April 25, 1933. H. E. NORVIEL 1,906,084

SWITCH

Filed April 13, 1932

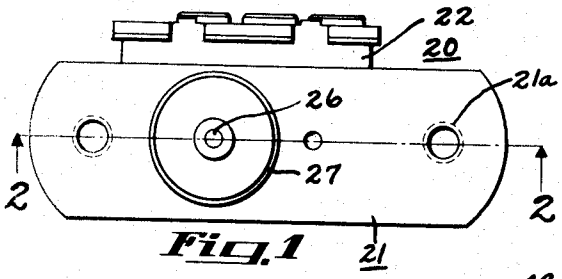


Fig. 1

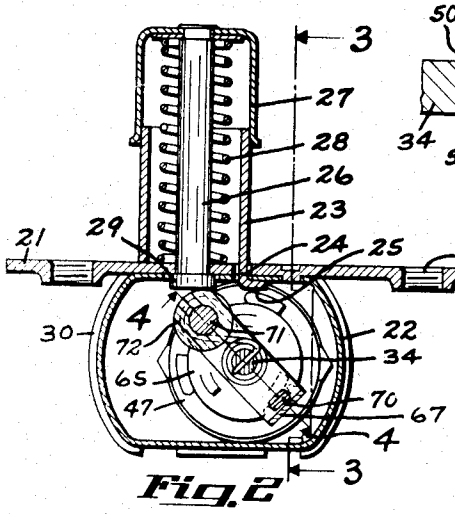


Fig. 2

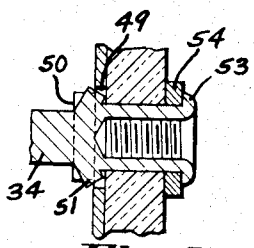


Fig. 7

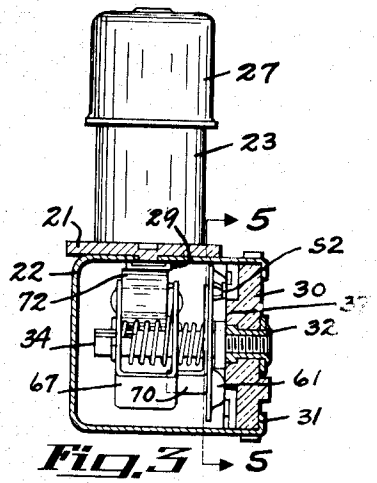


Fig. 3

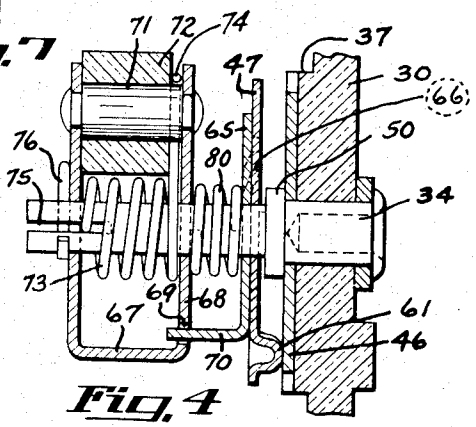


Fig. 4

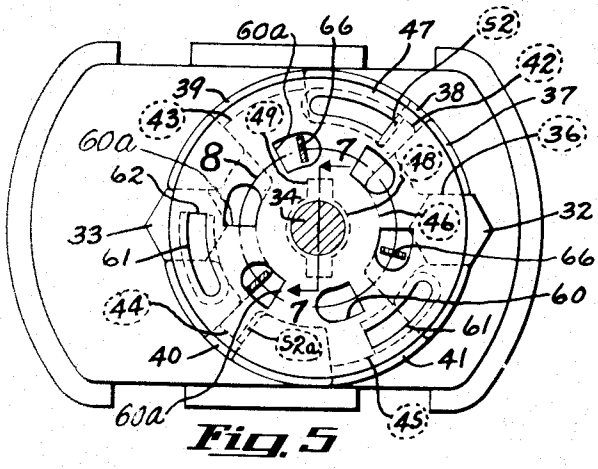


Fig. 5

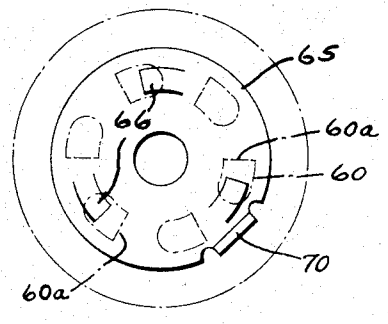


Fig. 6

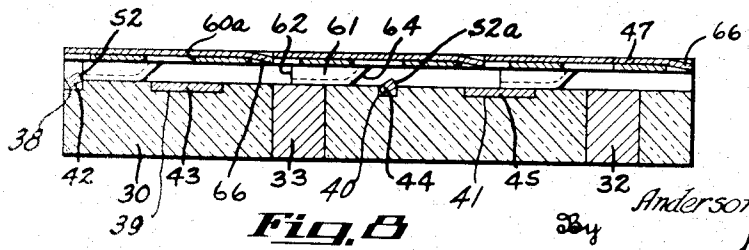


Fig. 8

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UNITED STATES PATENT OFFICE

HARRY E. NORVIEL, DECEASED, LATE OF ANDERSON, INDIANA, BY ANDERSON BANKING COMPANY, EXECUTOR, OF ANDERSON, INDIANA, ASSIGNOR TO DELCO-REMY CORPORATION, OF ANDERSON, INDIANA, A CORPORATION OF DELAWARE

SWITCH

Application filed April 13, 1932. Serial No. 605,091.

This invention relates to electrical switches, and particularly to switches of the ratchet type which may be operated by foot pressure.

It is among the objects of the invention to provide a ratchet-type switch in which the various types of switch parts are more perfectly adapted for the control of particular types of circuits, and to provide for operating such a switch by a foot-operated device so constructed and arranged that excessive foot pressure upon the foot operated device will not cause the parts to be damaged.

Another object is the provision of an improved switch of the class described having lighting circuit control contacts which are held in a controlling position and adapted to be moved in the next controlling position without possibility of stop at an intermediate point, and having provisions to insure a closed lighting circuit while the switch contacts are connected in the lighting circuit.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawing:

