Oct. 13, 1925. 1,557,394

C. E. ANDERSON

ELECTRIC SWITCH

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Fig. 1.

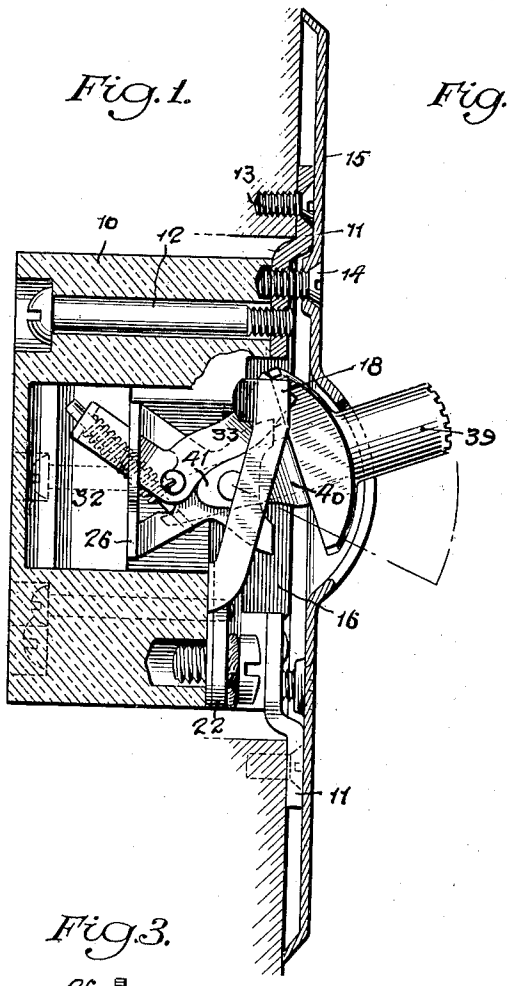


Fig. 2.

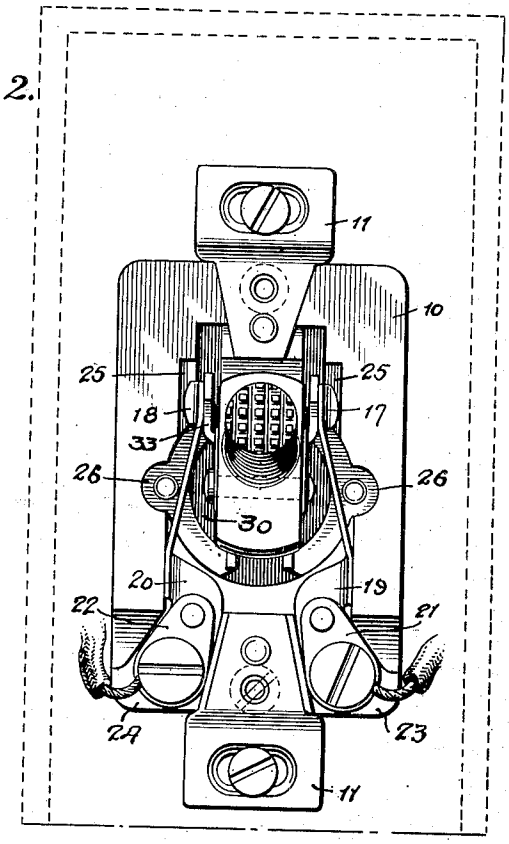


Fig. 3.

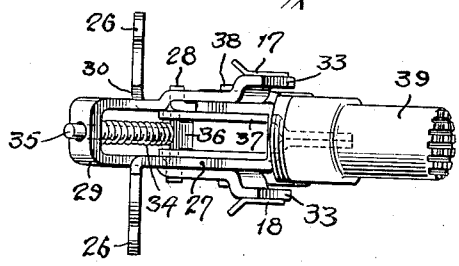


Fig. 4.

