Oct. 2, 1923. 1,469,574

A. ALLAN

SALVAGING METHOD AND APPARATUS

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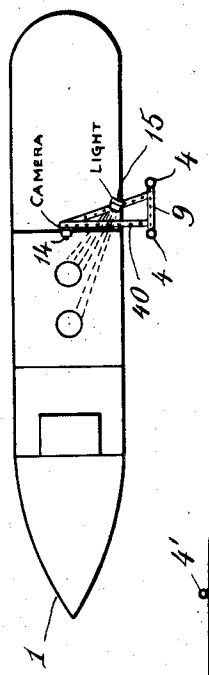


Fig. 1.

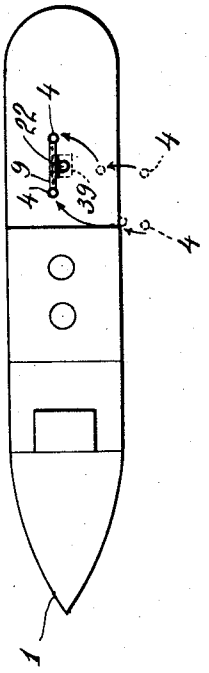


Fig. 2.

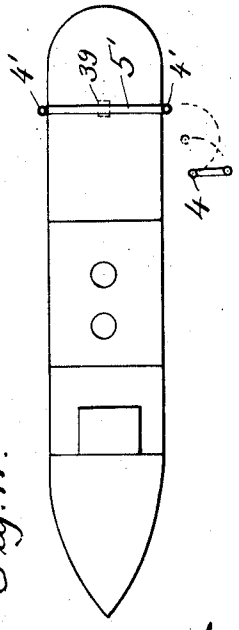


Fig. 11.

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Fig. 2a,

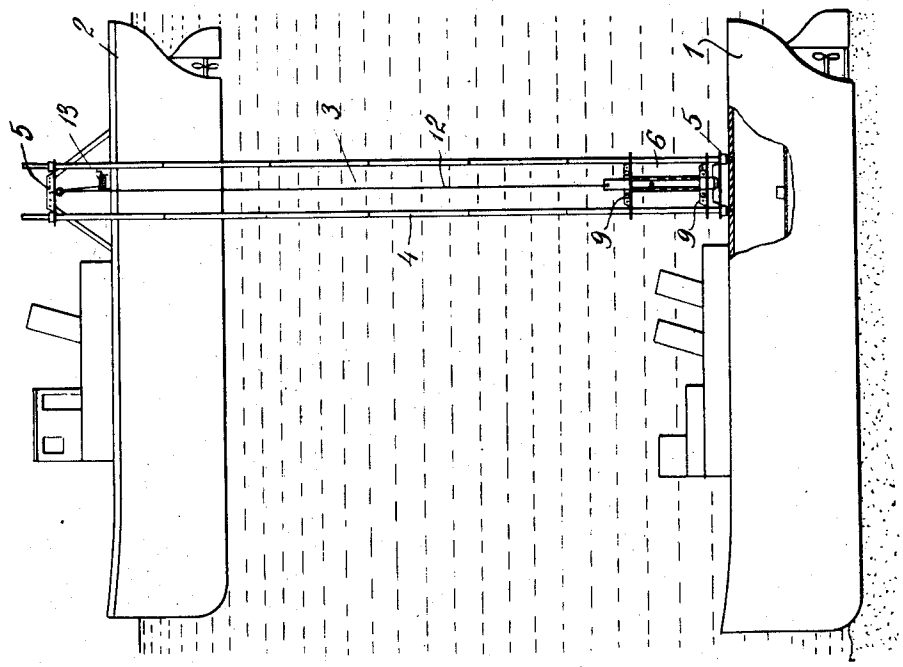
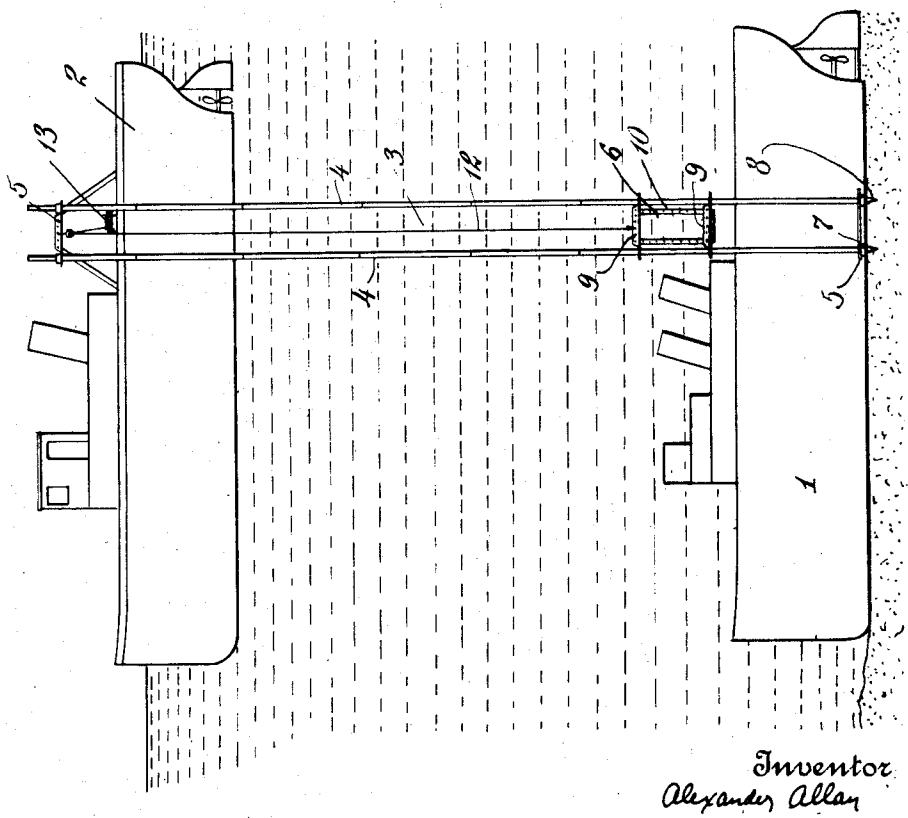


