

J. W. HAYWOOD AND L. W. HORNE.
 WATER TIGHT PLUG AND RECEPTACLE.
 APPLICATION FILED FEB. 27, 1919.

1,362,992.

Patented Dec. 21, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

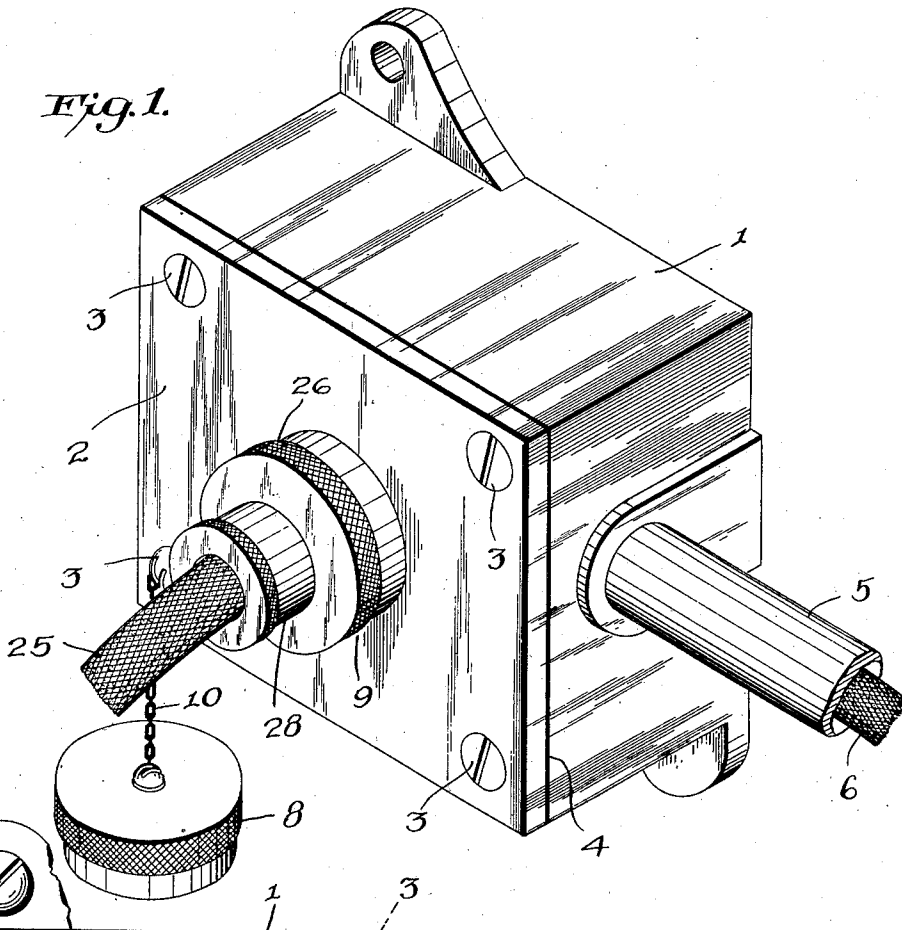
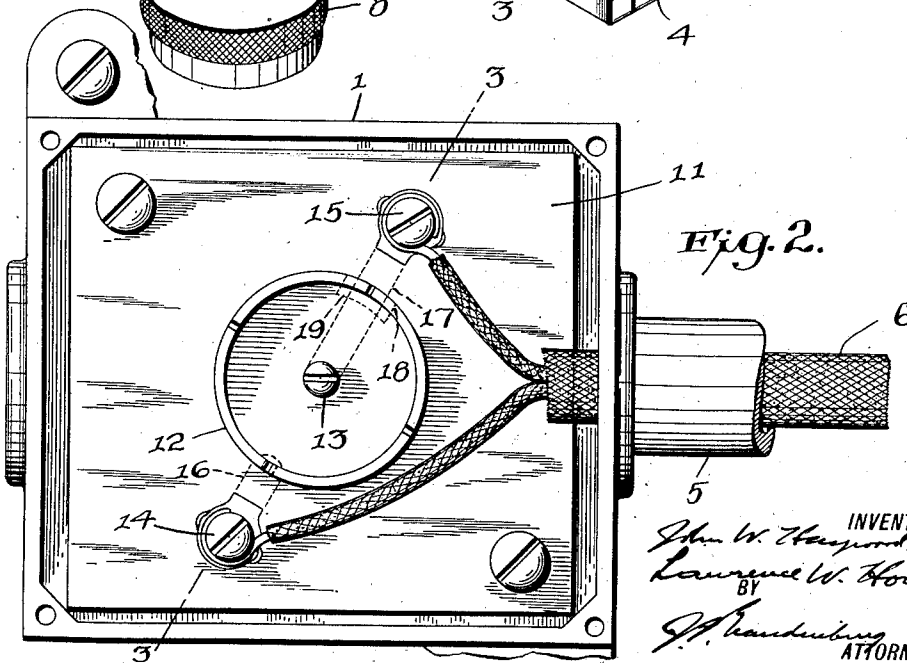


Fig. 2.

