June 9, 1942. J. B. WHITTED 2,285,479

ELECTRIC SWITCH

Original Filed March 6, 1936

Fig. 1.

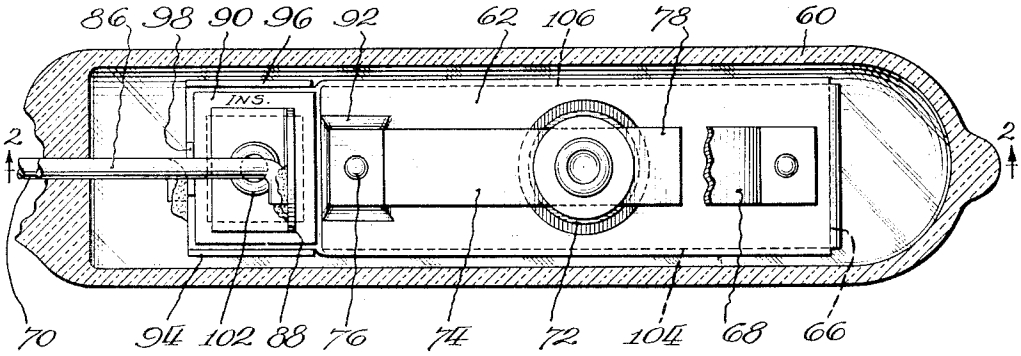


Fig. 2.

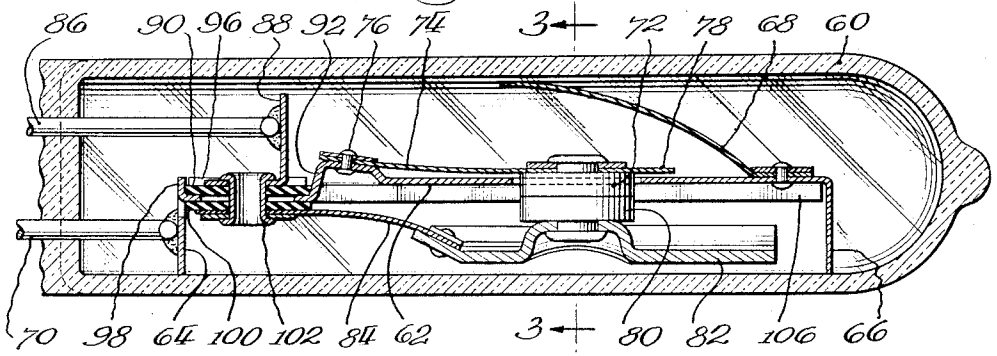
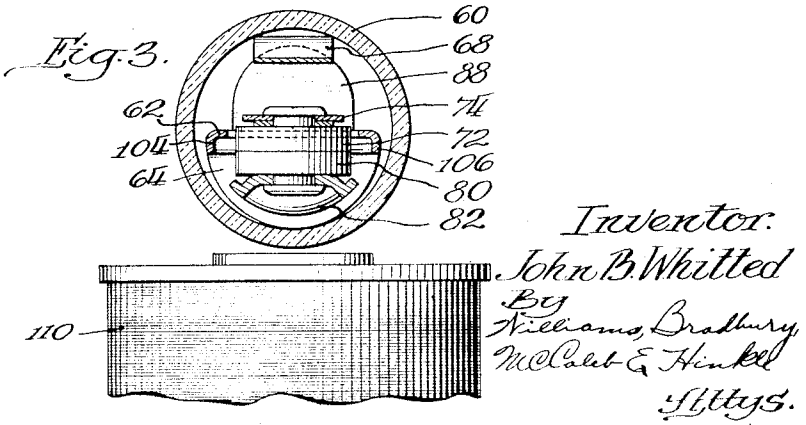


Fig. 3.



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ELECTRIC SWITCH

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Original application March 6, 1936, Serial No. 67,527, now Patent No. 2,169,827, dated August 15, 1939. Divided and this application October 8, 1938, Serial No. 233,903

3 Claims. (Cl. 200—87)

My invention pertains to electric switches and is more particularly concerned with switches especiailly adapted for use in connection with automobile fuel pumps like that disclosed in my parent application, Serial No. 67,527, filed March 6, 1936, now Patent No. 2,169,827, issued August 15, 1939, of which this application is a division.

An object of my invention is to provide a switch which will be more reliable than any heretofore known.

Another object is to provide a switch which may be quickly and economically manufactured.

Another object is to provide a magnetically operated switch in which the contacts will not burn or fuse and which can be operated with a minimum of magnetic force.

Another object is to provide a switch which will not be adversely affected by vibration.

Other objects and advantages will become apparent as the description proceeds.

In the drawing:

Figure 1 is a longitudinal section through a preferred embodiment of my invention;

Figure 2 is a longitudinal section taken on the line 2—2 of Figure 1; and

Figure 3 is a transverse section taken on the line 3—3 of Figure 2.

Referring to the drawing, I have shown therein a switch comprising a glass tube 60 containing a sheet metal frame 62 having downwardly turned legs 64 and 66 provided with rounded lower ends curved on a radius less than the radius of the tube 60 as most clearly shown in Figure 3. A spring 68 attached to the upper side of the frame 62 maintains the legs 64 and 66 pressed against one side of the tube 60.

An electrical conductor 70 extends through one end of the tube 60 and is attached to the leg 64. This conductor is in electrical communication with a contact 72 mounted on a spring 74 riveted or otherwise suitably attached to a raised portion of the frame as indicated at 76. The contact 72 lies in an opening in the frame 62 and is urged downwardly by the spring 74. The unattached end of the spring 74 is prolonged as indicated at 78 and contacts with the adjacent portion of the frame 62 when the contacts are separated to form a limit stop for the downward movement of the contact 72 under the influence of the spring 74.

