

May 17, 1938.

F. LOBL

2,117,966.

CORD TYPE ELECTRIC SWITCH

Filed Nov. 21, 1935

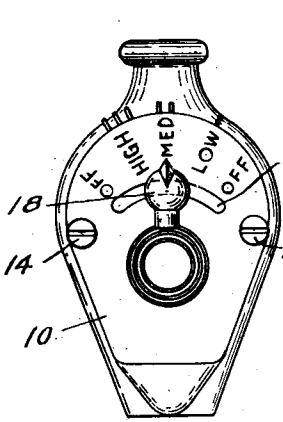


Fig. 1.

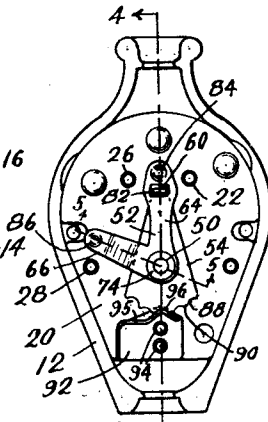


Fig. 2.

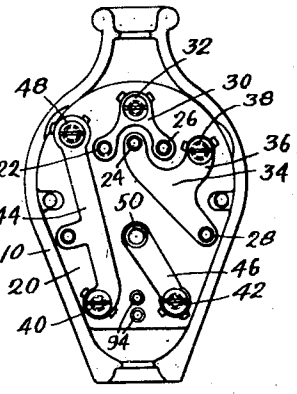


Fig. 3.

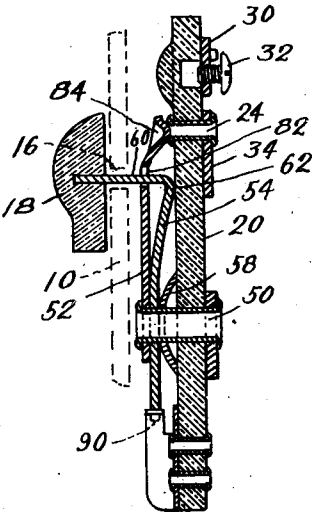


Fig. 4.

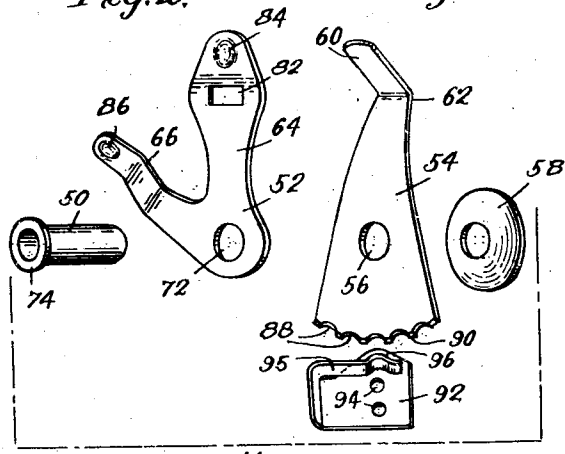


Fig. 6.

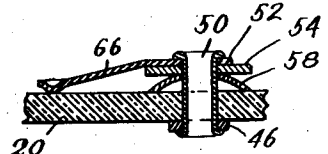


Fig. 5.

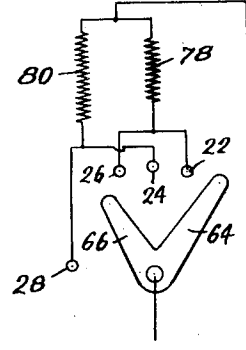


Fig. 7.

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UNITED STATES PATENT OFFICE

2,117,966

CORDTYPE ELECTRIC SWITCH

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Application November 21, 1935, Serial No. 50,911

7 Claims. (Cl. 200-11)

This invention relates to electric switches and particularly to so-called cord switches adapted to be inserted in the flexible cord of an electric heating pad, for instance, to connect the heater elements of the pad selectively singly and also in parallel in the circuit, whereby to vary the heat.

The switch of the present invention is in the nature of an improvement on the switch disclosed in my copending application, Serial No. 28,506, filed June 26, 1935, and has as an object therefor to improve, simplify and cheapen the construction of the switch of said application.

