

Dec. 9, 1930.

L. Y. SPEAR

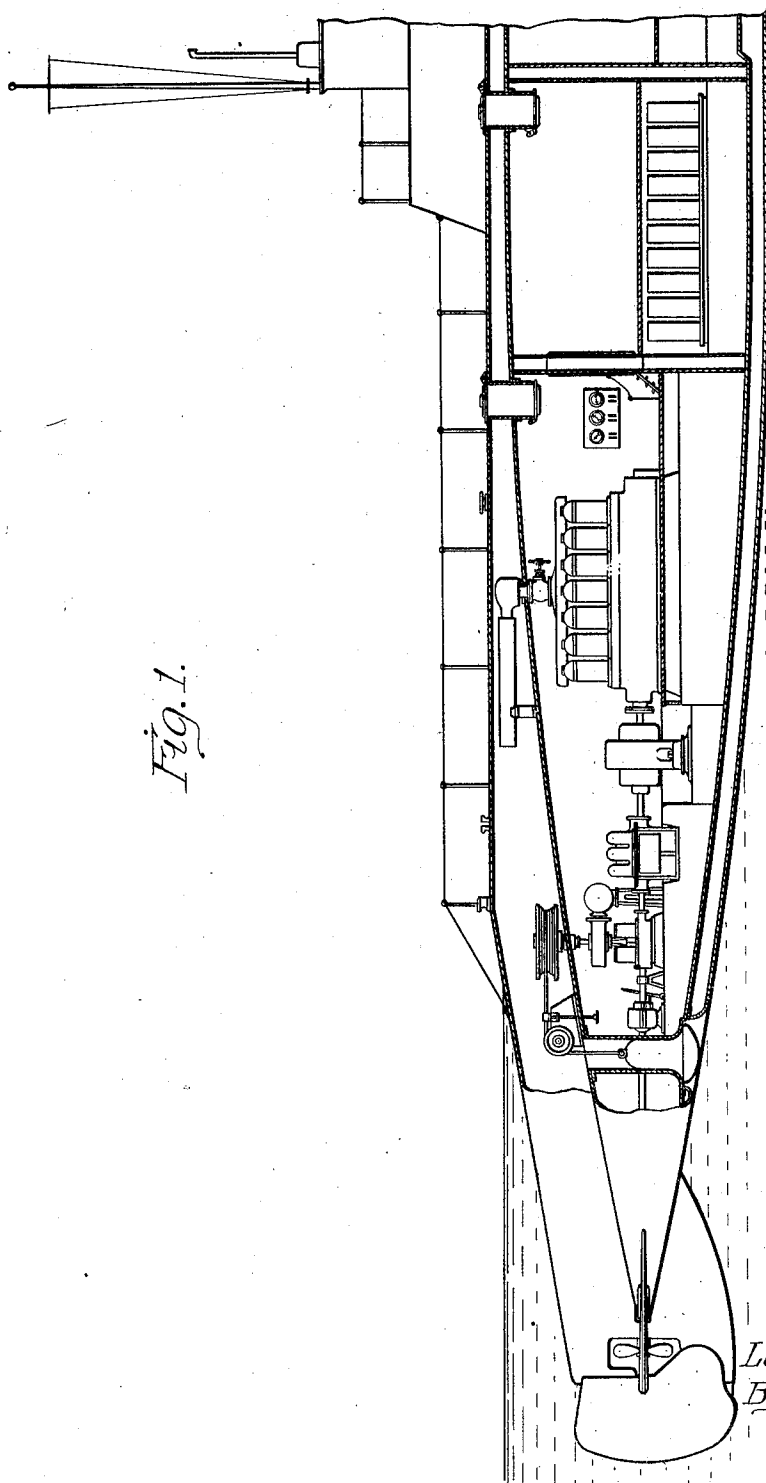
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RESCUE SUBMARINE

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4 Sheets-Sheet 1

Fig. 1.



