March 1, 1927. 1,619,642

C. E. WARD

PORTABLE REPAIR CHAMBER

Filed May 24, 1926 4 Sheets-Sheet 1

Fig. 11.

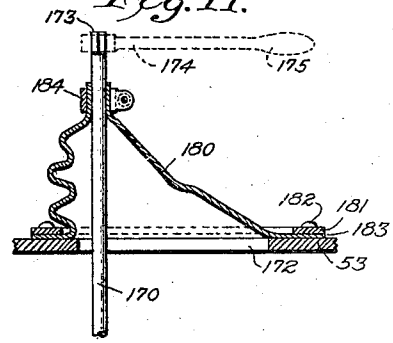
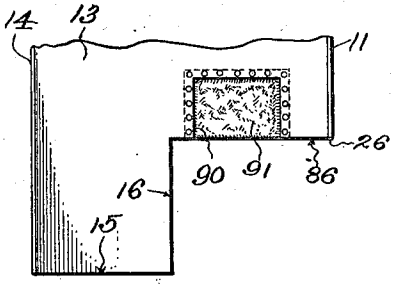


Fig. 1.

Fig. 5.



Inventor

Charles E. Ward,

By W. C. Seaver

Attorney

March 1, 1927. 1,619,642

C. E. WARD

PORTABLE REPAIR CHAMBER

Filed May 24. 1926 4 Sheets-Sheet 2

Fig. 3.

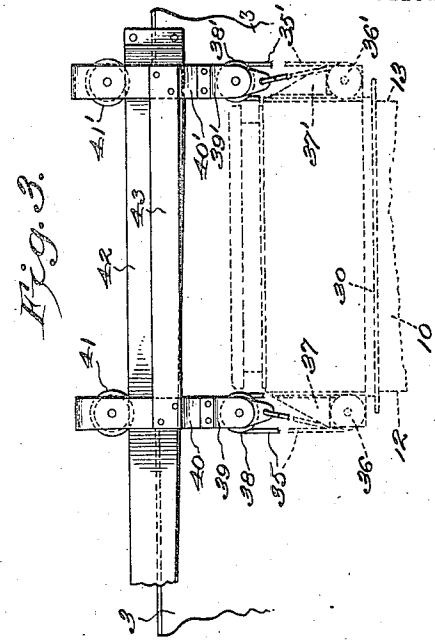


Fig. 4.

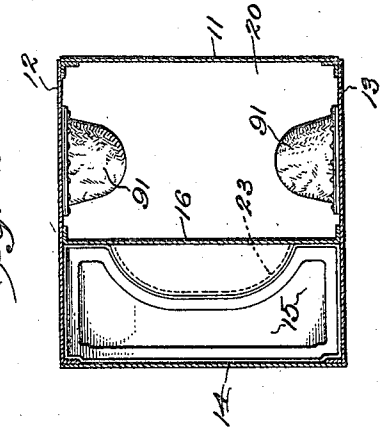
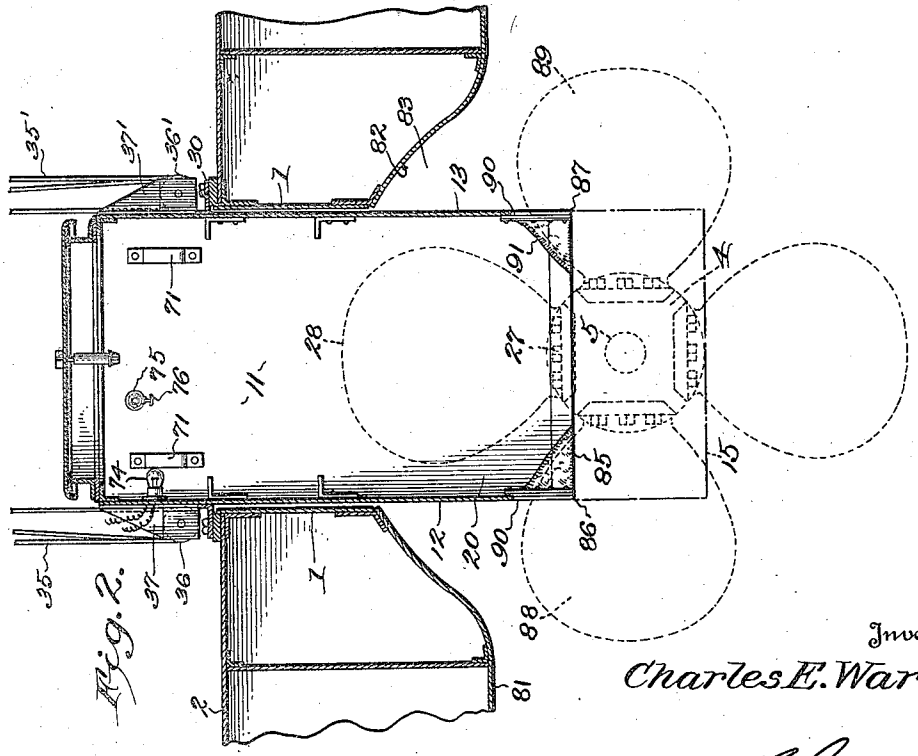


Fig. 2.