A second contact 80 is secured to an armature 82 carried by a spring 84 which urges the contact 80 upwardly and into engagement with the contact 72. A second conductor 86 extends through one end of the tube 60 and is attached to a terminal 88. The terminal 88 is insulated from the frame 62 by an insulating sheet 90 which is confined between shoulder 92, upturned frame edges 94, 96, and upturned finger 98.

A second insulating sheet 100 is located between the underside of the frame 62 and the spring 84. The terminal 88, insulating pieces 90 and 100, and spring 84, are attached to the frame 62 by a hollow rivet 102 which passes through an enlarged opening in the frame 62 so that there is no contact between this rivet and the frame. This rivet establishes an electrical connection between the terminal 88 and spring 84 so that the conductor 86 is in electrical communication with the contact 80.

Figure 2 shows the position of the parts when the contacts 72 and 80 are engaged. It is to be noted that in this position of the parts the spring 74 of the upper contact (as viewed in Figure 2) has been flexed upwardly so that the free end 78 of this spring is spaced from the upper surface of the frame 62. When a magnetic influence is exerted on the armature 82 as, for example, by a magnet 110, to draw this armature and its associated contact 80 downwardly, the upper contact 72 also moves downwardly until the end 78 of its spring engages the upper surface of the frame 62, whereupon the downward movement of the contact 72 is suddenly arrested. By the time this occurs, the lower contact 80 and its relatively heavy armature 82 have acquired momentum, and this momentum, plus the pull of the magnet, are sufficient to separate the contacts, even though they have a tendency to stick together. This is an important feature of my improved switch.

I have also provided means to insure the creation of a good electrical connection between the contacts 72 and 80 immediately upon their initial engagement. This I accomplish by eliminating any mechanical bouncing of either or both of these contacts when they are first brought together. In carrying out this objective, I mount the upper contact 72 upon a spring 74 so that, as the contacts first engage, the upper contact 72 yields in the direction of movement of the contact 80.

In this connection it is to be noted that the mass of the upper contact 72 is much less than the mass of the lower contact 80 and its associated armature 82. I find that the combination of the yielding mounting of what would normally be a fixed contact, together with the superior mass of the movable contact, completely elimi-

nates bouncing of the contacts when they first engage.

I also find that the particular mounting of the contacts of my invention maintains the engaging surfaces clean. This is due to the fact that as the surfaces engage, one slides across the other and these surfaces are thus wiped clean.

The conductors 70 and 86 may enter the glass tube 60 at either end thereof, the important thing being to have the point at which the glass is sealed about these conductors remote from the springs 68, 74 and 84 so that the heat utilized in effecting this seal does not destroy the temper of these springs. The seal formed between the conductors 70 and 86 and the tube 60 determines the longitudinal position of the frame 62 in the tube 60. As a means of strengthening the frame 62, its edges may be turned downwardly as indicated at 104 and 106.

In the foregoing description the terms "upper," "lower," "upwardly" and "downwardly" have been used in describing the structure with reference to Figure 2. The mechanism shown therein need not be used in the position shown in this figure but can be located in any desirable position.

It will be seen that the parts of the switch mechanism are in the main simple sheet metal parts which can be stamped to the desired shapes and which can be very cheaply made and assembled in operative position. Furthermore, because of the arrangement of the parts, no undue accuracy in manufacture or assembly is required.

The interior of the glass bulb 60 may be either evacuated or filled with any suitable gas, such as hydrogen, nitrogen, neon, etc., which will prevent burning and corrosion of the contact points. I have found hydrogen to be particularly desirable as it maintains the contact points clean and also serves as a good conductor of heat.

The contacts 72 and 80 are normally maintained in engagement by their supporting springs 74 and 84. Separation of these contacts is effected by exerting a magnetic pull on the armature 82 as, for example, by the magnet which I have indicated diagrammatically at 110. This magnet may be either a permanent magnet or an electromagnet and may be controlled in any of various ways, all as more fully disclosed in my said parent application, Serial No. 67,527. Due to the fact that the contacts are maintained clean and that the tendency of these contacts to fuse is reduced to a minimum, a very small amount of magnetic force exerted on the armature 82 suffices to separate the contacts 72 and 80.

While I have illustrated and described only a single embodiment of my invention, it is to be understood that my invention may assume numerous forms and that the scope of my invention is to be limited solely by the following claims.

I claim:

1. In a switch of the class described, the combination of a bulb presenting a generally cylindrical inner surface, a frame extending lengthwise of said cylindrical surface, said frame having legs engaging said cylindrical surface, each leg having a bulb engaging surface formed on a radius smaller than the radius of said cylindrical surface, a spring for urging said legs into engagement with said bulb, contact means carried by said frame, and means for engaging and disengaging said contact means.

2. In a switch of the class described, the combination of a bulb having a generally cylindrical surface, a sheet metal frame extending longitudinally of said surface and having bent-over ends engaging said surface, said ends having bulb engaging surfaces formed on radii smaller than the radii of said cylindrical surface, a spring for holding said ends in engagement with said bulb, a pair of contacts, a mounting spring for each contact, said springs being supported by said frame, and means for separating said contacts.

3. In a switch of the class described, the combination of a frame having a pair of openings formed therein, a contact located in one of said openings, a sheet of insulating material on each side of said other opening, securing means for said insulating sheets extending through said last named opening, a second contact, a support for said second contact attached to said securing means, a conductor connected to said securing means on the opposite side of said frame from said support, said conductor being in communication with said second contact through said securing means, a second conductor connected to said frame, and an electrical connection between said frame and said first-named contact.

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