ABSTRACT: An improvement in a two circuit snap switch of a type having opposed pairs of contacts and a leaflike contact blade positioned therebetween, which is normally urged into engagement with one pair of contacts and movable into engagement with an opposed pair of contacts, wherein an actuator stem extends through the contact blade and is normally biased against a spring in the interior of the housing and, wherein another spring stems across the contact blade and is intersected by the actuator stem. The snap switch of this invention is characterized by the provision of an offset medial portion in the actuator through which the contact blade spring extends, whereby lateral wiping action is imparted to the contact blade and the contacts it engages during movement thereof toward, and away from, the opposed contacts.
SNAP SWITCH

BACKGROUND OF THE INVENTION

1. Field of the Invention
This invention relates to switches and more particularly, to a two circuit snap switch.

2. Brief Description of the Prior Art
A two circuit snap switch of construction similar to that disclosed herein is shown in the Roesser U.S. Patent No. 2,840,657. The structure shown in the aforementioned Roesser patent includes an opposed pair of contacts with a two part leaflike contact blade. Each of the two parts of the blade abuts against opposite sides of a generally centrally positioned actuator which is biased against a spring. A spring runs through the actuator and is connected under tension, to each of the two parts of the contact blade. Through this arrangement the two part contact blade is normally urged into engagement with one pair of contacts in the housing but is movable into engagement with the other pair of contacts and upon depression of the actuator is automatically returnable into engagement with the one pair of contacts upon release of the actuator.

There is also currently available on the market a two circuit snap switch, wherein the leaflike contact blade is a one piece structure and the contact blade spring, which connects two portions thereof, is under compression and extends through the actuator, to join opposite sides of the contact blade and provide the desired "flip action" between the pairs of contacts in the housing. Snap switches utilizing a contact blade spring under compression are shown in the patents to Krantz U.S. Pat. No. 1,256,332; Shabeck U.S. Pat. No. 2,661,408; Koenig U.S. Pat. No. 2,918,544; and Barden U.S. Pat. No. 3,196,230.

During operation of snap switches and, other switches as well, dust and oxidation may cover the contacts and interfere with, or interrupt, the completion of a circuit through the contacts. Single circuit snap switches showing structures for "wiping" contacts are disclosed in the patents to Kryder U.S. Pat. No. 3,030,466 and Bauer et al. U.S. Pat. No. 3,459,912.

A need and desire has arisen in the art to provide a two circuit snap switch of the type referred to, wherein the contacts are automatically wiped or cleaned during operation of the switch. This invention is directed towards meeting this need and desire.

SUMMARY OF THE INVENTION
This invention is directed, in brief, to the provision of an improved two circuit snap switch.

The best mode currently contemplated for carrying out the invention includes the provision of a housing having opposed pairs of contacts and a one piece leaflike contact blade having contacts thereon, and positioned between the housing pairs of contacts. The contact blade is provided with a central opening, and this opening is intersected by a generally transversely oriented actuator stem. A coil spring under compression extends across the central opening in the contact blade and through an opening in the actuator stem. The actuator stem is also biased against a spring in the bottom of the housing, thereby normally urging the contact blade stem upwardly and urging the contact in engagement with the lower of the two pairs of housing contacts. The intermediate portion of the actuator which extends through the contact blade and through which the contact blade compression spring extends, has portions which are canted relative to the remainder thereof, so that lateral motion is imparted to the contact blade during reciprocal movement of the actuator.

BRIEF DESCRIPTION OF THE DRAWINGS
FIG. 1 is a perspective view of the contact blade and actuator stem utilized in this invention;
FIG. 2 is a section viewed through the snap switch of this invention showing the switch in its normal position with the contact blade in engagement with the lower of two pairs of contacts in the housing;
FIG. 3 is a view similar to FIG. 2 showing the initiation of movement of the actuator upon initial depression thereof;
FIG. 4 is a view similar to FIGS. 3 and 2 showing the actuator fully depressed and the contact blade moved into engagement with the upper of the two pairs of contacts in the housing, and;
FIG. 5 is a fragmentary enlarged perspective view of a modified form of the actuator element for use in carrying out the principle of this invention.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail a specific embodiment therefor, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

The switch 10 of this invention includes a generally boxlike housing 12 having a substantially hollow interior 12a. An upper pair of contacts 14 and 16 are located in the upper portion of the housing and are mounted on inwardly threaded ends 18a and 20a of terminal arms 18 and 20. Terminal arms 18 and 20 reside in slots 22 and 24, which open to the exterior of the housing. Arms 18 and 20 terminate in terminal lugs 18b and 20b which are positioned to the exterior of the housing.