Inventor
Charles E. Ward,

By W. B. Beaver
Attorney

March 1, 1927. 1,619,642

C. E. WARD

PORTABLE REPAIR CHAMBER

Filed May 24, 1926 4 Sheets-Sheet 3

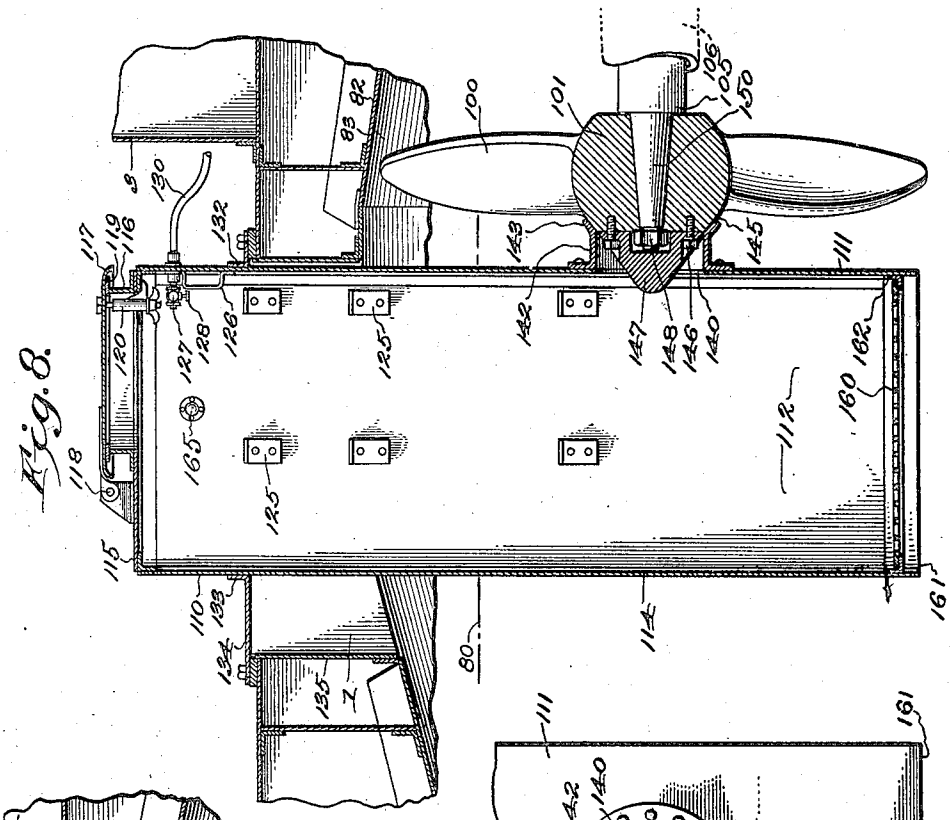


Fig. 8.

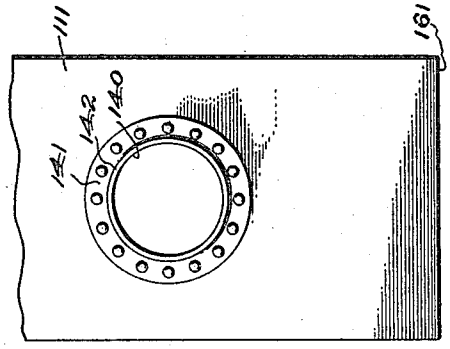


Fig. 9.

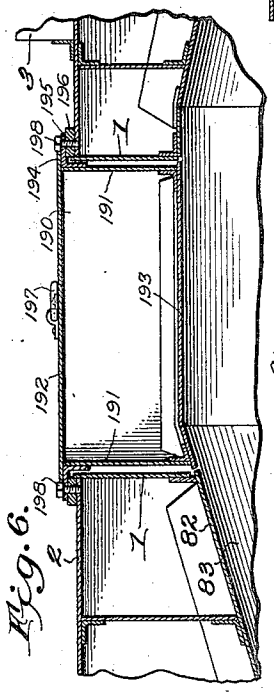


Fig. 6.

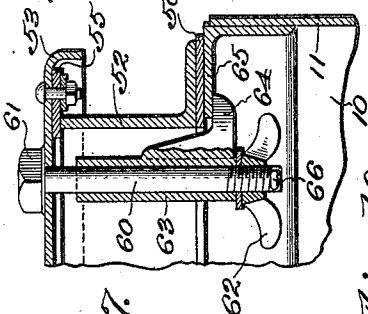


Fig. 7.

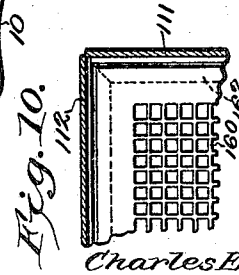


Fig. 10.

Inventor

Charles E. Ward,

By

Attorney

March 1, 1927. 1,619,642

C. E. WARD

PORTABLE REPAIR CHAMBER

Filed May 24, 1926 4 Sheets-Sheet 4

Fig. 13.