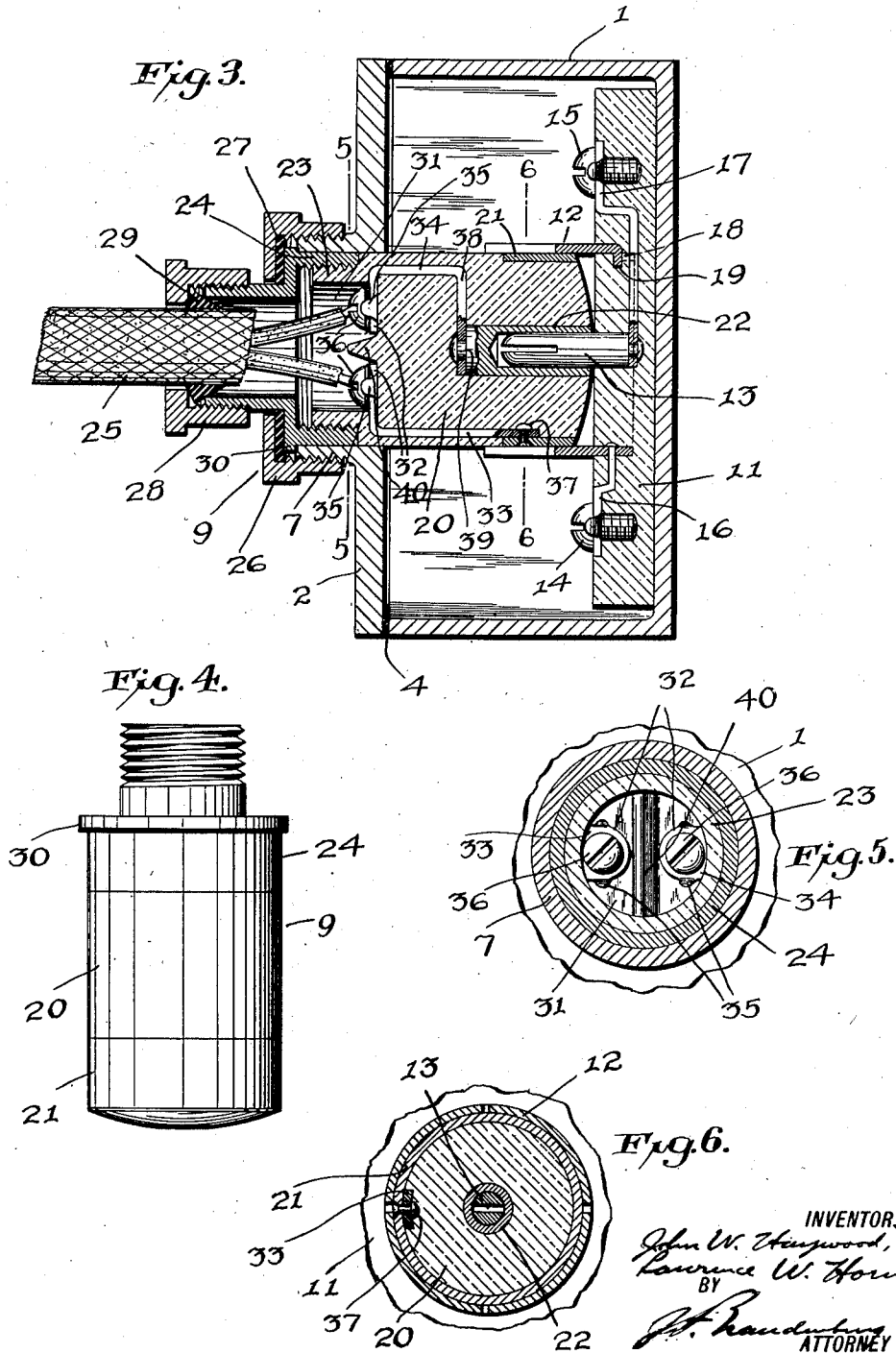


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UNITED STATES PATENT OFFICE.

JOHN W. HAYWOOD, OF NEW YORK, AND LAWRENCE W. HORNE, OF BROOKLYN,
NEW YORK, ASSIGNORS TO HORNE MANUFACTURING COMPANY, OF BROOK-
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WATER-TIGHT PLUG AND RECEPTACLE.

1,362,992.