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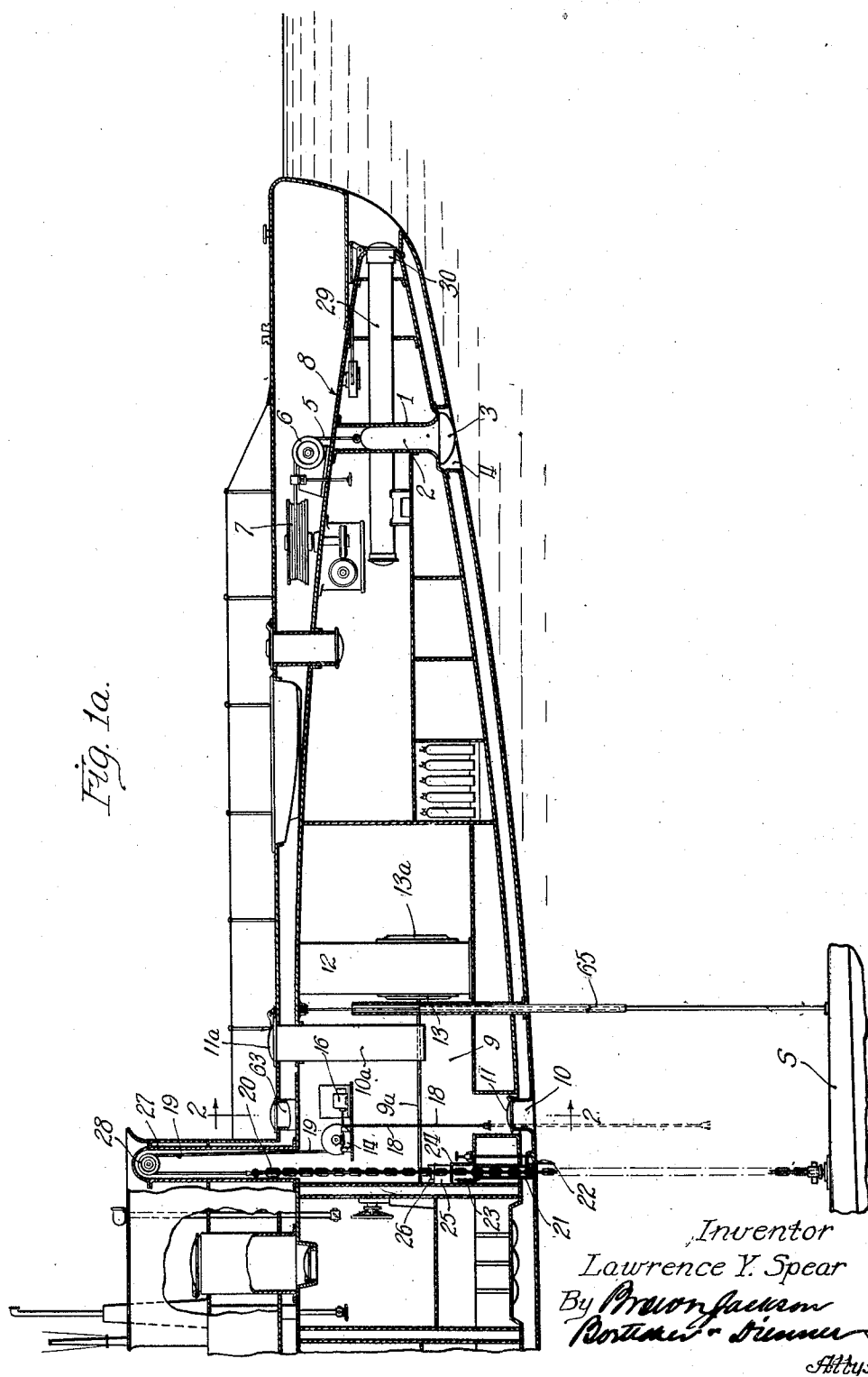
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RESCUE SUBMARINE