Fig. 1 is a plan view of a switch embodying the present invention.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional view on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged plan view of the switch back and circuit closing means looking in the direction of line 5—5 of Fig. 3.

Fig. 6 is a detail view of a switch ratchet.

Fig. 7 is a sectional view on the line 7—7 of Fig. 5.

Fig. 8 is a development of a sectional view taken on the dot-and-dash line circle 8 in Fig. 5.

Referring to the drawing, the present foot pedal controlled switch, which is indicated in its entirety by a numeral 20, is preferably installed upon the lower side of a floor board, not shown. The switch 20 comprises a relatively rigid mounting bracket or plate 21. A cup-shaped switch case 22 is attached to the plate 21 by a guide sleeve 23, the sleeve having tangs or tongues 24 extending through aligned apertures, in the plate 21 and case 22 and bent over as at 25 against the underside of the case. The plate 21 and a case 22 are provided with aligned apertures, through which an actuating rod 26 may extend. The rod 26 is attached at its upper end to a cap 27, and the rod is maintained normally in a position shown in the drawing by a spring 28 located between the plate 21 and the cap 27. The cap 27 is supported for endwise movement by the guide sleeve 23. A head 29 provided on the rod 26 is maintained normally in engagement with the plate 21 owing to the tension put upon the spring 28. The plate 21 is provided with apertured ends 21*a* adapted to be mounted upon and secured to the floor board or other suitable supports.