Fig. 1a,



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Fig. 3,

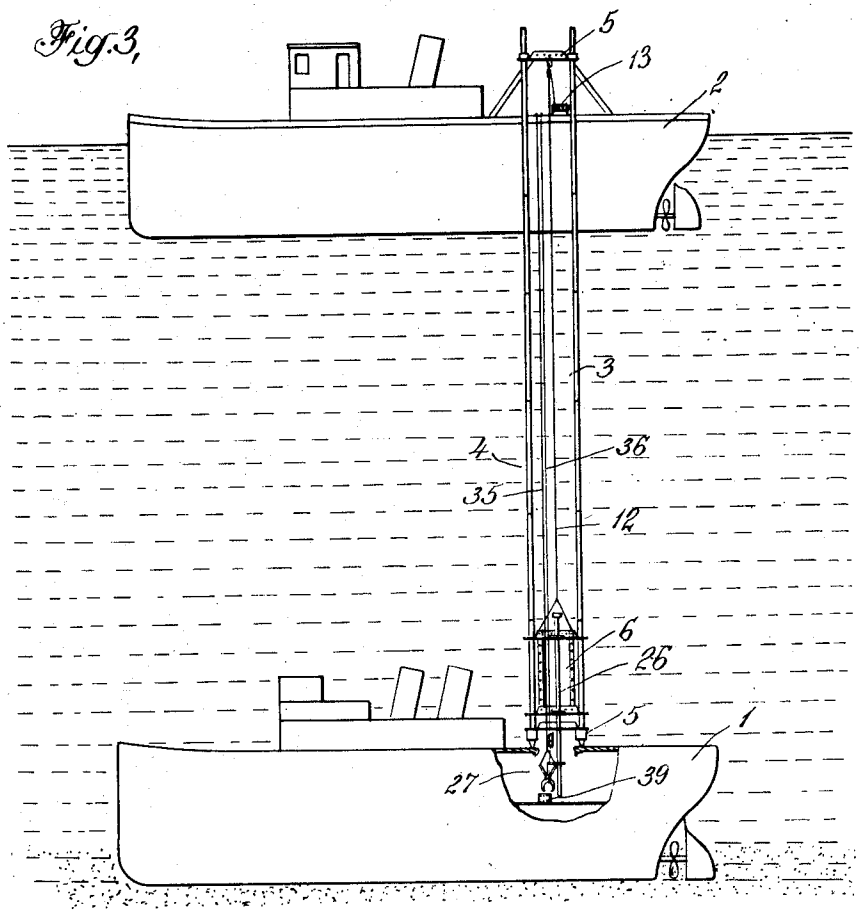


Fig. 4,

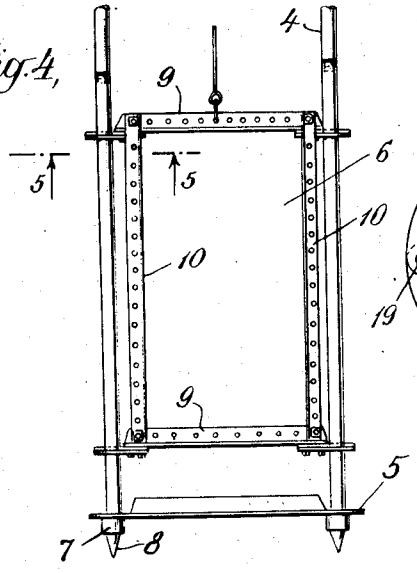
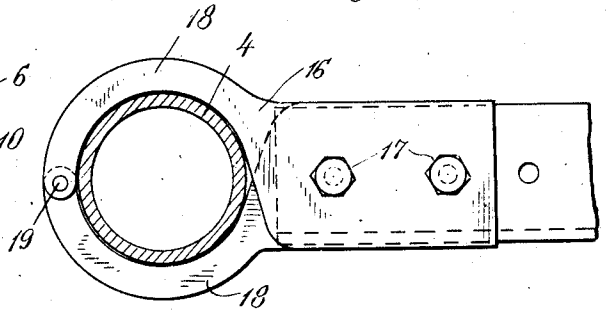