A lower pair of contacts 26 and 28 are located in the lower portion of the housing and are in general vertical alignment with the upper pair of contacts 14 and 16. Lower contacts 26 and 28 are connected to the interrelated ends 30a and 32a of arms 30 and 32. Terminal arms 30 and 32 reside in slots 34 and 36 which open to the exterior of the housing. Arms 30 and 32 terminate in terminal lugs 30b and 32b, also located to the exterior of the housing.

A switch button 40 is provided for actuating the switch. Switch button 40 extends through a mediately positioned opening 42 in the top of housing 12 and the underside of button 40 is provided with an enlarged flange 44 to retain the button 40 associated with the housing 12. An actuator member, plunger, or stem 46 is connected to the switch button 40 and is positioned generally uprightly in the central portion of the housing 10. The actuator 46 includes an upper tab 48 which is inserted into button 40 to connect the actuator 46 thereto. A canted medial portion or offset portion 50 extends from the upper tab portion 48 to a lower upright portion 52. Spring 54 which opens to the bottom thereof. The lower portion 52 of actuator 46 is positioned within medial recess 56 in the lower portion of the interior of the housing, and tracks in upright slots 58a at the opposite sides of the recess 56. Recess 56 also receives a coil spring 58 for normally biasing the actuator upwardly or in a direction towards the upper pair of contacts.

The switch 10 further includes a unitary leaflike contact blade 60 of suitable spring metal, preferably brass. Contact blade 60 is disposed between the upper and lower pair of contacts and is generally coextensive in length with the distance across contacts 14 and 16 and contacts 26 and 28. The contact blade 60 includes an upper face 60a and a lower face 60b and generally centrally located opening 62. Opening 62 has laterally opposed notches, such as 62a, through which the actuator 46 extends and, particularly, the medial canted portion 50 thereof.

Opposite ends of the central opening 62 of contact blade 60 are provided with inwardly directed ears 64 and 66. A coil spring 68 is connected to, and extends between, ears 64 and 66 under compression. In its normal orientation, spring 68 is slightly bowed outwardly relative to the blade 60 as seen in FIGS. 1, 2 and 4. The spring 68 extends through an opening 80a in the canted portion 50 of the actuator 46. Contact blade 60 further includes an upper pair of contacts 70 and 72 on the upper face 60a for engagement with housing upper contacts 14 and 16, and a lower pair of contacts 74 and 76 on the lower face 60b for engagement with the housing lower contacts 26 and 28.
The normal position of the switch is indicated in FIG. 2. Spring 58 biases actuator 46 upwardly to force spring 68 to its upwardly bowed position which, in turn, works in opposition against contact blade 60 to force the blade downwardly relative to the housing and into engagement with lower contacts 26 and 28. When button 40 is depressed, the upper end 152 of the contact blade upwardly, the canted medial portion 50 of actuator 46, tracking in opposed notches 62a, imparts slight lateral movement to blade 60, as shown in FIG. 3. Continued depression of button 40 reverses the orientation of spring 68, forcing blade 60 upwardly into engagement with upper contacts 14 and 16. At the termination of this upwardly extending actuator 50, still not completely depressed so that further depression thereof imparts more lateral motion to blade 60. When button 40 is released, spring 58 forces spring 68 upwardly to return blade 60 downwardly to the position shown in FIG. 2. During this return movement, slight lateral movement is imparted to the blade 60 at the initiation of its departure from the upper contacts and at the termination of its movement into engagement with the lower contacts.

