

1,012,806.

Patented Dec. 26, 1911.

2 SHEETS-SHEET 1.

Fig. 1.

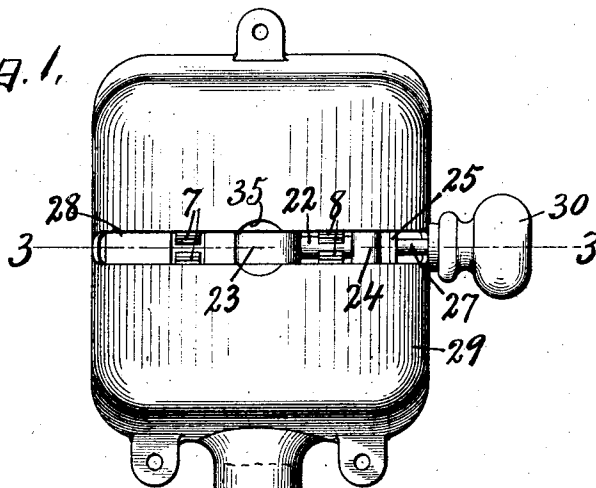


Fig. 2.

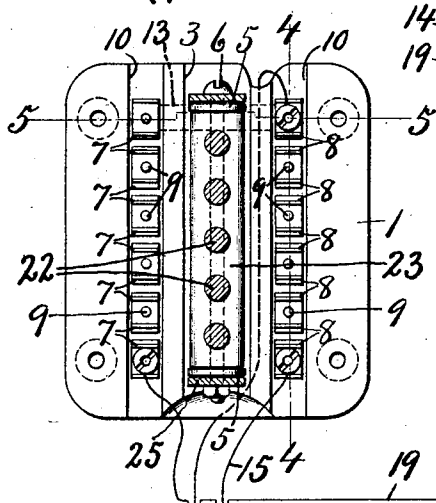


Fig. 3.

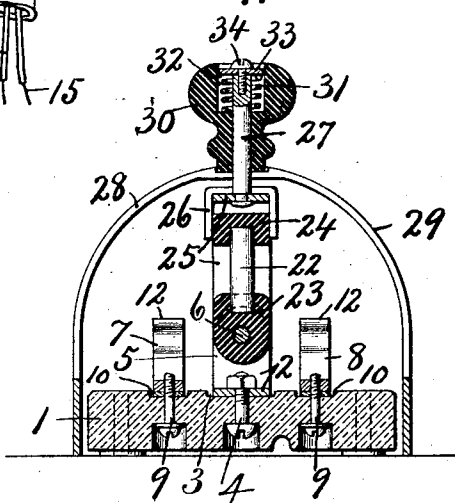
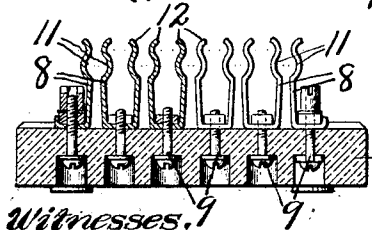


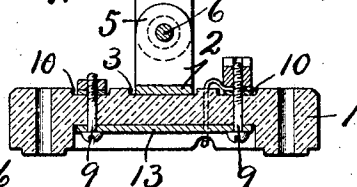
Fig. 4.



Witnesses.

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Fig. 5.



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ELECTRIC SWITCH.
APPLICATION FILED DEC. 20, 1909.

1,012,806.

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2 SHEETS—SHEET 2.

Fig. 8.

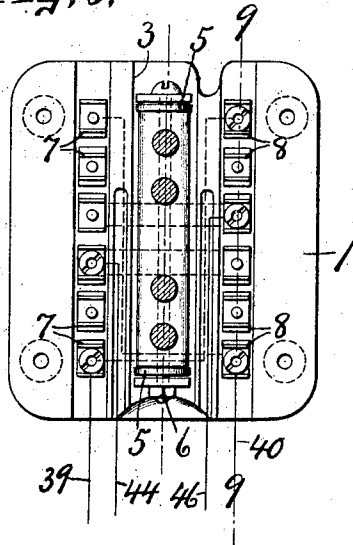


Fig. 6.