Fig. 5,



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Fig. 6,

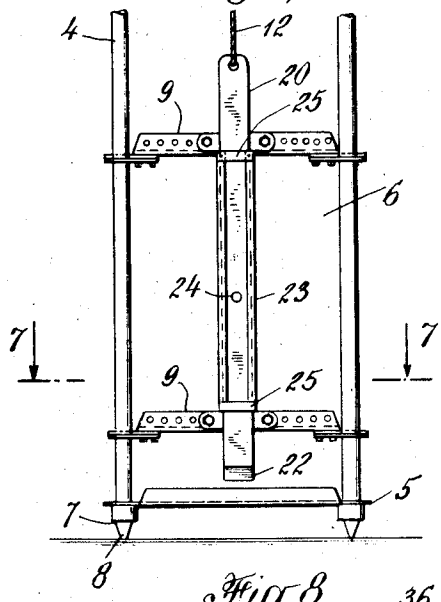


Fig. 7,

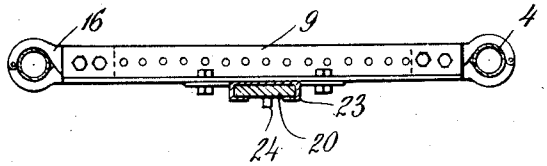


Fig. 9,

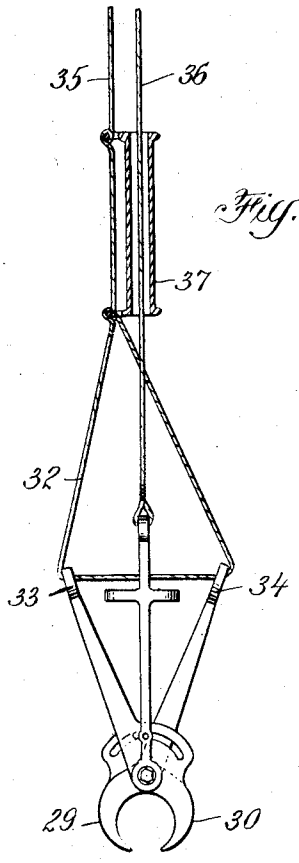


Fig. 8,

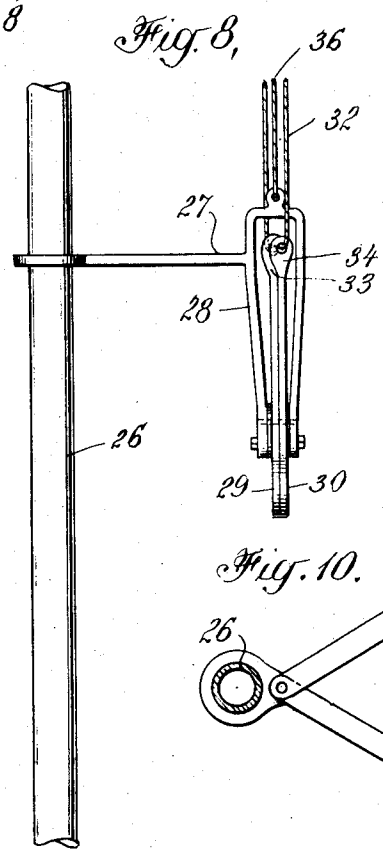
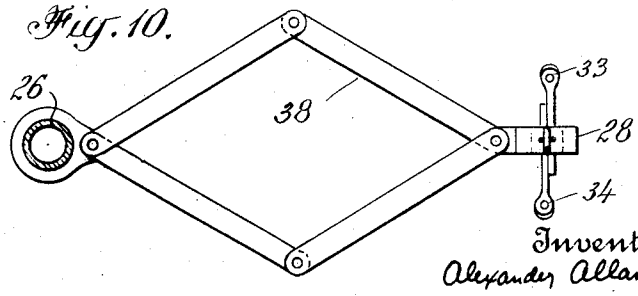


Fig. 10.



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UNITED STATES PATENT OFFICE.

ALEXANDER ALLAN, OF MIDDLETOWN, RHODE ISLAND.

SALVAGING METHOD AND APPARATUS.

Application filed February 7, 1921. Serial No. 443,191.

To all whom it may concern:

Be it known that I, ALEXANDER ALLAN, residing at Middletown, in the county of Newport, State of Rhode Island, have invented certain new and useful Improvements in Salvaging Methods and Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to salvaging, and particularly to the salvaging of cargo from sunken vessels.

Where a vessel has sunk in shallow water divers can accurately determine its position, can locate and remove its cargo and sometimes, if necessary, direct cutting operations for gaining access to the interior of the hull (although this last is almost always difficult). If the cargo is too bulky or heavy for their strength they can make it fast to hoisting means; when the vessel itself is to be raised they can direct the operations of making connections with submerged pontoons, or in other ways guide the movements of those working on the surface. On the other hand, where the wreck lies in more than about 100 feet of water, it is usually impossible for divers to descend and it has therefore been necessary to abandon any attempt to recover either vessel or cargo. Under these circumstances it becomes highly desirable to develop a system by means of which the need for divers can be dispensed with and all operations necessary in locating, securing and raising either ship or cargo directed from the surface of the water.

