

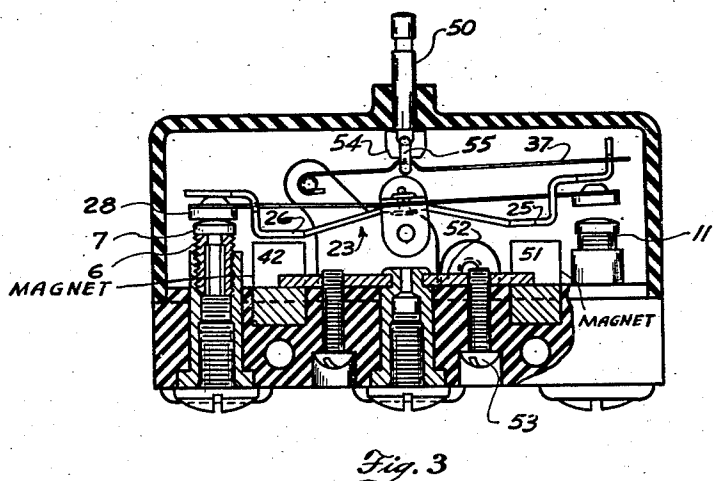
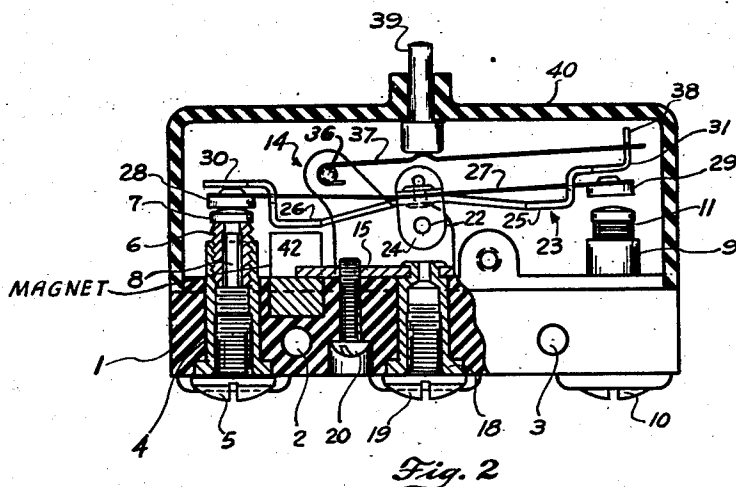
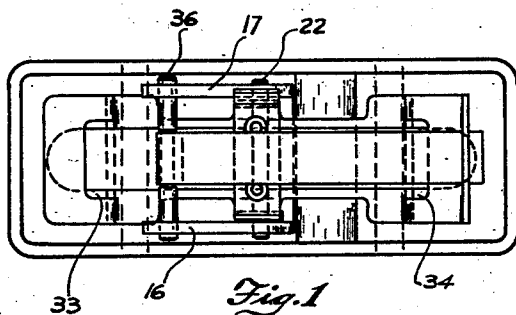
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SNAP SWITCH

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SNAP SWITCH

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This invention relates in general to switching mechanisms, and more particularly to snap action switches of the self-contained or enclosed type. The primary object of this invention is to provide a snap switch construction which is simple and dependable and which may be manufactured economically.

A further object of the invention is the provision of a snap switch mechanism which is readily adjustable after assembly so as to obtain optimum switching action.

Other objects will appear from the following description and appended claims.

For a full disclosure of the invention, reference is made to the following detailed description and to the accompanying drawing, in which,

Fig. 1 is a top view, with the cover removed, of one form of snap switch embodying the invention;

Fig. 2 is a side view, partly in section; and

Fig. 3 is a view similar to Fig. 2 of a modification.

Referring to the drawing, reference character 1 indicates a base member for the snap switch unit. This base member is of elongated rectangular shape and is provided with transverse holes 2 and 3 which are adapted to receive mounting screws. Preferably moulded in the base member is a terminal bushing 4 which is screw-threaded to receive a terminal screw 5. This bushing extends through the base member and at its upper end supports a contact stud 6 which carries a stationary contact 7. The contact stud 6 is screw-threaded in the terminal bushing and is formed with a hexagonal socket 8 which is adapted to receive a wrench which may be inserted through the open end of the bushing 4 when the contact screw 5 is removed.

Located on the other end of the base member is a second terminal bushing 9 which may be identical with the bushing 4. This bushing 9 receives a terminal screw 10 at its lower end and a contact stud 11 at its upper end. The contact stud 11 is identical with the contact stud 6 and may be adjusted by a wrench inserted through the terminal bushing 9.