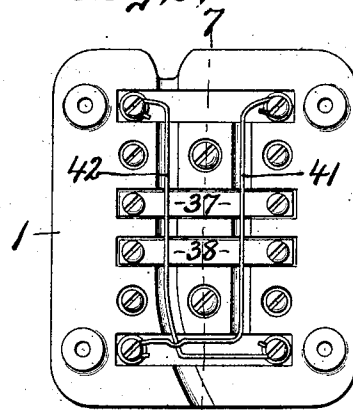


Fig. 10.

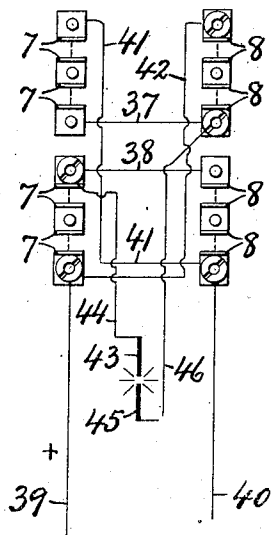


Fig. 7.

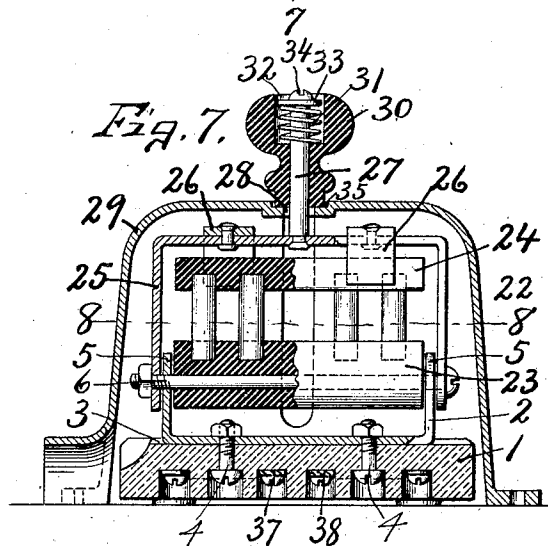
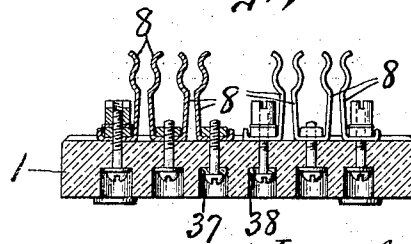


Fig. 9



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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,012,806.

Specification of Letters Patent.

Patented Dec. 26, 1911.

Application filed December 20, 1909. Serial No. 533,989.

To all whom it may concern:

Be it known that I, FRANK BUCHANAN, of Dayton, in the county of Montgomery, in the State of Ohio, have invented new and useful Improvements in Electric Switches, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in electric switches adapted to be used more particularly in connection with the lighting circuits of electric head-lights for cars and involves the use of a switch member movable in reverse directions into and out of contact with separate sets of electric terminals of the same or different electric circuits for varying the intensity of the light either by changing the polarity of the current through the same arc lamp or by alternately closing the same or different circuits through an arc lamp and incandescent lamp. These switches, for the purposes described, are necessarily handled more or less roughly and carelessly by inexperienced operators and are subjected to severe jolting by the action of the car upon which they are placed, thereby causing more or less imperfect contact and accidental operation of the switch.

One of the main objects of my present invention is to minimize the arcing effect between the contact members at the opening of the switch by the use of a multiplicity of terminals and corresponding contact members on the movable switch member.

Another object is to increase the contact area between the contact members by affording a greater degree of lap when in contact.

Another object is to render the switch self-centering and self-retaining in both its closed and opened positions to reduce the liability of its accidental operation.

A still further object is to simplify the general structure and at the same time to increase the efficiency and durability of the switch.