It is therefore an object of this invention to devise ways and means all operable from the surface and, if necessary, without the aid of divers, first, for accurately locating the sunken vessel and, second, for establishing operative connection with it by means of which either the cargo may be salved or the vessel raised.

It is a further and more specific object of this invention to perfect the method of and the apparatus for salving the cargo.

These objects may, according to the present invention, be attained as follows:

The wreck is first approximately located by any available means, such as by dragging the bottom in the locality where she is known to lie. This done, a pair of vertical, hollow, steel tubes, designed to have a slight buoyancy and remain upright of their own accord, and spaced apart a fixed distance by means of spacer eye bars at their upper and lower ends, are lowered in proximity to the wreck and temporarily made fast to the sea bottom. The next step is to locate the sunken vessel accurately with reference to these tubes. This is done by a system of photographic triangulation. A sliding frame is lowered upon the guide tubes and from this frame project two horizontal bars which intersect and form a triangle with the sliding frame as base. At the apex of this triangle a camera is fixed, and nearby upon the triangulation bars, a search light. A picture is taken of the wreck. The frame is then raised, the angular relation of the triangulation bars to the frame changed, the frame again lowered and a second picture taken. In this manner the exact location of two or more recognizable parts of the vessel, such as a mast, funnel, or hatch, can be determined with relation to the two guide tubes. The photographs also disclose the position of the ship relative to the sea bottom. Having accomplished this much, and the plan of the ship being known beforehand, it is a simple matter to draft a lay-out of the ship as she lies with the two tubes in their proper positions.

