April 28, 1931. H. E. GRIESHABER 1,802,943

ESCAPE HATCH FOR SUBMARINES

Filed May 7, 1928 3 Sheets-Sheet 1

Fig. 1.

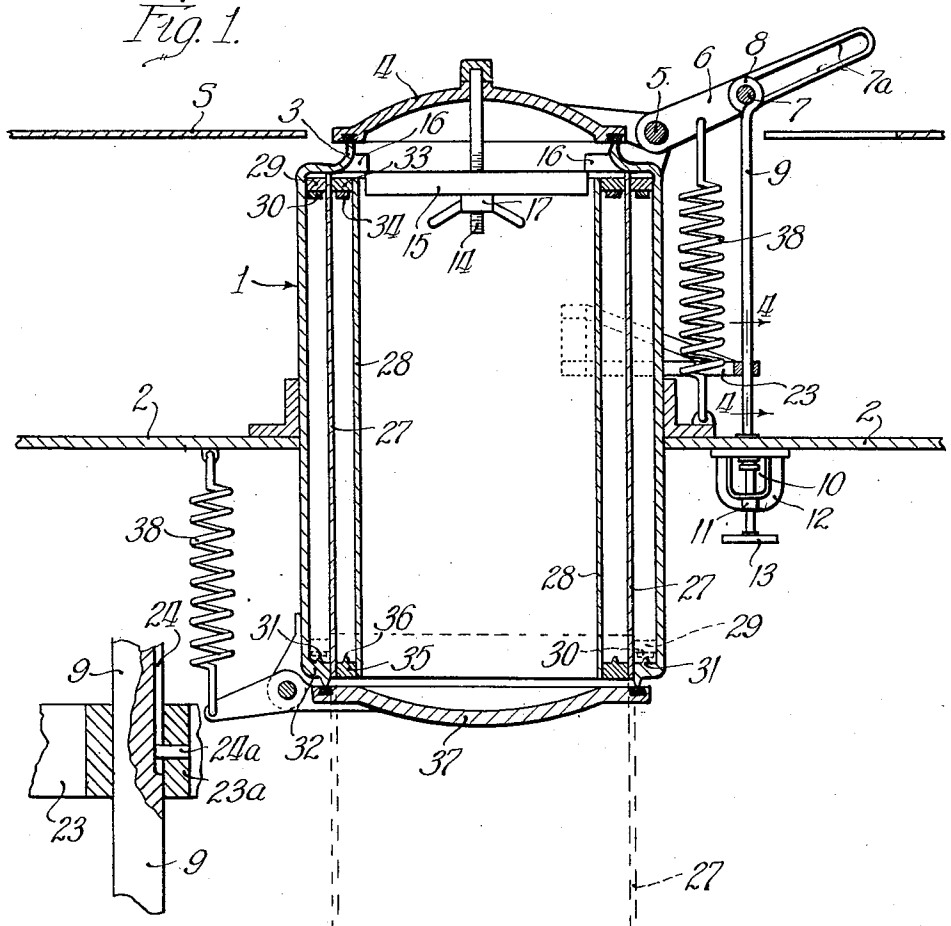
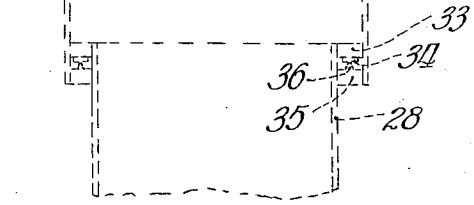


Fig. 4.



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Fig. 2.