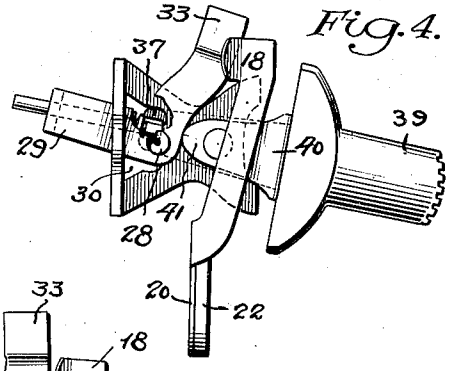
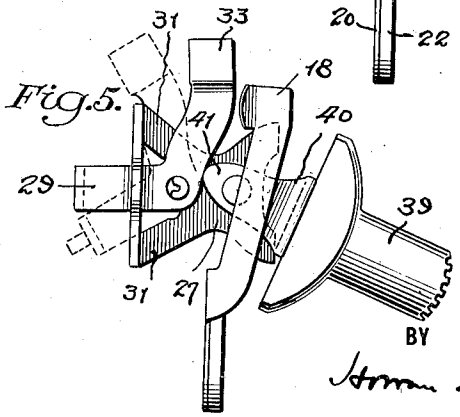


Fig. 5.



INVENTOR
CARL ERIC ANDERSON
BY
Strauss & Strauss
ATTORNEYS

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C. E. ANDERSON

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Fig. 6.

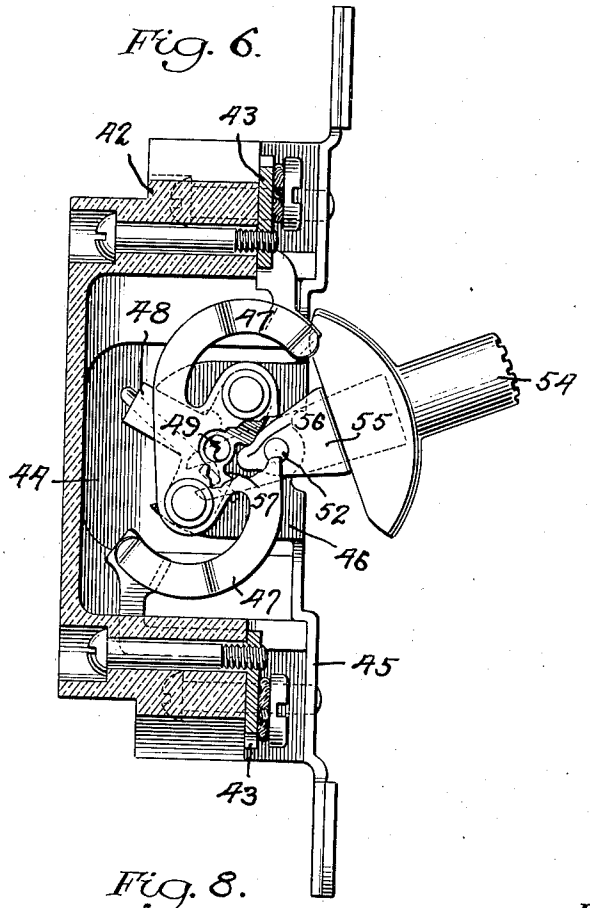


Fig. 7.

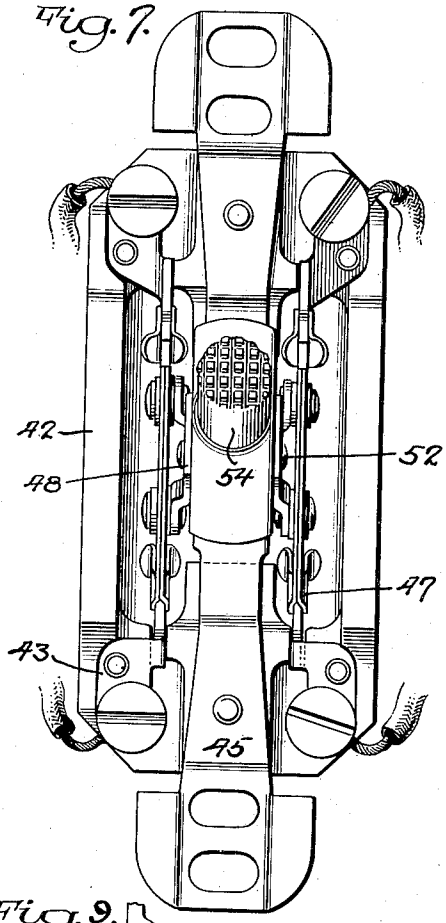


Fig. 8.