This relation once definitely established serves as a basis for succeeding operations. The procedure from this point on is adapted to the particular end sought. If the ship is to be raised a series of relatively permanent vertical tubes are fixed to the sea bottom on either side of the vessel and serve as means for guiding submersible pontoons into operative position, the location of these permanent tubes being determined directly from the first two. If the cargo is to be saved (our present concern) the procedure is as follows:

The location within the vessel of the particular cargo to be recovered being known beforehand, it can be definitely indicated on the lay-out. The distance separating the guide tubes being fixed and known, they are moved step by step after the fashion of a pair of dividers, stepping up upon the vessel and moving over to the spot where the particular cargo lies, when they are made fast. Or other tubes positioned with reference to the first two may be secured to the sea bottom adjacent the sides of the

wreck and on either side of the cargo. This done, cutting means, if required, are next lowered on the guides and a hole cut in the vessel directly above the spot where the cargo lies. Thereupon, the cutter is removed and a grapple or other elevating apparatus lowered on the guide rods and the cargo seized and raised to the surface.

In order that the invention may be more clearly understood reference is had to the accompanying drawings disclosing one embodiment of means whereby it may be carried out, and in which:

Figs. 1, 1ª, 2, 2ª and 3 are views showing the sunken vessel and the salvaging ship with the salvaging apparatus in position, and representing different stages in the process. Fig. 1 is a plan and Fig. 1ª an elevation of the wreck showing the guide tubes secured to the sea bottom in readiness for the locating operations and on these the sliding frame, with its triangulation bars, camera and searchlight. Figs. 2 and 2ª show the guide tubes fast to the deck of the sunken vessel, and the cutting means in position for cutting, Fig. 2 indicating the steps whereby the guide tubes may be moved from their original position to their ultimate location above the cargo. Fig. 3 shows the sunken vessel after the hole has been cut into its deck and with the grapple in operative position in the hold. Fig. 4 is a detail view of the lower ends of the guide rods showing the slidable frame which carries the various successive pieces of apparatus. Fig. 5 is a view taken on line 5—5 of Fig. 4 showing on an enlarged scale, the construction of one of the eyes of the frame which encircle the guide rods. Fig. 6 is a view similar to Fig. 4 showing the cutter bar in position. Fig. 7 is a view taken on line 7—7 of Fig. 6 showing, on an enlarged scale, the relation of the cutter bar and its slide to the lower eye bar of the frame. Figs. 8 and 9 are detail views of the grapple and hoist mechanism. Fig. 10 is a plan of a modified form of supporting means for the grapple. Fig. 11 is a plan view similar to Figs. 1 and 2 showing another location of the guide tubes when in their final position and in readiness to serve as guides for the cutting and grappling means. Here they are shown adjacent the sides of the vessel and made fast to the sea bottom.

In the drawings, 1 represents the sunken vessel, 2 the salvaging ship, and 3 the salvaging apparatus, the latter comprising sectional, parallel guide rods 4 spaced apart by upper and lower eye bars 5, and a slidable frame 6 on which the salvaging mechanisms, such as locating, cutting and grappling mechanisms, are successively mounted.

The guide rods 4 are made up of tubular sections of metal, fastened together in any convenient way, preferably with screwed ferrules inside the ends of the tubes, and made watertight by means of white lead, rubber gaskets, or annular rings of lead with forcing screws through the tubes. The tubes may also be made in single lengths if desired. It is a feature of this invention, however, that these tubes be sealed at their lower ends and hence naturally buoyant. They are designed so that for a given depth they will assume a vertical, floating position. This buoyancy greatly facilitates the ease with which they may be moved during positioning and use. The lower ends of these rods are each provided with collars 7 upon which rests lower spacing bar 5. Below these collars the rods terminate in means for securing them to the sunken vessel or the sea bottom. These means may be in the form of screw bits or sharp conical or chisel points. Conical points 8 have been illustrated.

The upper eye bar 5 is secured to the salvaging ship as shown and is loosely connected to the rods 4 to permit of relative vertical movement. This is necessary because of the raising and lowering of the salvaging ship by the tides and the sea.