The opened end of the switch case 22 is closed by a nonconducting cover or terminal block 30 which is suitably notched to receive tangs extending from the case and bent over as at 31 against the outer surface of the block to hold the block to the case. The block or support 30 carries terminal rivets 32 and 33 and a central terminal post or guide 34. The rivets 32 and 33 are located in radial notches or channels 36 arranged substantially diametrically opposite each other in a raised portion 37 formed integral with the support 30. The notches 36 receive flat portions on the heads of the rivets 32 and 33 to keep same from turning upon the back. The notches indicated by reference numerals 38, 39, 40 and 41 are adapted to receive fingers 42, 43, 44 and 45 respectively, of a plate 46. The fingers 43 and 45 are substantially flush with the surface of the raised portion 37, while the fingers 42 and 44 are bent at an angle out of the plane of the fingers 43 and 45 to form shoulders or stops 52 and 52*a* above the surface of the raised portion 37. The stops 52 and 52*a* cooperate with a plurality of bosses 61 provided by a movable contact 47 to restrain backward movement of the movable contact or in other words, restrain the

movable contact 47 in moving in a clockwise rotation as viewed in Figs. 2 and 5. The plate 46 is provided with an aperture 48 having a plurality of notches 49 extending therefrom. The plate 46 is held upon the back 30 by a collar 50 provided by the post 34, the collar being larger in dimension than the aperture 48 so as to engage the outer surface of the plate to form a good electrical connection between the post 34 and the plate 46. The collar 50 is deformed, as at 51, to form detents or prongs that are adapted to fit within the notches 49 keeping the post 34 from rotating within the support 30. The collar is held firmly against the plate 46 by deforming a portion of the post 34 extending through the back 30, as at 53, over a metallic washer 54.

The movable member 47 is rotatably supported by the post 34, and is provided with six equidistant noncircular apertures 60 and three channel-shaped contacts or bosses 61, the contacts have a flat edge 62 which will cooperate with the stops 52. The contact bosses 61 of the plate 47 have a tapered portion 64 to permit the contacts to ride freely over the stops in a counterclockwise direction as viewed in Figs. 2 and 5. The bosses 61 engage and slide over the fingers 38, 39, 40 and 41 and tend to maintain the contacting surfaces clean.

The movable contact member 47 is given a step-by-step rotary motion in a counterclockwise direction as viewed in Figs. 2 and 5 by a ratchet mechanism which comprises edges 60*a* of the apertures 60, which serve as ratchet teeth, and a driving member 65 having three pawls or tongues 66 which are integral with the member 65 and are bent away from the plane of the disc as shown in dotted lines in Fig. 4. The driving member 65 is rotatably supported by the post 34 and is actuated by a U-shaped bracket 67 and supported by the post 34. The U-bracket 67 has an arm 68 that is provided with an aperture 69 for receiving an ear 70 bent at right angles from the plane of the driving member 65. The arms of the U-bracket 67 carry a pin 71 which supports a nonconducting block 72. The U-bracket is yieldingly urged in a clockwise direction by a spring 73 so that the block 72 normally engages the head 29 of the rod 23 due to the tension in the spring 73 located between the arms of the U-bracket and coiled about the post 34. This is accomplished by the spring 73 having an end 74 under tension bearing against the pin 71, and the other end passing through a slot 75 provided by the post 34. The U-bracket is held upon the post 34 by a pin 76 extending through the rod 34.

A coiled spring 80 is interposed between the arm 68 of the bracket 67 and the driving member 65. The spring 80 is held under compression by the U-bracket 67 that is held upon the post 34 by the pin 76. The spring 80 yieldingly urges the parts 65 and 47 toward the back 37 so as to keep the driving member 65 in a good ratchet engagement with the contact plate 67 and at the same time hold the contact plate 67 in good electrical connection with the plate 46.

As shown in the drawing, see Fig. 5, the terminal 33 is engaged by one of the channel-shaped bosses 61 and since only one of the bosses 61 may be engaged with a terminal at the same time, the terminal 32, therefore will not be included in the electrical circuit as it is not engaged by one of the bosses 61. When one of the bosses is in engagement with a terminal 32, another boss 61 will be engaged with the finger 45, while still another boss 61 will have its square edge 62 engaging the stop 52 to prevent backward rotation of the member 47. When it is desired to close another circuit, the rod 26 through the cap 28 is moved downwardly until the bottom of the cap 27 will approximately engage the top of the sleeve 23. This movement of the cap 27 will cause the head 29 of the rod 26 to move the block 72 and the U-bracket 67 approximately 60° in a counterclockwise direction. This motion will be transmitted from the U-bracket 67 to the driving washer 65 through the ear 70, which in turn will transmit motion to the member 47 through the pawls 66 engaging the flat surface 60*a* of the apertures 60 causing the bosses 61 to be moved sufficiently to bring one of the bosses into engagement with the terminal 32 and causes the boss 61, which was previously in engagement with the terminal 33, to have its flat edge 62 engage the stop 52*a* provided by the finger 44.