Other objects and uses will be brought out in the following description:

In the drawings—Figures 1 and 2 are respectively a top plan and an inverted plan of an electric switch embodying the various features of my invention as used in connection with an arc lamp and an incandescent lamp which are shown diagrammatically in Fig. 2 as electrically connected to the switch. Figs. 3, 4 and 5 are sectional views taken

respectively on lines 3—3, Fig. 1 and 4—4 and 5—5, Fig. 2. Fig. 6 is an inverted plan of the same switch as used in connection with a single arc lamp circuit for changing the polarity of the current through the electrodes, omitting the inclosing case. Fig. 7 is a sectional view taken on line 7—7, Fig. 6 showing the inclosing case in section and a part of the switch in elevation. Fig. 8 is a sectional view taken on line 8—8, Fig. 7 except that the casing is omitted. Fig. 9 is a sectional view taken on line 9—9, Fig. 8. Fig. 10 is a diagrammatic view of a portion of the lighting circuit and contact terminals connected therein.

In carrying out the objects stated, I provide a flat supporting base —1— of insulating material, such as porcelain, and upon this base is centrally mounted a U-shaped metal bracket or bar —2— which is seated in a corresponding groove —3— and held in place by clamping screws or bolts —4—, said bar being provided at its ends with out-turned parallel ears —5— having suitable apertures for receiving a pivotal bolt —6—, the latter serving to support and retain a movable switch member hereinafter described.

Mounted upon the supporting base —1— at opposite sides of the bar —2— and spaced apart therefrom are separate sets of terminals —7— and —8— arranged in pairs of, in this instance five each, and held in place by clamping screws or bolts —9—, the base of said terminals being also seated in suitable grooves —10— in the adjacent face of the base —1— to hold them against turning on their clamping screws. These terminals are preferably made of spring copper and are provided with laterally yielding arms projecting outwardly from the base —1—. The arms of each coacting pair of terminals are formed just inside their outer ends with concave seats —11— terminated in outwardly diverging or flaring ends —12— for receiving and frictionally retaining the contact pieces of the movable switch member presently described.

Two of the terminals at one end of the base are electrically connected by a metal conductor or bar —13—, one of said end terminals being electrically connected by a wire —14— to the lighting circuit, as best shown in Figs. 2 and 5. The terminal at the opposite end of the same set is connected

by a wire —15— to one pole of an incandescent lamp —16—, the opposite pole of said lamp being connected by a wire —17— to the return wire, as —18—. The corresponding end terminal of the opposite set is connected by a wire —19— to one of the electrodes of an arc lamp —20—, the other electrode being connected by a wire —21— to the return conductor —18—.

The movable switch operating member comprises a plurality of, in this instance five, cylindrical metal contact members —22— arranged in a straight row, side by side, some distance apart and parallel with each other and having their opposite ends embedded in parallel bars —23— and —24— of insulating material such as vulcanized fiber or rubber, said insulator bars being spaced apart, one from the other, to expose the intervening portions of the contact members —22—. These contact members —22— therefore serve to hold the bars —23— and —24— in fixed relation to each other and, at the same time, the insulating bars serve in turn to hold the contact members in fixed relation a uniform distance apart, corresponding to the spacing of the terminals —7— and —8— of each set. The inner insulating bar —23— is pivotally mounted upon the supporting bolt —6— about which the movable switch member turns, said pivotal bolt being located slightly below the plane of the upper ends of the terminals —7— and —8—, substantially coincident with that of the concave faces or seats —11—, so that when that movable switch member is brought to a substantially horizontal position or parallel with the base —1—, the contact members —22— will engage in the respective seats —11— of the adjacent terminals. The terminals —7— and —8— of each pair although tensioned toward each other are normally spaced apart a distance slightly less than the diameter of the corresponding contact members —22—, so that when the switch is closed said contact members —22— wedge between and spread apart the terminals of each pair against their own tension, thereby causing the said terminals to automatically center, grip and frictionally hold the switch in its closed position.

In opening the switch as soon as the contact members —22— are withdrawn from their respective seats —11—, the flaring ends —12— operating under their own spring tension against the converging or rounding faces of the contact members —22— tend to forcibly inject or expel said contact members with considerable force from the terminals, thereby making a quick break and preventing, as far as possible, arcing of the current at the breaking points of contact.

