Nov. 2, 1965 W. K. NEWMAN 3,215,802

MULTI-LEVEL RESETTABLE SNAP ACTION SWITCH

Filed April 11, 1963 3 Sheets-Sheet 1

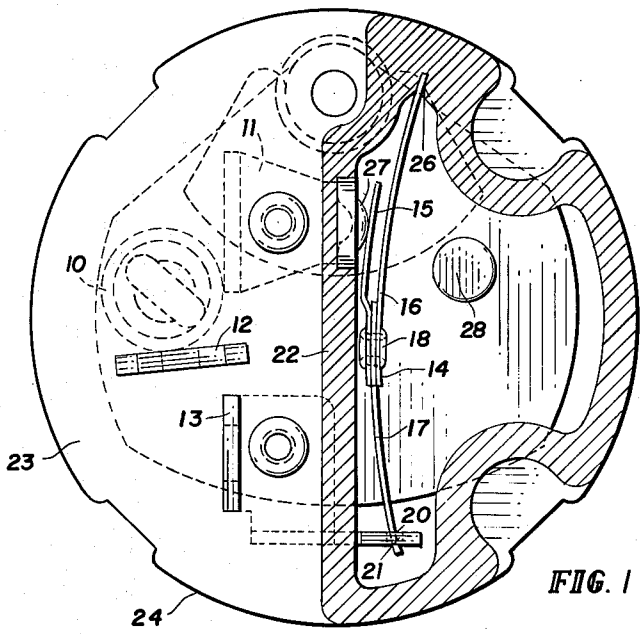

FIG. 1

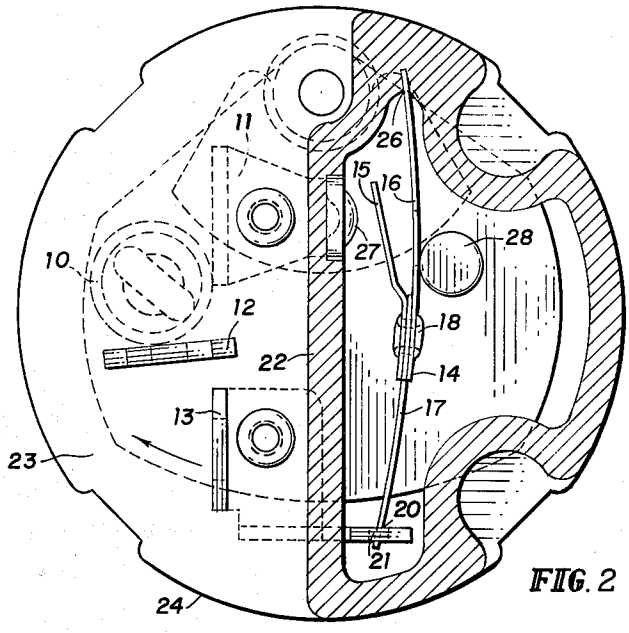

FIG. 2

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MULTI-LEVEL RESETTABLE SNAP ACTION SWITCH

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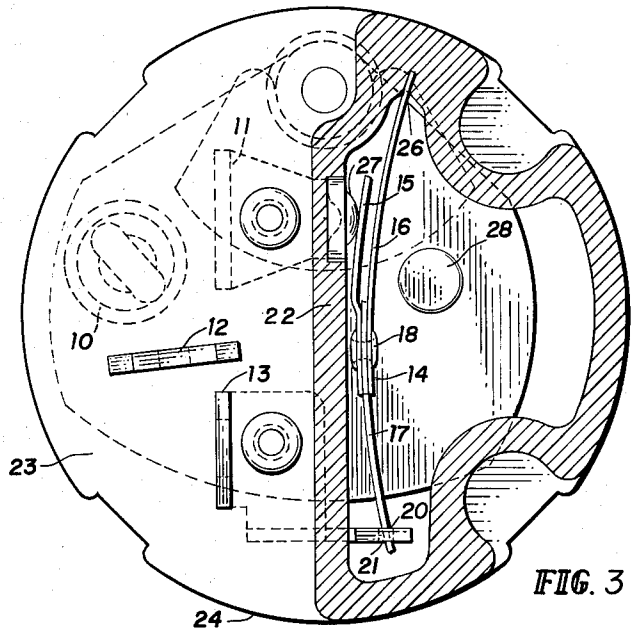