For the purpose of connecting the two, usually, heating elements of an electric heating pad in parallel, it is necessary to make connection at the same time between a line conductor and the two terminals of the heating elements, and the connection between the line conductor and each element should be positive and each uninfluenced by the other. It has been proposed, heretofore, to provide two switch members movable conjointly but each structurally independent of the other for this purpose. It is an object of the present invention, however, to accomplish the functions of the two separate switch members more simply with one member having two contact arms so arranged, and the cooperating stationary contact members also arranged, that the engagement of one arm with its stationary contact member does not deleteriously influence the security of the engagement between the other arm and its cooperating contact member.

Another object of the invention is the provision of a movable switch member and an actuating member, the two members being pivotally supported upon a common pivot pin and connected for conjoint angular movement thereabout but being otherwise free from mutual constraint so that the switch member can flex freely and independently of the actuating member in making and breaking the circuits.

A yet further object is generally to improve the construction and operation of cord-type switches.

Fig. 1 is a plan view of cord-type electric switch embodying the present invention.

Fig. 2 is a plan view of the switch with the top of cover part of the two part casing removed.

Fig. 3 is an obverse view of the switch of Fig. 2, the bottom part of the casing being removed.

Fig. 4 is an enlarged sectional detail of the switch taken along line 4-4 of Fig. 2.

Fig. 5 is an enlarged sectional detail taken along line 5-5 of Fig. 2.

Fig. 6 is an exploded view of the switch of Fig. 4.

Fig. 7 is a diagram of the circuits controlled by the switch.

The switch embodying the present invention is contained within an enclosing casing composed of

the upper part or cover 10 and the lower part or base 12, the two parts being secured removably together by screws 14. The cover is provided with an arcuate slot 16 through which is extended a part of the switch actuating mechanism terminated in a button 18 which can be positioned manually in any selected one of a plurality of positions corresponding to low, intermediate and high heats and end positions corresponding to circuit open positions of the switch.

The switch mechanism is carried by a single relatively thin insulating plate 20 received and suitably positioned and supported within the enclosing casing. The front face of the plate, shown in Fig. 2, carries the switch mechanism while the back face, shown in Fig. 3, carries the circuit connections and line and pad terminals.

The switch plate 20 is provided with three stationary contact members 22, 24, 26, preferably in the form of tubular eyelets which pass through the plate and are arranged in an arcuate line equally spaced from each other at the upper middle part of the plate. There is also a fourth and similar stationary contact member 28 disposed within the arcuate line of the other contacts and located at one side of the plate in the lower portion thereof.

The contact members 22 and 26 are connected together electrically by a generally U-shaped metal connecting member or plate 30 located on the back face of the supporting plate and through which the contact members are passed and upon which they are headed. The intermediate part of the connecting member is screw-threaded to receive a terminal screw 32.

The intermediate stationary contact member 24 is connected electrically to the low contact member 28 by a connecting plate 34 through which the eyelets which constitute said contact members are passed and over which they are headed. Said plate is provided with an upwardly directed extension 36 which is located near the top of the supporting plate in an arcuate line with the terminal screw 32 and is screw-threaded to receive a terminal screw 38.

The incoming pair of line conductors are adapted to be connected with terminal screws 40 and 42 which are located at the bottom part of the insulating plate and are screw-threaded into straps 44 and 46 respectively on the back face of said insulating plate. The strap 44 extends to the upper part of said plate and is screw-threaded to receive a terminal screw 48. Said strap serves to conduct current through the switch casing without passing through the contact members.

The strap 46 extends to the center of the arcuate line of contact members and a pivot pin 50 for the switch mechanism is passed there-through and electrically connected therewith.

Said pivot pin is preferably a tubular eyelet which is headed over said strap.

The switch mechanism is located upon the front face of said insulating supporting plate and includes a movable contact member 52 and an actuating member 54.

Said actuating member 54 comprises a generally flat plate, of triangular shape, having an aperture 56 intermediate its ends in which the pivot pin 50 loosely fits. Said plate is pivoted on said pin and is supported in elevated position above the face of the insulating plate by a cup-shaped spring washer 58, the base of which rests upon said insulating plate and the convex face of which is engaged by said actuating plate. The small end of said actuating plate is terminated in a rectangular shank 60 which is of substantial length and is reflexed upwardly at general right angles with the plane of the plate and is extended movably through the arcuate slot 16 of the casing and carries the actuating button 18. The plate is curved in a general downward direction or toward the supporting plate and has a foot 62 which underlies the base of the shank 60 and bears upon and rides over the face of the insulating plate so as to provide a good support for the free end of the plate.