The insulating bars —23— and —24— to-

gether with contact members —22— constitute a unitary structure or movable switch member and, in order that it may be conveniently operated, it is mounted within a U-shaped frame —25— which is hinged to the supporting frame —5— by the bolt —6— and is provided with U-shaped clamping members or retainers —26— riveted or otherwise secured thereto and projecting outwardly at the sides of the outer insulating bar —24—, so as to establish connection between the frame —25— and said insulating bar to rock the latter upon its pivotal bolt —6—.

Centrally secured to the cross bar of the frame —25— is an outwardly projecting stud or spindle —27— which extends through a circumferential slot —28— in a suitable housing or casing —29—. A handle or knob —30— is slidably mounted upon the outer end of the spindle —27— and is spring pressed inwardly by coil spring —31— which is arranged in a socket —32— in the handle and is interposed between the base of said socket and a washer or shoulder —33— on the outer end of the spindle, said washer being held in place by a machine screw —34—. The casing or housing —29— incloses the greater portion of the switch proper and its outer surface is substantially concentric with the pivotal bolt —6— and is provided at its apex with a socket —35— into which the inner end of the handle —30— is normally seated by spring pressure of the spring —31—, when the switch is in its open position, as shown in Figs. 2 and 3.

In Figs. 6, 7 and 8 is shown a similar switch adapted to be used in connection with an arc lamp for changing the polarity of the current through the electrodes, the parts of the switch being the same as shown in Figs. 1 to 5 inclusive except in the connection of the terminals adapted to a pole changing switch; for example, certain intermediate terminals of both seats are connected by metallic conductors or crossbars —37— and —38— on the under side of the base —1— as clearly shown in Fig. 6 and diagrammatically in Fig. 10.

In the diagram shown in Fig. 10 the positive and negative lighting wires —39— and —40— of the lighting circuit are electrically connected to one of the end terminals —7— and —8— of each set, said end terminal —8— being connected by a wire —41— to the opposite end terminal of the other set while the end terminal —7—, just described, is similarly connected by a wire —42— to the end terminal —8— at the opposite end of the opposite set.

One of the electrodes, as 43, of the arc lamp is connected by a wire —44— to the terminal —7— to which the cross bar —38— is connected, while the other electrode, as 130

—45— is connected by a wire —46— to the terminal —8— to which the cross bar —37— is connected.

It is now obvious that when the contact members —22— of the switch are brought into contact with the terminals —7— the current will pass from the wire —39— through the first half of the terminals —7— and corresponding contact members —22— thence through the wire —44— and electrodes —43— and —45—, wire —46— and terminal —8— connected thereto and then the cross conductor —37— and remaining terminal —7— and corresponding contact members —22— through the wire —41— and thence to the first terminal —8— to the return conductor —40— of the lighting circuit. On the other hand if the contact members —22— are brought into contact with the terminals —8— or negative side of the working circuit the current will pass from the first terminal —7— through the wire —42— to the last terminal —8— of the opposite set thence through the last half of the series of terminals —8— and corresponding contacts —22— through the wire —46— and electrodes —45— and —43—, wire —44—, cross conductor —38— and thence through the remaining terminal —8— and contacts —22— to the return conductor —40—.

In each of the modified forms of switches shown, the multiplicity of terminals employed tends not only to minimize the arcing effects upon the opening of the switch but the reversibility of the switch into and out of contact with either set of terminals enables the operator to easily and quickly throw into circuit lights of varying degrees of intensity, either by using an arc lamp and an incandescent lamp, as shown in Fig. 2, or by changing the polarity of the current in a single arc lamp, as shown in Fig. 10.

Another important feature of advantage of this invention is that the contact members —22— are wedge-shaped transversely and when brought into operative engagement with the terminals of either set at either side of the switch, spread said terminals apart against their own tension, thereby bridging the gaps between each separate pair of said terminals which, owing to their tension and concave seats, automatically center and hold the movable switch member in its closed position and at the same time the flaring ends of the terminals operating against the wedging faces of the contact members —22— serve to forcibly eject the movable switch member from its closed position to make a quick break and additionally prevent excessive arcing during the operation of opening the switch.

