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R. B. WESTON ET AL

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HIGH VOLTAGE VISIBLE OIL SWITCH

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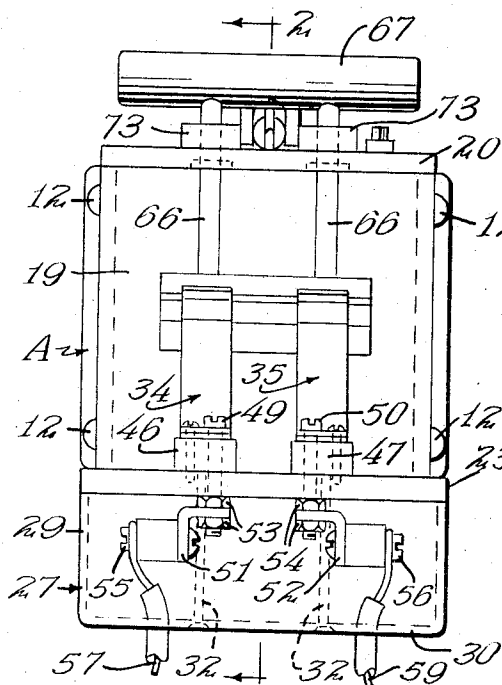


FIG. 1

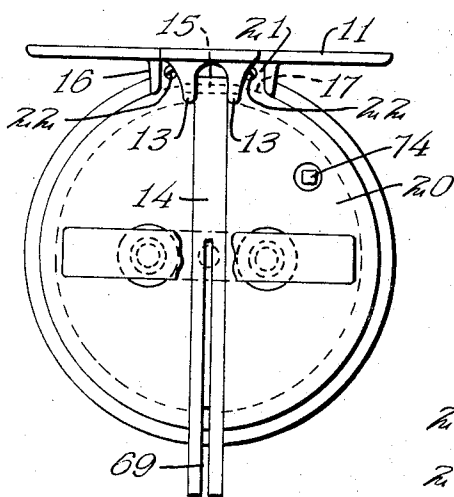


FIG. 4

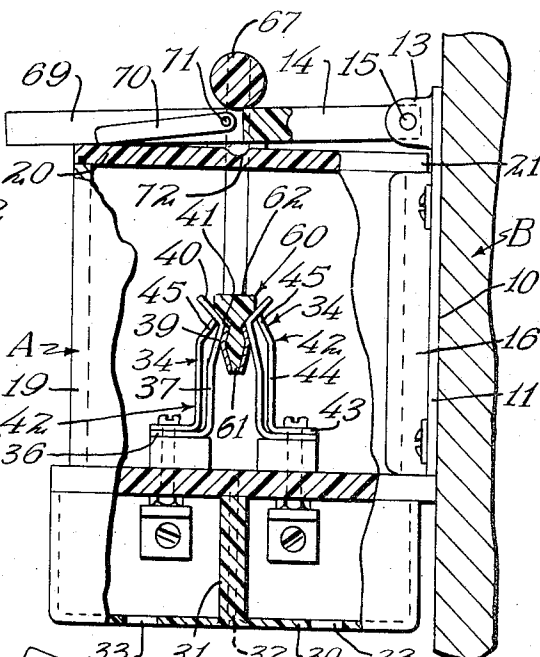


FIG. 2

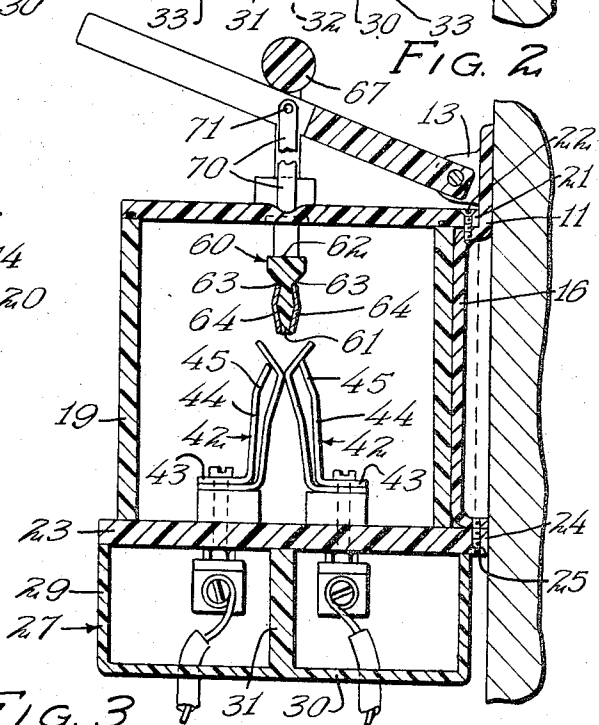


FIG. 3

INVENTOR

RALPH B. WESTON
ALBERT E. COLATO

BY

Robert Dunning

ATTORNEY

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HIGH VOLTAGE VISIBLE OIL SWITCH