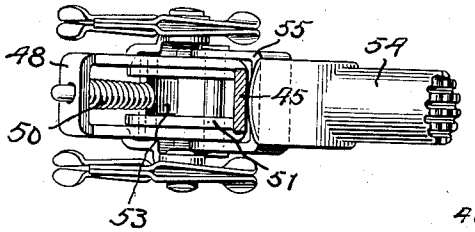
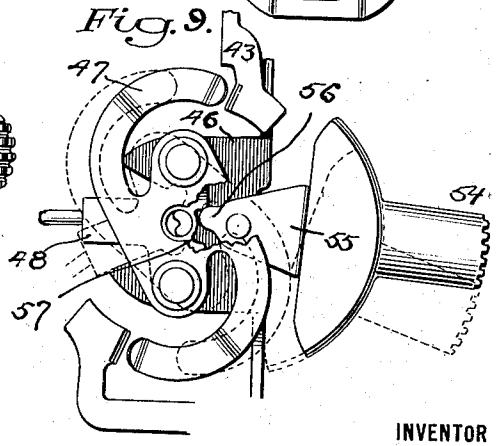


Fig. 9.



INVENTOR

CARL ERIC ANDERSON

BY

Attorneys and Attorneys

ATTORNEYS

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UNITED STATES PATENT OFFICE.

CARL ERIC ANDERSON, OF STRATFORD, CONNECTICUT, ASSIGNOR TO THE BRYANT ELECTRIC COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

ELECTRIC SWITCH.

Application filed March 11, 1921. Serial No. 451,462.

To all whom it may concern:

Be it known that I, CARL ERIC ANDERSON, a citizen of the United States of America, residing at Stratford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches, and particularly to snap switches of the toggle mechanism type. In switches of this type, the oscillating switch bar is thrust into "on" or "off" position by a spring connected at one end to the bar, and at its other end to a rocker, which not only stresses the spring, but shifts the end attached thereto from one side to the other of the axis of oscillation of the switch bar. The strength of the spring alone is thus relied upon to overcome the frictional engagement between the switch bar and the switch terminals when the switch is shifted from "on" to "off" position. It sometimes happens, however, that this engagement is so close, and the drag between the parts so great that the toggle spring has not sufficient strength to overcome it. The result is that although the operating lever is thrown to "off" position, the switch bar does not move, the circuit remains closed, and there is no means for opening it. To remedy this defect, I have provided means, preferably associated with the operating lever, which engages the switch bar and positively shifts it at the beginning of its throw from one position to the other. The mechanism may be such as to positively shift the switch bar only from circuit-closing position, that is to say, out of engagement with the switch terminals, or, alternatively, it may be such that the switch bar is positively shifted at the beginning of its throw in both directions.

Illustrative embodiments of the invention are shown in the accompanying drawings, in which—

Fig. 1 is a longitudinal section through a switch in which my invention is embodied in one form;

Fig. 2 is a plan thereof with cover plate removed;

Fig. 3 is an end elevation of the switch mechanism detached;

Fig. 4 is a broken side elevation thereof;

Fig. 5 is a side elevation showing the mechanism in another position;

Fig. 6 is a longitudinal section through a switch of modified construction;

Fig. 7 is a top plan view thereof;

Fig. 8 is an end elevation of the switch mechanism removed; and

Fig. 9 is a broken side elevation of the mechanism showing the position of the parts during the opening movement of the switch.

In the construction shown in Fig. 1, the switch comprises a cup-shaped body 10 of insulating material having yoke lugs 11 secured at its opposite ends by bolts 12 to receive screws 13, by means of which the switch is mounted in an outlet box, or otherwise supported. The lugs 11 also receive the screws 14, by which the cover plate 15 is held in place in a well understood manner.

