V. DURBIN.

WATER TIGHT ATTACHMENT PLUG AND RECEPTACLE.

APPLICATION FILED OCT. 2, 1913.

1,117,647. **Patented Nov. 17, 1914.**

2 SHEETS—SHEET 1.

Fig. 1.

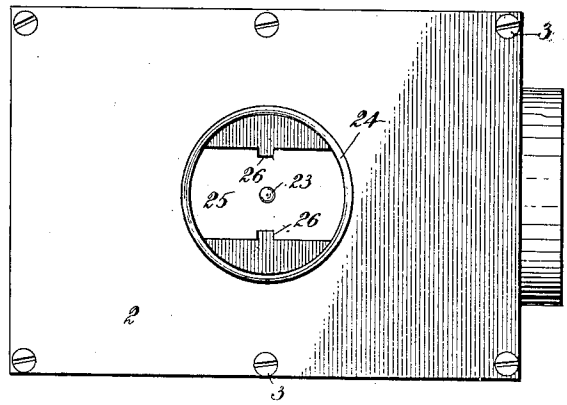


Fig. 2.

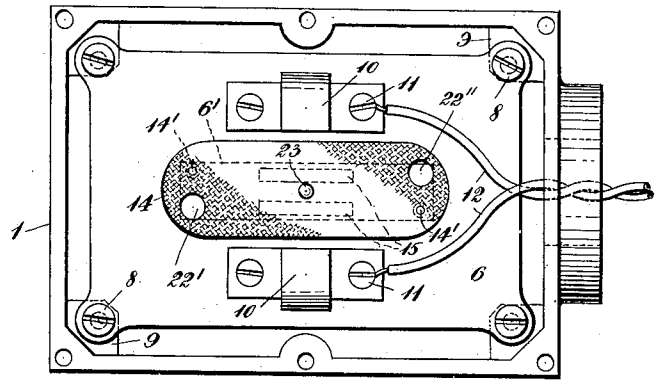


Fig. 3.

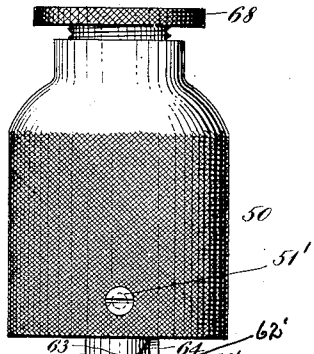
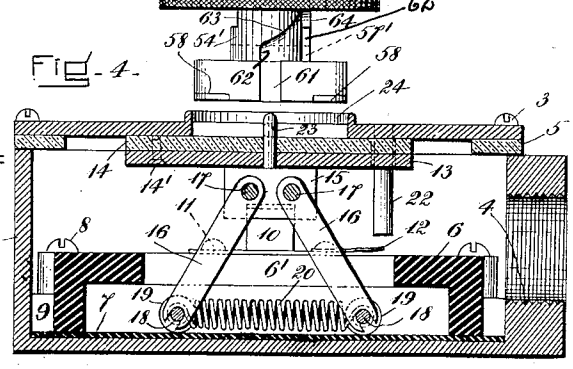


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

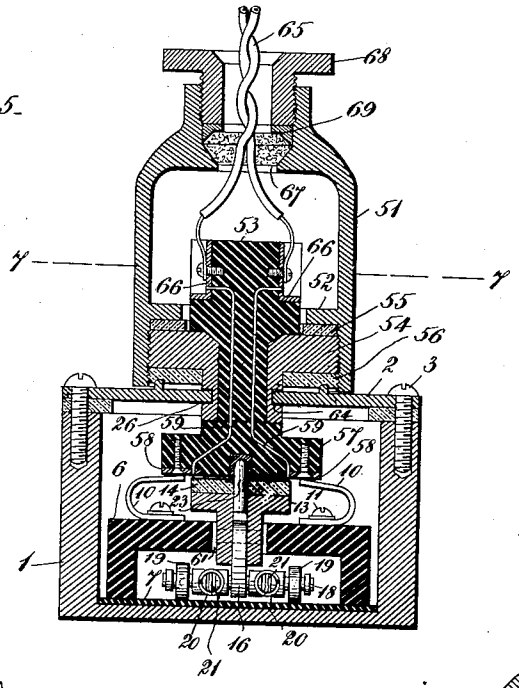


Fig. 6.

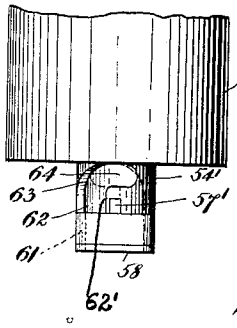
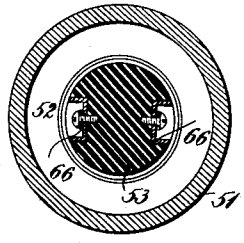


Fig. 7.