Ralph B. Weston, Culver City, and Albert E. Colato, Tujunga, Calif., assignors to Plastics, Inc., a corporation of Minnesota

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ABSTRACT OF THE DISCLOSURE

A high voltage visible oil switch device comprising a sealed housing having peripheral transparent side walls, a pair of stationary contact blades, a body of oil within the housing to a point above the level of said contact blades, a circuit breaker with blade supports, a handle connecting the upper ends of said blade supports, and a lever extending beneath said handle between said blade supports by means of which said handle may be raised.

This invention relates to an improvement in high voltage visible oil switch and deals particularly with a switch which may be operated with a minimum of arcing.

Street lighting systems are usually operated by high voltage, low amperage circuits. Usually a single circuit may be provided for a considerable number of street lights so that the entire series of lights may be turned on and off simultaneously. Circuits of this type often include safety switches which are operated only in an emergency or when it is the desire to isolate a certain portion of the circuit. As a result, such switches are seldom used and tend to deteriorate through lack of use. Furthermore, switches of this type are seldom inspected because of a difficulty involved in making the inspection. Failure of the switch to function properly may be extremely dangerous, particularly where the switch is designed for use in a shorting circuit or a grounding circuit.

An object of the present invention resides in the provision of a switch which is enclosed in a transparent plastic housing so that all of the operating elements of the switch are visible. As a result, the switch may be inspected without danger to the inspector and without exposing the operating elements of the switch by opening the housing.

A feature of the present invention lies in the provision of a switch in which the contacts are emersed in transformer oil, the oil acting to quench any arcing between the blades as the switch is operated. The oil employed is sufficiently transparent so that the contact blades may be viewed through the transparent housing encircling the switch.

A further feature of the present invention resides in the provision of a switch of the type described which is impervious to the vagaries of weather conditions and corrosion. As the switch contacts are emersed in the transformer oil, a minimum of arcing take place when the switch is operated. As a result, the switch may outlast most switches used for similar purposes.

A further feature of the present invention resides in the provision of a switch of the type described including a means of automatically locking the switch in closed position. When the switch is closed, locking means is provided to prevent the switch contacts from being spread apart by the switch opening wedge.

A further feature of the present invention resides in the provision of a switch of the type described in which a pair of contacts resiliently urged into contact to close the circuit. The contacts are provided with diverging end portions. An insulating wedge is supported for reciprocating movement toward and away from the contacts, and in one extreme position engages between the contact ledge to hold them in spaced relation. The wedge is properly

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designed to hold the wedge frictionally engaged between the contacts so that it cannot accidentally move from between the contacts to accidentally close the circuit.

An added feature of the present invention resides in the provision of a switch of the type described which can be produced at a relatively low cost of production.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims:

In the drawings forming a part of the specification; FIGURE 1 is an elevational view of the switch showing the construction thereof.

FIGURE 2 is a side elevational view of the switch shown in FIGURE 1, a part of the switch being broken away on the section line 2-2 of FIGURE 1.

FIGURE 3 is a vertical sectional view through the switch, showing the switch in closed position, the position of the section being indicated by the line 2-2 of FIGURE 1.

FIGURE 4 is a top plan view of the switch.

The switch, which is indicated in general by the letter A, is mounted on a support usually having a vertical surface 10 and indicated in general by the letter B. The body of the switch supported by a generally rectangular mounting plate 11, the corners of which are suitably apertured to accommodate mounting screws or mounting bolts 12. Adjoining the top of the plate 11 and on opposite sides of the center line of, a pair of generally parallel ears 13 project. An operating lever 14 which will be later described in detail is pivotally connected between the ears by the pivot 15. Below the ears 13, the center portion is bulged forwardly as indicated at 16, the forward surface of the forwardly extending portion 16 having a concave inner surface 17 to form a cradle and to fit the contour of the cylindrical wall 19 of the switch body.

The top of the cylindrical wall 19 is closed by means of a closure plate 20 which is sealed against the upper planar surface of the cylindrical wall 19. A rearward projection 21 is provided extending radially from the top plate 20 and anchoring screws 22 extend through this projecting portion 21 of the top cover plate 20 and into the upper end of the forwardly bulged portion 16 of the mounting plate 11 as may perhaps be best seen in FIGURE 3 of the drawings.