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To all whom it may concern:

Be it known that we, JOHN W. HAYWOOD and LAWRENCE W. HORNE, citizens of the United States, and residents, respectively, of the borough of Bronx, in the county of Bronx and city and State of New York, and of the borough of Brooklyn, in the county of Kings and city and State of New York, have invented a new and useful Water-Tight Plug and Receptacle, of which the following is a specification.

The invention is an improvement in electrical connections, and more particularly in water-tight plugs and receptacles such as are used on board ship. The object is to provide a construction suitable for such purposes which shall be simple, durable, and economical to manufacture, electrically efficient, and convenient in use. The device has a plain, substantial, cylindrical plug, of molded insulation, with rigid, concentric, slip contacts, consisting of a circumferential ring molded flush in the body of insulation and a central socket embedded therein. The receptacle contains a female yielding ring contact, standing free to receive the ring on the plug, and a central split post contact to enter the socket. A shouldered shell screws flush onto the rear end of the plug, which is thus metal bound at both extremities, with an intervening zone of insulating surface preventing grounding upon the cover of the box. Thus formed, the movable member of the connector is to a high degree wear-resisting, and is adapted to be simply inserted and pushed home, without requiring to be turned for special presentation, and to be reliably guided in its movement in both directions without possibility of mistake or injury. The terminals of the plug are located in a cavity in its rear end, where they are readily accessible upon removing the shouldered shell. Bent conductor strips, united with the concentric contacts and extending embedded within the insulation to the terminals, internally reinforce the plug and aid in anchoring the contacts, and permit the terminals to be placed at opposite sides of the center upon the bottom of the cavity, which is crossed, between them, by an insulating barrier or rib. These and other features of the invention will become apparent as the specification proceeds.

In the drawings, forming a part hereof:

Figure 1 is a perspective view of the device, connected up for use;

Fig. 2 is a plan view of the receptacle, with the cover removed;

Fig. 3 is a section taken axially of the plug, through the plug and receptacle, on the line 3—3 of Fig. 2;

Fig. 4 is an elevation of the plug;

Fig. 5 is a cross-section on the line 5—5 of Fig. 3; and

Fig. 6 is a cross-section on the line 6—6 of Fig. 3.

The receptacle 1 comprises a rectangular box, having a cover 2 fastened by screws 3, which compress a gasket 4 to make the joint moisture-proof. The conduit 5 for the permanent cable 6 is screwed into an opening in a side of the box. The cover 2 has an entrance provided with an outwardly projecting cylindrical flange 7, which is screw-threaded on the outside to receive a screw cap 8 when the plug 9 is not in place, the cap being secured against loss by a chain 10 fastened to one of the cover screws. The interior of the flanged entrance is plain and cylindrical, and affords a substantial guide bearing for the plug.

An insulating base block 11 is screwed to the bottom of the receptacle, and bears a freely projecting ring contact 12, the outer portion of which is split at one or more points, and the inner solid portion of which is embedded in the molded block. This ring is in line with the entrance in the cover and at a distance therefrom, and its internal diameter is slightly smaller than that of the entrance, so that the plug which slides freely through the entrance is received tightly and frictionally within the yielding, resilient ring. A split-post contact 13 has its base also embedded in the block from which it projects centrally of the ring. The wires of the cable 6 are connected to binding terminals 14, 15 on the insulating base, at the outer ends of conductor strips 16, 17, the inner portions of which are depressed so as to be embedded in the block, their inner ends being riveted to the contacts. For greater security the ring contact extends within the block below the conductor 17 leading to the post contact, and its wall is slotted at 18 to straddle this conductor, the

material thus removed by partial severance being bent laterally to form an embedded anchorage 19, balancing the embedded conductor 16 which is also an anchorage.

5 The plug 9 has a cylindrical integral body 20 of molded insulation, on the order of hard rubber, upon the forward end of which is a plain circumferential ring contact 21, molded flush with the cylindrical surface
10 of the insulation, the ring being rigid and solidly backed by the insulation, which it protects. A socket contact 22, likewise rigid, is embedded in the center of the forward part of the plug. The front end of
15 the plug is convex.

The rear end of the insulation body is formed with a reduced neck flange 23, which has a screw-thread molded on its exterior, to receive the portion of major diameter of a shouldered shell 24, which is internally
20 threaded. The smaller, outer portion or neck of this shell is adapted to approximate the diameter of the removable cable 25, and its shoulder receives the pressure of the inserted flange of a coupling 26, which is
25 screwed upon the entrance flange 7 of the receptacle. A gasket 27 interposed between the coupling flange and shoulder insures a tight joint. The neck portion of the shell
30 24 is externally screw-threaded, for engagement by a cap ring 28, smaller than the coupling 26, which serves to compress a gasket 29 against the cable to prevent entrance of water at this point, and also to
35 grip the cable so as to take strain off the binding terminals.