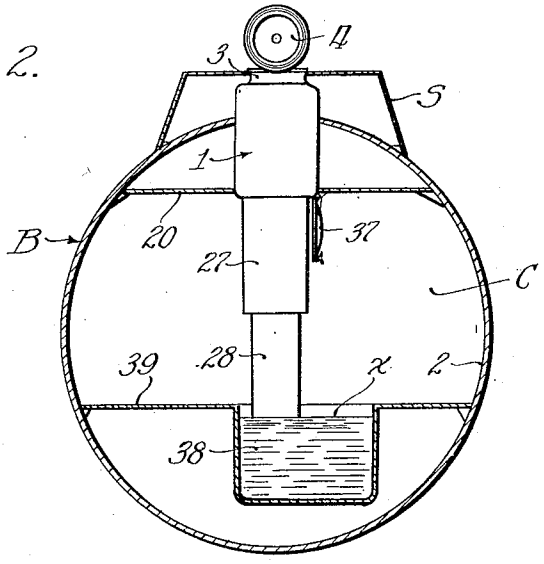
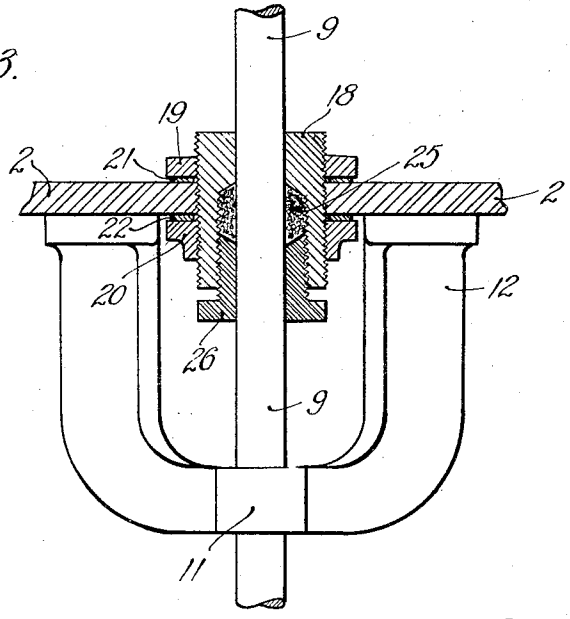


Fig. 3.



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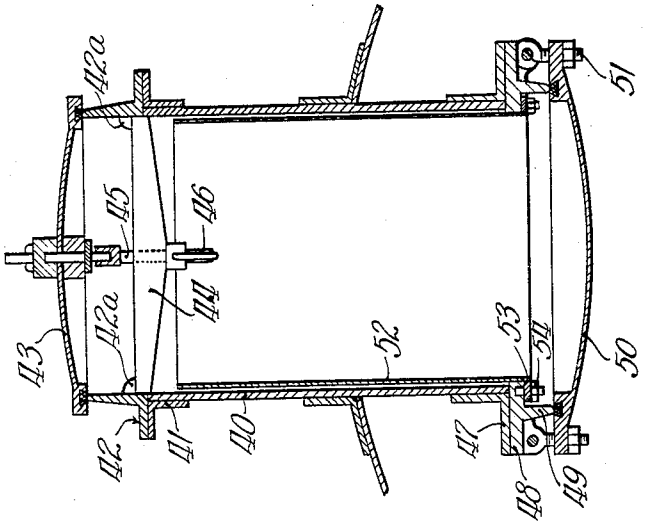


Fig. 5.

