

Sept. 14, 1943.

D. D. WILLIAMS

2,329,430

SUBMARINE RESCUE APPARATUS

Filed Aug. 8, 1941

2 Sheets-Sheet 1

FIG. 1

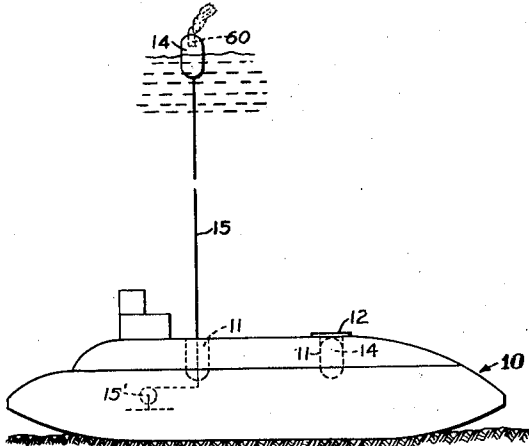


FIG. 2

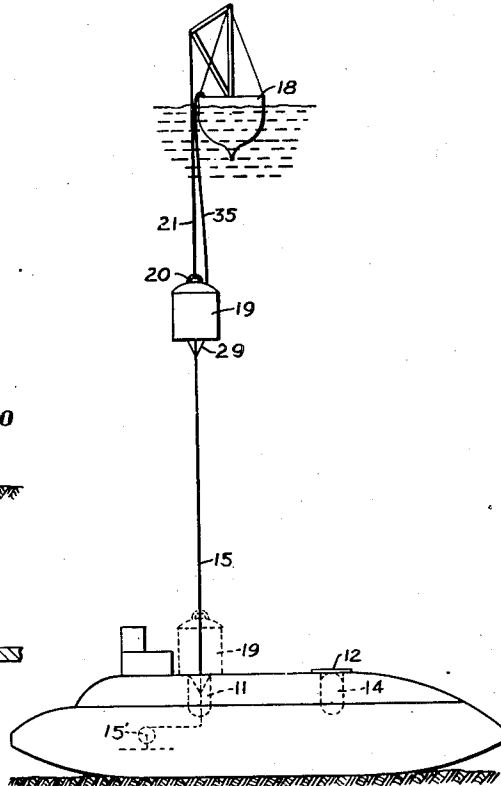


FIG. 3

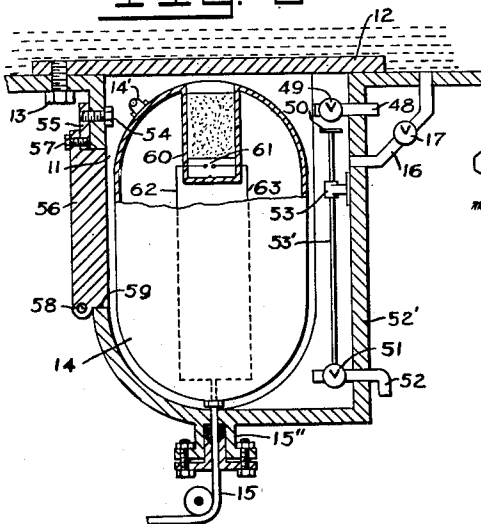
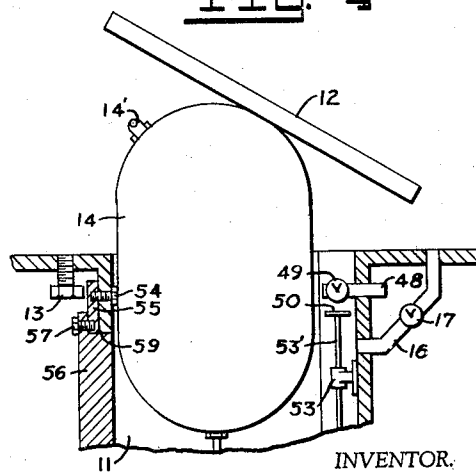