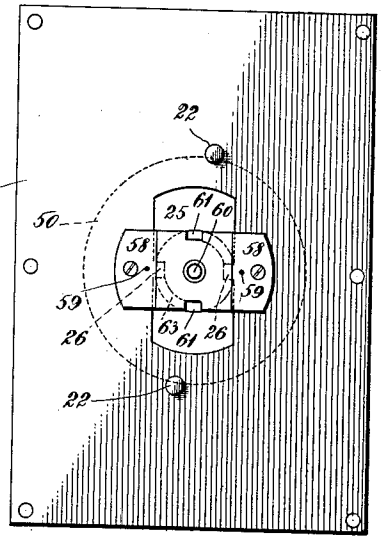


Fig. 8.

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UNITED STATES PATENT OFFICE.

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WATER-TIGHT ATTACHMENT-PLUG AND RECEPTACLE.

1,117,647. Specification of Letters Patent. Patented Nov. 17, 1914.

Application filed October 2, 1913. Serial No. 792,985.

To all whom it may concern:

Be it known that I, VERNON DURBIN, a citizen of the United States, and a resident of Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Water-Tight Attachment-Plugs and Receptacles, of which the following is a specification.

The object of the present invention is to provide an attachment plug and a self-closing water-tight receptacle for the same, especially adapted for use at sea, which, among other advantages, shall be water-tight when open as well as when closed by the plug and which shall not require any closing cap when the plug is removed.

One embodiment of my invention will be described in connection with the drawings which accompany and form a part of this specification.

In the drawings,—Figure 1 is a plan view of the receptacle; Fig. 2 is a plan view of the receptacle with the cover removed; Fig. 3 is an elevation of the plug; Fig. 4 is a longitudinal central section of the receptacle; Fig. 5 is a transverse central section of the receptacle with the plug inserted to close the circuit; Fig. 6 is an elevation of the lower part of the plug as seen from a point at right angles to the view-point of Fig. 3. Fig. 7 is a section on the line 7—7, Fig. 5; and Fig. 8 is an inverted plan view of the cover plate showing the plug turned to circuit-closing position.

In the particular drawings selected for more fully disclosing my invention, 1 represents a receptacle of brass or other suitable material, provided with a cover plate 2 held in place by the screws 3 which pass through the same and also through the gasket 5 and take into the upper edges of the receptacle.

A table 6 of insulating material, resting upon the insulating sheet 7 which covers the bottom of the receptacle is held in place by the screws 8 which are threaded into the lugs 9 at the corners of the bottom of the receptacle. Mounted on the top of this table on either side of the slot 6′ therein are two spring contacts 10 preferably of phosphor-bronze which are held in position in the present instance by the screws 11, one pair of which may, as shown, serve as binding posts for the conductors 12 which enter the receptacle through the threaded opening 4, adapted to receive the threaded end of a conduit.

The closure of the opening 25 in the cover plate is effected by the plunger plate 13, the upper face of which is provided with a layer 14 of water-proof material such as rubber with cloth insertion, or the like, and the latter is held in position in any suitable manner, as for example, by shellacking the same to the plate. Countersunk screws 14′ may also be employed as shown, to assist in holding the water-proof sheet to the plate and preventing the same from turning about the pin 23 when the plug is inserted and turned to lock the same in position as hereinafter more fully set forth.

Pivoted by the pins 17 to the saddle 15 which may be integral with the plunger plate are the two plunger arms 16, the lower ends of which are pivotally connected with the roller shafts 18, each of which, as shown more clearly in Fig. 5, is provided with a pair of rollers 19. A pair of spiral springs 20 connect the roller shafts and in the present instance the end of each spring is secured to its shaft by passing the same around a groove 21 cut into an enlarged portion of the shaft.

In order to guide the plunger plate, two pins 22 are inserted as shown, in the cover plate and take into the holes 22′ 22″ in the opposite corners of the plunger plate. Extending upwardly from the center of the plunger plate is a central pin 23 located exactly in the center of the space inclosed by the plug-guiding ring 24 which may be integral with or soldered to the cover plate. Extending into the opening 25 of the cover plate are two oppositely-disposed lugs 26 arranged to coöperate with correspondingly shaped slots 61 in the plug.

The plug which is shown at 50 consists essentially of a shell 51 inclosing the outgoing conductors and contact plate attaching means.

In the present instance the plug 53 of insulating material is secured within the shell 51 by the nut 54 which is screwed into the lower part of the shell and held in place by the set screw 51′, a gasket 55 preferably being interposed between the abutment 52 and nut and a gasket 56 of rubber or the like covering the lower face of said nut. The insulating member 57 is provided with a

tenon which takes into the groove 57′ cut into the tubular extension 54′ of the nut 54, or as will be obvious, the insulating member 57 may be secured in any desired manner to the nut. It will also be obvious that in place of using the insulating members bored to carry the conductors 59, the insulating plug may be molded into one integral piece in which case, of course, the gasket 56 would be placed in position before the plastic insulating material was poured into the mold, a part of which mold would be formed by the said tubular nut.