The lower end of the cylindrical sleeve 19 is closed by a bottom closure plate 23 which is of somewhat larger diameter than the sleeve 19 and is concentric therewith. The lower edge of the sleeve 19 is sealed to the upper surface of the bottom closure plate 23. The bottom closure plate 23 also includes a rearwardly extending projection 24 which extends beneath the forwardly bulged portion 16 of the mounting plate 11. Screws or similar means 25 extend upwardly through the projection 24 and into the lower end of the bulged portion 16 of the plate 10 as is also perhaps best illustrated in FIGURE 3 of the drawings.

The switch A also includes a lower housing which is indicated in general by the numeral 27. The lower housing 27 includes a cylindrical wall 29, the outside diameter of which is substantially equal to the outside diameter of the bottom closure plate 23. The bottom also includes a bottom wall 30 forming a bottom closure for this bottom housing. The lower housing 27 is divided into two separate compartments by a diametrically extending partition wall 31. The lower housing 27 is removable from the rest of the switch body and is normally secured thereto by bolts or screws 32 which extend upwardly through the partition 31 and into the bottom closure plate 23 to hold the parts assembled. The bottom wall 30 is provided with a pair of spaced apertures 33, one of which communicates with each of the two compartments. As is indicated in FIGURES

1 and 3 of the drawings, the purpose of these apertures is to accommodate conducting wires.

Two pairs of contacts 34 are mounted within the cylindrical wall 19. Each pair of contacts is formed as is best illustrated in FIGURES 2 and 3 of the drawings. Each contact includes a horizontally extending lower end portion 36, an upwardly extending portion 37 extending upwardly from an edge thereof, an inwardly inclined portion 39, and an outwardly inclined portion 40 at the upper edge thereof. There is a rounded portion 41 between the inclined portions 39 and 40 which swing into contact with the opposed contact member as is indicated in FIGURE 3 of the drawings when the contacts of each pair are not held apart. To add strength to each contact, an outer reinforcing blade 42 forms a part of each contact member 34. Each reinforcing blade includes a horizontal portion 43 which overlies the horizontal portion 36 of the previously described blade, an upwardly extending portion 44 connected to an edge thereof and extending upwardly generally parallel to the blade portions 37, and an inwardly inclined arm 45 at the upper end of the portion 44 which engages against the outwardly inclined portion 40 of the inner blade to add strength thereto and to urge the inner contact blade into contacting relation.

The contacts of each pair are mounted upon rectangular insulation blocks 46 and 47. Conductive screws 49 and 50 extend through the horizontal portions 36, 42 of the contacts 34 and the similar portions of the contacts 35 and also extend through the bottom closure plate 23. One screw 49 and 50 of each pair extends into the chamber on one side of the center partition 32, and the other bolt of each pair extends into the other chamber. Angle brackets 51 and 52 are secured to the bolts 49 and 50 by suitable nuts 53 and 54. The vertical portions of the angle brackets 51 and 52 are provided with anchoring bolts 55 and 56 to which insulated conductors such as 57 and 59 may be detachably secured.

As will be obvious, the wiring of the switch may be varied to suit the type of circuit employed.

An elongated wedge-shaped circuit breaker 60 is provided to break the circuit between the contacts of each pair, and this member may also serve to simultaneously make contact between one contact member of each pair and a corresponding contact member of the other pair. The member 60 is relatively narrow at its lower end 61 and relatively wider at its upper end 62. The member 60 also includes opposed notches 63 in its opposite sides, the walls of the notches 63 generally to the shape of the upper portions of the contact blades when the wedge is between the blades, as indicated in FIGURE 2 of the drawings. Normally, the member 60 is made of insulation material, but opposite sides of the wedge may bear strips 64 of conductive material which may serve to electrically connect one contact of each pair with a corresponding contact of the other pair when the wedge is between the contact blades as shown in FIGURE 2.

The contact flexing wedge 60 is supported by a pair of parallel rods 66 which extend vertically from the upper surface 62 of the member 60 and extend through the upper closure plate 20. The upper ends of the parallel rods 66 extend into a transversely extending handle 67 which serves as a connection between the rods. The handle 67 extends above the operating lever 14 which is pivoted to the mounting plate ears 13. Thus, upward movement of the handle lever 14 will raise the wedge 60 from the position shown in FIGURE 2 of the drawings to the position shown in FIGURE 3. The handle lever 14 is vertically slotted as indicated at 69 to provide a forward bifurcated end. If desired, this slot 69 may extend only through the center portion of the handle, leaving the forward end thereof solid. A locking arm 70 is provided in the slot 69 and is pivotally connected to the handle by a transverse pivot 71. The pivot 71 is preferably located generally above the center of the top closure plate

20. The center of the top closure plate 20 is provided with an indentation 72 into which the free end of the lever 70 may extend. Accordingly, when the handle lever 14 is swung upwardly, the free end of the lever 70 slides toward the center of the top closure plate 20 until it is engaged in the indentation 72. When in this position, the lever 14 is locked in the position shown in FIGURE 3, and the handle 67 may not be lowered until the locking lever is disengaged.