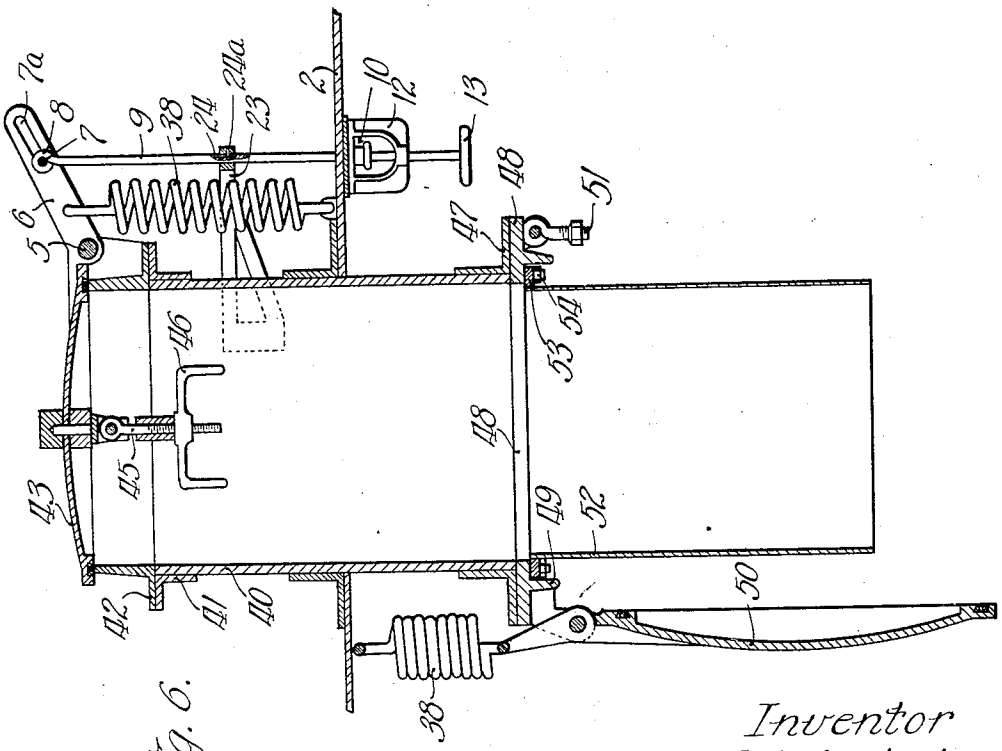


Fig. 6.

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UNITED STATES PATENT OFFICE

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ESCAPE HATCH FOR SUBMARINES

Application filed May 7, 1928. Serial No. 275,730.

This invention relates to submarine boats, and more particularly to an escape hatch structure therefor.

In the case of submarine boats which, due to collision or other cause, have been disabled and are unable to rise to the surface, it is desirable to provide means whereby the men can escape from the boat through an escape hatch without being subjected to pressure while immersed in the water for a longer period than is absolutely necessary. It is known to provide escape hatches in submarine boats, these hatches including a hatch trunk which extends downwardly a short distance into the compartment of the boat from the upper portion of the hull. In using these hatches the compartment is flooded until the water reaches the lower or inner end of the hatch trunk and effects a seal therewith. Under such conditions the men in the compartment are immersed in the water except for the upper portion of their bodies or their heads.

This is not usually seriously objectionable as the men can quickly escape from the compartment and are not subjected to high pressure in the water for an injuriously long period of time. In cases where the injured boat is at such a depth that the crew can not safely escape through the hatch without the use of diving suits or other apparatus and it is necessary for the men to remain in the compartment for some time after flooding thereof, this is objectionable. It has been found that a man can remain in a compartment filled with compressed air without suffering any ill effects therefrom for a much longer time than he can remain immersed in water under equal pressure. The water, at depths of 100 feet or more, such as that in which submarine boats operate, has a relatively low temperature. As a result, when the men in the compartment of the submarine boat are immersed in this water under pressure they are quickly chilled and their vitality is materially lowered. In consequence, the prospects of a man reaching the surface safely after being immersed in this water under pressure for an appreciable time are materially less than if the man were surrounded by compressed air, and not immersed in the water. It also appears that the water, regardless of its relatively low temperature, has an effect on men immersed therein under pressure which tends to quickly weaken the men and reduce their vitality.

One of the main objects of my invention is to provide simple and efficient means whereby the men in the compartment of a disabled submarine boat are enabled to remain in such compartment without being immersed in water after the escape hatch has been opened.

More specifically, my invention comprises an extensible hatch in conjunction with a well disposed to receive the lower end of the hatch when extended, this well being disposed below the compartment whereby the water does not rise into the compartment when the well is flooded, the men when escaping entering this well and passing therefrom into the hatch trunk. With the hatch fully extended the men have a dry deck where they can put on diving suits, and do not have to enter the water until after the diving suit has been completely applied and properly secured, and the man is ready to pass through the hatch trunk to be transferred to the rescue ship. Further objects and advantages of my invention will appear from the detailed description.