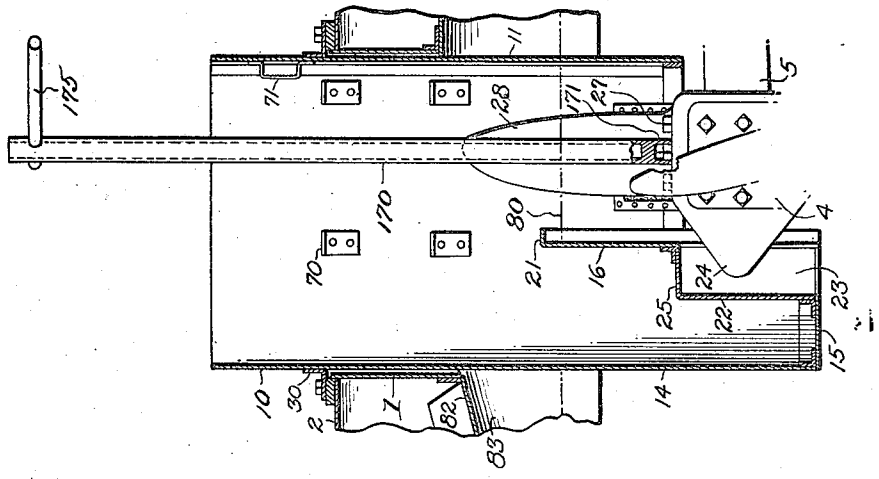
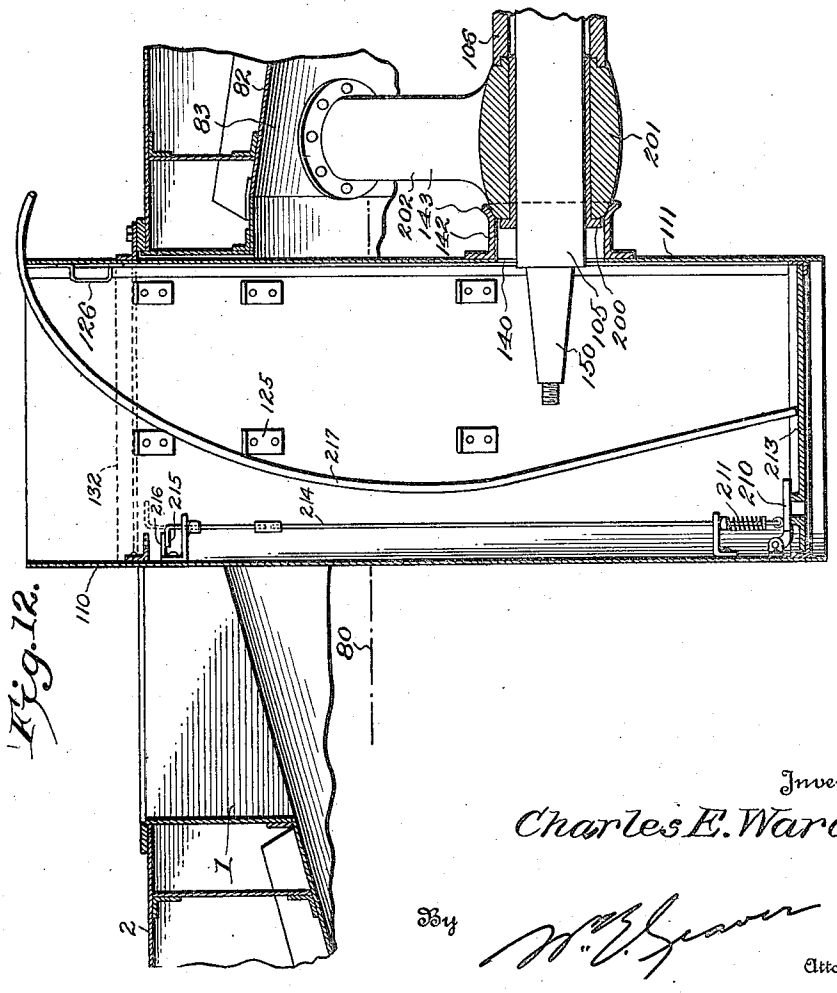


Fig. 12.



Inventor

Charles E. Ward,

By W. E. Spencer

Attorney

Patented Mar. 1, 1927. 1,619,642

UNITED STATES PATENT OFFICE.

CHARLES E. WARD, OF CHARLESTON, WEST VIRGINIA.

PORTABLE REPAIR CHAMBER.

Application filed May 24, 1926. Serial No. 111,414.

This invention relates to air locks or chambers for submarine repairs and has for its object to provide a portable device which may be carried on a vessel, as well as to provide a construction more simple and efficient in use than those heretofore proposed.

With these and other objects in view the invention consists in the novel details of construction and combinations of parts as will be more fully disclosed hereinafter and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views;

Fig. 1 is a vertical sectional view of the portable air lock in operative position;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1 and looking in the direction of the arrows;

Fig. 3 is a fragmentary elevational view illustrating a means for hoisting and conveying the air lock;

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 1 and looking in the direction of the arrows;

Fig. 5 is a detail elevational view illustrating one of the pockets disposed in said air lock;

Fig. 6 is a vertical sectional view of the hatch opening and cover therefor through which the portable air lock or chamber may be lowered;

Fig. 7 is a detail sectional view of the locking means for the cover of the air lock;

Fig. 8 is a vertical sectional view similar to Fig. 1 of a modified form of air lock;

Fig. 9 is an elevational view of a detail of the flange 142 associated with the propeller 101, constituting the modification shown in Fig. 8;

Fig. 10 is a fragmentary view partly in section of the flooring used in the modified form of air lock shown in Fig. 8;

Fig. 11 is a fragmentary view, partly in section, showing a means for loosening or tightening the nuts 27 associated with the propeller of the vessel;

Fig. 12 is a longitudinal sectional view similar to Fig. 8, but showing a further modified form of the invention; and

Fig. 13 is a view similar to Fig. 1 showing the adaptability of the chamber 10 to repair work without the use of air under pressure.

