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SNAP SWITCH MEANS

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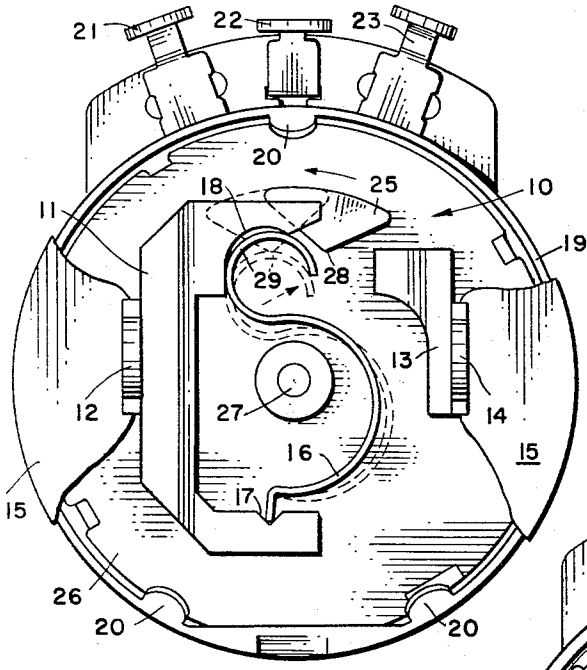


Fig. 1

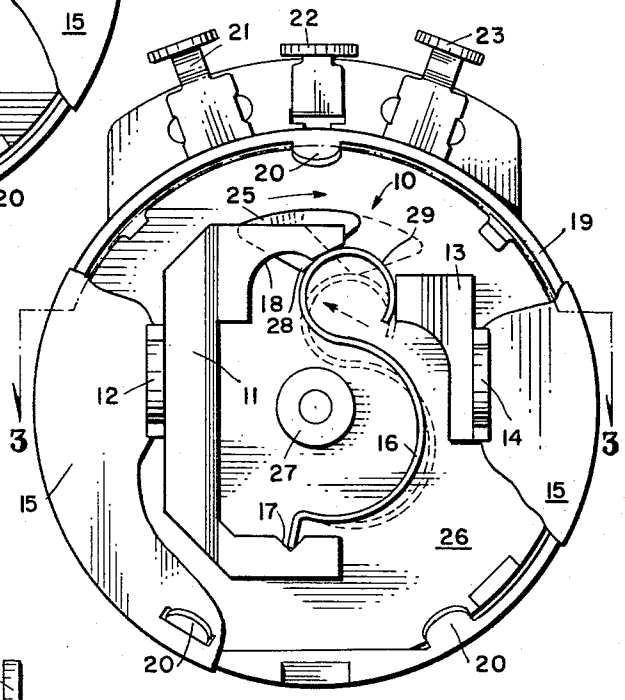


Fig. 2

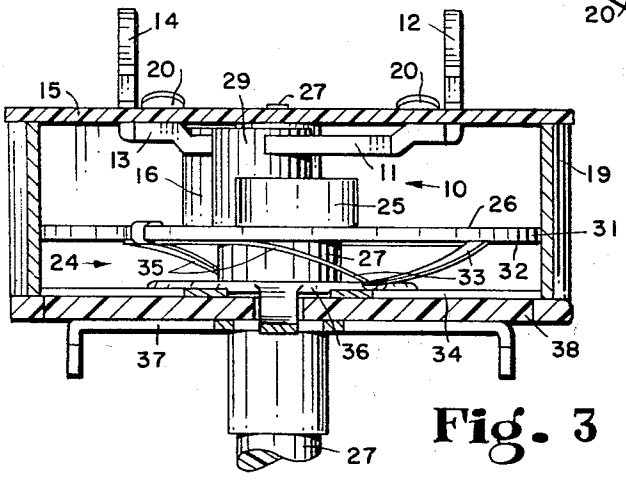


Fig. 3

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SNAP SWITCH MEANS

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The present invention relates to electric switches and more particularly relates to snap switches including those of the type mounted on the back of volume controls and which are designed to switch fairly heavy currents used in radio and television circuits and sets.

By the very nature of their use, the size of these switches is important as relatively small dimensions are characteristic of the specifications and dimensions set forth in these circuits. However the small diameter, shallow depth housing leads to difficulty in obtaining the requisite spring action or movement range for efficient make-and-break contact. It is also difficult to obtain prolonged life between the contacts by providing an efficient, self-cleaning and non-arcing means within the switch.

The present invention provides a simple, economical and efficient snap switch wherein all of the aforementioned desirable features are obtained at a minimum of material and labor cost, and wherein a small, compact, highly efficient structure is obtained having optimum calibration and alignment techniques, lack of depth, good wipe characteristics of the contacts and no current carried through the flexing portions of the contact spring except at the moment of switching.