When the cap 24 is released, the spring 28 will move the rod 23 upwardly into the position shown in Fig. 2, the driving washer 65 and the U-bracket 67 will be returned to their normal position by the spring 73, but the contact member 47 will remain in the last mentioned position since it cannot rotate in a clockwise direction, due to the engagement of one of the bosses 61 with the stop 52*a*. Therefore, successive operation of the rod 26 will cause the terminal post 34 to be connected alternately with terminals 32 and 33. The terminals 32, 33 and 34 are provided with tapped holes for receiving screws by which wires may be attached.

This switch is particularly adapted for dimming the headlights of an automobile when in use, the post 34 is connected with a storage battery or other source of current, and either one of the terminals 32 and 33 is connected directly with the bright circuit of the headlights, while the other one is connected through a resistance coil with the headlights. It is apparent that the headlights will burn bright and dim alternately, due to successive operations of the cap 27. Since

the cap 27 may be easily subjected to excessive foot pressure, the sleeve 26 will limit the downward movement of the cap 24, thus the rod 23 will be limited in its downward movement after it has been moved sufficiently to operate the switch. Therefore, no matter how vigorously the cap 27 is pushed downwardly, the switch mechanism will not be damaged as the sleeve 23 and the plate 21 which supports the sleeve are made relatively strong and rigid so as to withstand excessive pressure exerted upon the cap 27, which is transmitted to the sleeve 23, thence to the plate 21.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An electric switch comprising, in combination, an insulating support; a conducting plate carried by said support; a terminal contact post connected with said plate; stationary terminal contacts carried by said support; a circuit closing means, said means pivoted upon said post and provided with contact bosses and apertures, said apertures provided with ratchet engaging edges and said bosses connecting one of said stationary terminal contacts with said conducting plate; a driving plate having tangs extending from the plane of said driving plate to engage said ratched edges; a U-bracket pivoted upon said post, one arm of said bracket having an opening receiving an ear of said driving plate; manually operated means for moving said bracket in one direction to rotate said driving plate on said circuit closing means in one direction; a spring to turn said bracket and driving plate in the opposite direction; and spring means urging said driving plate and circuit closing means toward said stationary contacts.

2. An electric switch comprising, in combination, a support; terminals carried by said support; circuit closing means pivoted upon one of said terminals; driving means rotatably supported by said pivot terminal; actuating means rotatably supported by said pivot terminal connected to said driving means; a controller operable upon said actuating means to rotate said driving means, said driving means turning said circuit closing means in one direction; spring means to turn said actuating and driving means in another direction; and spring means urging said circuit closing means toward said terminals.

3. An electric switch comprising, in combination, a terminal block carrying a terminal post extending from said block, said block having a circular row of notches concentric with said post, stationary contacts attached to said block and extending into one or more of said notches; a conducting plate having a plurality of fingers fitting into one or more of said notches, one of said fingers bent at an angle and extending above the plane of said plate to form a stop; a movable contact plate rotatably supported by said post and having bosses and ratchet engaging edges, one of said bosses adapted to engage a stationary contact and another boss adapted to engage said stop; a driving disc rotatably supported by said post and having tongues extending from the plane of said disc to engage said ratchet edges of said movable contact plate; a U-shaped bracket rotatably supported by said post having one arm provided with an aperture, said aperture adapted to receive an ear bent at an angle and carried by said driving disc; manually operated means for rotating said bracket and driving disc in one direction to turn said movable contact plate until one of said bosses engages said stop; a spring for turning said bracket and driving disc in the opposite direction; and a spring for urging the driving disc toward said movable contact to urge said contact into engagement with said conduction plate.