FIG. 3

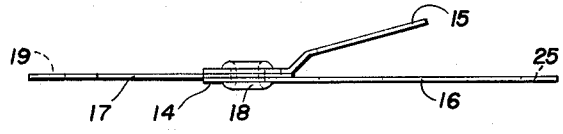

FIG. 4

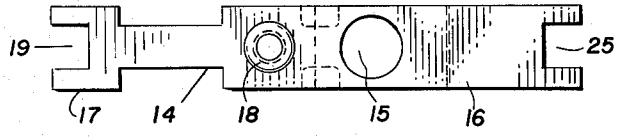

FIG. 5

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MULTI-LEVEL RESETTABLE SNAP ACTION SWITCH

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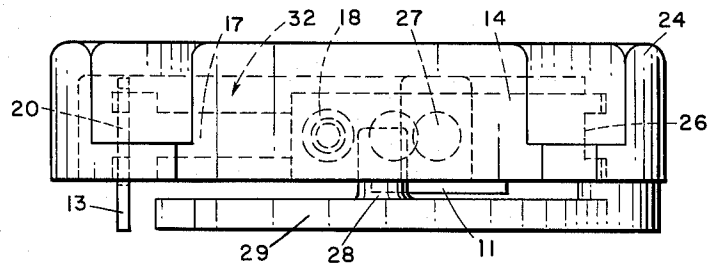

FIG. 6

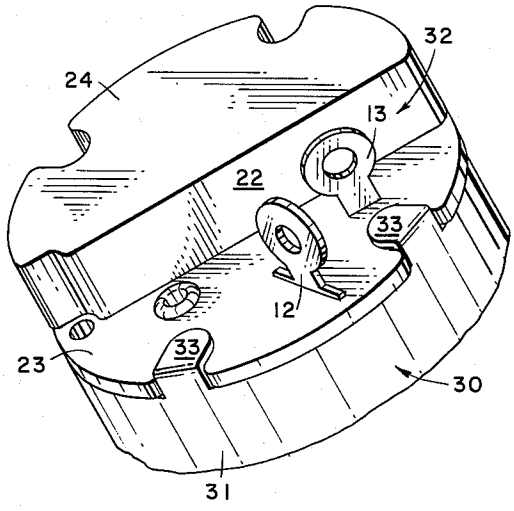

FIG. 7

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United States Patent Office 3,215,802 Patented Nov. 2, 1965

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3,215,802

MULTI-LEVEL RESETTABLE SNAP ACTION SWITCH

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Filed Apr. 11, 1963, Ser. No. 272,309
6 Claims. (Cl. 200—114)

This invention relates to electric power or line switches and more particularly to fast break snap switches of the type used in conjunction with rotary variable resistors usually found in radio, television and similar applications. The present invention lies in the adaptation of a thermal safe feature embodied in an electric switch such as covered by Patent No. 2,820,864 issued to George O. Puerner and myself on Jan. 21, 1958.

The use of fuses and separate thermal safe switches, independently mounted and actuated, in radio and television sets is presently known. However, such devices add signiificantly to the cost of those appliances and are much less efficient than the thermal safe assembly contained in the instant line or power switch and operable by the same knob and shaft as the volume control and line switch.

The present invention provides a simple, economical combination line switch and thermal safe feature not found in existing art.

It is, therefore, an object of this invention to provide an improved fast break line switch having a built-in thermally actuated means for breaking a circuit when such circuit reaches a pre-determined temperature.

It is another object of the present invention to provide an automatic inexpensive thermally actuated means of cutting off the power source to a radio, television set and other electrically operated devices.

It is another object of the present invention to provide a small novel space-saving line switch whereby a separate circuit breaker is unnecessary.

It is still another object of the present invention to provide a bimetal circuit breaker device which resets itself in preparation for return to a non-overload condition when the line switch is actuated to its normally open position.

A further object of the present invention is to provide a thermal safe line switch wherein three contact elements are closed to complete the power source.

Other objects will become apparent when the following description is considered in conjunction with the drawings, it being understood that modifications are contemplated as being within the scope of the claims.

In the drawings:

FIGURE 1 is a rear transparent view of a line switch showing features of the aforementioned line switch covered by Patent No. 2,820,864 as well as the bimetal thermally operated spring assembly in the normal operating position.

FIGURE 2 shows the position assumed by the bimetal assembly as a result of an overload condition having been introduced.

FIGURE 3 shows the position of all contact elements after the operating shaft has been actuated to the normally "off" position. After a waiting period or upon correction of the overload condition, the operatinig shaft is then actuated to the normally "on" position.

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FIGURES 4 and 5 show the bimetal spring subassembly constructional details. FIGURE 6 is a side view of the bimetal spring assembly and the cooperaitng insulative rotor.

FIGURE 7 is a perspective view of the casing and the insulative base closing the casing. Generally speaking, the present invention provides a compact combination electric power switch and overload mechanism comprising an insulative base having a plurality of contact terminals securely fastened therein and adapted to be connected to an electric circuit and so constructed to obviate the need for a separate fuse and/or circuit breaker. It incorporates an insulative rotor carrying a floating contact ring actuated from one position to another through an over-center spring manipulated by a control shaft. The casing provides a base for the power switch contacts and a chamber on a different level for the overload mechanism. The overload mechanism consists of a conductive contact spring, a buckle spring and a bimetal leaf spring all held together by a rivet and so assembled in the insulative base under tension that a thermal overload causes the bimetal assembly to snap from a closed position to an open position thereby breaking the power source circuit. The overload mechanism is then closed by actuating the floating contact ring to its normally off position until the overload condition or cause is corrected.