This invention is more particularly adapted for use with tow boats provided with tunnels in which the propelling means operates. Heretofore when damage has been done to one or more of the blades of the propeller, necessitating the removal of said blades and substitution of new blades therefor, it has been necessary either to dry-dock the vessel or else to place the vessel on a marine railway so that the stern thereof will be out of water to permit of the replacement or repair. Not only is this method of repair inconvenient, but it is extremely costly and sometimes necessitates the vessel being out of commission for a considerable length of time with resultant loss of towage. This device therefore is found well adapted for use when and where the accident occurs, so that the repairs or replacements can be made with a minimum loss of service.

Boats of this particular type, as is well known, are provided in their deck portions with hatchways immediately over the propellers so that access may be had thereto. However, the propellers are so disposed that the greater portion thereof is below the water level line. Further, the bolts securing the blades to the propeller block, being below the water level line, are not discernible in muddy waters, and are so far below the deck that they cannot be reached therefrom.

In Fig. 1, 1 represents the hatch opening in the deck 2 behind the deck house 3 and immediately over the propeller generally indicated by the numeral 4, secured to the shaft 5 passing through the casing 6 to the engine not shown. 10 generally indicates the portable air lock, closely fitting the hatchway 1, and provided with the front wall 11, the side walls 12 and 13, and the back wall 14 all welded or otherwise secured together in water and air tight relation. The bottom, however, comprises the floor 15, disposed between the rear wall 14 and an intermediate short vertical wall 16 disposed less than one-half the distance from the rear wall 14 to the front wall 11, and a large space generally indicated by the numeral 20 having no flooring at all. The intermediate wall 16 extends less than half the height of the air lock and is provided with an angularly disposed top edge 21 all as will be clear from Fig. 1. The lower central part of said wall 16 is provided with a cut-away portion about which there is

disposed a rearwardly extending curved wall 22 forming the pocket or recess 23 for the cap piece 24 of the propeller. The walls 16 and 22, and the bottom floor 15, are all welded or otherwise secured to the walls of the air lock to form a water tight joint therewith.

The depth to which the air lock 10 may extend in the hatchway 1 is limited by any suitable means such as the angle irons 30, rigidly secured to the walls and adapted to rest on the deck 2. When the lock or chamber 10 is thus supported in operative position in said hatchway, see Figs. 1 and 2, it will be observed that the bottom floor 15 is below and to the rear of the propeller shaft 5, but that the front wall 11 and part of the side walls 12 and 13 have a bottom edge lying in a horizontal plane 26 just below the bolts 27 holding the damaged blade 28 of the propeller to the propeller block.

Suitable means for raising and lowering the air lock are provided, such as the tackles 35 and 35′ passing over the sheaves 36 and 36′ rigidly secured as by the bracket supports 37 and 37′ to the sides 12 and 13 respectively of the airlock. The tackles 35 and 35′ also pass over the sheaves 38 and 38′ journaled in the yokes 39 and 39′ rigidly secured to the links 40 and 40′ journaled therein. The grooved rollers 41 and 41′ are adapted to travel on the rail 42 disposed transversely of the vessel and carried by the angles 43 rigidly secured to, and extending rearwardly from, the deck house 3 and said rollers are maintained in spaced relation by the link 43 rigidly joining the links 40 and 40′. With reference to Fig. 1, it will be seen that the parts are so dimensioned and spaced that the rail 42 will be substantially in the same vertical transverse plane with the sheaves 36 and 36′ and that said sheaves will be in the same vertical longitudinal planes with the rollers 41 and 41′. Thus it will be seen that the air lock may be readily moved from some convenient storage position on the deck of the vessel in a transverse direction to one of the hatchways 1 and lowered therethrough into the operative position shown in Fig. 1.

The top wall of the airlock comprises a plate 50 welded or otherwise securely fastened to the walls of the chamber to provide an airtight joint therewith. It is provided further with the opening 51 having secured about the edges thereof the upstanding annular flange 52 likewise in airtight relation with the said top 50. A cover 53 hingedly secured as at 54 to the top 50 is provided on its under side with any suitable means, such as the gasket 55, adapted to form with the upper edge of the vertical flange 52 an air tight joint when the cover 53 is in closed locked position. The cover 53 is provided with a glass 56 to allow light to pass therethrough to the interior of the chamber 10 and said glass is likewise secured in air tight relation with said cover 53.