4. An electric switch comprising, in combination, a support; terminal contacts and a terminal post carried by said support; a movable contact rotatably supported by one of said terminal posts; a ratchet member rotatably supported by said post for producing step-by-step rotation of said movable contact; an actuating member connected to said ratchet member; means for moving both of said members in one direction to rotate said movable contact to a circuit closing position; means for moving both of said members in the opposite direction; and resilient means urging said ratchet member toward said movable contact.

5. An electric switch comprising, in combination; a support; a terminal post carried by said support; contact terminals carried by said support; a stationary conducting plate connected to said post; a bridging member having a series of ratchet openings arranged in a circular row rotatably supported by said post, said bridging member having contact bosses, one of said contact bosses connecting said plate with one of said contact terminals; driving means rotatably supported by said post and adapted to engage one of said ratchet openings; means for actuating said driving means; manually operated means for moving said actuating means in one direction to turn said bridging member in the same direction; spring means for turning the actuating and driving means in the opposite direction; and spring means for urging said bridging means toward said conducting plate.

6. An electric switch comprising, in combination; a mounting plate; a cup-shaped

housing secured to said plate; a switch back forming a closure for said housing; a terminal post carried by said back; a stationary conducting plate connected to said post; stationary contacts carried by said back; a bridging member having a series of ratchet teeth arranged in a circular row rotatably supported by said post, said bridging member having a boss connecting said plate adapted with one of said stationary contacts; a driving washer rotatably supported by said post and adapted to engage said ratched teeth; means for rotating said driving washer; manually operated means for actuating said driving washer in one direction to turn the bridging member in the same direction; a spring for turning said rotating means and driving washer in the opposite direction; and means urging said boss toward said conducting plate.

7. An electric switch comprising, in combination; a housing; a closure for said housing; a plate supporting said housing; said closure providing a plurality of terminals; a conducting plate connected with one of said terminals; circuit closing means pivoted upon one of said terminals for connecting at least two of said terminals in a circuit; driving means rotatably supported upon said pivot terminal; actuating means connected with said driving means rotatably supported on said pivot terminal; a plunger supported by said plate operable to turn said actuating means, driving means and circuit closing means in one direction; a spring to turn said actuating and driving means in the opposite direction; and a spring interposed between said actuating and driving means urging said driving means and circuit closing means axially upon said pivot terminal toward said conducting plate.

8. An electric switch comprising, in combination, a rotatable member carrying a plurality of electrically connected contacts, a plurality of stationary contacts insulated from each other and engaged alternately by one or another of the movable contacts in successive positions of the movable member, a plurality of electrically connected stationary contacts engaged alternately by one or another of the movable contacts in successive positions of the movable member, and means for imparting to the rotatable member a step-by-step motion in the same direction.

9. An electric switch comprising, in combination, a rotatable member carrying a plurality of electrically connected contacts, a plurality of stationary contacts insulated from each other and engaged alternately by one or another of the movable contacts in successive positions of the movable member, a metal plate providing a plurality of stationary contacts, a plurality of electrically connected stationary contacts engaged alternately by one or another of the movable contacts in successive positions of the movable member, and means for imparting to the rotatable member a step-by-step motion in the same direction.

10. A metal plate providing a plurality of stationary contacts engaged alternately by one or another of the movable contacts in successive positions of the movable member, said plate providing parts extending beyond the plane of the stationary contacts to provide surfaces along which the movable contacts bear during movements thereof, said parts also providing stops to prevent reverse movement of the movable contacts, and means for imparting to the rotatable member a step-by-step motion in the same direction.

11. An electric switch comprising, in combination, a rotatable member carrying a plurality of electrically connected contacts, a plurality of stationary contacts insulated from each other and engaged alternately by one or another of the movable contacts in successive positions of the movable member, means for conducting current to the movable contacts, and parts extending beyond the plane of the stationary contacts to provide surfaces along which the movable contacts bear during movements thereof, said parts also providing stops to prevent reverse movement of the movable contacts, and means for imparting to the rotatable member a step-by-step motion in the same direction.

In testimony whereof is hereto affixed the signature.

ANDERSON BANKING COMPANY,
Executor of the Estate of Harry E. Norviel, Deceased.

By LINFIELD MYERS,
President.