FIG. 4



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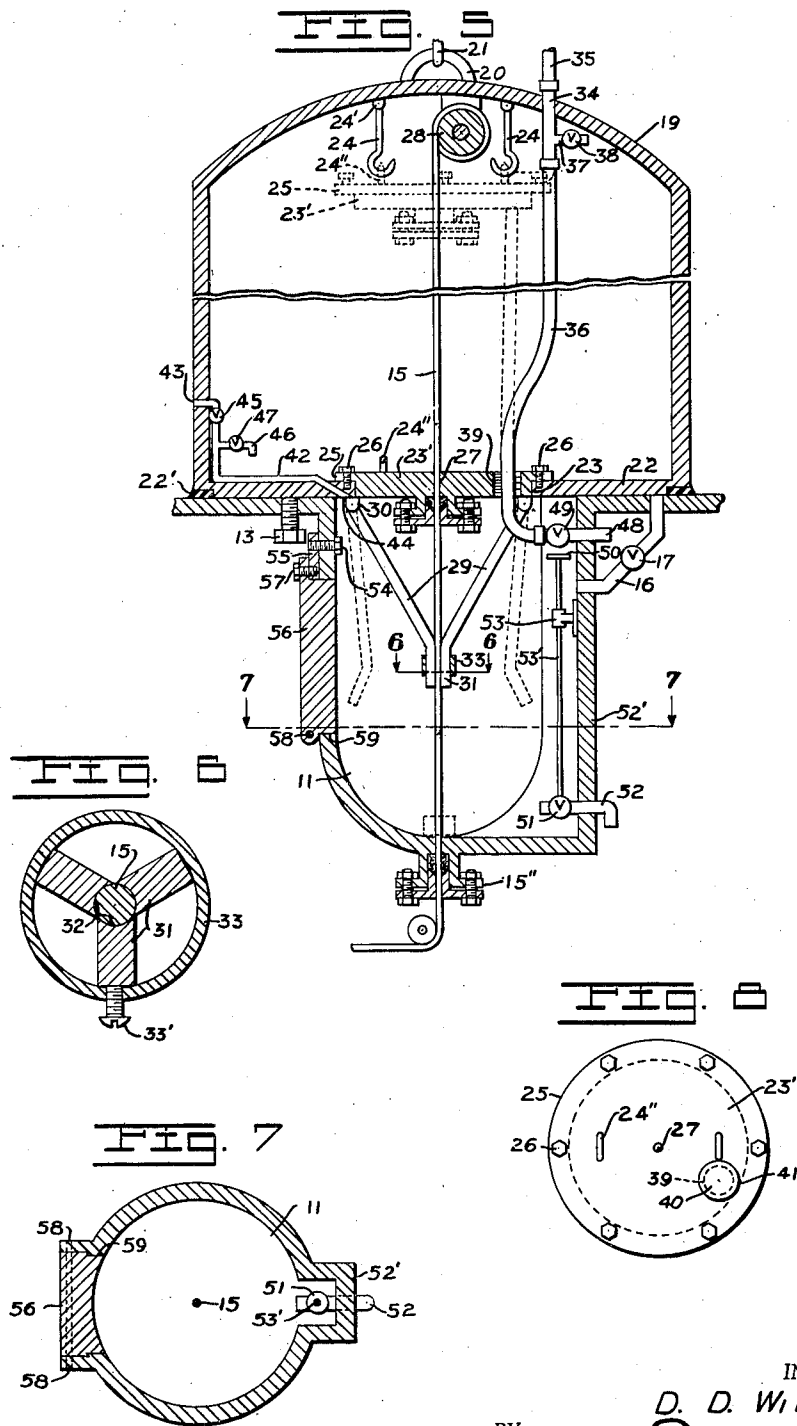
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UNITED STATES PATENT OFFICE

2,329,430

SUBMARINE RESCUE APPARATUS

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Application August 8, 1941, Serial No. 405,966

10 Claims. (Cl. 114-16.6)

This invention relates to submarine rescue apparatus.