More particularly, the present invention relates to a combination of an electric switch and an overload mechanism. The mechanism includes a casing having an open end and an insulative base closing the casing. A plurality of fixed contact terminals are carried on the base. At least two of the plurality of terminals are connected to an electric circuit. A first level is formed within the casing by the base closing the casing. An insulative rotor is mounted within the first level. The rotor carries a floating contact ring and, in addition, the rotor is a means for actuating the ring from a disengaged position to an engaged position with one of the two terminals and another terminal of the plurality of terminals so as to allow current to pass therethrough. A second level within the insulative base contains a fork-shaped bimetal assembly. The bimetal assembly includes a conductive contact spring forming a first prong of the assembly, a buckle spring forming a second prong of the assembly, and a bimetal leaf spring forming the stem of the assembly. The buckle spring is pivotably coupled to a second of the two terminals. The contact spring is normally engaging the other terminal of the plurality of terminals when the ring engages the one and the other of the plurality of terminals. The bimetal assembly disengages the other of said terminals with a snap action motion when an overload current flow passes through the ring to the bimetal assembly. A projection means is coupled to the insulative rotor and is utilized for resetting the bimetal assembly when rotatably displaced. Rotational displacement of the projection means also rotatably displaces the ring from an engaged position to a disengaged position with the one and the other of the plurality of terminals. As a result, the bimetal assembly is closed under a no load condition. Return of the insulative rotor causes the ring to engage the one and the other terminal.

Referring to FIGURE 1, it will be noted that it is necessary for three (3) contact terminals (one, a dummy) to be in intimate contact to complete a power source

circuit. In operating position, floating ring contact **10** is biased by means of an over-center spring (not shown) against dummy terminal **11** and active terminal **12**, the circuit being completed by virtue of the bimetal spring sub-assembly **14** connecting dummy terminal **11** and active terminal **13**. Terminals **12** and **13** are now electrically connected. Subassembly **14** consists of a contact spring **15** of highly conductive material such as silver alloy, a buckle spring **16**, and a bimetal leaf **17** securely fastened together in intimate contact through eyelet or rivet **18**. This sub-assembly terminates at both ends in a notched configuration, the notch **19** in the bimetal leaf end, abutting a web **20**, is centered between apertures **21** in terminal **13** which protrudes through a wall **22** perpendicular to the terminal mounting surface **23** of base **24**. A similar notch **25** in the buckle spring **16** pivots in a "V" shaped web **26** integral to base **24**. The distance between notches **19** and **25** is greater than the distance between webs **20** and **26** so as to keep the bimetal sub-assembly **14** bowed under tension, thereby maintaining biased contact between contact spring **15** and dimple **27** of terminal **11**. A thermal overload breaks this contact as stated previously. The bimetal spring assembly **14** is manually reset by a rotor projection **28**, actuated in the direction of the arrow shown in FIGURE 2.

Referring to FIGURE 6 of the present invention, a side view is shown illustrating the relative position of the forked-shaped bimetal spring assembly **14** with respect to the insulative base **24** and with respect to the insulative rotor **29**. The insulative base provides a second level **32**, which level serves to house the bimetal spring assembly.

FIGURE 7 illustrates the combination of casing **31** housing the power switch and the insulative base **24**. It is seen that the end of the casing is closed by the insulative base coupled thereto by any suitable means such as taps **33**. Terminals **12** and **13** are shown projecting through the mounting surface **23** of the insulative base. A first level **30** is formed within the casing by the insulative base closing the casing. The insulative rotor **29** and other cooperating apparatus of the power switch are disclosed in Patent No. 2,820,864. The forked-shaped bimetal assembly is carried within the second level **32** of the insulative base.

Although my invention is shown in a single pole, single throw embodiment, it will be apparent to those skilled in the art that other line switch circuits may be accommodated by the thermal safe device herein described.

What is claimed is:

1. In combination an electric switch and overload mechanism comprising: casing having an open end; an insulative base closing said casing; a plurality of fixed contact terminals carried on said base, at least two of said terminals connected to an electric circuit; a first level formed within said casing by said base closing said casing; an insulative rotor mounted within said first level, said rotor carrying a floating contact ring, and said rotor is a means for actuating said ring from a disengaged position to an engaged position with said one of said terminals and another of said plurality of termials so as to allow current to pass therethrough; a second level within said insulative base, said second level including means for mounting an overload mechanism, said mechanism moving from an engaged position with said terminals to a disengaged position with said terminals as a result of the heating effect of current flowing therethrough, and means for resetting said overload mechanism to engage said terminals said mechanism resettable only when said ring is disengaged from said terminals.