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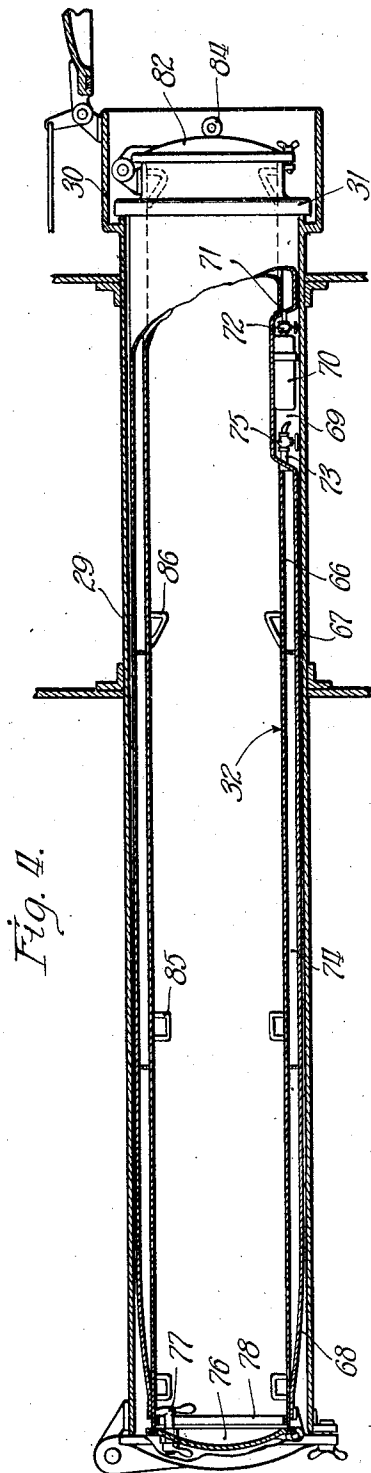
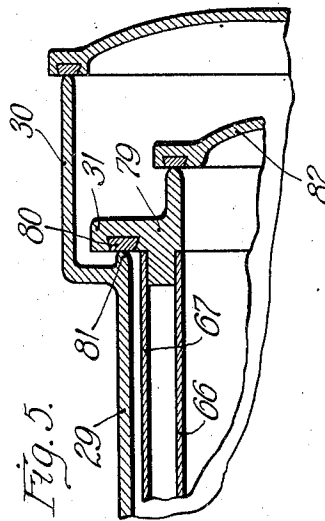
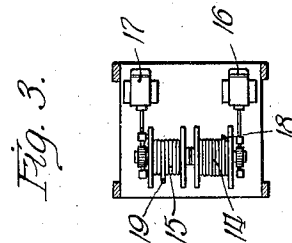
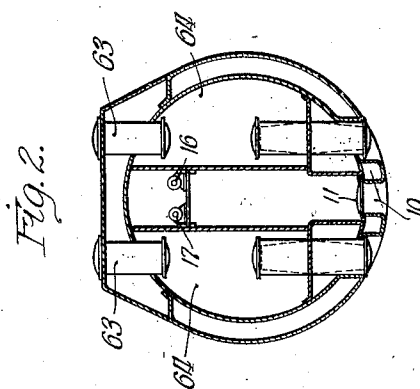
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RESCUE SUBMARINE

