Sept. 13, 1949. J. E. DIGMAN ET AL 2,481,829

ELECTRIC KNIFE SWITCH

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FIG. 1.

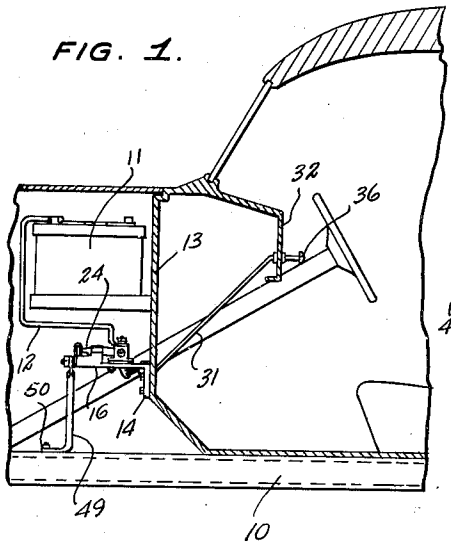


FIG. 2.

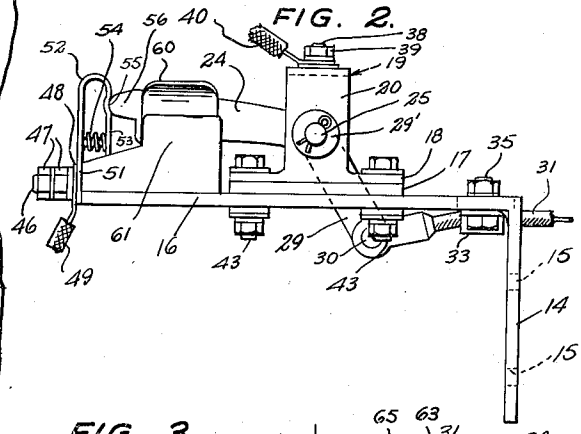


FIG. 3.

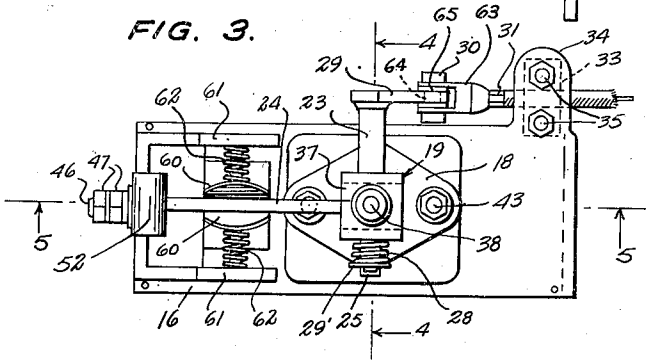


FIG. 4.

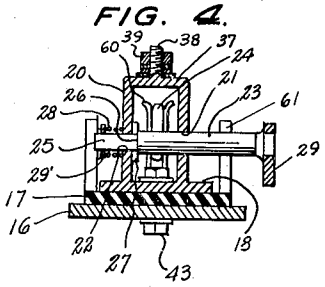
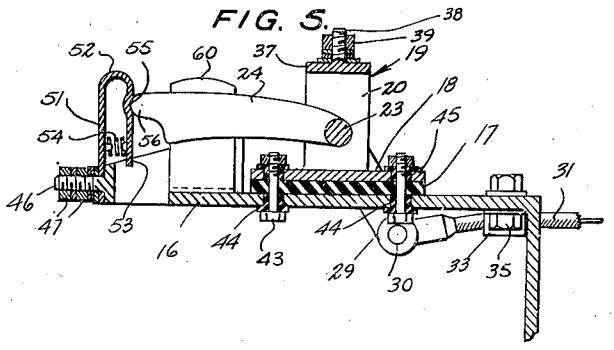


FIG. 5.



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ELECTRIC KNIFE SWITCH

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2 Claims. (Cl. 200—162)

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Our invention relates to electric switches, and more particularly to switches of the knife type wherein a pivotal blade contact is privoted into and out of engagement with a stationary contact to open and close a circuit, and wherein pivot means and a journal therefor pivotally mount said blade and are in said switch circuit.

A preferred use of the switch of the invention is to interpose the same in the ground circuit for the battery of a motor vehicle, whereby such circuit may be opened when the vehicle is idle and thereby open all circuits for the vehicle and prevent current losses through faulty insulation, short circuits or the like, and also to eliminate a fire hazard inherent in such faulty circuits.

In such switches it is inevitable that wear between the pivot and the journal therefor will eventually result in looseness of the pivot which in turn leads to corrosion of the contacting surfaces, a poor electrical contact, and may even result in sparking. Obviously, sparking is a particularly dangerous fire hazard, especially when the switch is used in a motor vehicle, as aforesaid, wherein it will usually be located beneath the hood of the vehicle adjacent the battery and engine.