The general object of the invention is to provide an improved apparatus and method for effecting the rescue of persons trapped in a submarine.

A more specific object of the invention is to provide a submarine rescue apparatus including a novel signalling buoy.

A further object of the invention is to provide an apparatus including a novel rescue bell.

Another object of the invention is to provide a novel means for guiding the rescue bell into place upon a submerged object.

Another object of the invention is to provide a submarine rescue apparatus including novel means for holding a rescue bell upon a submarine.

Another object of the invention is to provide a novel valve controlled means permitting a diving bell to be readily secured upon and released from a submerged vessel.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevation of a submarine embodying features of my invention;

Fig. 2 is a side elevation showing the rescue bell partially descended;

Fig. 3 is a fragmentary section, on an enlarged scale, showing the signal buoy in the submarine recess;

Fig. 4 is a fragmentary section, on an enlarged scale, showing the buoy partially removed from the recess;

Fig. 5 is a fragmentary section, on an enlarged scale, showing the rescue bell in place on the submarine;

Fig. 6 is a fragmentary section, on a further enlarged scale, taken on the line 6-6, Fig. 5;

Fig. 7 is a fragmentary section, on an enlarged scale, taken on line 7-7, Fig. 5; and

Fig. 8 is a plan on an enlarged scale showing the manhole cover.

Referring to the drawings by reference characters, I have shown my invention as embodied in a submarine vessel which is indicated generally at 10. As shown the submarine has a recess 11 therein which opens outwardly and is normally covered by a cover plate 12 secured to the submarine by bolts 13 which may be turned from inside the submarine to release the plate 12. Within the recess 11 a buoy 14 is arranged. This buoy is filled with air under heavy pressure by means of a valve 14' so that a relatively light

buoy body may be used while at the same time a heavy internal air pressure will prevent collapse of the buoy due to hydrostatic pressure.

Attached to the buoy by suitable releasable means I show a cable 15 which extends into the interior of the submarine and may be there secured to and wound upon a drum 15'. The cable 15 passes through a suitable packing gland 15'' in the bottom of the recess 11.

Communicating with the exterior of the submarine and the interior of the recess 11 I provide a conduit 16 which has a valve 17 intermediate the length thereof and is operable from within the submarine. When the bolts 13 have been released and the plate 12 is to be removed, the valve 17 may be opened thus admitting sea water into the recess 11 and to thereby equalize the hydrostatic pressure on either side of the plate. By releasing tension on the cable 15, the buoyant effect of the buoy 14 will push the plate 12 away from the recess and the buoy will then ascend to the surface as the cable 15 unreels from the drum (see Fig. 4).

A rescue ship 18, upon locating the buoy, detaches the cable 15 therefrom and attaches the cable to a rescue bell 19; the rescue bell 19 includes an eye 20 at the top thereof to which a cable 21 is secured. The cable 21 is operable preferably from the rescue ship to lower and raise the rescue bell 19. The rescue bell 19 also includes a bottom 22 of the same contour as the exterior of the submarine. The bottom 22 has a gasket 22' about the outer periphery thereof and a manhole 23 in the center thereof which may be closed by a cover 23'. The cover 23' has a flange 25 adjacent the outer periphery thereof through which bolts 26 are positioned to secure the cover 23' to the bottom 22. The cover 23' also has a central aperture 27 therein through which the cable 15 passes. The upper end of the cable 15 is secured to a windlass 28, within the rescue bell, upon which it is wound as the rescue bell descends.

Two hook rods 24 are pivoted to the interior of the top of the bell 19 as at 24' and are adapted to engage handles 24'' on cover plate 23' when the cover plate is raised to the position shown by dotted lines in Fig. 5.

