Aug. 2, 1960 R. PELLETIER 2,947,826

ELECTRICAL SWITCH

Filed Sept. 11, 1959

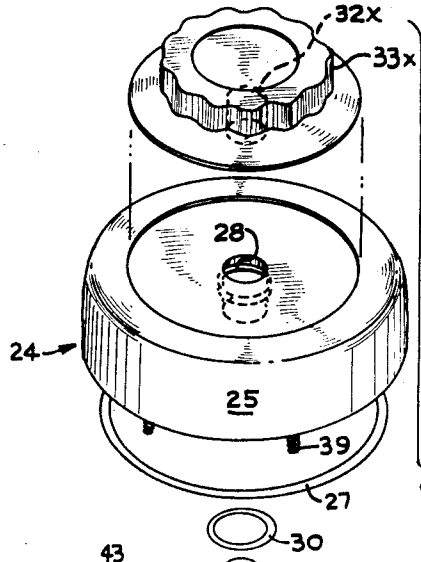


Fig. 1

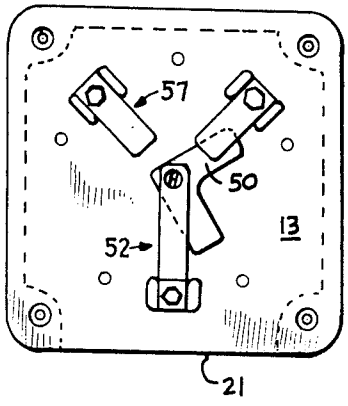


Fig. 2

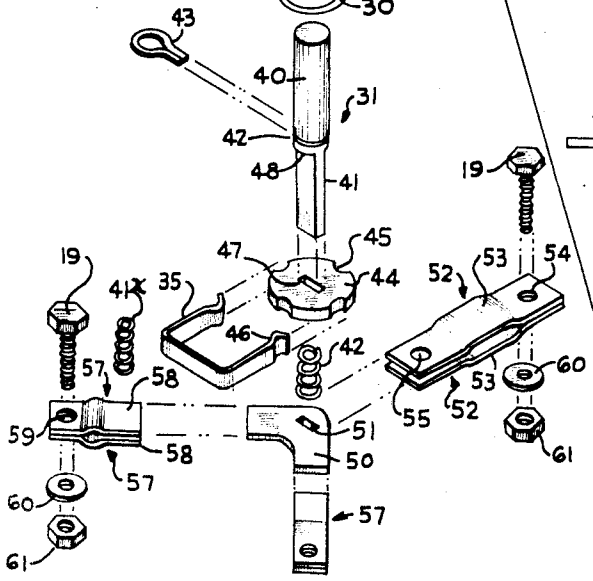


Fig. 3

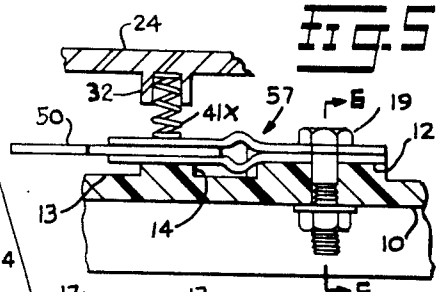


Fig. 5

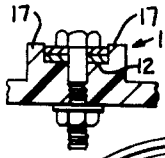


Fig. 6

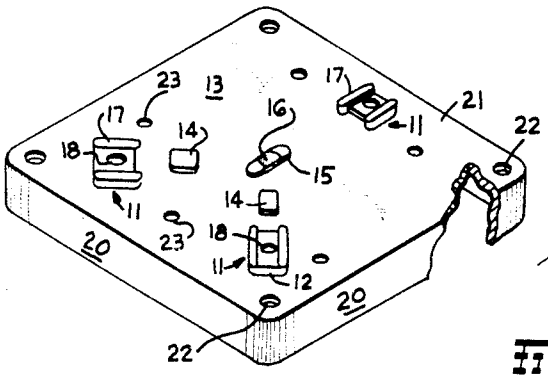
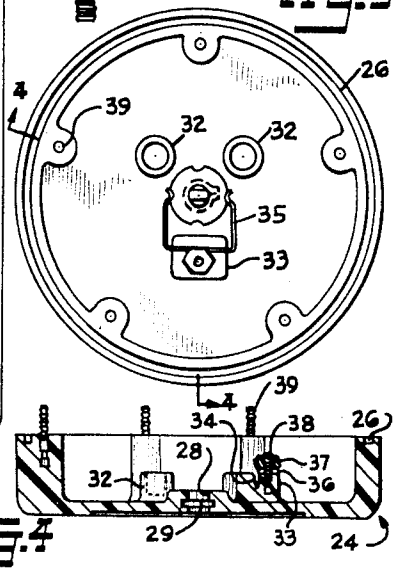