In the drawings:

Figure 1 is a sectional view through a hatch structure constructed in accordance with my invention, the upper portion of the hull and the superstructure of the submarine boat being shown fragmentarily, parts being shown in elevation;

Figure 2 is a transverse sectional view through a submarine boat of conventional type showing a hatch structure constructed in accordance with my invention as applied and extended;

Figure 3 is a vertical sectional view through the stuffing box for the hatch cover operating rod, parts being shown in elevation;

Figure 4 is a sectional view taken substantially on line 4—4 of Figure 1, on an enlarged scale;

Figure 5 is a view similar to Figure 1 of a modified form of hatch structure; and

Figure 6 is a view similar to Figure 5 but showing the hatch structure extended.

Referring more particularly to Figure 1, I provide a hatch structure which includes a trunk having a main section 1 which is fixedly secured to hull 2 of a submarine boat B. This section 1 is provided at its upper end with a reduced neck 3 defining a hatch opening which is closed by a scuttle or cover 4 hinged at 5 on trunk section 1. The cover 4 is provided with arms 6 extending therefrom, these arms extending beyond the pintle 5 and being provided with slots 7*a* which receive a pin 7. This pin passes through an eye 8 at the upper end of an operating rod 9 slidably mounted through a stuffing box 10 secured through hull 2. The rod 9 is also slidable through a guide collar 11 of a suitable bracket 12 secured to the inner face of hull 2, and is provided at its lower or inner end with a suitable head forming a handle 13, the rod being of T shape. The scuttle or cover 4 is secured closed by a screw 14 secured thereto and passing through a scuttle bar 15 which engages beneath lugs 16 extending from trunk section 1, a hand nut 17 being threaded onto the screw 14 and bearing against the bar. By loosening nut 17 and turning bar 15 from beneath the lugs 16, the scuttle is released so as to be opened. In this connection, it is to be noted that the scuttle 4 can be opened and closed independently of bar 9 which normally remains in its raised or inoperative position.

To insure proper engagement of eye 8 with pin 7, suitable means is provided for holding the rod 9 against turning movement. Such means may be of any suitable or preferred construction. In Figure 3 I have illustrated the rod 9 as operating through stuffing box 10 which includes a packing gland 18 extending through an opening in the top of hull 2. Suitable nuts 19 and 20 are screwed onto this gland and gaskets 21 and 22 are confined between the nuts 19 and 20, respectively, and the hull 2, these nuts being turned tightly into position to secure the packing gland and to form a fluid tight closure between the same and the hull.

Rod 9 also operates through a collar 23*a* of a bracket 23 suitably secured to hatch trunk 1. A pin 24*a* is secured in collar 23*a*. This pin projects into a groove 24 formed in rod 9 and extending longitudinally thereof, and holds the rod against turning movement.

The bore of the packing gland 18 is enlarged at its inner portion to receive a packing 25, in a known manner, and a packing nut 26 fits snugly about rod 9 and screws into the packing gland compressing the packing 25 about the rod 9 so as to provide a fluid tight closure about the same. When the scuttle or hatch bar 15 has been released so as to release the scuttle or cover 4, this cover may then be opened from within the compartment of the submarine boat by pulling downwardly on rod 9 thus swinging the cover 4 into open position through engagement of eye 8 with the rod or pin 7.

The scuttle section 1 has associated therewith an outer telescoping section 27 and an inner telescoping section 28. Section 27 is provided at its upper end with an outer annular member 29 secured thereto and providing, in effect, a flange of a width corresponding to the space between the section 27 and section 1, when the section 27 is in its raised or inoperative position. A rubber gasket 30 is secured to the underface of 29 and cooperates with a bead 31 extending from the upper face of a flange 32 extending inwardly from the lower end of trunk section 1, to form therewith a substantially fluid tight closure when trunk section 27 is in its lowered or extended position. The inner section 28 is provided with a similar flange member 33 and associated gasket 34 at its upper end, and the trunk section 27 is provided, at its lower end, with an annular member 35 secured thereto and extending inwardly therefrom. The members 33 and 35 correspond in width to the space between the sections 27 and 28, and member 35 is provided, on its upper face, with a rib 36 which cooperates with gasket 34 to form a substantially fluid tight closure when the section 28 is in its full lowered or extended position. The two sections 27 and 28 of the trunk structure, which telescope into each other and into the main fixed section 1, are thus held again any undesirable looseness or play and are effectively guided during extension or collapsing or folding of the trunk structure, the means for guiding these sections also serving to form fluid tight closures between the same.