With the foregoing in view, an object of our invention is to provide an improved switch of the class described.

A further object is to provide an improved switch of the class described which includes spring means loading the pivot or shaft for the blade contact in radial and/or axial directions whereby to maintain an intimate, self-cleaning contact between said shaft and said journal at all times.

A further object is to provide an improved switch such as that last-described, wherein the stationary contact comprises spring means associated therewith and bearing against the switch blade in a direction radially of said shaft whereby to load the same as aforesaid.

Other objects and advantages reside in the particular structure of the device, combination and arrangement of the several parts thereof, and will be readily apparent to those skilled in the art upon reference to the attached drawings in connection with the following specification wherein the invention is shown, described and claimed.

In the drawings:

Figure 1 is a fragmentary longitudinal vertical section through a motor vehicle showing a preferred use of a switch according to our invention;

Figure 2 is an elevation on an enlarged scale of a switch according to the invention;

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Figure 3 is a plan view thereof;

Figure 4 is a transverse vertical section taken substantially on the plane of the line 4—4 of Figure 3;

Figure 5 is a longitudinal vertical section taken substantially on the plane of the line 5—5 of Figure 3.

In the drawings, wherein like reference characters have been used throughout to designate like parts, 10 designates a frame of a motor vehicle which includes a storage battery 11 having a ground cable 12. The battery 11 is mounted in any suitable or usual manner adjacent the partition 13 separating the engine compartment of the vehicle from the passenger compartment.

The switch according to the invention includes a substantially L-shaped bracket having a vertically-disposed leg 14 which is suitably apertured, as at 15, for attachment to the partition 13 or any other suitable portion of the vehicle adjacent the battery 11. The bracket aforesaid includes a horizontally-disposed arm 16 on which the switch according to the invention is mounted in any suitable manner, as will appear later. The upper surface of the horizontal arm 16 of the bracket is provided with a relatively thick sheet of insulating material 17 on which is mounted the base plate 18 of a bracket which is generally indicated by 19. The bracket may comprise a pair of upstanding legs 20 which are formed with laterally-aligned apertures 21 and 22 which provide journals for a pivot or shaft 23 for the pivotal contact 24. It should be noted at this time that one of the openings 21, 22, in this instance, the opening 22, is smaller than the opening 21, and that the shaft 23 has a reduced free end 25 providing an annular shoulder 26 therearound, which may seat against the inner surface of the leg 20 of the journal, or, as is shown in Figure 4, may be operative to force a thrust washer 27 into intimate engagement with the inner surface of the leg 20 of the journal. The free end of the reduced end 25 of the shaft 23 extends outwardly beyond the adjacent leg 20, and has a spring 28 concentrically disposed about the same. One end of the spring 28 bears against the outer surface of the leg 20, while the other end bears against any suitable abutment 29' detachably secured on the free end of the reduced portion 25. The opposite end of the shaft 23 extends outwardly beyond the adjacent leg 20 of the bracket 19, and has fixed thereon a lever arm 29. The free end of the lever arm 29 may be pivoted, as at 30, to any suitable actuating means 31, such as a flexible cable, which is adapted to be extended through

the partition 13 and operatively secured on the dashboard 32 for convenient operation by the driver of the vehicle.

Any suitable mounting means for the flexible cable 31 may be associated with the bracket for the switch, and such means may comprise a sleeve 33 carried by the under surface of an ear 34 which extends laterally of the horizontal leg 16 of the bracket. The sleeve 33 may be detachably secured to the under surface of the ear 34 in any suitable manner, as by the bolts 35. It is to be understood from the foregoing that as the invention is disclosed, the operator of the car upon pushing in on the actuating button 36 adjacent the dashboard 32 will be effective to depress the lever 29, whereby the shaft 23 is rotated in a clockwise direction, Figure 2, and the blade contact 24 is raised out of contact with the stationary contacts, to be described later.

The legs 20 for the bracket 19 are connected in vertically-spaced relation to the base plate 18 by a cross-piece 37 which is provided on its upper surface with a vertically-extending threaded stud 38 on which a nut 39 is threaded, whereby to clamp the free end 40 of the battery ground cable 12 thereto. The base plate 18 for the bracket 19 is detachably secured atop the insulating slab 17 and to the bracket arm 16 in any suitable manner, such as by bolts 43 which are suitably insulated from both the base plate and the horizontal arm 16 in any suitable manner, as by the sleeves and/or washers 44 and 45. The free end of the horizontal arm 16 of the mounting bracket is provided with a threaded horizontally-extending stud 46 and nuts 47 for detachably securing the free end 48 of an auxiliary ground cable 49 thereto. The opposite end of the auxiliary cable 49 is detachably secured, as at 50, in any suitable manner to the frame 10 of the vehicle, whereby to ground the battery 11 when the switch according to the invention is closed.

