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L. J. KARL
ELECTRIC SWITCH
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2,623,142

Fig. 1

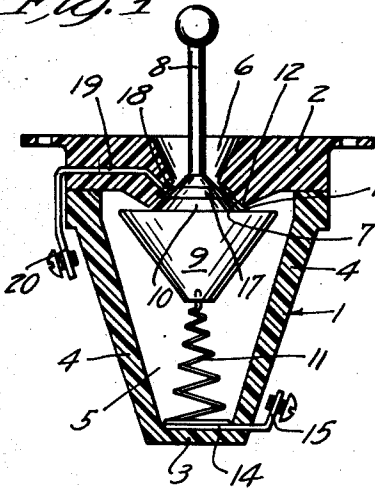


Fig. 2

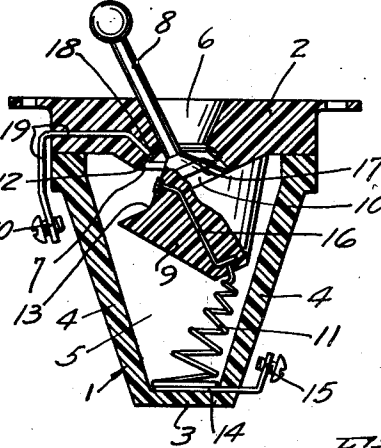


Fig. 3

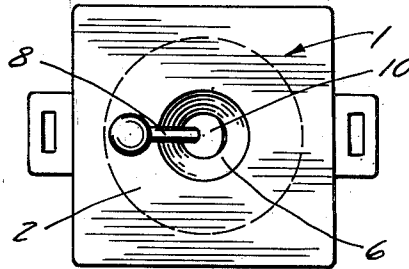


Fig. 4

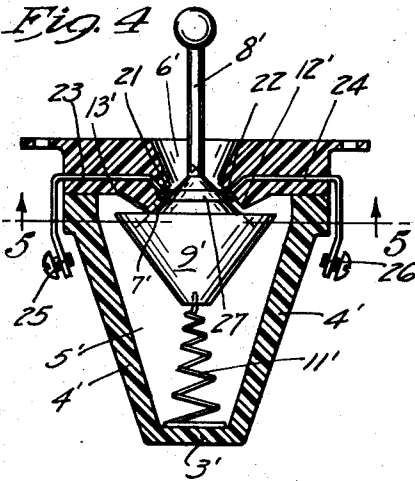


Fig. 5

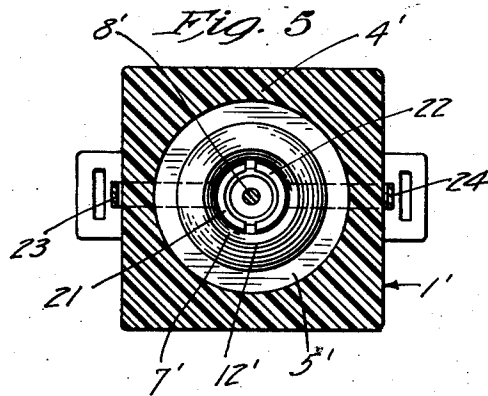
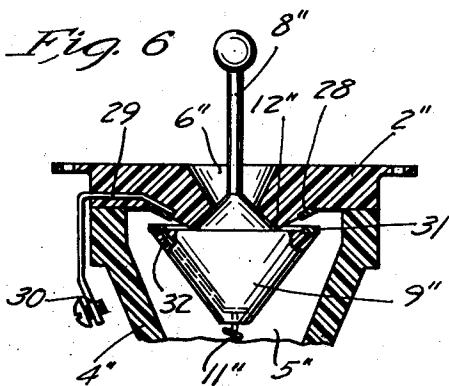


Fig. 6



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UNITED STATES PATENT OFFICE

2,623,142

ELECTRIC SWITCH

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4 Claims. (Cl. 200-154)

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My invention relates to electrical switches of the snap-action type and has for its primary object the provision of such a device which has a minimum of working parts.

A still further object of my invention is the provision of a device of the class described, which is positive in its action, which is easy to operate, and which has great durability.

The above and still further objects and advantages of my invention will become apparent from the following detailed specification, appended claims, and attached drawings.

Referring to the drawings, wherein like characters indicate like parts throughout the several views:

Fig. 1 is a view partly in vertical section and partly in side elevation of my novel switch;

Fig. 2 is a view corresponding to Fig. 1 but showing a different arrangement of some of the parts thereof, and some parts being broken away;

Fig. 3 is a view in plan of the structure of Fig. 2;

Fig. 4 is a view corresponding to Fig. 1 but showing a slightly modified form of my invention;

Fig. 5 is a view in transverse section taken on the line 5-5 of Fig. 4; and

Fig. 6 is a fragmentary view corresponding to Fig. 1, but showing a still further modified form of my invention.

