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2,601,142

ELECTRIC SWITCH

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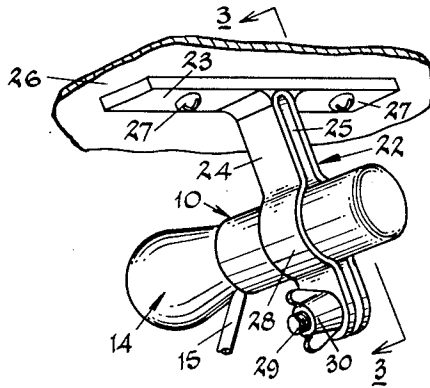


Fig. 2

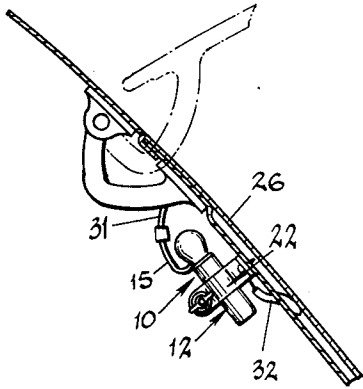


Fig. 1

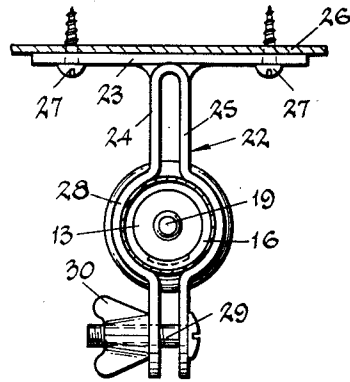


Fig. 3

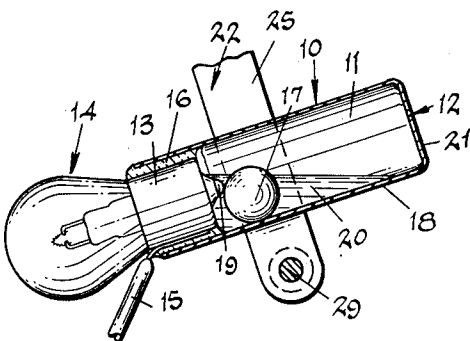


Fig. 5

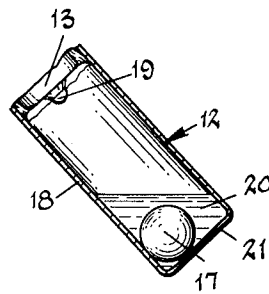


Fig. 4

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ELECTRIC SWITCH

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2 Claims. (Cl. 315—32)

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The present invention relates to electrical switches, and more particularly to a novel type of automatic, self-throwing switch which is operable upon tilting movement of the switch itself to make and/or break an electrical connection.

The switch of this invention can be readily adapted for a wide variety of uses in a great many fields. For example, I have found it to be particularly well suited for use as a light control means in rear luggage and glove compartments and under hoods, etc., of automobiles where it is desired to have the light turn on automatically whenever the compartment is opened and to have the light turn off when the compartment is closed.

Heretofore, a great deal of difficulty has been encountered with the switches used for this purpose, due to failure of the switches under the great number of repeated operations to which they are subjected during the life of the car; because of corrosion or oxidation of the contact points resulting from the presence of moisture and unquenched spark in the switch unit; and because replacement or repair of the prior used switches has been both difficult and expensive.

It is an aim of the present invention to provide a new type of tilt-operated switch for this purpose which will overcome all of the above objections, which is of relatively simple construction, and inexpensive to produce; which is remarkably long lived, and practically indestructible, and yet can be readily and easily replaced if necessary.

Another object is the provision of a switch unit of this general character which, when tilted at an angle to the horizontal in one direction, will close an electrical circuit and maintain it closed; and which, when tilted at an angle to the horizontal in another direction will break the circuit and maintain it open.