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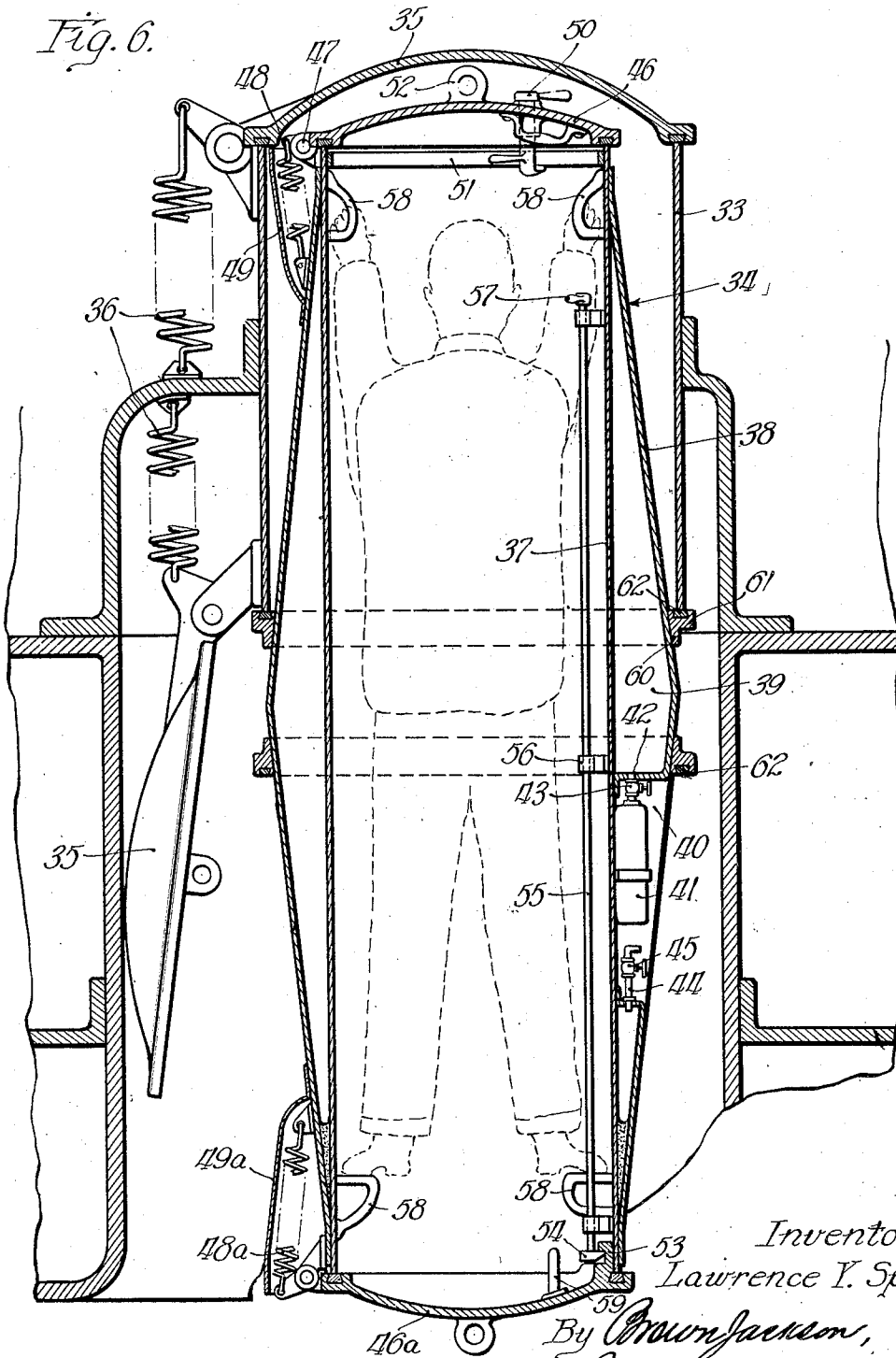
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Fig. 6.



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UNITED STATES PATENT OFFICE

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RESCUE SUBMARINE

Application filed February 20, 1928. Serial No. 255,684.

This invention relates to submarine boats, and more particularly to a submarine boat specially adapted for salvaging, and rescuing men from, a disabled or wrecked submarine boat resting on the bottom or submerged at an appreciable depth.

The efficiency of a rescue boat working on the surface is dependent upon weather conditions and, if the wreck is in an exposed position, surface rescue vessels can only operate under the best conditions of wind and wave, and often have to leave the scene of operations and seek shelter. This disadvantage, which is a vital one where rescue work is to be effected, can be avoided by providing a properly equipped rescue submarine boat capable of working submerged adjacent the wreck either on or near the bottom. This boat, being submerged, is not seriously affected by surface conditions and can carry on its work uninterrupted by such conditions. Fundamentally, my boat is constructed and designed like any other submarine boat and is fitted with all necessary propelling and auxiliary machinery, air compressors, air storage, et cetera. In addition to the usual equipment, a boat constructed in accordance with my invention carries the necessary fittings and apparatus for conducting all ordinary salvage work. With this object in view my salvage submarine is provided with suitable anchor gear at the bow and the stern thereof is also preferably provided with means for handling other mooring gear. A diving compartment fitted with all necessary diving equipment, including air locks and decompression tanks, and so designed that divers may leave the boat from either the bottom or the top thereof, is also provided. I also provide the boat with suitable tubes and compartments for reception of rescue cars stored therein, such cars being adapted for cooperation with the torpedo tubes and the access hatches of the disabled submarine for effecting rescue of the occupants thereof. An object of my invention is to provide a submersible salvage boat of the character stated having means associated therewith whereby a lifting chain or similar element may be secured to the lifting pad of the disabled sub-

marine boat and, by emptying the ballast tanks of the salvage boat, a lifting effect may be exerted for raising the disabled boat. A further object is to provide simple and efficient means whereby the salvage boat may be moored in position adjacent the wrecked or disabled submarine. Further objects and advantages will appear from the detailed description.