Supported on the upper face of the base 1 is a U-shaped bracket 14. This bracket consists of a base portion 15 and a pair of ears 16 and 17 (Fig. 1) which extend outwardly from the base. The base portion of the bracket 14 may be secured to the base 1 by means of staking to a central terminal bushing 18. This terminal bushing receives a terminal screw 19. The bracket 14 may be additionally secured to the base 1 by a screw

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20 which extends upwardly through the base and which is threaded into the base portion 15 of the bracket.

Extending between the ears 16 and 17 of the bracket 14 is a pivot pin 22. This pivot pin supports a rocker member generally indicated as 23. This rocker member is formed with a pair of downwardly extending ears 24 and with outwardly extending arms 25 and 26. Attached to the mid-portion of the rocker member between the ears 24 is a spring blade 27 which carries movable contacts 28 and 29 at its two free ends. The arms 25 and 26 of the rocker member are off-set adjacent the movable contacts so as to provide portions 30 and 31 which are adapted to engage the rear of movable contacts 28 and 29. These off-set portions are formed with openings 33 and 34 (Fig. 1) through which the spring blade 27 extends. These openings are wider than the thickness of the spring blade 27 and permit a limited amount of motion of the ends of the spring blade relative to the arms 25 and 26.

The bracket 14 also supports a second pivot pin 36. This pivot pin carries a leaf spring 37 which bears against an upward extension 38 on the rocker member 23. This leaf spring 37 is actuated by a plunger 39 which extends through the cover 40 of the switching mechanism.

The left hand leg 26 of the rocker member is formed to provide an armature which cooperates with a U-shaped permanent magnet 42 which is received in a cavity formed in the base member 1. This permanent magnet is held in place by an extension of the base portion 15 of bracket 14.

When no pressure is applied to the plunger 39, the permanent magnet 42 causes the parts to assume the positions shown in Fig. 2. Thus the magnet has pulled the rocker member 23 in a counterclockwise direction which causes the movable contact 28 to engage contact 7. At this time the right hand end of the leaf spring 27 is engaged by the bottom of the opening 34 in the rocker member, which insures that the movable contact 29 is disengaged from its corresponding stationary contact.

When pressure is applied to the plunger 39 it bows the leaf spring 37 and applies a downward force to the right hand end of the rocker member 23. This force acts in opposition to the attractive force of the permanent magnet 42. As the force on the plunger 39 is increased, a point will be reached at which the spring 37 overcomes the attractive force of the armature 42. The rocker member 23 will now snap to its clockwise position in which the contact 29 engages contact

ii. At this time the contact 28 is positively disengaged from contact 7 due to the bottom of the opening 33 in the rocker member engaging the contact spring 27 adjacent contact 28.

As the plunger 39 is permitted to move outwardly the spring tension on the spring 37 will be decreased to a point at which it is overcome by the attractive force of the magnet 42. When this point is reached the rocker member 23 will snap in the counterclockwise direction, thereby disengaging contact 29 from contact 11 and engaging contact 28 with contact 7.

It will be noted that when the contact 28 is in engagement with the contact 7 the portion 30 of the rocker member is in engagement with the rear face of contact 28. By this arrangement stationary contact 7 acts as a positive stop to the counterclockwise rotation of the rocker member. Thus adjusting of the contact stud 6 in the terminal bushing 8 provides an adjustment for the spacing between the armature portion 26 and the permanent magnet 42. As this spacing is decreased, the attractive force of the armature increases. This attractive force determines the amount of force that must be applied to plunger 39 in order to operate the switch. This attractive force may be adjusted so as to obtain the desired degree of snap action by turning the contact stud 6 in bushing 4. This may be done by removing the terminal screw 5 and inserting a hexagonal wrench through the terminal bushing.

It is also desirable to provide an adjustment for the gap between the contacts when open. It is necessary for this gap to be wide enough to insure a positive separation of the contacts. At the same time it is desirable to limit this gap as much as possible, as this reduces the amount of work required to operate the switch. This contact gap may be adjusted by rotating the contact stud 11 in the terminal bushing 9. This is preferably done by inserting a tool through the outer end of the terminal bushing.