The movable contact member 52 is made from a resilient thin metal plate and is bell-crank shaped or is provided with a pair of integral widely angularly spaced contact arms 64 and 66. The arm 64 is adapted to engage the stationary contact members 22, 24, 26 and is longer than the arm 66 which is adapted to engage only the stationary contact member 28. The arms are so angularly related that when the long arm 64 is engaged with contact member 26, the short arm 66 is simultaneously engaged with contact member 28. In all other positions of the long contact arm the short arm is free from engagement with any stationary contact member. When both arms are engaged with contact members 26 and 28 the two heater elements 78 and 80, see Fig. 7, are connected in parallel to the line conductors, thereby providing for maximum heat output of the heating pad.

The movable contact member 52 is provided with an aperture 72 through which the pivot pin 50 is extended loosely, the head 74 of the pin overlying the contact member and thus retaining it and also the actuating arm and washer 58 in position. The washer 58 preferably exerts a slight amount of pressure between the actuating and movable contact members and the head of the pivot pin, so as to ensure good electrical connection between the movable contact member and the strap 46, although the pressure is not so much as to interfere with the free snap movement of the mechanism as will be presently described.

The long arm 64 of the movable contact member is provided with a rectangular aperture 82 conformed to the cross-sectional shape of the shank 60 of the actuating plate 54 and through which said shank is freely extended whereby to connect the plate and arm for conjoint angular movement, there being sufficient freedom of fit to permit the long arm 64 of the movable contact member to move up and down or flex freely in riding over its cooperating contact members although there is not so much looseness as to give a deleterious amount of independent angular movement of the contact member and actuating plate.

The free end of the long contact arm 64 is bent

permanently in the direction of the cooperating contact members so that the end thereof is pressed firmly and resiliently into engagement therewith. The free end is provided with a contact boss 84 having a generally semi-spherically shaped face that is adapted to seat yieldingly in the tubular end faces of the stationary contact members.

The short contact arm 66 is also bent in the direction of its cooperating contact member and the free end thereof is provided with a similar contact boss 86. When said boss is not engaged with the contact member 28 it is resiliently engaged with and rides over and in contact with the face of the insulating supporting plate.

With the arrangement described a generally three-cornered support is provided for the movable switch member and the engagement of one contact arm with its stationary contact member does not weaken the firmness of the engagement between the other arm and its stationary contact member. Neither is the engagement affected by the actuating plate since the movable switch member is supported independently thereof.

The switch is provided with mechanism which holds the movable switch mechanism yieldingly in any set position thereof and which effects the rapid or snap movement of the switch mechanism from one position into the next adjacent position. To this end the broad edge of the actuating plate 54 is provided with an arcuate series of closely positioned semi-circular notches or indentations 88 and sharp-ended teeth or projections 90 between the notches, there being a notch for each of the three circuit-engaged positions of the movable switch member and two additional notches located at the ends of the series of notches and corresponding to circuit open positions of the switch member.

Said notches are adapted to be engaged, one at a time, by a retaining member comprising a plate 92 secured by rivets 94 to the supporting plate and having an upstanding free resilient arm 95 which confronts the series of notches and has a semi-cylindrical projection 96 that conforms generally to the shape of a notch and is adapted to enter a notch positioned in register therewith and bear with the inherent spring pressure of its arm 94 against the end of the actuating plate, whereby to hold the plate releasably in set position. Pressure on the plate tending to move the plate angularly is at first opposed by the resilient arm, which, upon sufficient pressure, suddenly yields permitting movement of the plate until a projection passes the center line of the arm projection 96 whereby the arm springs into the next notch, forcing the actuating plate angularly in the direction of the application of pressure. This results in the rapid or snap opening of one circuit and the rapid or snap closing of the next circuit.

I claim:

1. An electric switch comprising a supporting plate, a plurality of stationary contact members carried thereby and arranged in an arcuate series in a group, another stationary contact member carried by said plate remote from said group, a pivot pin in said plate, a movable switch member on said pin consisting of two divergent resilient arms extended laterally of said pivot pin on the same side thereof one cooperating with said group of contact members and the other cooperating only with said other contact member, an actuating plate pivoted on said pivot pin and disposed be-

tween said supporting plate and switch member, one of said arms having a perforation therethrough, and said actuating plate having a switch operating shank at the end thereof which up-stands through said perforation and connects said actuating plate and switch member for conjoint angular movement, said perforated arm and said shank being loose in the direction of resilient movement of said arm whereby to admit of free movement of said switch member in a vertical direction toward and away from said supporting plate, and a manually-engageable handle carried by said shank above said arm.