In the drawings:—

Figures 1 and 1—A are a sectional view of a submarine boat taken from the bow to the stern thereof;

Fig. 2 is a section taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a plan view of the windlasses and associated motors for winding and unwinding the cables for attachment of the lifting chain to the disabled boat;

Fig. 4 is a section through one of the storage tubes and an associated rescue car, the rescue car being partly broken away and shown in sections;

Fig. 5 is a detailed fragmentary sectional view on an enlarged scale through the muzzle end of a storage tube and the associated rescue car;

Fig. 6 is a section through another form of rescue car and its associated storage hatch and associated parts.

My boat is of known construction, the hull being divided into the usual compartments, ballast tanks, fuel storage tanks, etc. The hull is provided, adjacent the bow and the stern thereof, with an anchor compartment 1 which opens through the top and the bottom of the hull, this compartment receiving the shank 2 of an anchor of suitable type the head 3 of which fits into a recess or pocket 4 formed in the bottom of the hull. A cable 5 is secured to the anchor and passes over a suitable pulley 6, this cable being wound onto and off of a windlass 7 which is driven from means within the hull 8 in a known manner. These anchors provide simple and efficient means whereby the salvage submarine boat can be effectively moored either above or adjacent a disabled or wrecked submarine lying on the bottom or at an appreciable depth,

I further provide a diving compartment 9 which is disposed substantially amidship adjacent the conning tower and bridge. This compartment has suitable access hatches opening through the top and the bottom of the boat. The lower hatch 10 is closed by a suitable cover or door 11 which, in the form illustrated opens inboard though the cover may open outboard where necessary or desired. The upper hatch has a trunk 10a the upper end of which is closed by a door or cover 11a. This trunk extends downwardly below the platform 9a in the compartment 9. The provision of the upper and lower hatches is advantageous as permitting the diver to enter compartment 9 from below, as when the rescue boat is above the disabled boat or off of the bottom, or from above, as when the rescue boat is resting upon or closely adjacent the bottom. The diving compartment has associated therewith suitable means for supplying air under pressure thereto, and decompression chambers 12 are disposed adjacent the compartment 9 and have communication therewith and with the interior of the boat, by means of doors 13 and 13a. This provides simple and efficient means whereby the divers and their assistants can pass from the diving compartment to the adjacent compartment of the boat, and vice versa, without suffering any ill effects from a sudden increase or decrease in air pressure. When the diving compartment is not in use, the decompression chambers or tanks provide direct passageways between this compartment and the adjoining compartment. A pair of windlasses 14 and 15 are mounted in the upper portion of compartment 9 in a suitable manner and have associated therewith driving electric motors 16 and 17, respectively. A cable 18 is wound upon windlass 14 which is disposed to raise and lower the cable through the hatch 10. A second cable 19 is wound upon the windlass 15 and has its outer or free end secured to a lifting chain 20, which passes through a hawse pipe 21 opening through the bottom of the hull adjacent the access hatch 10, the lower end of this pipe being normally closed by a suitable cover 22 which opens outboard and the upper end of the hawse pipe being closed by a cover 23 which opens inboard. An angle member 24 extends transversely of the diving compartment 9 above the upper end of the hawse pipe 21 and is provided with an opening to accommodate the chain 20. The chain also passes through a block 25 which rests upon the member 24. By inserting a suitable pin 26 through a link of the chain at the top of the block 25, movement of the chain downwardly through the block is positively limited, and the load to which the lower end of the chain is attached is transmitted to the hull through the angle member 24. In this manner, the cable 19 and

associated parts are relieved of the stresses incident to raising heavy loads. The cable 19 passes upwardly from its windlass 15 into a suitable water tight housing 27, forming an extension of the diving chamber and about a guide pulley 28 suitably mounted in the upper end portion of this housing, this pulley being disposed to operate the chain 21 and cable 19 through the hawse pipe 21. In using the boat for salvage purposes it is preferably moored adjacent the disabled or wrecked submarine and a diver descends from the compartment through the hatch 10. The diver carries with him the cable 18 which is wound off of the drum or windlass therefor as the diver descends. The diver then secures the end of cable 18 to the wrecked or disabled submarine at or adjacent to the lifting pad thereof. After this has been done the ballast tanks are filled so that the boat has but slight positive buoyancy and the cable 18 is then wound upon its windlass, thus drawing the salvage boat down into position above and adjacent the disabled or wrecked boat. The chain 20 is then lowered through the hawse pipe and is secured to the lifting pad of the disabled submarine, as in Fig. 1—A. The water is then forced out of the ballast tanks of the salvage submarine and the buoyancy thereof exerts a lifting effect on the disabled boat.