Projecting into the switch chamber 16 from one end of the body, are two switch terminals 17 and 18 in the form of spring straps or brushes, the supporting ends 19 and 20 of which are offset at right angles and secured beneath the wire terminal plates 21 and 22, resting on depressed ledges 23 and 24. Shoulders 25, formed on opposite sides of the lower portion of the switch chamber, support the foot pieces 26 of the skeleton bridge frame 27. Outwardly offset aligned lugs 28 struck from opposite sides of the frame, form bearing studs for the switch bar yoke 29, which straddles the sides of the frame and works in the opening 30 between the foot pieces 26 and the legs 31 at each side of the frame. The lower end of the yoke 29 oscillates in the channel 32 formed in the base below the shoulders 25 on which the frame rests, while the contact arms 33 of the yoke extend substantially at right angles thereto and work through an arc, the mid-line of which is substantially at right angles to the plane passing through the axes of the switch bar and rocker.

Associated with the switch bar and serv-

ing to impart thereto a snap action, is the switch spring 34 coiled around a guide pin 35, and bearing at one end against the switch bar through which the guide pin 35 passes. At the other end of the guide pin is a spring abutment cross head 36, which engages the rocker 37 pivoted on the pin 38 and working between opposite sides of the frame 27. Rigid with the rocker is the operating thumb-piece 39. Carried by the latter and thus moving with the rocker 37 is a yoke 40, the legs of which straddle both the rocker 37 and the frame 27, and extend downward beyond the cross pin 38 (on which they are pivoted) to form cam lugs 41.

These lugs 41 serve the important function of positively disengaging the switch bar contact arms 33 from the terminals 17 and 18 on the opening of the switch. As will be observed in Fig. 1, the position of the cams 41 is such when the switch is closed they lie against the arms 33 of the switch bar at a point above their axis of oscillation 28. On the opening movement of the switch illustrated in Figs. 4 and 5, the cams 41 positively engage and force the switch arms 33 away from and out of contact with the terminals 18. Simultaneously the swinging of the rocker 37 shifts the spring abutment 36 from one side to the other of the axis of oscillation 28 of the switch bar. The shape of the parts is such that substantially simultaneously with the passage of the spring abutment 36 across the switch bar axis 28, the cams 41 positively free the switch bar arms from the terminals 18, and the expansion of the spring 34 opens the switch with snap action. This action of the cams 41 not only effects the positive separation of the contacts from the switch terminals, thus relieving the spring from the frictional drag which it would otherwise have to overcome, but it also lessens the angular impedance to the action of the spring, since the cam swings the yoke 29 in the same direction that the spring abutment 36 is shifted, and thus brings the parts into position for the most effective exertion of the spring effort as the abutment 36 crosses the axis 28 of the switch bar. For this reason the switch spring may be made lighter than hitherto, thus relieving the porcelain and securing devices against present vibration and impact strains, while at the same time attaining a perfectly certain operation of the switch.

The switch just described is of the single-pole double-break type. In the remaining figures I have shown the same invention applied to a double-pole double-break switch.

In this construction the insulating body 42 is also shown as having a general cup-shape, with combined wire and switch terminal plates 43 at its four corners. Spanning the switch chamber 44 is a supporting yoke 45 with offset side wings which form the switch frame 46. The switch bars 47 are mounted on a yoke 48 pivoted at 49 on the frame and subjected to the action of the coil spring 50. The rocker 51 is pivoted on the cross pin 52 and engages the abutment 53 for the opposite end of the switch spring. Associated with the rocker and the actuating handle 54 is a yoke 55, the legs of which terminate in lugs 56. These lugs are engaged with lost motion between the opposite ends of notches 57 formed in the upper edge of the cross bar of the switch bar rocker 48. The size of the cam lugs 56 and the notches 57, and the relation of these parts is such that upon the movement of the actuating button 54 the cam 56 engages one or the other side of the notch 57 and serves to impart a positive throw of the switch bar substantially simultaneously with the shift of the switch spring abutment 53 across the axis of oscillation 49 of the switch bar.