What I claim is:

1. An electric switch comprising a support, a frame pivoted to this support, insu-

lators mounted in the frame and spaced some distance apart, a cylindrical conductor bridging such space and having its ends seated in the insulators and thereby insulated from the frame, and a pair of spring terminals mounted on the support a distance apart normally less than the diameter of the conductor and insulated from each other, said terminals being located at opposite sides of the path of movement of said conductor and provided with registering concave seats for receiving the conductor and frictionally holding the switch in its closed position, the outer ends of the terminals being deflected from each other to forcibly eject the conductor and produce a quick break at the initial opening of the switch.

2. An electric switch comprising a support, a bracket mounted on the support, a frame hinged to the bracket, insulators parallel with the axis of the frame and spaced some distance apart, a series of conductors seated in and bridging the space between the insulators and spaced some distance apart, and a corresponding number of pairs of spring terminals mounted on the support at one side of the axis of the frame, those of each pair being insulated from each other and having their adjacent faces lying in the path of movement of opposite sides of the corresponding conductor for contact therewith when the switch is closed.

3. An electric switch comprising a base of insulating material, a bracket secured to the base, a frame pivoted to the bracket by a pivotal rod, a bar of insulating material mounted on the rod, contact members of conducting material secured to and projecting radially from said insulating bar and spaced some distance apart from each other, means for holding the contact members and insulating bar stationary relatively to the frame, and a row of contact terminals arranged in pairs, those of each pair being insulated from each other and disposed in the path of movement of opposite sides of their respective contact members.

4. An electric switch comprising an insulating base having separate rows of contact terminals parallel with each other and spaced some distance apart, those of each pair being insulated from each other, a bracket secured to the base between the separate rows of terminals, a frame pivoted to the bracket to swing in opposite directions from a vertical position, yielding means for holding said frame in its vertical position, a bar of insulating material mounted in the bracket coaxial with the axis of the frame, contact members of conducting material secured to and projecting radially from said insulating bar and spaced a distance apart corresponding to the distance between the terminals of each row, means for holding the insulating bar and contact members sta-

tionary relatively to the frame, said contact members being movable with the frame into and out of contact with the terminals which are alined therewith.

5 5. An electric switch, having separate parallel rows of spring terminals arranged in pairs, those of each pair being of opposite polarity and having their ends flaring laterally, and a rocking support near said
10 rows having cylindrical contact members movable to and from a position between the corresponding pairs of terminals of each row.

6. In an electric switch, an insulating base,
15 a rocking support mounted on the base, separate pairs of terminals of opposite polarity at opposite sides of the support, those of each pair being insulated from each other, insulating bars mounted on the support and
20 spaced apart from each other, and contact members bridging the space between and secured to said bars for bridging the gap between the terminals of each pair as the rocking support is moved in reverse directions
25 to close the switch.

7. In a reversible electric switch, an insulating base, a rocking support mounted upon the base, separate rows of spring terminals at opposite sides of the rocking support and also mounted upon the base, those
30 of each row being arranged in pairs and

those of each pair being insulated from each other, insulating bars mounted on the rocking support and spaced apart from each other, each row of terminals being located 35 at substantially the same distance from the axis of the rocking support as that between said axis and space between the insulating bars, and a plurality of contact members bridging the space between and secured to 40 said bars and spaced apart a distance corresponding to the distance between the pairs of terminals of each row for electrically connecting the corresponding pairs of terminals as the rocking support is moved in 45 reverse directions for closing the switch.

8. An electric switch, having a rocking support provided with a contact member, an inclosing case having a portion of its face concentric with the swinging axis of the 50 support and provided with a socket, and a radially yielding movable handle on the support and spring pressed into the socket to hold the support in a predetermined position. 55

In witness whereof I have hereunto set my hand on this 6th day of December 1909.

FRANK BUCHANAN.

Witnesses:

H. E. CHASE,

A. L. HUMPHREY.