When the trunk structure is in its normal non-extended or collapsed condition, the sections 27 and 28 are disposed within the main fixed section 1. A lower door or scuttle 37 closes the lower end of section 1, this door 37 being hingedly mounted and normally secured closed by suitable dogs, in a known manner. In practice, the upper hatch cover or scuttle 4 is also normally secured in closed position. The dogs for securing the scuttle 37 are, of course, disposed exteriorly of the hatch trunk and may be mounted thereon.

The hatch sections 27 and 28 may be of light construction and may be held raised by a pin or latch, or equivalent means, at the lower end of trunk 1, when the hatch covers 34 and 37 are open, as when the boat is on the surface. Any suitable means may be used to hold the hatch sections raised, and it is not thought necessary to illustrate any specific means. With sections 27 and 28, the trunk 1 and associated parts provide an access hatch of conventional type. As clearly illustrated in Figure 2, the lower end of trunk 1 is adjacent the top of compartment C pro-

viding ample head room for passage of the personnel of the boat through this compartment. The trunk and associated parts, constructed and arranged in this manner, normally provide an access hatch available for use at any time, and do not occupy valuable space which could be used for other purposes, which is of primary importance.

In the event that the submarine boat is disabled by collision or otherwise, and is unable to rise to the surface, the crew is assembled in a compartment provided with a telescoping hatch structure in accordance with my invention. The lower hatch cover 37 is then released and opened, and the hatch trunk is extended as in Figure 2. With the trunk in extended condition, the lower end of section 28 thereof extends into the upper end of a well 38 provided in hull 2 of the boat which is of conventional construction and includes the superstructure S.

After this has been done, compressed air is admitted to the compartment C either from a supply carried on board the submarine boat or from a salvage vessel, until the pressure inside of the compartment is equal to or slightly greater than the pressure of the water at the depth of the submarine. The outer hatch cover 4 is then opened by means of the rod 9 in the manner described, it being understood that hatch bar 15 is released and turned into inoperative position before extension of the hatch trunk. Upon opening of the cover 4, the well 38 is flooded with water, this water sealing the lower end of the extensible hatch trunk, the water level being indicated at X. The men within the compartment C stand upon the walking flat 39 of this compartment and are not immersed in the water. The extensible hatch trunk thus provides means whereby a comparatively great volume of air is trapped in compartment C for the benefit of the men in such compartment and awaiting rescue.

In the event the depth at which the boat is submerged is too great for the men to safely attempt reaching the surface by passing upwardly through the hatch trunk and without the provision of a diving suit, a diver from a rescue ship at the surface enters the compartment C through the extended hatch trunk. This diver carries with him an additional diving suit and hose, this additional suit being put on by one of the men to be rescued who then enters the well 38 and passes into the hatch trunk, being raised to the surface in the usual manner. This operation is repeated until all of the men in the compartment have been rescued. In the event that the depth at which the boat is submerged is such that the men can safely attempt to reach the surface without the use of a diving suit or other apparatus, the men successively enters the well 38 and pass upwardly through the extended hatch trunk, swimming to the surface where they are rescued.

In either case, the men within the compartment C awaiting rescue are not immersed in the water, and consequently, do not have their vitality reduced thereby, thus very materially increasing the possibility of rescue of such men.

The compartment C is also provided with web frames 20 adjacent the inner end of trunk section 1, these web frames forming air locks in a known manner in the event that the trunk cannot be extended. In such case, the escape trunk can be utilized for the escape of the men, as at present. In the event the boat is not lying on an even keel, the hatch trunk can be extended until the lower or inner end thereof forms a seal with the water in the compartment C, thus reducing as far as possible the extent to which the men are immersed in the water and, consequently, conserving the vitality of the men to this extent. Under most conditions, however, the boat will be on an even keel so that the extensible hatch trunk can be used in full extended position as illustrated in Figure 2 and the full benefits of this trunk and the well cooperating therewith may be had.