A modified form of the actuator element of this invention is shown in FIG. 5. There the button 40 is connected to actuator 146 preferably in the same fashion as described with respect to actuator 46 and preferably actuator 146 would also have a tab means (not shown) for making this connection. Actuator 146 has a generally upright medial portion 50 in contrast to the canted medial portion 50 of actuator 46. Actuator 146 has a through opening 150a for receiving spring 68 in the same fashion as actuator 46. The lower end 152 of actuator 146 is also generally uprightly aligned with the remainder of the actuator and is provided with slots 154a and 154b in the bottom thereof for receiving a biasing spring such as spring 58.

The medial portion 150 of actuator 146 includes portions which are offset relative to the remainder of the actuator. These offset portions are shown as laterally outwardly extending ribs 156 on the opposite sides of medial portion 150. It is intended that the ribs 156 would be received in notches 62a of contact blade 60. Ribs 156 include a first or upper forwardly oriented portion 158, a second or medial rearwardly oriented portion 160 and, a third or lower forwardly oriented portion 162. This rib configuration causes relative lateral wiping movement of the contact blade 60 in two directions during reciprocal movement of actuator 146 responsive to depression of button 40.

Thus, it can be seen that with the switch of this invention, a relative lateral wiping action occurs between the blade contacts and the housing contacts automatically as an incident to the movement of the contact blade between the upper and lower portions. This insures that the contacts will be maintained relatively free of dust particles and minor particles of oxidized matter, and thus insures a good circuit through the contacts.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as some modifications may be obvious to those skilled in the art.

We claim:

1. A snap switch comprising: a housing having an interior; and opposed pair of contacts positioned in the housing interior; a switch arm extending across and positioned between said housing pairs of contacts, said switch arm including a medial opening and a spring means stressed across said opening between spaced portions of the switch arm, and an actuator mounted in the housing for generally reciprocal movement in a direction generally transverse to said switch arm, said actuator extending through said switch arm medial opening and having an intermediate portion intersecting said spring means, and a bottom portion slidably mounted in said housing, said actuator intermediate portion having surfaces offset relative to said bottom portion and in engagement with portions of the switch arm, whereby reciprocal movement of said actuator will cause movement of said switch arm from a position engaging one of said pair of contacts to a position engaging the other of said pair of contacts while simultaneously imparting relatively lateral movement to said switch arm at the initiation of movement away from one pair of contacts and during the termination of movement into engagement with the other pair of contacts.

2. The snap switch of claim 1 wherein the actuator is connected to biasing means for normally urging the actuator in one direction of its movement.

3. The snap switch of claim 1 wherein the spring for the switch arm is stressed in a state of compression across the switch arm opening.

4. The snap switch of claim 1 wherein said intermediate portion of said actuator is cantilever relative to said bottom portion.

5. The snap switch of claim 1 wherein said intermediate portion of said actuator is generally upright with said offset surfaces comprising rib portions thereon.

6. The snap switch of claim 4 wherein said actuator is connected to biasing means for normally urging said actuator in one direction of movement and wherein said spring means intersects said actuator on one side of the switch arm and extends through said cantilever portion of said actuator.

7. The snap switch of claim 6 wherein said switch arm has contacts on opposite ends of each of the faces thereof.

8. The snap switch of claim 1 wherein the actuator bottom portion is generally perpendicular to the switch arm and the actuator intermediate portion is cantilever relative to said bottom portion and said switch arm and, wherein the spring means intersects the cantilever portion of the actuator.

9. The snap switch of claim 1 wherein the actuator intermediate portion is generally perpendicular to the switch arm and wherein said offset surfaces includes rib portions on the opposite sides thereof, said rib portions including upper and lower forwardly offset portions and an intermediate rearwardly offset portion, and wherein said switch arm opening includes laterally opposed notches in which said ribs are received.

10. The snap switch of claim 8 wherein the spring means for said switch arm is stressed in a state of compression across the switch arm opening.

11. The snap switch of claim 9 wherein the spring means for said switch arm is stressed in a state of compression across the switch arm opening.