If weather conditions are bad, the salvage submarine upon arriving upon the scene will drop its anchors near the wreck and will then fill its ballast tanks until the reserve buoyancy is less than the weight of the combined anchors on the bottom. When this has been done, the anchor cables 5 are wound upon the windlasses 7 and the salvage boat hauls itself down into the vicinity of the wreck. The boat can then operate from this position or, if desired, divers can attach mooring lines to the submerged wreck after which the salvage boat hauls up its own anchors and the mooring lines permits it to float above the wreck, the distance between the two boats being controlled by suitable warping gear. This renders it possible for the boat to operate submerged in bad weather, thus avoiding any delay in the rescue and salvage work from this cause. Under conditions of good weather the boat has the choice of working either from the surface or submerged.

The first and most important duty of a boat of this character is, of course, to effect rescue of those upon the injured or disabled submarine boat. With this object in view I provide, at the bow of the boat, a plurality of tubes 29 similar in all respects to torpedo tubes, except that the muzzle ends 30 of the tubes 29 are enlarged to receive flanges 31 at the outer ends of rescue cars 32 of a suitable length to be stored in such tubes, these cars being especially adapted for cooperation

with the torpedo tubes of the disabled submarine, as more fully explained in my co-pending application for rescue car, filed February 20, 1928, Serial No. 255,683. If the salvage boat operates from the surface, the rescue cars 32 are removed from the tubes 29 and are lowered into position adjacent the disabled or wrecked submarine, these cars being then inserted into the torpedo tubes and the men entrapped in the torpedo compartment of the disabled submarine are rescued therefrom by means of the rescue car in the manner set forth in my co-pending application above referred to.

I also provide suitable hatch trunks 33 for reception of rescue cars 34 which are stored in the trunks which open through the bottom of the hull of the salvage submarine. The trunks 33, when not used for storing the cars 34 are closed at their inner and outer ends by suitable doors or covers 35 which are secured closed in a known manner and have associated therewith counter-balancing springs 36. The car may be constructed similarly to the rescue car disclosed in my co-pending application, filed February 20, 1928, Serial No. 255,682. I prefer, however, to use the car illustrated in Fig. 6 of the drawings. This car includes a body comprising an inner cylindrical shell 37 and an outer shell 38, the outer shell being spaced away from the inner shell at its central portion and tapering toward each end. This provides a space 39 between the two shells. The outer shell 38 is provided with a depression forming a pocket or recess 40 for reception of a compressed air flask 41 which communicates by a tube 42 with the space 39, a suitable valve 43 being interposed in this tube and operable exteriorly of the car by the diver. A water tube 44 is also disposed within the pocket 40 and opens into the space 39, the outer end of this tube being open and a suitable valve 45 being interposed in this tube to be operated by the diver for controlling the same. By proper manipulation of the valves 43 and 45, the diver can regulate the buoyancy of the car so as to facilitate handling thereof.

The car is provided at one end with a suitable closure member or door 46 hingedly mounted on the car at 47 and having associated therewith a counter-balance spring 48 which urges the door in open direction. This spring is disposed within a suitable guard member 49 secured to the outer shell 38. The door 46 is secured in closed position by suitable dogs 50 operable from both the interior and the exterior of the car, these dogs engaging beneath a ring 51 secured within the car adjacent the end thereof. The door 46 is provided with an eye member 52 for reception of a suitable line or cable for use in handling and hoisting the car. A door 46a is mounted at the other end of the car in the

same manner as door 46 is mounted and is provided with upwardly extending hook elements 53 adapted for cooperation with securing dogs 54 on the lower ends of rods 55 rockably mounted through suitable brackets 56 secured on the inner face of the inner shell 37. A handle 57 is secured on the upper end of the rod in position to be grasped by a man standing upon the brackets 58 secured to the inner face of inner shell 37 adjacent each end thereof. The upper brackets provide hand holds for the occupant of the car. To permit closing of the door 46a by the occupant of the car, a U-shaped member or stirrup 59 is secured to the inner face of the door, this member being adapted for reception of the toe portion of the foot. By inserting the foot in the stirrup the door 46a can be moved into closed position and then secured by manipulating the rods 55 through the handles 57 thereof.