Sealing collars 73 preferably encircle the rod 66 above the top closure plate 20 to prevent the entrance of moisture into the sleeve 19. A removable filling plug 74 is provided in the top closure plate 20 (see FIGURE 4) by means of which the oil in the switch housing may be replenished.

The oil level is usually maintained well above the surface of the contacts to prevent corrosion and to reduce arcing. The wedge 60 is normally raised from a position between the contacts to the position shown in FIGURE 3 by means of the lever 14. When desired, the wedge 60 may be returned to its lowered position by a downward force on the handle 67.

In accordance with the patent statutes, the principles of construction and operation of this improvement in high voltage visible oil switch have been described, and while an endeavor has been made to set forth the best embodiment thereof, it should be understood that changes may be made within the scope of the following claims without departing from the spirit of the invention.

We claim:

1. A switch comprising:
 - a sealed switch housing including a bottom closure plate, a top closure, and peripheral transparent side walls connecting said top and bottom closures and sealed relative thereto,
 - insulation block means overlying said bottom closure, a pair of spring contact blades having angularly turned lower ends mounted on said insulation blocks and normally biased into contact,
 - clamping bolts extending through the angularly turned lower ends of said blades, through said insulation block means and through said bottom closure plate, means on said clamping bolts to clamp them in position and providing a liquid tight seal with said bottom closure plate,
 - a body of oil within said housing the liquid level of which is above said contact blades,
 - a circuit breaker,
 - means on said top closure supporting said circuit breaker for movement from a position between said blades to a position above said blades,
 - a terminal housing extending downwardly from said bottom closure into which said clamping bolts extend, and
 - a central partition of insulating material within said terminal housing between the lower ends of said clamping bolts providing a pair of side-by-side terminal housing chambers.
2. The structure of claim 1 and in which said supporting means is slidably supported by said top closure, and in which said top closure includes bearing means snugly accommodating said supporting means in both positions thereof.
3. A switch comprising:
 - a sealed switch housing including a top closure, a bottom closure, and peripheral transparent walls connecting said closure,
 - a pair of resilient contact blades including horizontal lower end portions, upwardly and inwardly inclined intermediate portions, and upwardly and outwardly inclined upper end portions arranged in opposed relation and normally in contact at the juncture between the intermediate portions and the upper end portions, electrically conductive blade securing means extending

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through said horizontal blade portions and said bottom closure,
 a circuit breaker blade,
 a pair of parallel breaker blade supports secured to said circuit breaker blade and extending through, and slideably supported by said top closure,
 said blade supports supporting said breaker blade for movement from a position between said blades to a position above said blades, and
 a handle connecting the upper ends of said blade supports.

4. The structure of claim 3 and including a lever pivotally supported on a horizontal pivot above said top closure and extending beneath said handle between said blade supports by means of which said handle may be raised.

5. The structure of claim 4 and including a locking arm pivotally connected to said lever on a horizontal axis and engageable with said top closure when said lever is swung upwardly to lock said lever from downward movement.

6. A switch including:
 a switch housing including a top closure and a bottom closure, and a peripheral wall connecting said closures,
 two pairs of contact blades mounted on said bottom closure and extending upwardly therefrom,
 the blades of each pair being in opposed relation and normally biased into contacting engagement, and the blades of one pair being aligned with the blades of the other pair,
 the blades of each pair having upwardly and outwardly diverging upper ends,
 a contact breaker bar,
 a pair of parallel supports extending through said top

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closure and supporting said breaker bar for movement from a position between the blades of each pair to a position above said blades,
 said housing having a relatively electrically non-conductive fluid therein to a level above said blades, and
 a handle connecting the upper ends of said parallel supports by means of which said breaker bar may be actuated between said positions.

7. The structure of claim 6 and in which said breaker bar is transversely notched on opposite sides thereof, the notches accommodating the portions of the contact blades which contact one another when the breaker bar is in position above the blades.

8. The structure of claim 6 and in which said peripheral walls are transparent.

9. The structure of claim 6 and including a terminal chamber beneath said switch chamber and supported thereby, said terminal chamber being sealed relative to the interior of the said switch housing, and terminals in said terminal chamber each connected to a corresponding said blade.

10. The structure of claim 9 and including an insulation wall in said terminal chamber dividing one terminal of each pair from the other terminal thereof.

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ROBERT K. SCHAEFER, *Primary Examiner.*H. BURKS, *Assistant Examiner.*