The portion of the shell 24 of greater diameter bears a peripheral flange 30 at the shoulder, this flange constituting a stop co-
40 operative with the end of the entrance flange 7 to limit the inward movement of the plug. Forwardly of this region, the part of the plug which is pushed into and drawn out of the receptacle and which is externally
45 constituted, as described, of two zones of metal and an intervening zone of insulation, is smooth, continuous and cylindrical, and reinforced by the functional elements of the construction.

50 The neck flange 23 incloses a circular cavity 31 within the rear portion of the insulation body. At opposite sides of the center upon the bottom of this cavity are two binding terminals, comprising ends 32
55 of two conductor strips 33, 34, bent laterally and provided with ears 35 and binding screws 36. Of the said strips, the conductor 33 is united at its forward end by a rivet 37 to the ring contact 21, and is
60 thence offset inward to carry it well within the contour of the exposed intermediate part of the insulation body. The other conductor 34 has a forward portion 38 transversely disposed within the insulation, with
65 its end perforated to receive a reduced pro-

jection 39 on the rear end of the socket contact 22, the projection being riveted over upon the conductor. The transverse portion 38 extends away from the conductor 33, so that the longitudinal portions of the
70 conductors are located at opposite sides of the center. A diametrical rib 40 raised from the insulation at the bottom of the cavity 31 passes between the terminals and constitutes a barrier to prevent stray strands
75 from the wires from producing a short-circuit. The terminals in their open rear cavity are easily gotten at by taking off the shouldered shell.

What we claim as new is:

80 1. A water-tight plug and receptacle comprising the combination of a receptacle having a cover with a flanged entrance to receive a coupling, an insulating base in the receptacle, a yielding ring contact standing
85 free from said base at a distance inwardly from the flanged entrance, and a central split post contact standing within said ring contact, and a cylindrical plug adapted to be slipped into and out of said entrance in
90 any position of rotation about its axis, the same comprising a plug of insulation bearing rigidly on its forward end a circumferential ring contact to enter the ring contact of the receptacle and a central embedded
95 socket contact to take over the post contact, and a shell on the rear portion of the plug of two diameters to present a shoulder to co-operate with the coupling and a reduced screw-threaded rear portion to receive means
100 for making a tight joint around the cable, the cylindrical body of the plug which slips in and out of the entrance thus comprising externally three zones, namely the ring contact at the front, the shell at the rear, and
105 an intermediate zone of insulation which intervenes between said ring contact and the cover when the plug is in place.

2. A plug for a water-tight receptacle comprising an integral plug of molded in-
11 insulation, a circumferential ring contact rigidly held on its forward end, a shouldered shell having its forward portion screwed upon the rear end of the plug and an externally threaded reduced rear portion, a cen-
11 tral embedded socket contact in the forward portion of the plug, binding terminals in the rear part of the plug having embedded connections with the contacts, the plug with its ring contact at the front and the shell
12 portion of larger diameter at the rear and the intervening zone of insulation being smooth and cylindrical.

3. A plug for a water-tight receptacle comprising a cylindrical plug of molded in-
12 insulation formed at the rear with a reduced neck screw-threaded upon the outside and inclosing a cavity in the plug, a circumferential ring contact rigidly held on its forward end, a shouldered shell screwed upon said
13

neck, with an intervening flush surface of insulation between the shell and contact, binding terminals in the rear portion of the plug, and embedded connections between the 5 contacts and terminals.

4. A plug for a water-tight receptacle comprising a cylindrical plug of molded insulation formed at the rear with a reduced neck screw-threaded upon the outside and 10 inclosing a cavity in the plug, a circumferential ring contact rigidly held on its forward end, a shouldered shell screwed upon said neck, with an intervening flush surface of insulation between the shell and contact, 15 binding terminals in the rear portion of the plug, embedded connections between the contacts and terminals and a barrier rib rising from the bottom of the cavity between the terminals.

20 5. A receptacle containing an insulating base, a female ring contact partly embedded in said base, a central post contact also

partly embedded in the base, both projecting freely therefrom, binding terminals on the base, embedded conductors connecting the 25 terminals with the contacts, the embedded portion of the ring contact having a slot straddling the conductor leading to the post contact and the material from the slot disposed within the base as an anchorage. 30

6. A plug for a water-tight receptacle having a cylindrical plug of molded insulation, a circumferential ring contact rigid upon its forward end, a shouldered shell 35 screwed on its rear end, a central embedded socket contact, binding terminals in the rear portion of the plug, and embedded conductors, the body of the plug being externally smooth and cylindrical, with the ring and shell continuous with the exposed interven- 40 ing zone of insulation.

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