With particular reference to Figs. 1, 2 and 7, it will be observed that the cover 53 is provided with a free turning bolt 60 having the head 61 disposed on the outside of the cover, said bolt depending into the chamber 10 and having its end threaded to receive the wing nut 62. A sleeve 63 provided with an L-shaped lug 64 is slidably mounted on the bolt 60 and adapted to be moved longitudinally thereof by the wing nut 62 to cause the lug 64 to engage the undersurface of the top 50 to secure the cover 53 in tight closed position from within. In Fig. 7 the lug 64 is shown engaging a flange of the angle bar 65 forming the joint between the walls and the top 50 of the chamber 10, but said flange is an integral part of the top 50. By the construction shown in said Fig. 7, it will be readily seen that a repairman located inside the chamber 10 can manipulate the wing nut 62 to open or to secure the cover 53 in closed tight position, and it will also be seen that the bolt 60 can be turned from the outside of said chamber by applying a wrench or other suitable tool to the head 61 of said bolt. In other words, by turning the head 61, the bolt may be unscrewed sufficiently from the wing nut 62 to loosen the frictional engagement of the lug 64 with the cover 50, and any further movement of the head 61 will not only turn the bolt 60, but the wing nut 62 and the sleeve 63 sufficiently to disengage the lug from the undersurface of the top, whereupon the cover may be lifted. Any suitable means such as a cotter pin 66 may be employed in the free end of the bolt 60 to prevent the wing nut 62 from accidentally becoming disengaged from the bolt and lost.

The chamber or air lock 10 is provided interiorly with a plurality of steps 70 and hand holds 71 to aid the repairman in entering and leaving the chamber. The steps 70 together with the turned over upper edge 21 of the intermediate partition 16, and the top 25 of the inwardly extending pocket or recess 23 will thus be seen to easily allow the repairman to assume the position shown in dotted lines in Fig. 1: with each foot resting on the floor 15 and on either side of the said pocket 23. The top of the pocket 23 will be found a convenient shelf for tools. An electric light 74 is advantageously disposed within the chamber 10 for illuminating purposes, and a valve 75 having the handle 76 is provided within the chamber, said valve connecting through one of the walls of the chamber with a hose line 77 adapted to furnish air under pressure to the chamber from any suitable source, not shown.

In operation it will be assumed that the particular blade 28 of the propeller 4 has

been damaged and is to be repaired or replaced. The vessel is stopped, and the cover removed from the hatchway over the damaged propeller whose shaft 5 is slowly turned by any suitable means until the damaged propeller blade 28 is uppermost. The portable air lock 10 is then swung down through the hatchway so that the damaged blade 28 will extend upwardly into the space 20 between the side walls 12 and 13, the front wall 11 and the intermediate wall 16 all as will be clear from Figs. 1 and 2. The intermediate partition 16 is of sufficient height that when the chamber 10 has been lowered and is resting by means of the angle bars 30 on the deck 2 of the vessel, the upper edge 21 of said wall 16 will lie above the liquid level represented by the dot and dash line 80, which also represents the surface level of the river. 81 represents the main bottom line of the stern portion of the vessel and 82 represents the bottom of the vessel forming the arched roof of the tunnel 83 in which the propeller 4 operates.

When the chamber is thus positioned, the repair man enters through the open cover and assumes his position as indicated in Fig. 1. There will be no water in that part of the chamber between the intermediate wall 16 and the rear wall 14, but there will be water within the space 20 up to the water level line 80. The cover 53 is then clamped in tight locked position by means of the wing nut 62 and lug 64, and the air valve 75 opened by means of the handle 76 under the control of the repairman. Air under pressure will then be admitted into the chamber 10, driving out the water in the space 20 until said water has reached the bottom plane 26 of said space, when the air will escape as shown by the bubbles in Fig. 1 to the water level 80 and thence through the hatchway 1. When the water has thus uncovered the damaged blade 28, the nuts 27 holding the said blade in place may then be unscrewed whereupon the damaged blade can be removed by any suitable means, such as a block and tackle suspended from the rail 42 through the open cover 53, and the new blade lowered into position, the block and tackle removed, the cover 53 closed, and air again admitted to the chamber under pressure in order that the repairman will be the better enabled to secure the new blade into place by the nuts 27. It will be observed that the lock 10 illustrated in Fig. 1 is made particularly for a propeller such as 4, provided with removable blades. That is to say, the width of the space 20 is made sufficient for the blades of said propeller and the pocket 23 is made only of sufficient size to receive the cap piece 24.

With particular reference to Figs. 1, 2 and 5, it will be observed that when the air lock 10 is in operative position, not only will the damaged blade 28 be disposed within the space 20, but also the adjacent blades. In other words, the blades are so shaped that when the chamber is in full lowered position, see Fig. 2, with the bottom edges 85, 86 and 87 of the front and side walls below the plane of the nuts 27 securing the damaged blade 28, then the adjacent blades 88 and 89 will have a portion of their edges extending above the plane of said edges. Therefore to accommodate the propeller blades 88 and 89, the bottom portion of the side walls 12 and 13 have been notched to provide the apertures as clearly shown at 90 in Fig. 5. About the edges of the notches 90 there is secured, by any suitable air tight means, the edge portion of a flexible pocket, generally indicated by the numeral 91, and which may be made of any close woven heavy fabric which is substantially water and air tight. Thus it will be seen that when the chamber 10 is in its lowered position, the propeller blades 88 and 89 will lie within the notchse 90 of the side walls, but the flexible pockets 91 will fit closely over said blades so that when air is admitted to the chamber, the water will be expelled from the space 20 down to the bottom edges 85, 86 and 87 of the side walls before the air will pass from said space 20. In other words, the flexible pockets 91 prevent the escape of the air under pressure from the space 20 until all of the water has been expelled from said space.