Fig. 4



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ELECTRICAL SWITCH

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5 Claims. (Cl. 200—15)

This invention relates to an electrical switch and more particularly to vapor tight switches such as are used on boats for connecting to one or two batteries for example, for starting a boat motor.

It is an object of this invention to provide a vapor tight switch.

It is another object to provide a rigidly constructed switch having large areas of contact.

It is a further object to provide an electrical switch adapted for marine use having large areas of positive contact.

These and other objects of this invention will become apparent upon reading the following descriptive disclosure taken in conjunction with the accompanying drawing in which:

Fig. 1 is an exploded view of the switch,

Fig. 2 is a top plan view of the switch block showing the manner of contacting respective terminals,

Fig. 3 is an interior view of the switch cap,

Fig. 4 is a modified view taken on line 4—4 of Fig. 3,

Fig. 5 is a section view of a switch blade disposed between parallel contact plates, and

Fig. 6 is a section view taken on line 6—6 of Fig. 5.

Turning to the drawing, a molded square switch block 10 made from suitable plastic of high impact strength is provided with a plurality of three integral cradles 11, each having a platform 12 of suitable predetermined height above the top plane wall 13 of block 10.

Two of the cradles are inlet or battery cradles and are oppositely disposed on respective diagonal lines of the block 10 and the third cradle or outlet cradle is disposed perpendicularly to an edge of the block so that the three cradles are disposed in a Y-configuration. The inlet cradles are hooked respectively to a battery terminal and the outlet cradle is hooked for example, to the starter switch of the boat motor.

An integral platform pad 14 of suitable predetermined height above the plane surface of top wall 13 is suitably located on the respective diagonal line interiorly of each battery cradle 11. The height of the pads 14 is for example, one sixteenth inch lower than the height of the outlet cradle platform 12 (Fig. 5).

An integral central pad 15 of a height equal to that of pads 14 is provided with a well cavity 16 to receive a spindle. Thus the planar surfaces of pads 14 and 15 lie in the same horizontal plane.

As shown in the drawing each of the cradles 11 is provided with a pair of suitably raised parallel integral shoulders 17 so as to form a trough for receiving electrical contact elements to be described. The cradles 11 are each further provided with suitable apertures 18 through which bolts 19 are respectively passed.

The block 10 is provided with depending continuous wall 20 on three sides leaving one of the edges 21 of the block free for insertion of electrical wires to engage the bottom of bolts 19.

The block 10 is additionally provided with a plurality of corner apertures 22 for securing it to a flat insulated

surface and is also provided with a plurality of suitably small circularly disposed holes 23 for securing a cap element 24 thereto.

The cap 24 is made of suitable plastic and is provided with a flat top wall integral with a continuous depending skirt 25 in the edge of which is a suitable groove 26 for receiving a suitable O-ring 27.

The cap 24 is further provided with a centrally disposed aperture 28 in which a suitable groove 29 is milled to receive a suitably small O-ring 30.

A suitably long spindle 31 is passed through O-ring 30 disposed in the wall of aperture 28 in a vapor tight manner and thence into a suitable cavity 32X of an integral plastic serrated turning knob 33X and secured therein by at least two set screws (not shown).

The cap 24 is provided with a pair of suitably disposed spring receiving cavity containing studs 32 and a suitably rectangular split stud 33 having a suitable groove 34 to receive a U-shaped detent spring 35.

The detent spring 35 is locked in place by a washer 36 and nut 37 disposed on a suitable molded in place threaded insert 38.

The cap skirt 25 is provided with a plurality of suitably disposed threaded inserts 39 which are passed through apertures 23 in block 10 and then secured thereto by conventional nuts.