Referring with greater particularity to the drawings, and, more specifically, to Figs. 1-3 thereof, the numeral 1 indicates, in its entirety, a switch housing having spaced front and rear walls 2 and 3 respectively and side walls 4. Together, the walls 2, 3, and 4 define a chamber 5. Front wall 2 is shown as being provided with a switch arm-receiving aperture or recess 6 which defines a generally circular inwardly-facing seat 7 concentric with the aperture 6. A switch arm 8 works through the aperture 6 with clearance for limited rocking movements in planes intersecting the axis of the seat 7. At its inner end, the switch arm 8 is provided with an enlarged or expanded head portion 9. As shown, head 9 provides a generally circular seat 10 adapted to seat against the seat 7 in the wall 2 of the housing when the switch arm is aligned with the axis of said seat 7. A coil compression spring 11, having one end seated against the rear wall 3 of the housing in axial alignment with said front wall seat 7, has its other end seated against and secured to an axial portion of the switch arm inwardly spaced from the seat 10 thereof. It will

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be noted that, in the structure shown, the switch arm 8 is tiltable in all directions radially of its axis, although this is not an essential limitation to the invention.

As shown, the front wall 2 is provided with an annular fulcrum shoulder 12 concentric with and inwardly-spaced from, and of greater diameter than, the wall seat 7. Likewise, the head 9 is provided with an annular fulcrum shoulder 13 which cooperates with the fulcrum shoulder 12 under tilting movements of the switch arm 8.

Spring 11, in the structure of Figs. 1-3, forms a part of an electrical lead 14, which, at its lower end, extends through the wall 4 and terminates in a connector 15. At its upper end, the lead 14 is shown as extending generally axially through the body 9, as indicated at 16, and terminates in an annular contact element 17. Preferably and as shown, the contact element 17 is raised from the plane of the surface of the conical seat 10. A cooperating contact element 18 is mounted on the seat 7 and is disposed so as to have circuit-closing engagement with the contact element 17 when the switch arm 8 is axially disposed with respect to the aperture 6, as shown in Fig. 1. An electrical lead 19 extends radially outwardly from the contact element 17 and terminates in a screw-equipped connector 20 laterally outwardly of the adjacent side wall 4.

Spring 11 tends to yieldingly maintain the switch arm 8, either in the seated position approximately perpendicular to the face of the front wall as in Fig. 1, whereby to close the circuit through the leads 14 and 19, or in the relatively tilted position with respect thereto, as shown in Fig. 2, wherein the contact elements 17 and 18 are separated whereby to break the circuit. It will be noted, that, when the switch arm 8 is tilted, the fulcrum shoulder 12 of the front wall 2 is engaged by the annular fulcrum shoulder 13 of the head 9 to provide an axis of tipping movement thereof. Under tilting movements of the switch arm 8, the extreme lower end of the head 9 moves beyond dead center relationship with respect to the lower end of the spring 11, whereupon spring 11 will tend to further tilt the switch arm 8 and head 9 toward their position of Fig. 2. Circuit-opening tilting movement of the switch arm 8 and head 9 is limited by engagement of the upper flat surface of the head 9 radially outwardly of the annular fulcrum 13 thereof with the inner surface of the front wall 2 radially outwardly of the fulcrum shoulder 12. As shown in Fig. 2, this movement may be also limited by engagement of the switch

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arm 8 with a side wall portion of the aperture 6.

In the modified form of the invention shown in Figs. 4 and 5, the structure, except for the disposition of the contact elements and circuit leads, is identical to that of Figs. 1-3 inclusive; and parts identical to those of Figs. 1-3 inclusive are given the same numerals with prime marks added. In this embodiment of the invention, a pair of opposed segmental contact elements 21 and 22 are mounted in spaced relationship on the seat 7' and are connected to laterally outwardly-extending electrical leads 23 and 24 respectively which terminate in screw-equipped connectors 25 and 26 on opposite sides of the housing adjacent the walls 4' thereof. The contact surfaces of the elements 21 and 22 are adapted to make electrical circuit-closing connection with the contact surface of an annular contact element 27 when the switch arm 8' is moved to its position axially of the aperture 6'. The circuit is broken by tipping the switch arm 8' in any desired direction radially of the axis of the aperture 6', the fulcrum portion 13' engaging the fulcrum shoulder 12' in exactly the same manner as that of Fig. 1-3 inclusive.

In the modified form illustrated in Fig. 6, a front wall section 2'' is shown as having mounted on the inner wall thereof, radially outwardly of the fulcrum shoulder 12'', an annular contact element 28. An electrical lead 29 has one end secured to the contact element 28 and projects laterally outwardly of the front wall 2'', terminating in a screw-equipped connector 30. The enlarged head 9'' of the switch arm 8'' is provided on its upper flat surface radially outwardly of the annular fulcrum 13'' thereof with an annular contact element 31, the upper contact surface thereof being adapted to make circuit-closing connections with the contact surface of the cooperating contact element 28 when the switch arm 8'' is moved in a direction radially outwardly of the axis of the aperture 6''. The circuit lead 32 is connected at one end to the annular contact element 31 and extends downwardly through the enlarged head 9'', its other end being connected to a coil compression spring 11''. Although not shown, it may be assumed that the lower end of the spring 11'' is connected to a lead and connector similar to that shown in Figs. 1 and 2.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the above objects; and, while I have shown and described a preferred embodiment and two modifications of my novel switch construction, it will be understood that the same is capable of further modification, as to construction and arrangement of parts, without departure from the spirit and scope of the invention as defined in the claims.