In Fig. 8 there is disclosed a slight modification of the invention. In other words, in this figure there is disclosed the same type of vessel provided, however, with a slightly different propeller construction, in that the propeller of this figure is made in a unitary casting whereas the propeller shown in Figs. 1 and 2 was made with detachable blades. Consequently a serious damage to a blade 100 of the propeller generally indicated by the numeral 101 would necessitate the removal of the entire propeller from the shaft 105 operating through the sleeve 106.

A modification of the air lock 10 will be required for this purpose. Such a chamber, designated by the numeral 110 in Fig. 8, comprises the front wall 111, the side walls 112 and 113, and the rear wall 114, all secured together by air and water tight joints. The top wall 115 is likewise secured in air tight relationship to the side walls and is provided with an opening about the edge of which is integrally disposed the flange 116 extending upwardly, the top edge of which is adapted to be engaged by the cover 117 hinged as at 118 and provided with a gasket 119 to insure an air tight fit. A fastening means 120 for the cover is provided similar in all respects to the fastening means for the cover 53 shown in Fig. 1. Likewise there are provided a plurality of steps 125 within the chamber as well as hand holds 126

to aid the repairman in entering and leaving the chamber. Further, there is a valve 127 operated by the handle 128 disposed within the chamber and connected as by the pipe line 130 to a suitable source of air supply not shown.

To support the chamber 110 in operative position, there is provided on its front and side walls the brackets 132, but on its rear wall 114 is secured a bracket 133 having a relatively long horizontally disposed member 134 to reach the rear wall 135 of the hatchway 1 for a purpose presently to appear. The front wall 111 of the chamber is provided with an opening 140, having thereabout in water tight relation a frame 141 provided with the outwardly projecting annular wall 142 which is further provided with an extreme edge portion 143, see Fig. 8, more or less flexible and adapted to contact with the hub portion 145 of the propeller 101, to form a substantially water tight joint therewith. From said Fig. 8 it will be perfectly clear that the purpose of this opening in the front wall 111 is to permit access to the bolts 146 securing the cap piece 147 to the propeller block 101. In other words, when the chamber is in operative position, a repairman within the chamber 110 will be enabled to remove the bolts 146 and the cap piece 147 whereupon the nut 148 securing the propeller 101 on the tapered end 150 of the propeller shaft 105 can be removed, the propeller 101 disengaged and a new propeller installed.

That is to say, in actual operation, the air lock 110 is lowered through the hatchway 1 and forced by any suitable means lengthwise of the vessel until the frame 142 of the aperture 140 in the front wall 111 of said chamber has engaged the hub 145 of the propeller and become suitably maintained therewith. The repairman then enters through the cover 117, locks the same, and then turns on the air which will force the water in the bottom part of the chamber 110 out through the grated flooring 160 serving as the bottom of the chamber until the water has reached the bottom edge 161 of said chamber whereupon the air will escape. The grated flooring 160 is supported on suitable brackets 162 several inches above the bottom edges 161 as clearly seen in the drawings, so that when the water has receded through the grated bottom of the chamber, the repairman can step down onto a relatively dry flooring. When the cap piece 147 and the nut 148 have been removed, the repairman then leaves the chamber, which is then hoisted from its operative position, and any suitable cable or other device lowered through the hatchway and passed around the propeller, which may then be entirely removed from the tapered spindle 150 and withdrawn through the hatchway 1. The space between the rear wall 114 of the chamber and the rear wall 135 of the hatchway is provided to allow the chamber with its extending frame 142 to pass easily through said hatchway, as will be obvious. The new propeller may be lowered through the hatchway, forced onto the tapered spindle 150, the air lock 110 again lowered into operative position, entered by the repairman, air admitted under pressure, and the new propeller 101 rigidly secured in place. The chamber 110 may likewise be provided with an electric light 165 which may be positioned in any suitable part of the chamber to better aid the repairman in his work, and a glass light provided in the cover 117 or not as desired.

In Fig. 12 there is shown the chamber 110 in the hatchway 1 but it is to be noted that in said figure the entire top portion of the chamber is removed. Further, it will be observed that the propeller has been removed from the tapered end 150 of the propeller shaft 105 and that the problem presented in said figure is to replace the bushing 200 about the shaft 105 and carried by the journal 201 supported as by the strut 202 from the roof structure 82 of the tunnel 83. In this application of the invention, and after the propeller has been removed from the shaft, the chamber 110 is moved within the hatchway 1 until the angular frame 142 contacts with the journal 201 supporting the shaft 105 whereupon the flexible end 143 of said frame 142 will frictionally contact with said journal as clearly indicated and seal the aperture 140 in the front wall 111 so that water will not enter therethrough.