It is therefore an object of the present invention to provide an improved snap switch for operating under heavy current conditions, said switch being exceedingly simple in construction and efficient in resultant operation.

It is an object of the present invention to provide a low cost power switch especially adaptable for use on a control where a cam shaped pin on a molded rotor is the means for actuating the contact means.

It is an object of the present invention to provide a power switch having superior action because of the actuating of the contact spring on a relatively large radius from the outside in.

It is a further object of the present invention to provide a power switch characterized by lack of depth, good wipe characteristics of the contact spring, minimum number of parts and low cost.

It is another object of the present invention to provide a new and improved snap action switch having novel, discretely shaped, stationary contact elements one of said elements retaining a resilient contact means which is actuated by a cam shaped pin integrally formed on one surface of a rotor.

It is a further object of the present invention to provide a simple, economical and efficient snap switch having the desired characteristics of quick make-and-break in air, long life, positive mating action and wherein there is more efficient transmission of current between the contacts and their associated terminals.

The invention in another of its aspects relates to the novel features of the instrumentalities described herein for teaching the principal objects of the invention and to the principles embodied in these instrumentalities; whether or not these features and principles may be used in the said objects and/or in similar fields.

Other objects of the invention and the nature thereof will become apparent from the following description considered in conjunction with the accompanying drawings and wherein like reference numbers describe elements of similar functions therein and wherein the scope of the

invention is determined rather from the dependent claims.

For illustrative purposes, the invention will be described in conjunction with the accompanying drawings in which:

FIGURE 1 is a top view of an embodiment of the switch adapted to illustrate the open position of the spring contact element;

FIGURE 2 is a top view showing the closed position of the spring contact element;

FIGURE 3 is a sectional view showing the switch in closed position taken through section 3—3 of FIGURE 2.

Generally speaking the present invention is a low cost power switch especially adaptable for use on a control where a cam shaped pin on a first surface rotor is the means for actuating the contacts. The rotor may be integrally formed with or connected to a control shaft, so that as the shaft is rotated, a resilient contact means, which is affixed at one end of a contact member and retained at the second end either by the contact member or a retaining means, is displaced and compressed by the actuator to either make or break the circuit, depending upon the direction of rotation of the rotor. The second surface of the rotor may carry a plurality of wiper nibs for contacting a printed resistive element. The rotor may be either an insulating or a metallic component suitably joined by mechanical means to the control shaft or may be integrally formed with the control shaft by molding techniques and the like.

The simple construction provides a device having shallow depth, good wipe characteristics of the contacts and no current carried through the flexing portion of the contact spring except at the moment of switching. The actuating of the contact spring on a relatively large radius from the outside in provides superior snap action over devices known in the art.

Referring now to the accompanying drawing in which like numerals indicate similar elements, FIGURE 1 is a top view of switch **10** indicating a single-pole single-throw snap switch adapted for illustrative purposes as a circuit breaker mounted on the back of a volume control element, said switch being in an open position. Switch **10** comprises a substantially C-shape terminal member **11** having external lead **12** in electrical contact therewith, and L-shaped terminal member **13** having external lead **14** in electrical contact therewith. Members **11** and **13** are affixed in a spaced apart relationship on insulating cap **15** which has been cut away in FIGURES 1 and 2. A first end of contact spring **16** electrically contacts and pivots within V-shaped notch **17** in contact member **11**. The second end of spring **16** is retained by groove **18** in contact member **11**, although any insulating or conductive retaining means is suitable. Cap **15** is held to the switch and variable resistor housing by a plurality of retaining means **20**. Terminals **21**, **22**, and **23** are affixed to variable resistor unit **24** (FIG. 3).

As was previously stated, switch **10** is adapted to be mounted on the back of devices such as volume controls and the like. Accordingly the actuator **25** which is in the illustrative embodiment, a triangular shaped boss, is integrally formed with a first surface of rotor insulator **26** which cooperates with insulating control shaft **27**. When control shaft **27** is rotated in a counterclockwise direction, the cam face of actuator **25** compresses contact spring **16** thereby displacing portion **29** of the spring from groove **18**. As point **28** of actuator **25** passes the center of the arc of portion **29** of spring **16**, the inclined surface guides the snap action of spring **16** in a clockwise direction and the spring snaps to the closed position shown in FIGURE 2 thereby providing an electrical path between contact members **11** and **13**.

As shown in FIGURE 2, to break contact, control shaft **27** is rotated in a clockwise direction whereby

the cam face of actuator **25** compresses contact spring **16** and the spring is once again guided in the direction of the angle of the actuator and snaps back to the open position shown in FIGURE 1.