Another object is to provide such a switch unit that is made up of a housing having a conducting portion on or associated therewith, an electrical contact within the housing and insulated therefrom, and a movable conductor also within the housing and in continuous contact with the conducting portion associated therewith and movable into and out of engagement with the insulated contact upon tilting of the switch unit.

Another object is the provision in a switch unit of such character of a supply of liquid adapted to lubricate the movable contact and to dampen or restrict undesirable movement thereof.

Still another object is to provide a combination light and switch unit of this same general

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character, but in which a light bulb is mounted in the housing.

Other objects and advantages of the invention will become more apparent during the course of the following description, when taken in connection with the accompanying drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is a fragmentary section taken through the rear luggage compartment of an automobile, showing the lid of the compartment closed and the switch unit of the invention mounted on the inside thereof;

Fig. 2 is a perspective view on a larger scale of the switch and mounting shown in Fig. 1, but showing the position of the switch when the lid of the luggage compartment is raised to open position;

Fig. 3 is a section taken substantially on the line 3—3 in Fig. 2;

Fig. 4 is a fragmentary section taken through the switch when it is in the position shown in Fig. 1; and

Fig. 5 is a similar section taken through the switch when it is in the position shown in Fig. 2.

Referring now more particularly to the drawings, there has been illustrated therein a preferred form of combined light and switch unit which is designated in its entirety by the numeral 10.

As best shown in Fig. 5 the unit 10 comprises a cylindrical metal casing or housing 11 which is closed at one end as at 12, and open at the opposite end to receive the base 13 of an incandescent lamp 14. The base 13 carries a lead wire 15 in electrical contact therewith and is sealed into the casing or housing 11 by a suitable water vapor resisting cement or mastic 16 which also serves to insulate the wire 15 and base 13 from the casing.

Carried within the sealed housing 11 is a movable conductor, here shown in the form of a single ball 17 which is free to run back and forth on, and in contact with the conducting wall 18 of the housing upon tilting movement of the housing from one side to the other of the horizontal. The ball is of sufficient diameter to permit it to make an electrical connection between the conducting wall 11 and a contact 19 on the lamp base 13 when it rolls into the position illustrated in Fig. 5.

As pointed out above, in the past considerable difficulty has been experienced with tilt type switches because of the tendency of the contacts

and conductors to corrode and oxidize from exposure to moisture and from sparking when contacts were made. According to this invention such difficulties are overcome first by sealing the cylinder against the entrance of moisture and second by causing the ball conductor to run in a bath of lubricating fluid 20.

The sealing material 16 should be a moisture impermeable or a highly moisture resistant substance such as a substantially solvent free substance including a partially polymerized olefin sulphide resin and a thermosetting phenol formaldehyde resin mixed with a catalyst. Such a seal will not only prevent, or at least greatly retard, the ingress of water vapor, which would rust or corrode the conductor and contacts, into the cylinder, but will also seal the lubricating fluid therein.

As here shown the lubricating fluid 20 is in the form of an oil and I prefer to use silicone oil which flows freely at -70° F. and has a very high flash point. The presence of this oil in the tube serves a twofold purpose. In the first place it lubricates and prevents rusting of the ball 17, and in the second place it will act to quench the spark when the ball conductor 17 makes the connection between the conducting wall 18 of the cylinder and the contact 19. For this latter purpose it is important to have sufficient oil in the cylinder to cover the surfaces of the conductor 17 and the contact 19 when the switch is in the position illustrated in Fig. 5.

Still another function of the liquid 20 is to dampen or retard movement of the ball 17 when the switch is in the position shown in Fig. 4. This is important because when the switch is in this position it is undesirable to have the conductor thrown into engagement with the contact 19 by vibration or by bumping of the vehicle to which the switch is attached over rough roads and the like. Of course a similar result can be attained by using a cylinder 11 of sufficient length, but I prefer the damping action of the liquid which gives a positive control and permits the use of a much shorter cylinder.