In the arrangement shown in Fig. 2 the switch is operated in one direction by pushing plunger 39 in, and is operated in the other direction by permitting the plunger 39 to move outwardly. In some applications it is desirable to have the switch operate with a push-pull action. In other words, it is desirable to have the switch remain in actuated position until the plunger is actually pulled out, instead of simply being allowed to move outwardly. This action may be obtained by the arrangement shown in Fig. 3. In this figure the construction is substantially identical with the construction of Fig. 2, except for the plunger 50 and the inclusion of an extra permanent magnet 51. The permanent magnet 51 is held in place by an extension 52 of the bracket base 15 which is secured to the base 1 by means of a screw 53. The plunger 50 is formed with an enlarged head 54 which is attached by a link 55 to the spring blade 37.

With the parts in the positions shown, the plunger 50 has been pulled to its outermost position. The armature portion 26 is now closer to the permanent magnet 42 than the armature portion 25 is to magnet 51. The attractive force of magnet 42 is therefore greater than the attractive force of magnet 51, and the rocker member 23 is therefore held in its counter-clockwise position in which the movable contact 28 engages stationary contact 7.

When the plunger 50 is pushed inwardly, it applies a counter-clockwise force to the rocker mem-

ber which is added to the clockwise attractive force of the magnet 51. Finally a point is reached in which the clockwise forces are greater than the counter-clockwise force of magnet 42 and the rocker member 23 snaps to its clockwise position.

When the inward force of plunger 50 is removed the rocker member 23 will remain in its clockwise position due to the fact that the attraction of magnet 51 on armature portion 25 will now be greater than the attraction of magnet 42 on armature portion 26. When an outward force is applied to the plunger 50, this will be transmitted through the spring 37, thereby applying a counter-clockwise force to the rocker member 23. When this force, coupled with the attractive force of magnet 42, becomes sufficient to overcome the attractive force of magnet 51, the rocker member will snap to its counter-clockwise position as shown.

In Fig. 3 it will be apparent that adjustment of the contact stud 6 will determine the degree of inward force required on plunger 50 in order to operate the switch in one direction, and that adjustment of the contact stud 11 will determine the outward force required on plunger 50 to operate the switch in the opposite direction.

From the foregoing it will be apparent that the present invention provides a simple and positive snap switch construction. It will also be apparent that the present invention provides a construction which may be readily assembled. It will be further apparent that the invention provides easily accessible adjusting means by which the switch may be calibrated for securing optimum switching action.

While I have shown and described only two forms of the invention, the construction may be varied considerably without departing from the scope of the invention. I therefore desire to be limited only by the scope of the appended claims.

What is claimed is:

1. In a switch unit, a base, a switch arm on one side of the base and pivoted thereto, a movable contact operated by said switch arm, a stationary contact cooperating with said movable contact, adjusting means for the stationary contact, a terminal member having a screw hole for mounting a terminal screw on the other side of the base, the screw hole for the terminal screw being in alignment with the adjusting means for the stationary contact whereby the stationary contact may be adjusted by a tool inserted through said screw hole.

2. In a switch unit, a base, a switch arm on one side of the base and pivoted thereto, a movable contact operated by said switch arm, a hollow terminal bushing extending through the base for mounting a terminal screw on the other side of the base, a stationary contact screw threaded in the terminal bushing on said one side of the base, said stationary contact cooperating with said movable contact and being adjustable by means of a tool inserted through said hollow bushing.

3. In an enclosed snap switch unit, a base, a switch arm on one side of the base and pivoted thereto, a cover for the snap switch unit, means extending through the cover for actuating said switch arm, a movable contact actuated by said switch arm, a permanent magnet secured to the base, an armature cooperating with said magnet for causing movement of the movable contact with snap action, a stationary contact cooperating with said movable contact and forming a stop for limiting movement of said armature with

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respect to the magnet, adjusting means for the stationary contact, a terminal member having a screw hole for mounting a terminal screw on the other side of the base, the screw hole for the terminal screw being in alignment with the adjusting means for the stationary contact whereby the stationary contact may be adjusted by a tool inserted through said screw hole.

4. In an enclosed snap switch unit, a base, a switch arm on one side of the base and pivoted thereto, a cover for the snap switch unit, means extending through the cover for actuating said switch arm, a movable contact actuated by said switch arm, a permanent magnet secured to the base, an armature cooperating with said magnet for causing movement of the movable contact with snap action, a stationary contact cooperating with said movable contact and forming a stop for limiting movement of said armature portion with respect to the magnet, a hollow terminal bushing extending through the base for mounting a terminal screw on the other side of the base, said stationary contact being screw-threaded in the terminal bushing on said one side of the base and being adjustable by means of a tool inserted through the hollow bushing.