FIGURE 3 is a sectional view of switch **10** in combination with a variable resistor unit **24** to illustrate a simple, efficient and economical combination off-on switch and volume control unit for radios, television sets and the like. Contacts **11** and **13** are affixed to cap **15** and have terminals **12** and **14** extending respectively therefrom. Spring **16** is in contact with both of the fixed contacts as shown in FIGURE 2. Cap **15** is secured to housing **19** by a plurality of retaining means **20**. Actuator boss **25** is integrally formed on surface **26** of rotor insulator **31** which is integrally formed with the insulated control shaft **27**.

The second surface **32** of rotor insulator **31** carries 2 pairs of wiper nibs, a first pair **33** contacting resistance element **34** and a second pair **35** contacting conducting ring **36** which is electrically connected to terminal **22** (FIGS. 1 and 2). Resistive element **34** terminates in terminals **21** and **23** (FIG. 2) respectively and is insulated from mounting plate **37** by an insulating mounting board **38**.

From the foregoing description, taken in connection with the accompanying figures of the drawing, it will be readily apparent of those skilled in the art that this invention provides a new and improved switch, the figures of which may be applied to other arts and devices. Accordingly, it is contemplated that the scope of the invention is to be determined from the claims herein. Having thus described my invention,

I claim:

1. A snap switch comprising a housing having open ends, insulating means closing said open ends of said housing, control shaft means rotatably journalled in said insulating means and projecting through one of said insulating means, rotor means in said housing and carried by and displaced with said shaft, a plurality of terminal means carried by another one of said insulating means, one of said terminal means having a notch and a groove formed therein, another of said terminals predeterminately spaced from said one terminal, pivotally displaceable spring means having one extremity pivotally seated in said notch of said one terminal means and a section of said spring means normally interfitting with said groove of said one terminal means so that said spring means is compressively retained therebetween, boss means carried by and displaced with said rotor means, said boss means having surfaces in an interference path with said section of said spring means, displacement of said shaft causing one of said surfaces of said boss means to engage with and compressively displace said spring means storing energy therein, said stored energy released with a snap action motion when the apex of said boss means passes the center of said section of said spring means thereby pivotally displacing said spring means so that said section of said spring means disengages said groove of said one terminal and is guided by said boss means to a position substantially between said first and said second terminal means thereby allowing said section of said spring means to engage with said first and said second terminals, said spring means compressively retained between said notch and said first and said second terminals.

2. A snap switch comprising a housing having open ends, insulating means closing said open ends of said housing, control shaft means rotatably journalled in said insulating means and projecting through one of said insulating means, rotor means in said housing and carried by and displaced with said shaft, a plurality of terminal means carried by another one of said insulating means, one of said terminal means having a notch and a groove formed therein, another of said terminals predeterminately spaced from said one terminal, pivotally displaceable S-shaped compression spring means having one extremity and a curved section of said S-shaped compression spring means normally interfitting with said groove of said one terminal means so that said S-shaped spring means is compressively retained therebetween, boss means carried by and displaced with said rotor means, said boss means having surfaces in an interference path with said curved section of said S-shaped compression spring means, displacement of said shaft causing one of said surfaces of said boss means to engage with and compressively displace said spring means storing energy therein, said stored energy released with a snap action motion when the apex of said boss means passes the center of said curved section of said S-shaped spring means thereby pivotally displacing said S-shaped spring means so that curved section disengages said groove of said one terminal and is guided by said boss means to a position substantially between said first and said second terminal means thereby allowing said curved section of said S-shaped spring means to engage with said first and said second terminals, said S-shaped spring means compressively retained between said notch and said first and said second terminals.

3. A snap switch comprising a housing having open ends, insulating means closing said open ends of said housing, control shaft means rotatably journalled in said insulating means and projecting through one of said insulating means, rotor means in said housing and carried by and displaced with said shaft, a plurality of terminal means carried by another one of said insulating means, one of said terminal means having a notch and a groove formed therein, another of said terminals predeterminately spaced from said one terminal, pivotally displaceable S-shaped compression spring means having one extremity pivotally seated in said notch of said one terminal means and a curved section of said S-shaped compression spring means normally interfitting with said groove of said one terminal means so that said S-shaped spring means is compressively retained therebetween, a triangular shaped boss means carried by and displaced with said rotor means, sad triangular shaped boss means having surfaces in an interference path with said curved section of said S-shaped compression spring means displacement of said shaft causing one of said surfaces of said boss means to engage with and compressively displace said S-shaped spring means storing energy therein, said stored energy released with a snap action motion when the apex of said boss means passes the center of said curved section of said S-shaped spring means thereby pivotally displacing said S-shaped means so that said curved section of said spring means disengages said groove of said one terminal and is guided by said triangular shaped boss means to a position substantially between said first and said second terminal means thereby allowing said curved section of said S-shaped spring means to engage with said first and said second terminals, said S-shaped spring means compressively retained between said notch and said first and said second terminals.