Silicone oil is at present quite expensive and other oils, liquids or even gases having suitable lubricating qualities and relatively high flash points and low flow points, may be used to accomplish all or some of the same purposes as the silicone oil. Of the oils, circuit breaker oil can be satisfactorily used in temperate climates.

The fluid 20 of this invention can also be advantageously used in switches of different construction from the one illustrated here to lubricate and/or dampen unwanted movement of a movable conductor. For example, it will also prolong the life and increase the efficiency of mercury type switches, or switches equipped with a hinged or swinging conductor.

In producing the particular switch units here described, the closure plate 21 can be formed as part of the cylinder 11, or it can be soldered into place during assembly of the unit. The incandescent lamp can, of course, be removably mounted in the open end of the cylinder in the conventional manner, using a threaded lamp base and cylinder, or by bayonet slots and suitable lugs, if desired. With this arrangement, burned out bulbs could be readily replaced. However, my unit can be made so inexpensively that I prefer to cement the lamp into the switch cylinder to form a sealed, composite, integral unit.

A convenient way of mounting the switch unit of the invention on the lid of a rear luggage com-

partment of an automobile has been illustrated in Fig. 1. As here shown, a bracket 22 having a base plate 23 and a pair of mounting arms 24 and 25 is secured to the inside of the lid 26 with screws 27. The switch 10 is then mounted between outwardly curved portions 28 of the arms and clamped in place by means of a bolt 29 and wing nut 30. A hot wire 31 from the electrical circuit of the automobile is connected to the lead wire 15, and a ground wire 32 is connected to the bracket 22. The ground wire 32 can be omitted if desired because the metal bracket 22, clamped to the metal cylinder 11 of the switch and screwed to the metal lid 26 will provide a suitable ground.

With the switch 10 thus mounted on the automobile, and the lid 26 closed as shown in Fig. 1, the ball conductor 17 will be in the position shown in Fig. 4 and the lamp 14 will be out. However, when the lid of the luggage compartment is raised, as shown in Fig. 2, the switch will be in the position illustrated in Fig. 4, and the conducting ball 17 will roll along and in contact with the conducting wall 18 of the cylinder 11 into the position shown in Fig. 5, where it will complete the circuit between the cylinder 11, conductor 17 and contact 19 to light the lamp.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same, but that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. An expendable switch unit comprising a metal cylinder, a plate permanently closing one end of said cylinder, an incandescent lamp having a base extending into and substantially closing the opposite end of the cylinder and a contact on said base, a substantially solvent-free sealing material comprising a partially polymerized olefin sulphide resin and a thermosetting phenol formaldehyde resin mixed with a catalyst in the space between said base and said cylinder impermeably sealing the interior of the cylinder cementing said cylinder and said lamp together into an integral unitary structure and insulating said base from said cylinder, a single metal ball within said cylinder free to move in continuous contact with the wall thereof, and a supply of high flash point low flow point lubricating oil also within said cylinder in sufficient volume to cover the points of contact of said ball with said wall and said contact on the base of said lamp but freely movable with the ball.

2. An expendable switch unit comprising a metal cylinder, a plate permanently closing one end of said cylinder, an incandescent lamp having a base extending into and substantially closing the opposite end of the cylinder and a contact on said base, a substantially solvent-free sealing material comprising a partially polymerized olefin sulphide resin and a thermosetting phenol formaldehyde resin mixed with a catalyst in the space between said base and said cylinder impermeably sealing the interior of the cylinder cementing said cylinder and said lamp together into an integral unitary structure and insulating said base from said cylinder, a single metal ball within said cylinder free to move in continuous contact with the wall thereof, and a supply of a high flash point silicone oil free flowing at -70° F. also within said cylinder in sufficient volume to cover the points of contact of said ball with said

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wall and said contact on the base of said lamp
but freely movable with the ball.

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