The rescue bell also includes three guide rods 29 each pivoted at one end thereof to the exterior of the bottom 22 as at 30. The free ends of the guide rods 29 include end portions 31 which are at such an angle to the bar 29 that they are parallel to the cable 15 when placed against the cable. The end portions 31 each include arcuate

grooves 32 which when the portions 31 are placed together, form an aperture through which cable 15 slides. The end portions 31 are releasably secured together by means of a slip ring 33 held in place as by a set screw 33'.

The rescue bell 19 at the top thereof is provided with a fitting 34 onto the exterior end of which an air supply hose 35 is secured and onto the interior end of which an air delivery hose 36 is secured. Intermediate its length the fitting 34 includes an outlet 37 which has a valve 38 thereon.

The cover 23' has a threaded aperture 39 therein in which may be closed by an externally threaded plug 40 which has a knurled knob portion 41 thereon by which the plug may be inserted into and removed from the aperture 39.

The rescue bell has a conduit 42 therethrough, which at one end communicates with the exterior of the bell at the side thereof as at 43 and at the other end communicates with the exterior of the bell at the bottom thereof adjacent the manhole as at 44. Intermediate the conduit 42 is a valve 45 operable from the interior of the bell 19. The conduit also includes an outlet 46 with a valve 47 therein also operable from within the bell 19. The outlet 46 communicates with the interior of the bell 19.

After the cable 15 is released from the buoy 14, it is inserted through the slip ring 33 and through aperture 27 in the cover 23'. The cover 23' is opened and a rescue man (not shown) enters the rescue bell 19. The rescue man secures the end of the cable 15 to the windlass 28. The guide bars 29 are then pivoted so that the ends 31 surround the cable 15, whereupon the slip ring 33 is slid over the ends 31 to hold them in place. The rescue man closes the cover 23 and secures it by means of bolts 26, closes the valves 45 and 47 and secures the plug 40 in the aperture 39.

The bell 19 is then lowered into the water and allowed to descend by means of cable 21. The rescue man keeps the cable 15 as taut as possible by winding the slack on windlass 28 as the descent is made. Cable 15 thus acts as a guide for the bell 19. As the bell approaches the submarine, the guide rods 29 urge it into correct seating position relative to the chamber 11. When the bell is seated against the submarine, the rescue man opens the valve 47 thus reducing the hydrostatic pressure in the recess 11 and against the bottom of the bell 19.

The hydrostatic pressure on the top of the bell forces it into tight engagement with the submarine. The bell 19 seats over the exterior opening of the conduit 16 so that if the valve 17 is left open, communication between the sea and chamber 11 is cut off. The rescue man then removes the plug 40, inserts his hand with the free end of the air delivery hose 36 through the aperture 39 and connects the hose to an air tube 48 and opens the valve 49. Thus air is delivered into the interior of the submarine into which the air tube 48 extends.

The rescue man then turns a valve handle 50 to open a valve 51 in a conduit 52 arranged in a wall 52' at one side of the recess 11 and communicating between the bottom of chamber 11 and the interior to the submarine. The water from the chamber 11 is thus drained into the submarine. A guide 53 secured to the wall of the chamber 11 provides a bearing for the stem 53' of the valve 51. The cover is then released after removing the bolts 26 and raised to the position shown by dotted lines in Fig. 5 and the hooks are engaged. The

slip ring 33 is then disengaged from the guide rods 29 which are then allowed to hang vertically as shown by dotted lines in Fig. 5. The valve 38 may be opened to supply air to the interior of the bell 19 if so desired.

The rescue man then removes bolts 54 which engage a plate 55 to which an exit-hole cover 56 is secured by bolts 57. This arrangement permits the exit-hole cover 56 to be opened from either within or from without the submarine. The exit-hole cover 56 is pivoted as at 58 and when open hangs downwardly and thus communication is established between the rescue bell 19 and the interior of the submarine.