2. In combination an electric switch and overload mechanism comprising: casing having an open end; an insulative base closing said casing; a plurality of fixed contact terminals carried on said base, at least two of said terminals connected to an electric circuit; a first level formed within said casing by said base closing said casing; an insulative rotor mounted within said first level, said rotor carrying a floating contact ring, and said rotor is a means for actuating said ring from an disengaged position to an engaged position with said one of said terminals and another of said plurality of terminals so as to allow current to pass therethrough; a second level within said insulative base, said second level including means for pivotably mounting an overload mechanism assembly, said mechanism moving with a snap action from an engaged position with said terminals to a disengaged position as a result of the heating effect of current flowing therethrough; and means for resetting said overload mechanism to engage said terminals, said mechanism resettable only when said ring is disengaged from said terminals.

3. In combination an electric switch and overload mechanism comprising: casing having an open end; an insulative base closing said casing; a plurality of fixed contact terminals carried on said base, at least two of said terminals connected to an electric circuit; a first level formed within said casing by said base closing said casing; an insulative rotor mounted within said first level, said rotor carrying a floating contact ring, and said rotor is a means for actuating said ring from a disengaged position to an engaged position with said one of said terminals and another of said plurality of terminals so as to allow current to pass therethrough; a second level within said insulative base, said second level including means for pivotably mounting a bimetal assembly, said assembly moving from an engaged position with said terminals to a disengaged position as a result of the heating effect of current flowing therethrough; and means for resetting said bimetal assembly to engage said terminals, said assembly resettable only when said ring is disengaged from said terminals.

4. In combination an electric switch and overload mechanism comprising: casing having an open end; an insulative base closing said casing; a plurality of fixed contact terminals carried on said base, at least two of said terminals connected to an electric circuit; a first level formed within said casing by said base closing said casing; an insulative rotor mounted within said first level, said rotor carrying a floating contact ring, and said rotor is a means for actuating said ring from a disengaged position to an engaged position with said one of said terminals and another of said plurality of terminals so as to allow current to pass therethrough; a second level within said insulative base, said second level including means for pivotably mounting a forked-shaped bimetal assembly, said bimetal assembly including a conductive contact spring forming a first prong of said assembly, a buckle spring forming a second prong of said assembly, and a bimetal leaf spring forming a stem of said assembly, said bimetal assembly normally engaged with said terminals when said ring is engaged with said terminals, said bimetal assembly disengaged from said terminals by an overload current flow passing through said ring to said assembly; and means for resetting said bimetal assembly to engage said terminals, said assembly resettable only when said ring is disengaged from said terminals.

5. In combination an electric switch and overload mechanism comprising: casing having an open end; an insulative base closing said casing; a plurality of fixed contact terminals carried on said base, at least two of said terminals connected to an electric circuit; a first level formed within said casing by said base closing said casing; an insulative rotor mounted within said first level, said rotor carrying a floating contact ring, and said rotor is a means for actuating said ring from a disengaged position to an engaged position with said one of said terminals and another of said plurality of terminals so as to allow current to pass therethrough; a second level within said insulative base, said second level including means to pivotably mounting a forked-shaped bimetal assembly, said assembly changing from an engaged position with said terminals to a disengaged position with

said terminal as a result of the heating effect of current flowing therethrough, and means for resetting said bimetal assembly to engage said terminals, said assembly resettable only when said ring is disengaged from said terminals.

6. In combination an electric switch and overload mechanism comprising: casing having an open end; an insulative base closing said casing; a plurality of fixed contact terminals carried on said base, at least two of said terminals connected to an electric circuit; a first level formed within said casing by said base closing said casing; an insulative rotor mounted within said first level, said rotor carrying a floating contact ring, and said rotor is a means for actuating said ring from a disengaged position to an engaged position with said one of said terminals and another of said plurality of terminals so as to allow current to pass therethrough; a second level within said insulative base, said second level including means for pivotably mounting a forked-shaped bimetal assembly, said bimetal assembly including a conductive contact spring forming a first prong of said assembly, a buckle spring forming a second prong of said assembly, said buckle spring pivotably coupled to said base

and a bimetal leaf spring forming a stem of said assembly, said bimetal spring pivotably coupled to one of said terminals, said contact spring normally engaging another of said terminals when said ring engage said terminals, disengaging said another of said terminals with a snap action motion by an overload current flow passing through said ring to said assembly; and means for resetting said bimetal assembly so that said contact spring engages said another of said terminals, said assembly resettable only when said ring is disengaged from said terminals.

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