The insulating member 57 is shaped to conform with the opening 25 in the cover plate, and its lower face carries the contact plates 58, preferably phosphor-bronze, secured thereto by screws or otherwise and making electrical contact with the conductors 59. The center of the lower face of the member 57 is provided with a metallic cup 60 shaped to receive the upper rounded end of the pin 23, but being preferably a trifle less in depth than the portion of the pin which projects above the layer 14. The side faces of the member 57 are provided with slots 61 conforming in shape to the lugs 26 on the cover plate, and two cam-grooves are cut at diametrically opposite points in the tubular extensions 54′ of the nut. A portion 62 of each cam-groove constitutes a continuation of one of the slots 61, the next portion 63 is inclined with respect to the axis of said tubular extension and the terminal portion 64 is horizontal, the latter portion serving to lock the plug in circuit-closing position.

The out-going conductors 65 are attached to the brass terminal plates 66 set into the insulation 53, and the upper end of the plug is made water-tight by jute packing or the like held in position by the stuffing-tube nut 68 coöperating with the washer 69.

When the plug is removed and the parts are in the position shown in Fig. 4, the springs 20, acting on the toggle formed by the arms 16, exert a maximum upward force upon the plunger-plate, thereby insuring a perfect water-tight closure of the opening 25. When the plug is inserted in this opening, considerable initial force is required to push it downwardly and separate the roller-shafts 18 against the tension of the springs until the upper ends of the grooves 62 come in contact with the lugs 26, such force decreasing as the plunger plate moves away from the cover plate 2 because of the diminished leverage effect of the toggle. As soon as the lower portions of the inclined grooves 63 come into contact with the lugs 26, the plug is turned to the right and said inclined portions enable the plug to be forced home, as shown in Fig. 5, with the contact plates 58 in electrical contact with the springs 10. A slight further turning of the plug will bring the horizontal portions 64 of the cam-grooves into engagement with the lugs, thereby locking the plug in circuit-closing position. The roller-shafts are now separated as far as possible and the plunger arms are nearly horizontal, so that the springs 20 exert very little upward force on the plunger plate. Because the depth of the cup 60 is less than the projecting length of the pin 23, the lower face of the member 57 is not forced into contact with the water-proof layer 14, and there is no tendency for the turning of the plug to rub said layer from the plunger plate.

To open the circuit it is necessary only to turn the plug to the left, thereby releasing the horizontal portions 64 of the grooves from the lugs 26, whereupon the springs 20 force the plunger plate upwardly a distance equal to the length of the straight vertical portion 62′ of each groove, thereby so quickly separating the contact members 58, 10 as to eliminate all danger of arcing, the result being substantially the same as that accomplished by a quick-break snap-switch. A slight further turn of the plug to the left will bring the slots 61 into line with the lugs and permit the spring-controlled plunger plate to force the plug from the receptacle and close the opening 25. Receptacles of this kind are usually provided with snap-switches which are turned on after the plug is inserted and turned off before the plug is withdrawn in order to prevent the disastrous arcing which would result if the loaded circuit terminating in the plug contact members were connected to the main circuit, or disconnected therefrom, by means of the plug alone.

It will be understood of course that various kinds of spring-controlled toggles may be substituted for the toggle shown in the drawings, said toggle performing the double function of forcing the aperture-closing member against the cover plate with a maximum pressure which decreases with the downward movement of said plate, and separating the electrical contact members so quickly as to prevent arcing.

Heretofore in receptacles of this kind as used at sea, it has been necessary to provide a cap or plug usually secured by a chain to the receptacle for closing the aperture therein after the withdrawal of the plug. It has been found that the operators often fail to take the trouble to close the aperture after removing the plug and that the interior parts of the receptacle soon become corroded and unfitted for use. It will be obvious that by means of the present invention I have overcome this defect and provided a device whereby the closure of the receptacle is effected automatically.

I do not wish to limit myself to the details shown and particularly described, inasmuch as various modifications may be made therein by those skilled in the art without departing from my invention as defined in the appended claims.

I claim:

1. In combination, a receptacle having an aperture in one of its walls, a movable aperture-closing member, and a spring-actuated toggle operatively connected with said member.

2. In combination, a receptacle having an aperture in one of its walls, a movable aperture-closing member, a toggle having one end of each of its elements pivotally connected to said member, and resilient means connecting the other ends of said elements and tending to draw them together, the last mentioned ends of said elements coacting with a stationary member.

3. In combination, a receptacle having an aperture in one of its walls, a movable aperture-closing member, a toggle having one end of each of its elements pivotally connected to said member, roller shafts in pivotal connection with the other ends of each of said elements, and resilient means connecting said roller shafts and tending to draw them together.

In testimony whereof, I have hereunto subscribed my name this 30th day of Sept., 1913.

VERNON DURBIN.

Witnesses:
JOHN ALBERT POLLARD,
FREDERICK W. BROWN.