The device according to the invention comprises a pair of stationary contacts, one of which may comprise a vertically-extending standard 51 which may be clamped to the free end of the horizontal arm 16 of the mounting bracket, as by the nuts 47. The upper end of the standard 51 is formed to provide a bight 52 which merges into a depending contact leaf 53. Such leaf 53 is preferably a spring leaf and the spring load thereof is preferably increased by interposing a coil spring 54 between the adjacent surfaces of the leaf 53 and standard 51. Suitable aligned pins may be formed on the adjacent surfaces of the standard and leaf to maintain the spring 54 in position thereon. The outer surface of the leaf 53 is preferably formed with a recess 55 therein which is adapted to receive the rounded free end 56 of the pivotal blade 24 of the switch. It follows from the foregoing that when the switch blade 24 is moved to the closed position, Figures 2 and 5, the spring-loaded leaf 53 of the stationary contact will load the switch arm 24 in a direction radially of the shaft 23, whereby the shaft is forced into intimate contact with the journals 21 and 22 of the legs 20 of the bracket 19. Thus, the spring leaf 53 and the spring 28 load the shaft 23 in both axial and radial directions into intimate contact with the journals. It follows, then, that irrespective of wear between the axle or shaft 23 and the journals 21 and 22, such wear will be taken up by the action of the springs 28 and 54, together with the spring leaf 53. In this way, not only is looseness in the shaft and journal prevented, but sparking is eliminated, and the constant pressure of the springs in directions at right angles to each other against the journal tends to make the journal connection self-cleaning, whereby each actuation of the shaft 23 will be operative to rub off any corrosion formed on the abutting surfaces of the shaft and the journals.

The bracket arm 16 also mounts a pair of opposed stationary contacts 60 which are each inwardly spaced from a pair of bracket ears 61 carried by the horizontal bracket arm 16. Springs 62 are interposed between the inner surfaces of the bracket ears 61 and the outer surfaces of the contacts 60, whereby to load the contacts 60 toward each other and insure an intimate engagement with the adjacent portions of the switch plate 24 as the same passes therebetween. The springs 62 may be supported in any suitable manner, as on stub pins which are fixed in axial alignment on the opposed outer and inner surfaces of the contacts 60 and ears 61, respectively. Such contacts 60 cooperate with the contact provided by the leaf spring 53 to insure a good contact when the switch is closed.

The clevis 63 and pivot 30, which connects the flexible cable 31 to the switch lever arm 29, is insulated from the free end of such lever arm by any suitable means, such as a flanged insulating sleeve 64 and an insulating washer 65, Figure 3.

In the operation of the device, when the driver or owner of the vehicle wishes to leave the same, and at the same time wishes to open all circuits in the vehicle, it is only necessary for him to push in on the operating handle or button 36, whereby motion is transmitted through the flexible shaft 31 to the lever arm 29. This motion is effective to give the shaft 23 a partial rotation in a clockwise direction, when viewed as in Figure 2, to raise the arm 24 out of contact with the stationary contacts 53 and 60, whereby to open all circuits in the vehicle. At the same time, the cross-piece 37 of the bracket 19 is effective to engage the upper surface of the switch blade 24 to limit movement thereof in an open direction. When the driver or owner of the vehicle wishes to use the same, he need only pull out on the handle or button 36, whereby the shaft 23 is rotated reversely to close the switch.

While we have shown and described what is now thought to be the preferred embodiment of the invention, it is to be understood that the same is susceptible of other forms and expressions. Consequently, we do not limit ourselves to the precise structure shown and described hereinabove except as hereinafter claimed.

We claim:

1. In combination with a pair of stationary side contacts and a stationary U-shaped spring leaf end contact provided with a curved recess in the free extremity thereof, a pivotal switch blade movable into and out of engagement with said stationary contacts, an arcuate extremity on said blade adapted to be seated in the recess in the end contact when the switch is in closed position, spring means carried by the end contact for exerting axial pressure against the switch blade, spring means carried by each of the side contacts for exerting opposed lateral pressure against the switch blade, spring means carried on the pivot of the switch blade for exerting radial pressure against said blade, and an arm for actuating said switch rigidly secured to the switch blade pivot and having a remote control connected therewith.

2. An electrical switch comprising a pair of opposed stationary side contacts, a stationary U-

shaped spring leaf end contact transversely disposed with respect to said side contacts, a free inner extremity on said end contact, an arcuate recess in the free extremity, a pivotal switch blade movable into and out of engagement with said stationary contacts, an arcuate extremity on the free end of said blade adapted to be seated in the recess in the end contact when the switch is in closed position, a coil spring positioned within the U of the end contact for exerting axial pressure against the switch blade, a coil spring mounted upon each of the side contacts for exerting opposed lateral pressure against the switch blade, a coil spring surrounding the pivot of the switch blade for exerting radial pressure against said blade, and an arm for operating said switch

rigidly secured to the switch blade pivot in angular relationship to the switch blade and having a remote control connected therewith.

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