The rescue car is provided with two spaced rings 60 secured about the central portion thereof, each of these rings being provided with an outwardly extending radial flange 61 having a dovetail groove in its outer face which receives a packing or gasket 62. This gasket is adapted to seat tightly upon the end of the hatch trunk 33 when the car 34 is inserted therein in the position illustrated in Fig. 6. The flange rings are also adapted for cooperation with the access hatch trunks of a disabled submarine boat for effecting rescue of the men entrapped in the compartments thereof. As will be noted more clearly from Fig. 2, the salvage submarine is provided with access hatches including hatch trunks 63 which are disposed above the trunks 33 and open into compartment 64 into which the trunks 33 also open. In using the rescue car illustrated in Fig. 6, it is inserted into the hatch trunk of the disabled submarine and a man in the compartment of such boat enters the car and is transferred thereby to the rescue submarine in the manner set forth in my co-pending application, Serial No. 255,682, above identified. If the salvage submarine is disposed above the disabled submarine S, as illustrated in Fig. 1—A, the lower door 35 of the trunk 33 is opened, the trunk being first flooded in a known manner, and the car is then inserted into the trunk through the lower end thereof so as to bring the packing gasket 62 adjacent the trunk end. The trunk is then drained and the exterior pressure of the water forces the gasket tightly against the end of the trunk so as to form a water tight closure therewith. The upper door 35 is then opened, after which the cover 46 of the car is opened to permit escape of the occupants therefrom. The door 46 is then closed and secured, after which door 35 at the upper end of the trunk 33 is closed and the trunk is again flooded permitting the car to be removed therefrom and returned to the wreck where it is again

inserted into one of the access hatches. In the event that the salvage submarine is moored on or near the bottom, the rescue car with the occupants therein may be inserted into one of the hatch trunks 63 from the upper end thereof, the gasket 62 of the lower ring 60 seating upon the upper end of the trunk to form a water tight closure therewith. In this case, the door 46a is opened to permit escape of the occupant of the car through the lower end thereof.

To facilitate lowering of the rescue car illustrated in Fig. 6, particularly if the rescue boat is operating on the surface or an appreciable distance above the disabled boat, a weight member of suitable value may be placed within the rescue car, this member being removed therefrom upon opening the door 46a. Under ordinary conditions, however, this weight is not used. A similar weight may be used with the car of Fig. 4.

Preferably the salvage submarine is provided, adjacent the diving compartment 9, with a graduated telescopic sounding tube 65 of known type, by means of which the distance of the salvage boat above the disabled or wrecked submarine can be readily determined. This enables the salvage boat to approach within a very short distance of the disabled submarine while avoiding danger of injury to the latter.

The hawse pipe 21 through which the lifting chain 20 operates is disposed on the center line of the ship and at a point fore and aft coinciding approximately with the center of gravity of the combined water ballast tanks of the salvage submarine. While I have illustrated but one lifting chain, I contemplate the use of more than one chain. Where more than one chain is used, the chains should be so disposed that the center of gravity of the ballast tanks falls between the points at which the lifting chains are attached or connected to the boat.

Referring more particularly to Figs. 4 and 5, the car 32 includes an inner cylindrical shell 66 and an outer shell 67 spaced therefrom, this outer shell tapering at one end at 68. Shell 67 is provided with a depression or pocket 69 which receives an air flask 70 having a tube 71 opening into space 74 and provided with a control valve 72 operable by the diver exterior of the car. A water tube 73 is also disposed within the pocket 69 and opens into the space 74, this tube being provided with a control valve 75 interposed therein and readily accessible to the diver exterior of the car. This provides simple and efficient means under the control of the diver whereby water may be admitted to and expelled from the space 74 so as to regulate the buoyancy of the car to facilitate handling thereof. A vent tube may also be provided for permitting escape of air from space 74 when water is admitted thereto, this tube

being provided with a valve similar to valve 75, and disposed so as to be readily accessible to the diver. As vent tubes and valves therefor are well known, it is not thought necessary to illustrate or describe in detail such tube and valve.