2. An electric switch comprising a supporting plate, a plurality of stationary contact members carried thereby and arranged in an arcuate series in a group, another stationary contact member carried by said plate remote from said group, a pivot pin in said plate, a movable switch member on said pin consisting of two divergent resilient arms one cooperating with said group of contact members and the other cooperating only with said other contact member, an actuating plate pivoted on said pivot pin and disposed between said supporting plate and switch member and under one only of said arms, the other of said arms being extended laterally of said actuating plate, means connecting said actuating plate and switch member for conjoint angular movement, an actuating handle carried by said means, said connecting means admitting free movement of said switch member in a vertical direction toward and away from said supporting plate, said actuating plate having a series of arcuately arranged closely spaced notches in one edge thereof, and a spring arm carried by said supporting plate having a cam projection resiliently retained releasably in any one of said notches.

3. An electric switch comprising a supporting plate, a plurality of stationary contact members carried thereby and arranged in an arcuate series in a group, another stationary contact member carried by said plate remote from said group, a pivot pin in said plate, a movable switch member on said pin consisting of two divergent resilient arms extended laterally of said pivot pin on the same side thereof one cooperating with said group of contact members and the other cooperating only with said other contact member, each of said arms providing support for the other arm, an actuating plate pivoted on said pivot pin and disposed between said supporting plate and switch member, said actuating plate having an upstanding normally-engageable shank which projects loosely through an arm of said switch member and constitutes means connecting said switch member and arm for conjoint angular movement, and an operating handle on said shank, said arm being free to flex over said shank toward and away from said supporting plate.

4. An electric switch comprising a supporting plate, a plurality of stationary contact members carried thereby and arranged in an arcuate series in a group, another stationary contact member carried by said plate remote from said group, a pivot pin in said plate, a movable switch member on said pin consisting of two divergent resilient arms one cooperating with said group of contact members and the other cooperating only with said other contact member, an actuating plate pivoted on said pivot pin and disposed under said switch member, resilient plate spacing means on said pin under said actuating plate operative to press said actuating plate and switch member

into yielding engagement, said actuating plate having an upturned switch-operating shank which loosely passes through and engages an arm of said switch member and constrains it for conjoint angular movement with said actuating plate, said actuating plate at said shank end thereof having a depressed part that engages and rides over the face of said supporting plate.

5. An electric switch comprising an insulating supporting plate, a pivot pin therein, a series of stationary contact members arranged in a close positioned group in arcuate order in said plate about said pin, another stationary contact member carried by said plate remote from said group, an actuating plate pivoted intermediate its ends on said pivot pin, said actuating plate at one end having an upturned manually engageable switch-operating shank, a switch member on said pivot pin consisting of a resilient metal plate having a pair of divergent resilient contact arms, one for engagement only with said group of contact members and the other for engagement only with said other contact member, one of said arms overlying a part of said actuating plate and having an aperture therethrough through which said shank is passed loosely whereby to connect said actuating plate and switch member for conjoint angular movement, said apertured contact arm being free to flex toward and away from said supporting plate, said other arm extended laterally of said actuating plate, the free ends of said arms being bent into contact with said supporting plate whereby said switch member is provided with a three-cornered stable support for angular movement, the end of said actuating plate remote from said shank and on the other side of said pivot pin being elevated above said supporting plate and having an arcuate series of closely spaced notches therein, and a spring arm carried by said plate having a cam projection pressed yieldingly into any one of said notches.

6. A cord type electric switch comprising a supporting base, a pivot pin carried by said base, a movable resilient bell-crank switch member on said pin, separate stationary contact members engageable by separate resilient arms of said switch member, a movable actuating plate on said pin and under said movable switch member and having a part underlying one only of said arms, the other arm being extended laterally of said plate, said underlying part having an upstanding member extended loosely through the overlying arm, and a manually-engageable plate-actuating part above said overlying arm.

7. A cord type electric switch comprising a supporting base, a pivot pin carried by said base, a movable resilient bell-crank switch member on said pin, separate stationary contact members engageable by separate resilient arms of said switch member, a movable actuating plate on said pin and under said movable switch member and having a part underlying one only of said arms, the other arm being extended laterally of said plate, said underlying part having an upstanding member extended loosely through the overlying arm, a manually-engageable plate-actuating part above said overlying arm, said actuating plate having peripherally notched sections on the side of said pivot pin opposite said underlying part, and a spring-urged member releasably retainable in said notches.