5. In a snap switch unit, a base, a pair of spaced stationary contacts secured to the base on one side thereof, a pair of movable contacts cooperating with said stationary contacts, a switch actuating member pivotally secured to the base at a point between the stationary contacts and adapted selectively to cause one of said movable contacts or the other to disengage its corresponding stationary contact, a permanent magnet secured to the base, an armature carried by said switch actuating member adjacent said permanent magnet, a pair of terminals mounted opposite the stationary contacts on the other side of the base, and independent adjusting means for each of said stationary contacts, said adjusting means being accessible through said terminals.

6. In a snap switch unit, a base, a pair of spaced stationary contacts secured to the base on one side thereof, a rocker member pivotally secured to the base at a point between said stationary contacts, spring blade means attached at a point between its ends to the rocker member adjacent its pivot, said spring blade means extending generally parallel with the base and having a movable contact adjacent each end thereof cooperating with a corresponding stationary contact, the rocker member comprising oppositely extending arms located between the spring blade means and the base, said arms extending perpendicular to the base adjacent the movable contacts and being formed with openings through which the spring blade means extends, the edges of said openings determining the limits of lost motion between the ends of the spring blade means and the rocker member.

7. In a snap switch unit, a base, a pair of spaced stationary contacts secured to the base on one side thereof, a rocker member pivotally secured to the base at a point between said stationary contacts, spring blade means attached at a point intermediate its ends to the rocker member adjacent its pivot, said spring blade means extending generally parallel with the base and having a movable contact adjacent each end thereof cooperating with a corresponding stationary contact, the rocker member comprising oppositely extending arms located between the spring blade means and the base, said arms extending perpendicular to the base adjacent the movable con-

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tacts and being formed with openings through which the spring blade means extends, the edges of said openings determining the limits of lost motion between the ends of the spring blade means and the rocker member, said rocker member being formed with an armature portion between the spring blade means and the base, a permanent magnet secured to the base adjacent said armature portion, and a resilient actuator for applying force to said rocker member.

8. In a snap switch unit, a base, a pair of spaced stationary contacts secured to the base on one side thereof, a rocker member pivotally secured to the base at a point between said stationary contacts, spring blade means attached intermediate its ends to the rocker member adjacent its pivot, said spring blade means extending generally parallel with the base and having a movable contact adjacent each end thereof cooperating with a corresponding stationary contact, the rocker member comprising oppositely extending arms located between the spring blade means and the base, said arms extending perpendicular to the base adjacent the movable contacts and being formed with openings through which the spring blade means extends, the edges of said openings determining the limits of lost motion between the ends of the spring blade means and the rocker member, said rocker member being formed with an armature portion on each side of its pivot, a first permanent magnet secured to the base adjacent one armature portion, a second permanent magnet secured to the base adjacent the other armature portion, and a resilient actuator for applying force to said rocker member.

9. In a snap switch unit, a base, a pair of spaced stationary contacts secured to the base on one side thereof, a rocker member pivotally secured to the base at a point between said stationary contacts, spring blade means attached intermediate its ends to the rocker member adjacent its pivot, said spring blade means extending generally parallel with the base and having a movable contact adjacent each end thereof cooperating with a corresponding stationary contact, the rocker member comprising oppositely extending arms located between the spring blade and the base, said arms extending perpendicular to the base adjacent the movable contacts and being formed with openings through which the spring blade means extends, the edges of said openings determining the limits of lost motion between the ends of the spring blade means and the rocker member, said rocker member being formed with an armature portion between the spring blade means and the base, a permanent magnet secured to the base adjacent said armature portion, a resilient actuator for applying force to said rocker member, and means for independently adjusting said stationary contacts.

10. In a snap switch unit, a base, a stationary contact secured to the base, a rocker member pivoted to the base, a spring blade carried by said rocker member and extending generally parallel with the base, said spring blade carrying a movable contact adapted to engage the stationary contact, the rocker member including an armature portion extending generally parallel with the base between the spring blade and the base, the rocker member also including a portion extending perpendicular of the base adjacent the movable contact and being formed with an opening through which the spring blade extends, the edges of the opening determining the limits of lost motion between the free end of the spring

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blade and the rocker member, a permanent magnet secured to the base adjacent said armature portion, and a resilient actuator for said rocker member.

11. In a snap switch unit, a base, a stationary contact secured to the base, a bracket mounted on the base and having ears extending outwardly from the base, a first pivot pin extending between the ears of said bracket, a rocker member extending generally parallel of the base and pivoted

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on said first pivot pin, a movable contact co-operating with said stationary contact and actuated by said rocker member, snap action means associated with said rocker member, a second pivot pin carried by said bracket, a leaf spring pivoted on said second pivot pin and engaging said rocker member, and an actuator bearing against said leaf spring.

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