4. A snap switch comprising a housing having open ends, insulating means closing said open ends of said housing, control shaft means rotatably journalled in said insulating means and projecting through one of said insulating means, rotor means in said housing and carried by and displaced with said shaft, C-shaped and L-shaped terminal means carried by another one of said insulating means, said C-shaped terminal means having a notch and a groove formed therein, said L-shaped terminal means predeterminately spaced from said C-shaped terminal means, pivotally displaceable S-shaped compression spring means having one extremity pivotally seated in said notch of said C-shaped terminal means and a curved section of said S-shaped compression spring means normally interfitting with said groove of said C-shaped terminal means so that said S-shaped spring means is compressively retained therebetween, a triangular shaped boss means car-

ried by and displaced with said rotor means, said triangular shaped boss means having surfaces in an interference path with said curved section of said S-shaped compression spring means, displacement of said shaft causing one of said surfaces of said boss means to engage with and compressively displace said S-shaped spring means storing energy therein, said stored energy released with a snap action motion when the apex of said boss means passes the center of said curved section of said S-shaped spring means thereby pivotally displacing said S-shaped spring means so that said curved section of said spring means disengages said groove of said C-shaped terminal and is guided by said triangular shaped boss means to a position substantially between said C-shaped and said L-shaped terminal means thereby allowing said curved section of said S-shaped spring means to engage with said C-shaped and said L-shaped terminal means, said S-shaped spring means compressively retained between said notch and said C-shaped and said L-shaped terminal means.

5. A snap switch comprising a housing having open ends, insulating means closing said open ends of said housing, control shaft means rotatably journalled in said insulating means and projecting through one of said insulating means, rotor means in said housing and carried by and displaced with said shaft, C-shaped and L-shaped terminal means carried by another one of said insulating means, said C-shaped terminal means having a notch formed in one leg and a groove formed in the opposite leg thereof, said L-shaped terminal means predeterminately spaced from said C-shaped terminal means, pivotally displaceable S-shaped compression spring means having one extremity pivotally seated in said notch of said C-shaped terminal means and a curved section of said S-shaped compression spring means normally interfitting with said groove of said C-shaped terminal means so that said S-shaped spring means is compressively retained therebetween, a triangular shaped boss means carried by and displaced with said rotor means, said triangular shaped boss means having surfaces in an interference path with said curved section of said S-shaped compression spring means displacement of said shaft causing one of said surfaces of said boss means to engage with and compressively displace said S-shaped spring means storing energy therein, said stored energy released with a snap action motion when the apex of said boss means passes the center of said curved section of said S-shaped spring means thereby pivotally displacing said S-shaped spring means so that said curved section of said spring means disengages said groove of said C-shaped terminal and is guided by said triangular shaped boss means to a position substantially between said C-shaped and said L-shaped terminal means

thereby allowing said curved section of said S-shaped spring means to engage with said C-shaped and said L-shaped terminal means, said spring means compressively retained between said notch and said C-shaped and said L-shaped terminal means.

6. A switch comprising a housing having open ends, insulating means closing said open ends of said housing, control shaft means rotatably journalled in said insulating means and projecting through one of said insulating means, rotor means in said housing and carried by and displaced with said shaft, a plurality of terminal means carried by another one of said insulating means, one of said terminal means having a notch and a groove formed therein, another of said terminals predeterminately spaced from said one terminal, pivotally displaceable spring means having one extremity pivotally seated in said notch of said one terminal means and a section of said spring means normally interfitting with said groove of said one terminal means so that said spring is compressively retained therebetween, boss means carried by and displaced with said rotor means, said boss means having surfaces in an interference path with said section of said spring means, displacement of said shaft causing one of said surfaces of said boss means to engage with and compressively displace said spring means storing energy therein, said stored energy released with a snap action motion when the apex of said boss means passes the center of said section of said spring means thereby pivotally displacing said spring means so that said section of said spring means disengages said groove of said one terminal and is guided by said boss means to a position substantially between said first and said second terminal means thereby allowing said section of said spring means to engage with said first and said second terminals, said spring means compressively retained between said notch and said first and said second terminals, said rotor means carrying wiper nib means riding on resistance means carried by said one insulating means, said wiper nib means displaced on said resistance means by displacement of said shaft thereby varying the resistance of said resistance means.

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