As shown in Fig. 1, the spindle 31 is provided with a top round portion 40 integral with a bottom portion 41 of rectangular cross-section. A suitable circular groove 42 is cut into the round portion and a flat generally U-shaped lock pin 43 is disposed in the groove 42.

A detent plate 44 is provided with suitable notches 45 disposed 90 degrees apart. The legs of the U-shaped detent spring 35 are each provided with a V-shaped portion 46 which engage a pair of opposed notches 45 to lock the spindle in place. The plate 44 is provided with a rectangular aperture 47 and the rectangular portion 41 of spindle 31 is keyed in the slot. The plate 44 is inserted on the spindle 31 until it engages the shoulder 48 formed by the round spindle portion 40.

A suitable coil spring 41X is disposed in each cavity stud 32 and a suitably larger coil spring is disposed around the spindle portion 41 beneath the detent plate 44.

An important feature of this invention is the provision of electrical contact elements of large area and flat surfaces for the transmission of a large amount of amperes of current.

A generally V-shaped copper switch blade 50 is provided with a suitably disposed rectangular slot 51. A pair of copper plates 52 each having a suitably raised front and a raised bridge section 53 are disposed in opposed relationship with respect to the bridge sections 53. The plates 52 are each provided with a suitable aperture 54 for receiving the securing bolts 19 in the outlet cradle 11 and also with a suitable aperture to receive the portion 41 of spindle 31. The V-shaped plate 50 is disposed between the suitably raised or spaced-apart front portion of the parallel plates 52 disposed in the outlet cradle so that its rectangular slot 51 is in linear relationship to the apertures 55 of the respective plates 52.

Each battery cradle 11 is provided with a pair of suitable flat copper plates 57 each having a front raised portion 58. Each plate 57 is provided in its rear portion with an aperture 59 through which a bolt 19 is passed and then bolt 19 is passed through respective aperture 18 of a battery cradle 11. The raised portion 58 of a plate 57 is such that when two plates 57 are disposed in opposed relationship and locked in a cradle by a bolt 19, the distance between the portions 58 is such as to receive a blade element of the switch blade in full planar contact at both the top and the bottom surface of blade 50.

In other words, the engagement of switch blade 50 on rotation in between a pair of opposed flat portions 58 of stationary blade 57 locked in respective battery cradles 11 is a planar engagement on both sides of the blade 50 with the respective opposed blades 57.

In assembling the switch, cap 24 is turned upside down with the O-ring 30 of neoprene disposed in the groove in aperture 28. Then the spindle 31 lockingly disposed in the knob 33 is disposed in the aperture 28 so that the O-ring engages the round spindle portion 40 in a vapor tight manner. The flat lock pin 43 is now seated in its circular groove 42 and being of a diameter larger than that of the round spindle portion 40 it extends beyond the spindle wall locking spindle 31 in place and thereby preventing its being pulled out of the plastic cap 24. Next the index or detent plate 44 is inserted on the spindle 31 and index or detent spring 35 locked in place by bolt 37 preferably with a co-acting washer 36. Then springs 41 are inserted in the well studs 32 and spring 42 is disposed on spindle 31. Lastly O-ring 27 of neoprene is inserted in its groove 26 and the cap 24 is assembled for connecting it to the base 10.

The base 10 is next assembled by placing a pair of copper contact shoes or plates 57 in each of the two battery cradles 11 so that the raised portions 58 of the plates are in opposed relationship thereby giving a space between the front portions 58 just sufficient to receive switch blade 50 with full top and full bottom contact with the respective portions 58. The bottom surface of each botton plate front portion 58 rests on a respective platform 14. Next the respective pairs of plates 57 are secured in their respective cradles by bolts 19.

The copper contact shoes or plates 52 are disposed in opposed relationship in the outlet cradle 11 so that the front portions of the plates 52 are spaced apart to receive blade 50. Next the plates 52 are secured by a bolt 19 within a cradle 11, said bolt 19 passing through a cradle aperture 18 and secured to the underside of block 10 by washer 60 and nut 61. The switch blade 50 is next inserted between the opposed plates 52 so that its rectangular slot 47 is within the apertures 55 of the plates 52.

Now the assembled block 10 with its fixed flat opposed contacts and frictionally held blade 50 is turned over upon the assembled cap 24 so that bolts 39 pass through their respective apertures 23. Lastly nuts are threaded onto the bolts 39 so that O-ring 27 engages the flat top wall 13 of block 10 in a vapor-tight manner.