The occupants of the submarine then pass through the hole 59 into the chamber 11 and then through manhole 23' into the rescue bell 19 until the desired number of occupants are removed. The cover 56 is then replaced, the rods 29 secured in place by slip ring 33, the valve 51 closed, then valve 49 is closed, the air delivery hose is disconnected from the air tube 48 and is pulled through the aperture 39. The plug 40 is then inserted into the aperture 39, the cover 23' is closed and secured. The valve 47 is then closed and the valve 45 opened thus creating communication between the sea and chamber 11 so that hydrostatic pressure is equalized at the top and bottom of the bell 19 thus breaking the seal between the bell and the submarine and allowing the bell to be hoisted to the surface and the rescued occupants removed therefrom. As the bell 19 ascends to the surface, the cable 15 is allowed to unreel from the windlass 28.

The buoy 14 is preferably provided with suitable signalling means such as a smoke bomb 60 which when operated by a spark gap 61 will be noticed by near-by vessels. The leads 62 and 63 to the spark gap 61 may be enclosed within the cable 15.

If more occupants are left in the submarine the described operation may be repeated.

From the foregoing it will be apparent that I have invented a novel submarine rescue apparatus and method which is highly efficient for its intended purpose.

Having thus described my invention, I claim:

1. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, a conduit in the diving bell and having one end communicating with the interior of the recess and the other end communicating with the interior of the diving bell, said conduit having a valve therein whereby when said valve is opened pressure is released from within the recess and hydrostatic pressure holds the bell on the submarine, said bell bottom having a manhole and a cover therefor, said manhole cover having a hand hole therein, a plug removably mounted in said hand hole, an air conduit in said diving bell, a hose attached to said air conduit, an air tube in said recess affording communication between the interior of the submarine and the interior of said recess, said air tube having a valve operable from within said recess, means to releasably attach the air hose to the air tube whereby air may be delivered into the submarine, means to suspend said

manhole cover above said manhole, a drain conduit affording communication between the interior of the submarine and the bottom of the recess, said conduit having a valve therein, means to operate said drain valve from the top of the recess, said recess having an exit manhole permitting passage therethrough, a cover for said last mentioned manhole, means operable from within the submarine or recess to release the exit manhole cover, and conduit means extending through the diving bell and communicating at one end with the interior of the recess and at the other end with the sea, said last mentioned conduit having a valve therein whereby fluid under pressure may enter the recess to equalize pressure on the top and bottom of the diving bell.

2. A submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, a drain conduit in the bottom of the recess, an air tube in said recess affording communication between the interior of the submarine and the interior of said recess, said air tube having a valve operable from within said recess, means to releasably attach an air hose to the air tube whereby air may be delivered into the submarine, said drain conduit affording communication between the interior of the submarine and the bottom of the recess, said drain conduit having a valve therein, means to operate said drain valve from the top of the recess, said recess having an exit manhole permitting passage therethrough, a cover for said last mentioned manhole, and means operable from within the submarine or recess to release the exit manhole cover.

3. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, said bell bottom having a manhole and a cover therefor, said manhole cover having a hand hole therein, an air tube in said recess affording communication between the interior of the submarine and the interior of said recess, a removable closure for said hand hole, and a hose passing through said hand hole and attached to said air conduit, said air tube having a valve operable from within said recess.

4. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, a conduit in the bell and having one end communicating with the interior of the recess and the other end communicating with the exterior of the submarine, said conduit having a valve therein operable from within the submarine whereby when said valve is opened pressure is balanced between the recess and the sea, said bell bottom having a manhole and a cover therefor, said recess having an exit manhole permitting passage therethrough, a

cover for said last mentioned manhole, and means operable from within the submarine or recess to release the exit manhole cover.

5. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, a conduit in the recess and having one end communicating with the interior of the recess and the other end communicating with the interior of the submarine, said conduit having a valve therein whereby when said valve is opened pressure is released from within the recess and hydrostatic pressure holds the bell on the submarine, said bell bottom having a manhole and a cover therefor, said manhole cover having a hand hole therein, a plug removably mounted in said hand hole, an air conduit in said diving bell, a hose attached to said air conduit, an air tube in said recess affording communication between the interior of the submarine and the interior of said recess, said air tube having a valve operable from within said recess, and means to releasably attach the air hose to the air tube whereby air may be delivered into the submarine.

6. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, the diving bell having a bottom larger than the opening of said recess, a conduit communicating at one end with the interior of the recess and at the other end communicating with the interior of the submarine, said conduit having a valve therein operable from within the submarine whereby when said valve is opened pressure is released from within the recess, said bell bottom having a manhole and a cover therefor, said recess having an exit manhole permitting passage therethrough, a cover for said last mentioned manhole, means operable from within the submarine or recess to release the exit manhole cover, and conduit means extending through the diving bell and communicating at one end with the interior of the recess and at the other end with the sea, said last mentioned conduit having a valve therein whereby fluid under pressure may enter the recess to equalize pressure between the sea and the recess.

7. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, a conduit in the bell communicating with the interior of the recess and with the interior of the submarine, said conduit having a valve which may be opened to release pressure from within the recess, said bell bottom having a manhole and a cover therefor, said manhole cover having a hand hole therein, a removable closure for said hand hole, an air

conduit in said diving bell, a hose attached to said air conduit, an air tube in said recess affording communication between the interior of the submarine and the interior of said recess, said air tube having a valve operable from within said recess, means to releasably attach the air hose to the air tube whereby air may be delivered into the submarine, said recess having an exit manhole permitting passage therethrough, a cover for said last mentioned manhole, and means operable from within the submarine or recess to release the exit manhole cover.

8. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, a drain conduit in the recess and having one end communicating with the interior of the recess and the other end communicating with the interior of the submarine, said conduit having a valve therein whereby when said valve is opened pressure is released from within the recess and hydrostatic pressure holds the bell on the submarine, said bell bottom having a manhole and a cover therefor, said manhole cover having a hand hole therein, a plug removably mounted in said hand hole, an air conduit in said diving bell, a hose attached to said air conduit, an air tube in said recess affording communication between the interior of the submarine and the interior of said recess, said air tube having a valve operable from within said recess, means to releasably attach the air hose to the air tube whereby air may be delivered into the submarine, means to suspend said manhole cover above said manhole, said drain conduit affording communication between the interior of the submarine and the bottom of the recess, said drain conduit having a valve therein, means to operate said drain valve from the top of the recess, said recess having an exit manhole permitting passage therethrough, a cover for said last mentioned manhole, and means operable from within the submarine or recess to release the exit manhole cover.

9. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, guide means on the diving bell engaging the cable to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess, said bell bottom having a manhole and a cover therefor, said manhole cover having a hand hole therein, a plug removably mounted in said hand hole, an air conduit in said diving bell, a hose attached to said air conduit, an air tube in said recess affording communication between the interior of the submarine and the interior of said recess, said air tube having a valve operable from within said recess, means to releasably attach the air hose to the air tube whereby air may be delivered into the submarine, a drain conduit affording communication between the interior of the submarine and the bottom of said recess, said drain conduit having a valve therein, means to operate said drain valve from the top of the recess, said recess having an exit manhole permitting passage therethrough, a cover for said last mentioned manhole, means operable from within the submarine or the recess to release the exit manhole cover, and conduit means extending through the diving bell and communicating at one end with the interior of the recess and at the other end with the sea, said last mentioned conduit having a valve therein whereby fluid under pressure may enter the recess to equalize pressure between the top of the submarine and the recess.

10. In an apparatus for effecting a rescue from a submerged submarine, a submarine having an outwardly opening recess, a cable extending through the recess and into the submarine, a diving bell, means to attach the diving bell to the cable, means in the bell to pull in and pay out the cable, a plurality of guide rods pivoted to the bell at their upper ends, means to releasably secure the lower ends of the guide rods together, the guide rods converging downwardly and engaging the cable, the guide rods serving to seat the bell over the recess, the diving bell having a bottom larger than the opening of said recess

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