In the construction shown in Fig. 8, water enters the chamber during its placement in the hatchway but said water is expelled therefrom by the admission of air under pressure in the chamber, the water passing out through the grated bottom 160. In Fig. 12 there is disclosed a different or modified form of construction. That is to say, when the chamber 110 illustrated in said Fig. 12 is lowered through the hatchway, the valve 210 which is opened against the tension of the spring 211 by the pressure of the water which freely enters the chamber through the opening 212 in the otherwise imperforate bottom 213 thereof. After the chamber is correctly positioned for the repair and secured in place, then the rod 214 is pushed downwardly and the handle 215 is snapped under the bracket extension 216 to secure the valve 210 in closed position, after which the water in the bottom of the chamber may be removed in any suitable manner such as by pumping through the hose or pipe 217. It is to be understood, however, that any suitable valve and operating connections may be used, the particular valve 210 simply being by way of illustration. Thus it will

be seen that the type of chamber shown in Fig. 12 may be used without the aid of air under pressure or it may be employed with air, by providing a suitable top or cover and a perforated bottom as shown in Fig. 8. When the new bushing has been positioned, then the chamber 110 is moved rearwardly and the propeller replaced on the spindle 150 and the cap piece 147 secured in position all as disclosed above and with reference to Fig. 8.

It sometimes happens that the nuts 27, being submerged, become rusted and are quite difficult to loosen. In fact it has been found impossible sometimes to move these nuts with a hand wrench in the relatively small confines of the space 20. Therefore there has been provided a means illustrated in Fig. 11 for loosening or tightening these nuts.

This means comprises a rod 170 provided at its lowermost end with the socket portion 171 adapted to fit the nuts 172 in the cover 53 and has its upper end squared as at 173 to receive the wrench 174 provided with a long handle 175 in order that great leverage may be obtained. In order that air from the chamber 10 may not escape, there is provided a flexible sheet of suitable material 180 such as closely woven fabric the outer edges of which are adapted to be secured to the cover 53 as by the strips 181 riveted or otherwise secured as at 182 to the cover to provide the air tight joint 183. The material 180 is preferably substantially cone-shaped and the apex of the cone is adapted to snugly fit the rod 170 being secured thereto in air tight relationship as by the collar or other suitable clamp 184. It is of course to be understood that the fabric cone 180 is to be of sufficient size to permit the rod 170 being axially turned from 90° to 180°, and to allow the necessary lateral movements of said rod for engagement with any one of the nuts 27 holding any one of the blades of the propeller. When the rod 170 is not required, it may be withdrawn from the fabric cone 180 and any suitable plug, not shown, of the same diameter as the rod 170 inserted in the place thereof and the clamp 184 tightened so that there will be no escapement of air from within the chamber 10 when the cover 53 is closed. Thus it will be seen that the rod 170 may be operated by one or more persons on the deck whereby great leverage may be obtained to loosen the tightest of the nuts 27. The socket 171 of the rod will of course be positioned by the repair man within the chamber, and if desired the rod may be provided with a squared portion just above the socket in convenient reach of the repairman so that he may apply a wrench thereto and operate the same to work on the tight nut jointly with the persons on the deck.

In Fig. 13 there is disclosed a means of applying additional power in order to tighten or loosen the nuts 27 without necessitating the use of compressed air. That is to say, the chamber 10, which is similar to the chamber illustrated in Fig. 1 in every way except it has no cover nor in fact any top whatever, is positioned in the hatchway 1, water entering the bottom thereof to the level represented by the dot and dash line 80, but, as hereinbefore explained water will not enter the compartment where the repairman will stand. The recessed end 171 of the rod 170 is then guided by the repairman to position on a nut 27 and additional power applied to the upper end of said rod as through the handle 175. Thus it will be seen that the open top chamber illustrated in Fig. 13 may be employed where circumstances, such as clear water, etc., permit, or the chamber may be provided with a tight top and cover which, when securely fastened, will create a chamber adapted to serve as an air lock, and the water expelled therefrom to uncover the nuts 27 as hereinbefore explained.

In Fig. 6 is illustrated the cover 190 for the hatchway 1. Said cover is box-like in construction, having the side walls 191, the top wall 192, and the bottom wall 193 which forms with the roof 82 of the tunnel 83 a smooth surface in order that the water set in motion in said tunnel by the propeller may pass thereover with the least friction possible. All of the walls are rigidly secured together, the top wall or cover 192 extending beyond the side walls as at 194 and secured to the angles 195 which are adapted to overlie the combing 196 around the hatchway. A handle 197 is provided for the cover which may be fastened to the vessel in any suitable manner such as by the bolts 198. The brackets 30, 132 and 133 of the respective chambers 10 and 110 may be drilled for registration with the holes in the combing 196 so that said bolts 198 may be utilized for securing said chambers to the vessel.

From the above disclosure it will therefore be seen that by this invention there is provided a chamber 10 or 110 comprising a plurality of walls, an open bottom and a cover hingedly secured to one of said walls, said cover adapted to be unlocked from either side thereof. Further there is provided means comprising a plurality of brackets 30, 132 and 133 rigidly secured to said walls and adapted to register with the fastenings 198 of the hatchway cover 190, cooperating with the deck of the vessel to secure the chamber in predetermined partial submergence. Also there is provided means comprising the tackle 35 to readily position the chamber

with respect to a particular propeller, as well as a flexible air tight connection 180 adapted to receive a repair tool 170 for operation from either inside or outside of the chamber. And, lastly, there is provided means to prevent water entering the chamber while the repairs are being made, which includes the admission of fluid pressure through the valve 75 under control from within the chamber, the flexible pockets 91, the gasket 55 of the cover 53 and the fastening means 60, 62 and 63 for said cover operable from within the chamber.

It is obvious that those skilled in the art may vary the details of construction as well as the arrangements of parts without departing from the spirit of this invention and therefore it is not desired to be limited to the foregoing except as may be demanded by the claims.