In connecting the assembled switch to batteries and a starter of a motor, the battery lead wire of each of two batteries is connected to a respective bolt 19 of a battery cradle 11. The wire to the starter of the motor is connected to the outlet cradle 11 of the switch.

The raised center portion 53 of the plates 52 permit passage of the blade arms of the switch blade 50 without frictional contact, as frictional contact of said blade arms with the outlet plates 52 serves no useful purpose.

The springs 41 co-acting with platforms 14 press upon the surface of the respective elements 57 to effect a good planar surface to surface electrical contact with blade 50 on both of its sides.

Also spring 42 pressing on the top plate 52 and thence on the switch plate 50 and thence on the bottom plate 52 and coacting with the platform 15 upon which the bottom plate 52 rests, effects an excellent planar surface to surface contact of the respective plates 52 to the two sides of the rotatable switch plate 50.

Detent spring 35 is so adapted as to lock the switch blade 50 in its engaged or electrical contacting positions.

This invention has been described by means of an illustrative embodiment but it is not limited to this embodiment.

I claim:

1. A vapor tight electrical switch comprising an electrically insulating flat plastic base, a plurality of three

cradle means integral in said base each adapted for holding a pair of metal contact plates, an integral center platform of predetermined height in the center of said base having a cavity therein, a circular plastic cap having a depending skirt around its periphery, said skirt having a suitable groove in its edge, said cap having a central round aperture having a circular groove in the aperture wall, a suitable plastic O-ring disposed in said aperture groove, a suitable O-ring disposed in the groove of said skirt, a plurality of threaded inserts molded into the edge of said skirt, said inserts being passed through co-acting apertures in said base to secure said cap to said base in a vapor tight manner, a rotatable spindle disposed through said cap aperture in a vapor tight manner and extending into the cavity of said center platform of said base, knob means secured fixedly to said spindle protruding above said cap, a pair of metal outlet relatively long contact plates having suitably spaced-apart front portions each having a round aperture therein disposed fixedly in one of said cradles, a rotatable flat dual arm switch plate having a suitable rectangular key slot therein disposed between said spaced-apart outlet contact plates, a pair of relatively short inlet contact plates having suitable spaced-apart front portions disposed in the remaining two cradles, a spindle having a round top portion and a rectangular bottom portion extending through said round apertures of said outlet contact plates and in said key slot of said rotatable blade whereby rotation of said knob selectively rotates said switch blade between said spaced-apart inlet contact plates to effect a large contact area on each side of the arms of said rotatable plate.

2. The switch of claim 1 comprising a cap having an interior suitably disposed stud having a channel therein, a threaded insert in said stud adjacent said channel, a generally U-shaped detent spring having a straight base integral with a pair of legs having notches on their respective ends, the base of said detent spring being disposed in said channel of said stud, threaded means disposed on said threaded insert for locking the detent spring in place, and a substantially round detent plate having a rectangular slot in its center and a plurality of suitable opposed notches in its periphery for receiving the pair of notches on the legs of said detent spring, said bottom of said spindle being keyed in said slot of said detent plate whereby rotation of said spindle is selectively arrested at pre-determined locations of contact of said rotatable switch blade and said inlet contact plates in the inlet cradles.

3. The switch of claim 2 wherein the interior of said cap is provided with suitably spaced-apart studs each having a round cavity therein, a suitable coil spring disposed in the cavity of each of said studs and adapted to bear onto the top surface of each pair of said inlet contact plates to effect a pressure contact of said plates to said rotatable blade.

4. The switch of claim 3 comprising a suitable coil spring disposed around the bottom portion of said spindle and bearing against the detent plate and the top surface of said outlet contact plates whereby continuous pressure contact of said outlet plates to said rotatable switch plate is effected.

5. The switch of claim 4 wherein the top surface of said plastic base is provided with an integral pad in front of each inlet cradle, each pad having a flat top wall of predetermined height above said base, the tops of said center platform and said pads being in a first horizontal plane and the platforms of said cradles being in a second horizontal plane, said respective coil springs in said studs of said cap being disposed over said respective pads whereby said coil springs in said studs exert their respective pressure on said spaced-apart inlet contact plates.

No references cited.