The frame 6 comprises upper and lower eye bars 9, the eyes of which encircle the guide bars and permit the frame to slide relative thereto, and vertical side bars 10. The upper and lower eye bars 9 of the frame may be removably mounted on the guide rods 4 by means of separate eyes (Fig. 5), which are clamped upon bars 9 by means of bolts 17. Each eye consists of two sickle-shaped members 18 hinged together at the extremities of their arcs, as indicated at 19, and which, when in position, encircle a guide rod 4. A hoisting cable 12 wound about a drum 13 on the salvaging ship raises the frame 6.

Adjustably mounted on the lower eye bar of the sliding frame 6 are a pair of so-called triangulation bars 40 (Fig. 1). These bars carry a camera 14 and a search light 15 by means of which photographs of the wreck may be taken. The position of these triangulation bars relative to the frame may be varied so that a series of photographs taken from different predetermined angles may be secured. Or the angle which the axis of the camera makes with these bars may be changed. Both camera and search light may be controlled electrically or mechanically from the salvaging ship.

The cutting apparatus (Figs. 6 and 7) comprises a heavy steel bar 20, provided at its lower end with a sharp chisel edge 22, slidably mounted in a guideway 23 which is removably bolted to upper and lower eye bars 9 in such a manner as to allow the cutter 20 to clear lower spacing bar 5. Cutting bar 20 is raised by means of cable 12, operated from the salvaging ship, and al-

lowed to drop freely upon the sunken ship, thus effecting the cutting. A projection 24 in the face of the bar cooperating with stops 25 at either end of the guideway 23 prevents the bar 20 from being drawn accidentally from its guides or dropped through the lower end of its guides before reaching the position of cutting. As shown in Fig. 6, side bars 10 of the frame 6 are not essential when the cutter bar and its guideway are in use, although, of course, it is not necessary to remove them.

When the hole has been cut, the cutter is removed and a grapple or other elevating mechanism substituted. In the arrangement specifically illustrated an auxiliary guide rod 26 is secured to the frame 6 and upon this rod is slidably mounted a grapple. This grapple comprises an L-shaped supporting frame, the upper and horizontal arm 27 of which is provided with an eye through which rod 26 passes, and the vertical arm 28 of which supports the grapple proper. The grapple proper may be of any desired type and is shown in Fig. 9 as consisting of two pinchers 29 and 30 pivoted on the vertical arm 28 and closed by pulling on a noose 32 passing through eyes 33 and 34 at the extremities of the pincher arms. Pull on noose 32 is exerted through cable 35. The grapple is supported and raised by means of cable 36 which passes through a short tube 37 fastened to cable 35. This tube prevents the tangling of the two cables.

The rigid horizontal arm 28 of the grapple frame fixes the radius of rotation of the grapple about rod 26. Greater flexibility may be obtained by replacing this rigid arm with a lazy-tong frame 38 shown in Fig. 10.

The operation may be briefly reviewed as follows: The sunken hull having been located, the guide rods 4 are lowered from the salvaging ship and temporarily secured to the adjacent sea bottom. These rods are spaced apart a fixed distance by means of the two eye bars 5. Frame 6 slidably mounted on these rods by means of eyes 16, and carrying triangulation bars, camera and searchlight, is then lowered and a picture taken of that portion of the vessel which lies immediately adjacent to the camera. The angular relation of the triangulation bars to the frame is then changed and other photographs taken. In this way it is possible to discover the position in which the vessel is lying and the relaton of the guide rods to some definite parts of the vessel which can be identified. The exact location within the vessel of the cargo to be salvaged being known beforehand, the rods may then be moved after the fashion of a pair of giant dividers until they stand exactly above the spot where the particular cargo lies. If necessary additional photographs may be taken to check this location. The position of the rods being thus or otherwise accurately established, they are secured in place by means of points 8. The cutting operation follows. The triangulation bars, camera and search-light are removed from the slidable frame and the cutting bar 20 mounted in its independent guideway thereon. The frame is then again lowered until the cutting bar contacts with the vessel, and the cutting effected by repeatedly raising the cutter and allowing it to drop upon the sunken vessel. The rods, may, of course, be moved in order to permit enlargement of the hole. When an opening of sufficient size has been made, the slidable frame and cutter are raised to the surface and the cutting bar and its guideway replaced by guide rod 26 and the grapple 29, 30. These are then lowered to the vessel and the grapple dropped through the hole and made to seize the cargo 39.