What I claim is:

1. In a switch of the class described, a switch housing having spaced front and rear walls, the front wall being provided with a switch arm-receiving aperture and defining a generally circular inwardly-facing seat concentric with said aperture, a switch arm working through said aperture with clearance for limited rocking movements in planes intersecting the axis of said seat and having an expanded head portion providing a generally circular seat adapted to seat against the seat of the front housing wall when the switch arm is aligned with the axis of the housing wall seat, a compression spring having one end seated against the rear wall of the housing in axial

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alignment with said front wall seat having its other end seated against an axial portion of the switch arm inwardly-spaced from the seat thereof, whereby the spring will yieldingly maintain the switch arm either in a position of coaxial alignment with the axis of the wall seat or in a relatively tilted position with respect to the wall seat axis, the front wall and switch arm head having cooperating contact areas that are engaged in one of said switch arm positions, said front wall having opposite fulcrum shoulder portions adjacent opposite inner marginal edges of the seat thereof, and cooperating shoulder portions on the switch arm for engagement with the wall shoulder portions under tilting movements of the switch arm.

2. In a switch of the class described, a switch housing having spaced front and rear walls, the front wall being provided with a switch arm-receiving aperture and defining inwardly-facing seat portions adjacent opposite marginal portions of the aperture, said switch arm working through said aperture with clearance for limited rocking movements in a plane intersecting the center of the aperture and having an expanded head portion providing a seat for engagement with the seat portions of the front housing wall when the switch arm is approximately perpendicular to the outer surface of the front wall, and a compression spring having one end seated against the rear wall of the housing at a point inwardly-spaced from the inner end of the switch arm but in axial alignment with the switch arm when the latter is approximately perpendicular to the outer surface of the front wall and having its other end anchored to the inner end of said switch arm, whereby the spring will yieldingly maintain the switch arm either in a seated position approximately perpendicular to the outer face of the front wall or in a relatively tilted position with respect to the outer surface of the front wall, the front wall and switch arm having cooperating contact areas that are engaged in one of said switch arm positions, said front wall being provided with an annular fulcrum shoulder portion concentric with and inwardly-spaced from and of greater diameter than the wall seat, and a cooperating fulcrum shoulder on the switch arm for fulcrum engagement with the wall shoulder under tilting movements of the switch arm.

3. In a switch of the class described, a switch housing having spaced front and rear walls, the front wall being provided with a switch arm-receiving aperture and defining a generally circular inwardly-facing seat concentric with said aperture, a switch arm working through said aperture with clearance for limited rocking movements in planes intersecting the axis of said seat and having an expanded head portion providing a generally circular seat adapted to seat against the seat of the front housing wall when the switch arm is aligned with the axis of the housing wall seat, a compression spring having one end seated against the rear wall of the housing in axial alignment with said front wall seat having its other end seated against an axial portion of the switch arm inwardly-spaced from the seat thereof, whereby the spring will yieldingly maintain the switch arm either in a position of coaxial alignment with the axis of the wall seat or in a relatively tilted position with respect to the wall seat axis, the front wall and switch arm head having cooperating contact areas that are engaged in one of said switch arm positions, said front wall having opposite fulcrum shoulder portions ad-

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jacent opposite inner marginal edges of the recesses, and cooperating shoulder portions on the switch arm for engagement with the wall shoulder portions under tilting movements of the switch arm, the said shoulder portions of the switch arm being inwardly-spaced from the cooperating shoulder portions of the housing wall when the seat portions of the arm are seated against the seat portions of the wall.

4. In a switch of the class described, a switch housing having spaced front and rear walls, the front wall being provided with a switch arm-receiving aperture and defining inwardly-facing seat portions adjacent opposite marginal portions of the aperture, said switch arm working through said aperture with clearance for limited rocking movements in a plane intersecting the center of the aperture and having an expanded head portion providing a seat for engagement with the seat portions of the front housing wall when the switch arm is approximately perpendicular to the outer surface of the front wall, and a compression spring having one end seated against the rear wall of the housing at a point inwardly-spaced from the inner end of the switch arm but in axial alignment with the switch arm when the latter is approximately perpendicular to the outer surface of the front wall and having its other end anchored to the inner end of said switch arm, whereby the spring will yieldingly maintain the switch arm either in a seated position approximately

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perpendicular to the outer face of the front wall or in a relatively tilted position with respect to the outer surface of the front wall, the front wall and switch arm having cooperating contact areas that are engaged in one of said switch arm positions, said front wall being provided with an annular fulcrum shoulder portion concentric with and inwardly-spaced from and of greater diameter than the wall seat, and a cooperating fulcrum shoulder on the switch arm for fulcrum engagement with the wall shoulder under tilting movements of the switch arm, the said annular fulcrum shoulder portion of the switch arm being inwardly-spaced from the cooperating shoulder of the housing wall when the switch arm is aligned with the axis of the aperture.

LESTER J. KARL.

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