What is claimed is:—

1. In a portable air lock adapted for use in repairing propellers of a vessel the combination of a chamber comprising a plurality of walls, an open bottom, and a cover hingedly secured to one of said walls, said cover adapted to be unlocked from either side thereof; means cooperating with the deck of the vessel to secure said chamber in partial submergence; and means to prevent water entering said chamber while said repairs are being made.

2. In a portable air lock adapted for use in repairing propellers of a vessel the combination of a chamber comprising a plurality of walls of differing lengths and a cover; means cooperating with the neck of the vessel to secure said chamber in partial submergence with the longer of said walls extending below the center of said propellers and the shorter of said walls disposed above said center; and means to prevent water entering said chamber while said repairs are being made.

3. In a portable air lock adapted for use in repairing propellers of a vessel the combination of a chamber comprising a plurality of walls and a cover hingedly secured to one thereof; means cooperating with the deck of the vessel to secure said chamber in partial submergence; and means including said cover to prevent water entering said chamber while said repairs are being made.

4. In a portable air lock adapted for use in repairing propellers of a vessel the combination of a chamber comprising a plurality of walls and a cover, one of said walls being apertured to accommodate said propeller; means cooperating with the deck of the vessel to secure said chamber in partial submergence; and means including means flexibly associated with said aperture to prevent water entering said chamber while said repairs are being made.

5. In a portable air lock adapted for use in repairing propellers of a vessel the combination of a chamber provided with a plurality of walls and a cover; means cooperating with the deck of the vessel to secure said chamber in partial submergence; means to prevent water entering said chamber while said repairs are being made; and a flexible connection associated with said cover adapted to receive a repair tool for operation from either inside or outside said chamber while said last named means is functioning.

6. In a portable chamber adapted for use in repairing propellers of a vessel the combination of a chamber provided with a plurality of walls and a cover; means cooperating with the deck of the vessel to secure said chamber in partial submergence; means to prevent water entering said chamber while said repairs are being made; and a flexible airtight connection associated with said cover adapted to receive a repair tool for operation from either inside or outside said chamber while said last named means is functioning.

7. In a portable chamber adapted for use in rapairing a propeller of a vessel the combination of a plurality of water tight walls; a support for the repairman within said chamber, said support constituting a portion of the bottom of said chamber; means to receive a portion of said propeller; including the remainder of said bottom of said chamber; and means to keep said repairman substantially dry while said repairs are being made.

8. In a portable chamber adapted for use in repairing a propeller of a vessel the combination of a plurality of water tight walls; a support for the repairman within said chamber; means comprising an aperture in one of said walls to receive a portion of said propeller; means to prevent water entering said aperture; and means to keep said repairman substantially dry while said repairs are being made.

9. In a portable chamber adapted for use in repairing a propeller of a vessel the combination of a plurality of water tight walls; a support for the repairman within said chamber; means comprising an aperture in one of said walls to receive a portion of said propeller; flexible means to prevent water entering said aperture; and means to keep said repairman substantially dry while said repairs are being made.

10. In a portable air lock adapted for use in repairing propellers of a vessel provided with a propeller hatch the combination of a chamber comprising a plurality of walls, a bottom provided with an opening, and a cover, one of said walls being apertured to accommodate said propeller; means carried by said walls coacting with the fastenings of said hatch to secure said chamber in par-

tial submergence; and means to prevent water entering said chamber while said repairs are being made.

11. In a portable air lock adapted for use in repairing propellers of a vessel the combination of a chamber comprising a plurality of walls, a bottom provided with an opening, and a cover, one of said walls being apertured to accommodate said propeller; means cooperating with the deck of the vessel to secure said chamber in partial submergence; and means including means associated with said aperture to prevent water entering said chamber while said repairs are being made.

12. In a portable air lock adapted for use in repairing propellers of a vessel provided with a propeller hatchway and a cover therefor the combination of a chamber; means coacting with the fastenings of said hatchway cover to secure said chamber in partial submergence; and means to prevent water entering said chamber while said repairs are being made.

13. In a portable air lock adapted for use in repairing propellers of a vessel provided with a propeller hatchway and a cover therefor the combination of a chamber comprising a plurality of walls; means rigidly secured to said walls coacting with the fastenings of said hatchway cover to secure said chamber in partial submergence; and means to prevent water entering said chamber while said repairs are being made.

14. In a portable air lock adapted for use in repairing propellers of a vessel provided with a propeller hatchway and a cover therefor the combination of a chamber; means comprising a plurality of brackets coacting with the fastenings of said hatchway cover to secure said chamber in partial submergence; and means to prevent water entering said chamber while said repairs are being made.

15. In a portable air lock adapted for use in repairing propellers of a vessel provided with a propeller hatchway and cover therefor the combination of a chamber; means adapted to register with the fastenings of said hatchway cover and coacting therewith to secure said chamber in partial submergence; and means to prevent water entering said chamber while said repairs are being made.

16. In a portable chamber adapted for use in repairing a propeller of a vessel the combination of a plurality of water tight walls; a support for the repairman within said chamber; means comprising an aperture and a closure therefor in one of said walls to yieldingly receive a portion of said propellers; and means to keep said repairman substantially dry while said repairs are being made.

In testimony whereof I affix my signature.

CHARLES E. WARD.