Preferably, each of the hatch covers 4 and 37 has associated therewith a counterbalancing spring 38 which acts, in a known manner to counterbalance the cover.

In the modified form illustrated in Figs. 5 and 6, I have shown a single section or tube and means for securing the same to the hatch trunk, but it will be understood that two or more sections may be used and such sections may be secured together in the same manner as the top section is secured to the trunk.

An angle ring 41 is secured to the upper end of hatch trunk 40 and has secured thereto an angle ring 42 upon which is mounted a scuttle 43 which is opened and closed in the same manner as scuttle or cover 4 of Fig. 1. Scuttle 43 is secured closed by a bar 44 the ends of which engage beneath lugs 42*a* projecting from the inner face of ring 42. Bar 44 slides upon a screw rod 45 secured to the cover in a known manner, and a hand nut 46 operates upon the rod and contacts bar 44 for securing the scuttle tightly closed. An angle ring 47 is secured on the lower end of hatch trunk 40 and has secured thereto a flat ring 48 having a depending annular flange 49 providing a seat for a lower cover or scuttle 50 hingedly mounted on ring 48 and secured closed by suitable dogs 51.

A tubular member or trunk section 52 fits within trunk 40. This member is provided, at one end, with an outer flange 53 which is secured, by means of suitably spaced cap screws 54 to rings 48, flange 53 being of proper diameter to fit within flange 49 of the ring. By removing cap screws 54 section 52 can be withdrawn from trunk 4 and then secured to

the ring 48 in inverted position, by means of the cap screws, so as to form an extension of the trunk as in Fig. 6. This is particularly useful in permitting escape of the crew through the hatch in shallow water as, under such conditions, the men can quickly pass through the escape hatch and are not subjected to pressure, when immersed in water, for an appreciable period of time.

I also contemplate providing two or more extension sections or members which may be secured together in the same manner as member 52 is secured to trunk 40, the lower portion of such structure, when extended, being disposed within the well 38 of the boat, as in Fig. 2. My invention also comprehends a scuttle trunk and an extension member therefor of such length that the lower end of the extension member, when in operative position, will extend into the well of the boat.

As above indicated, and as will be understood by those skilled in the art, changes in construction and arrangement of parts of my invention may be resorted to without departing from the field and scope of the same, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred forms only of my invention are disclosed.

I claim:

1. In a submarine boat, an extensible escape hatch trunk opening through the top of the hull of the boat, and a well in the hull disposed to receive the lower end of the trunk when said trunk is extended.

2. In a submarine boat, a hatch trunk open at its outer end and defining a hatchway, said trunk being extensible downwardly into the hull of the boat, a well within the hull and disposed to receive the lower end of the trunk when extended, a hatch cover for closing said hatchway, and means operable interiorly of the hull for opening said hatch cover.

3. In a submarine boat, an access hatch trunk fixed to the hull, a removable cover for the outer end of the trunk, a removable cover for the inner end of the trunk, and a tubular section telescoping the trunk and movable into and out of the same through the lower end thereof, said section when in its normal inoperative position being disposed entirely within the trunk between the covers thereof.

4. In a submarine boat, an access hatch trunk, a cover for the outer end of the trunk and opening outboard, a cover for the inner end of the trunk and opening inboard, and a tubular section telescoping into the trunk and movable through the inner end thereof into the hull, said section when raised being disposed within the trunk and between the covers thereof.

5. In a submarine boat, an access hatch trunk, a cover for the outer end of the trunk and opening outboard, a cover for the inner end of the trunk and opening inboard, a tubular section telescoping into the trunk and movable through the inner end thereof into the hull, said section when raised being disposed within the trunk and between the covers thereof, and means for supporting said section from the trunk when the section is extended into the hull.

6. In a submarine boat, an access hatch trunk opening directly into a main compartment of the hull, a removable cover for the outer end of the trunk, a removable cover for the inner end of the trunk, and a tubular section telescoping the trunk and movable through the inner end thereof, said section when raised being disposed within the trunk and between the covers thereof.

In witness whereof, I hereunto subscribe my name this 3d day of May, 1928.

HUGO E. GRIESHABER.