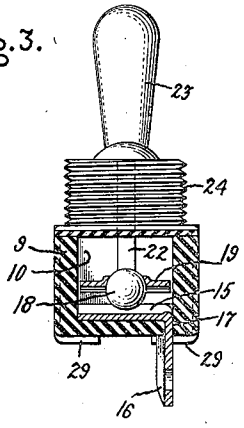
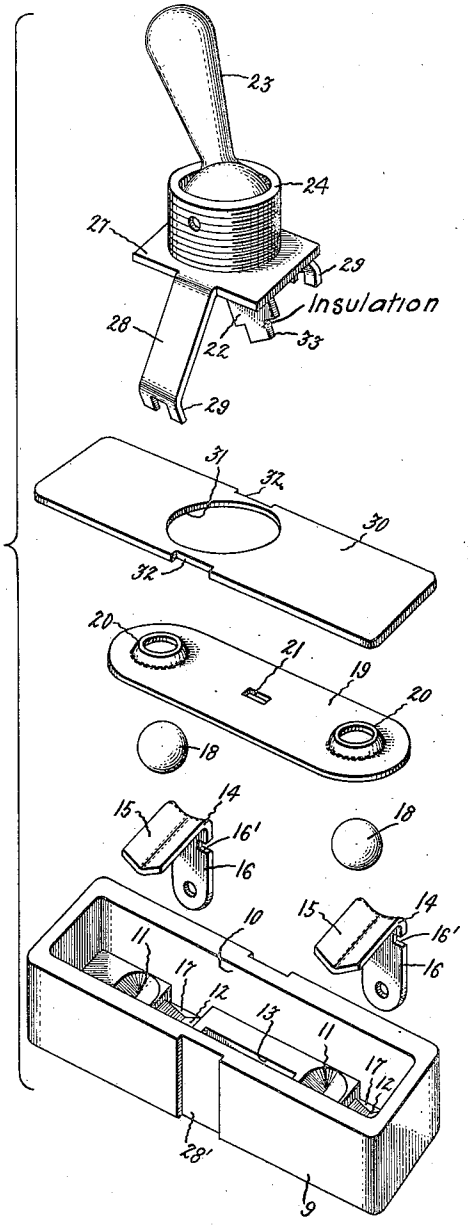


Fig. 4.



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2,254,729

UNITED STATES PATENT OFFICE

2,254,729

ELECTRIC SWITCH

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Application July 2, 1938, Serial No. 217,196

6 Claims. (Cl. 200—154)

This invention relates to electric switches, and more particularly to electric switches employing rolling contacts.

It is an object of the invention to provide an improved construction and arrangement of switches of this type and one which is easily assembled and manufactured at low cost.

In the accompanying drawing Fig. 1 is an elevational view of the switch; Fig. 2 is a sectional view through the switch housing showing the switch elements in operative position; Fig. 3 is a sectional view along the line 3—3 of Fig. 2, and Fig. 4 is an exploded view of the switch parts.

Referring to the drawing the numeral 9 designates a switch housing formed with an inner recess 10. The housing may be formed of insulating material such as a phenolic condensation product and filler. The bottom of the housing is provided with a plurality of spaced grooves 11 and 12. The grooves are arranged in pairs on each side of a central slot 13. The groove 12 of each pair is made deeper than the corresponding groove 11 and receives a contact member 14. According to the invention, the contact members 14 are substantially L-shaped and have a grooved contact arm 15 and a depending terminal leg 16. The contact arms 15 are located within the respective grooves 12 while the terminal legs 16 are inserted in vertically disposed slots 17 and extend below the housing as shown in Fig. 2. Notches 16' in the terminal legs frictionally engage the wall of the housing. Inasmuch as the grooves 12 are deeper than the grooves 11, the thickness of metal in the contact arms 15 builds up the depth of the groove until the edges of the grooved arms 15 are flush with the bottom of the recess and the grooves in the arm are of the same depth as the grooves 11.

A plurality of rolling contacts 18, which take the form of ball bearings, cooperate with the grooves 11 and the grooved arms 15. One of the ball bearings is disposed on each side of the contral slot 13 and the bearings are interconnected by means of a flexible spring slider member 19 which is provided with flanged openings 20 at each end adapted to receive the ball bearings. The flanges of the openings 20 provide a raceway for each of the ball bearing contacts and hold the bearings in assembled position. The slider member spans the distance between the pairs of grooves and causes the ball bearing contacts to move in unison. A central slot 21 is formed in the slider member and is adapted to coact with an operating arm 22.

The operating member or arm 22 of insulating material is secured to and depends from the switch handle 23. The handle and arm are pivotally mounted upon a mounting collar 24 by means of a pin 25. The collar 24 is screw threaded so that the switch may be mounted on a panel. In order to support the mounting collar and associated switch handle upon the switch housing, the mounting collar is provided with a flange 26 which engages the lower side of a plate 27 clamped on the top of the housing. The plate 27 is provided with arms 28 disposed in slots 28' on each side of the housing and the arms are formed with prongs 29 which are bent around the bottom of the housing to clamp the plate 27 and the collar 24 to the housing structure. A fiber insulating plate 30 is clamped between the plate 27 and the top of the housing and functions to close the recess 10 to provide a completely enclosed switch mechanism. The plate 30 is provided with an opening 31 to receive the collar flange 26 and with oppositely disposed recesses 32 in which the clamping arms 28 are seated.