The car 32 is provided at each end with a suitable cover 76 secured closed by dogs 77 which engage a ring 78 secured within the car. A relatively thick flanged ring 79 is provided at the other end of the car and has formed integrally therewith the flange 31 previously referred to. This flange is provided in its inner face with a dovetail groove in which is seated a packing ring or gasket 80 which cooperates with a bead 81 at the muzzle end of tube 29 to effect a fluid tight closure therewith. A cover 82 similar to cover 76 closes the car at the outer end of ring 79, cover 82 being provided with suitable securing dogs cooperating with the ring in a known manner. The cover 82 is also provided with an eye 84 for reception of a line or cable for hoisting and handling the rescue car. Within the car I provide a plurality of pairs of brackets 85 and 86 of suitable shape to provide hand holds and supports for the men within the car to stand upon. The car illustrated is intended to receive three men therein.

The rescue submarine boat is also equipped with suitable external air and pump connections for use in emptying the tanks and compartments of the disabled or wrecked submarine. This greatly facilitates the work of salvaging the injured or disabled boat.

To facilitate handling of the torpedo tube rescue car and insertion thereof into the torpedo tube of the disabled boat, when the rescue boat is operating from a position above the disabled boat, the car may be lowered in horizontal position and suspended adjacent the muzzle end of the torpedo tube by a bridle arrangement associated with the line for raising and lowering the car, in the manner illustrated and described in my co-pending application for rescue car, Serial Number 255,683, filed February 20, 1928.

What I claim is:—

1. In a submarine boat, a lifting chain, the boat having an opening through the bottom of its hull, said chain operating through the opening and being disposed at the approximate centre of gravity of the ballast tanks, and means for limiting movement of the chain through said opening.

2. In a submarine boat, a diving compartment having an access hatch opening through the bottom of the hull, a windlass, a cable windable onto and off of the windlass and operating through said opening, a hawse pipe opening through the bottom of the hull adjacent said opening, a second windlass, and a second cable windable onto and off of said

second windlass and operating through the hawse pipe.

of the hull and giving access from the exterior of the hull to said compartment.

In witness whereof I have hereunto subscribed my name this 2nd day of February, 1928.

LAWRENCE Y. SPEAR.

3. In a submarine boat, a diving compartment having an access hatch opening through the bottom of the hull, two windlasses within the compartment, a cable windable onto and off of one of the windlasses and operating through said opening, and a second cable windable onto and off of the other windlass, said compartment having a hawse hole opening thereinto and through the bottom of the hull adjacent the hatch opening, the second cable operating through said hawse hole.

4. In a submarine boat, a diving compartment having an access hatch opening through the bottom of the hull, a hawse pipe opening through the bottom of the hull adjacent said hatch opening, a windlass, a cable windable onto and off of the windlass, said cable operating through the hawse pipe, a lifting chain secured to the end of the cable and operating through the hawse pipe, and means releasably secured on the chain and cooperating with the hawse pipe to limit downward movement of the chain through the pipe and support the load to which the lower end of the chain is secured.

5. In a submarine boat, means for lowering a cable through the bottom of the hull and for winding up the cable after attachment thereof to an object beneath the boat, means for lowering a second cable with a lifting chain attached thereto through the bottom of the hull and for winding up said second cable after securing of the chain to the object to be raised, and means detachably secured to said chain for limiting downward movement thereof and for taking the load of the object being lifted.

6. In a submarine boat, a diving compartment having a hatch, a second compartment, and a decompression chamber having doors giving access to the respective compartments through said chamber.

7. In a submarine boat, a diving compartment within the hull, an access hatch through the bottom of the hull and giving access from the compartment to the sea and a second access hatch opening through the top of the hull and giving access directly into said compartment.

8. In a submarine boat, a diving compartment within the hull at the lower portion thereof, an access hatch through the hull and giving access from the compartment to the sea, a second access hatch opening through the top of the hull, and a trunk leading from the second hatch into said compartment.

9. In a submarine boat, a diving compartment within the hull, an access hatch through the bottom of the hull and giving access from the compartment to the sea, and a second access hatch opening through the upper portion

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