It is not necessary that the tubes be stepped up upon the vessel itself and be made fast thereto. In some instances this might not be practicable and in such cases the method shown in Fig. 11 would be preferable. The tubes are stepped from their original position to a position along the side of the vessel as shown, until one of them is as close as possible to the cargo. A third tube 4′ is then positioned on the opposite side of ship as shown, secured to the sea bottom, and both tubes connected by means of eye bars 5′. The distance between the tubes in such a case is greater than when the tubes are attached directly to the vessel itself. This necessitates the use of long eye bars but does not affect the operation of the cutting and grappling means.

By means of the method and apparatus above described it is possible to locate accurately the position of wrecks which lie in comparatively deep water without resorting to the use of divers or diving chambers of any kind. Once the position of the vessel has been located it is possible to locate accurately any particular part of the cargo which, because of its value, is deemed worthy of salvage. This done, a hole can be cut in the deck or hull of the vessel and the particular cargo seized and brought to the surface. All of these operations are directed wholly by men working at the surface of the water.

I claim:

1. In apparatus for salvaging cargo from sunken ships, a buoyant tool guide extending from adjacent the cargo space of the sunken ship to the salvaging vessel and serving to guide successively the salvaging tools required to reach and lift the cargo.

2. In apparatus for salvaging cargo from sunken ships, a guide frame comprising parallel guide rods extending from the ship to the surface of the water, a spacing member between said rods, a toolholding frame slid-

able on the rods, and means on said frame to hold in succession various tools for reaching and elevating the cargo.

3. Apparatus for salvaging cargo from sunken ships, comprising the combination of a pair of guide rods spaced apart a fixed distance, means at the lower ends of said rods for securing them to the sunken ship or the sea bottom, these guide rods when positioned, serving to guide the successive salvaging tools required to reach and lift the cargo.

4. Apparatus for salvaging cargo from sunken ships, comprising the combination of a pair of buoyant guide rods spaced apart a fixed distance, means at the lower ends of said rods for securing them to the sunken ship or the sea bottom, means slidable on said rods successively to support cutting means and grappling means.

5. The method of locating a sunken vessel which comprises establishing a guideway extending from a point on the sea bottom adjacent the vessel to the surface of the water, lowering a camera adjacent said guideway and taking a series of photographs of the said vessel from a plurality of points having predetermined relation to the guideway.

6. In a method of salvaging, the steps of establishing a guideway extending from a point on the sea bottom adjacent a sunken vessel to the surface of the water, lowering a camera adjacent said guideway, taking a series of photographs of the said vessel from a plurality of points having predetermined relation to the guideway, thus locating the vessel relative to said guideway, and establishing other connections with the surface, the position of which is determined with reference to the guideway.

7. Apparatus for locating a sunken vessel comprising a guideway, extending from a point in proximity to the vessel to the surface, a camera and means slidable upon said guideway for supporting said camera.

8. Apparatus for locating a sunken vessel comprising parallel rods spaced apart a fixed distance and designed to be secured to the sunken ship or the sea bottom, a frame designed to slide upon said rods, triangulation bars adjustably mounted on said frame and a camera mounted upon said triangulation bars.

9. In apparatus for salvaging cargo from sunken ships, guide rods extending from the sunken ship to the salvaging ship on the surface of the water serving to guide successively the salvaging tools required to reach and lift the cargo, and means connecting the guide rods to the salvaging ship permitting vertical movement of the salvaging ship relative to the guide rods.

10. The method of locating a sunken ship which comprises roughly locating the ship on the sea bottom, establishing a pair of spaced guide rods adjacent the ship and extending to the surface of the water and accurately locating the position of the ship relative to these rods by a system of photographic triangulation.

11. The method of salvaging the cargo of sunken ships which comprises roughly locating the position of the ship on the sea bottom, establishing a pair of spaced guide rods adjacent the ship and extending to the surface of the water, accurately locating the position of the ship and its cargo relative to these rods, moving the rods step by step into proximity to the cargo, lowering cutting means on the rods and cutting through the deck or hull to expose the cargo and raising the cargo from the ship by means of grappling devices lowered on the rods.

In testimony whereof I affix my signature.

ALEXANDER ALLAN.