The mechanisms above described thus insure the positive opening of the switch, even in case of failure of the switch spring. Moreover, in the construction shown in Figs. 6 to 9, the mechanism is such that the switch may not only be positively opened, but it may also be positively closed by reason of the positive engagement between the lugs 56 and the switch bar. The combination of this positive engagement between the rocker and the switch bar, with the spring snap action, provides a switch of greatly improved functional operation, while the lessened jars and strains incident to the resultant possible weakening of the switch spring, increases its longevity. The particular embodiments of the invention shown are to be regarded as in no way limitative, but merely illustrative of what I claim as my invention.

I claim—

1. An electric switch comprising a freely oscillating switch bar, a switch spring, one end of which operatively engages the same, a rock lever operatively engaging the other end of said spring to shift said end across the axis of oscillation of the switch bar, and means moving with the rock lever but independently pivoted on the axis thereof and having a lost motion engagement with said switch bar on the throw of the rocker in either direction, said means serving to positively initiate the oscillation of the switch bar.

2. An electric switch comprising a freely oscillating switch bar, a switch spring, one end of which operatively engages the same, a rock lever operatively engaging the other end of said spring to shift said end across the axis of oscillation of the switch bar, and a

lug associated with the rocker but independently pivoted on the rocker axis and positively engaging said switch bar to initiate its oscillation on the switch-opening throw of the rocker.

3. An electric switch comprising a freely oscillating switch bar, a switch spring, one end of which operatively engages the same, a rock lever operatively engaging the other end of said spring to shift said end across the axis of oscillation of the switch bar, and a lug associated with the rocker but independently pivoted on the rocker axis and freely engaging said switch bar to positively initiate its oscillation on the switch-opening throw of the rocker.

4. In an electric switch, a frame plate, a switch bar pivoted on said plate to one side of the latter, an actuating rocker pivoted on said plate but at the opposite side thereof, a toggle spring interposed between said rocker and switch bar and one end of which is shifted by the rocker across the axis of the switch bar to stress the latter for oscillation, in combination with means associated with the rocker but lying on the switch bar side of the frame plate and having a lost motion engagement with the switch bar to positively initiate its throw on the actuation of the rocker.

5. In an electric switch, a frame plate, a switch bar pivoted on said plate to one side of the latter, an actuating rocker pivoted on said plate but at the opposite side thereof, a toggle spring interposed between said rocker and switch bar and one end of which is shifted by the rocker across the axis of the switch bar to stress the letter for oscillation, in combination with means associated with the rocker but lying on the switch bar side of the frame plate and having a lost motion engagement with the switch bar to positively initiate its throw in either direction on the actuation of the rocker.

6. In an electric switch, a switch frame, a switch bar straddling the same and pivoted thereon, a switch lever also pivoted on the frame, a toggle spring operatively connected at one end with the switch bar, and at its other end with the switch lever, the oscillation of the latter serving to increase the stress of the spring and to shift the lever end thereof across the axis of oscillation of the switch bar, together with means operatively associated with the lever for positively causing the switch bar to part from the stationary contact substantially as the lever end of the actuating spring crosses the axis of oscillation of the switch bar.

7. In an electric switch, a switch frame comprising a pair of spaced plates, a switch bar straddling the plates and pivoted thereon, a switch lever working between said frame plates, a toggle spring operatively interposed between the switch bar and switch lever, the oscillation of the latter serving to shift its associated end of the switch spring across the axis of oscillation of the switch bar, together with a lost-motion positive operating connection between the switch lever and the switch bar for positively causing the switch bar to part from the stationary contact substantially as the lever end of the toggle spring crosses the axis of oscillation of the switch bar.

8. In an electric switch, a frame plate, a switch bar pivoted on said plate to one side of the latter, an actuating rocker pivoted on said plate but at the opposite side thereof, a toggle spring interposed between said rocker and switch bar and one end of which is shiftable by the rocker across the axis of the switch bar to stress the latter for oscillation, in combination with a member moving with the rocker but arranged on the switch bar side of the frame plate, said member and switch bar being shaped for lost motion engagement by which the switch bar is positively caused to part from the stationary contact substantially coincident with the passage of the rocker end of the toggle spring across the axis of oscillation of the switch bar.

In testimony whereof I have signed my name to this specification.

CARL ERIC ANDERSON.