The operating member 22 is connected to the slider member 19 by a tang 33 which rests in the central slot 21. On each side of the tang 33 the operating member is provided with a curved edge 34 which engages the top surface of the slider member. The length of the operating member 22, depending from the pivot point 25, is so proportioned that the flexible resilient slider element 19 is flexed or bent downwardly as shown in Fig. 2, to exert a compressive force upon the ball bearing contacts and maintain a firm contact between them and the contact arms 15.

It will be seen from Fig. 2 that as the operating member 22 is moved to and fro by means of the switch handle that the resilient slider member will be flexed to a greater degree as the operating member passes over dead center thereby increasing the pressure upon the ball bearing contacts so that as the tang moves the slider from side to side the ball bearings will roll up the side of the one groove and be snapped over into the adjacent groove by the increased compression in the resilient slider. As the operating member is rocked to and fro the arcuate edges 34 roll or pivot upon the upper surface of the slider member thereby depressing the slider and accomplishing a smooth and quick snap-action of the switch as the slider is moved longitudinally by the tang 33 seated in the slot 21. The end of the tang projecting below the slider moves freely in the slot 13.

In the position shown by Fig. 2, the switch is "on" and current flows from one of the terminal legs through the corresponding ball bearing con-

tact and then through the slider 19 to the other ball bearing contact and terminal leg. By moving the switch handle to the right the ball bearing contacts are snapped over into the grooves 11 formed in the insulated base thereby placing the switch in "off" position. Due to the fact that the ball bearings ride up the sides of the grooved contact arms 15 under the movement of the operating member, it will be seen that the slider is flexed considerably; at the same time the flexible slider member is tensioned or flexed further by movement of the operating member toward dead center, so that as the bearing contacts reach the top of the grooved contact arms they snap over into the adjacent grooves 11, as the slider moves longitudinally, thereby releasing the flexure stresses in the slider and causing the switch quickly to assume its new position. This action gives a quick break of the circuit through the switch.

By the construction described a quick-break switch is provided which embodies relatively few parts and which may be easily and quickly assembled. The flexible slider and operating arm provide a simple and improved means for operating the ball bearing roller contacts.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a switch structure, an insulated housing having a recess therein, spaced pairs of grooves in said recess, a grooved contact in one groove of each pair, a flexible slider element longitudinally movable in said recess and having a flanged opening in each end, a ball bearing contact seated in each of said openings and each cooperating with a grooved contact respectively, and operating means connected to said slider for moving it longitudinally to position said ball bearing contacts either in said grooved contacts or in the grooves in said recess to close or open said switch, said operating means flexing said slider as it is moved longitudinally to provide a quick make and break of said switch.

2. In a switch structure, a housing of insulated material, spaced pairs of grooves in said housing, a grooved contact in one groove of each pair, a flexible slider longitudinally movable and having a flanged opening in each end, a ball bearing contact seated in each of said openings and cooperating with said grooved contacts and an operating arm pivotally mounted on said housing and engaging said slider for moving it longitudinally to position said ball bearing contacts either in said grooved contacts or in the grooves in said housing to open or close said switch, said operating arm flexing said slider as it is moved longitudinally to provide a quick make and break of said switch.

3. In a device of the class described, a housing of insulating material, spaced pairs of grooves in said housing, a grooved contact in one groove of each pair, a flexible slider movable longitudinally in said housing and having a flanged opening in each end and a centrally disposed slot, a ball bearing in each of said openings and cooperating with said grooved contacts and an operating handle pivotally mounted in said housing and having a tang engaging said slot for moving said slider longitudinally to position said ball bearing contacts either in said grooved contacts or in the grooves in said housing to close or open said switch, said operating member having arcuate edges on each side of said tang for engaging the surfaces of said flexible slider to flex it as it is moved longitudinally of the housing and thereby providing a quick make and break of said switch.

4. In a device of the class described, a housing of insulating material having a recess therein, spaced pairs of grooves in said recess, a substantially L-shaped contact having a grooved arm in one groove of each pair and having a terminal portion extending beyond the confines of said recess, a flexible slider longitudinally movable in said recess and having a flanged opening in each end, a ball bearing contact seated in each of said openings and each cooperating with a grooved contact arm, and an operating member mounted in said housing and having a tang connected to said slider for moving said slider longitudinally to position said ball bearing contacts either in said grooved contact arms or in the grooves in said recess to close or open said switch, said operating means having arcuate surfaces on each side of said tang for engaging the surface of said slider to flex it as it is moved longitudinally to provide a quick make and break of said switch mechanism.

5. In a switch structure, an insulated housing having a recess therein, spaced pairs of grooves in said recess, a grooved contact in one groove in each pair, a flexible slider element longitudinally movable in said recess, a rolling contact mounted on opposite ends of said slider and each cooperating with a grooved contact respectively, and operating means connected to said slider for moving it longitudinally to position said roller contacts either in said grooved contacts or in the grooves in said recess to close or open said switch, said operating means flexing said slider as it is moved longitudinally to provide a quick make and break of said switch.

6. In a device of the class described, a housing of insulating material, spaced pairs of grooves in said housing, a grooved contact in one groove of each pair, a flexible slider movable longitudinally in said housing having a centrally disposed slot, contact means including rolling contacts at each end of said slider, said contacts cooperating with said grooved contacts, and an operating handle pivotally mounted in said housing and having a tang engaging said slot for moving said slider longitudinally to position said rolling contacts either in said grooved contacts or in the grooves in said housing to close or open said switch, said operating member having arcuate edges on each side of said tang for engaging the surface of said flexible slider to flex it as it is moved longitudinally of the housing and thereby providing a quick make and break of said switch.

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