Feb. 6, 1962 W. WELSHAUSEN 3,019,754

SHIP SALVAGE SYSTEM

Filed April 4, 1957 2 Sheets-Sheet 1

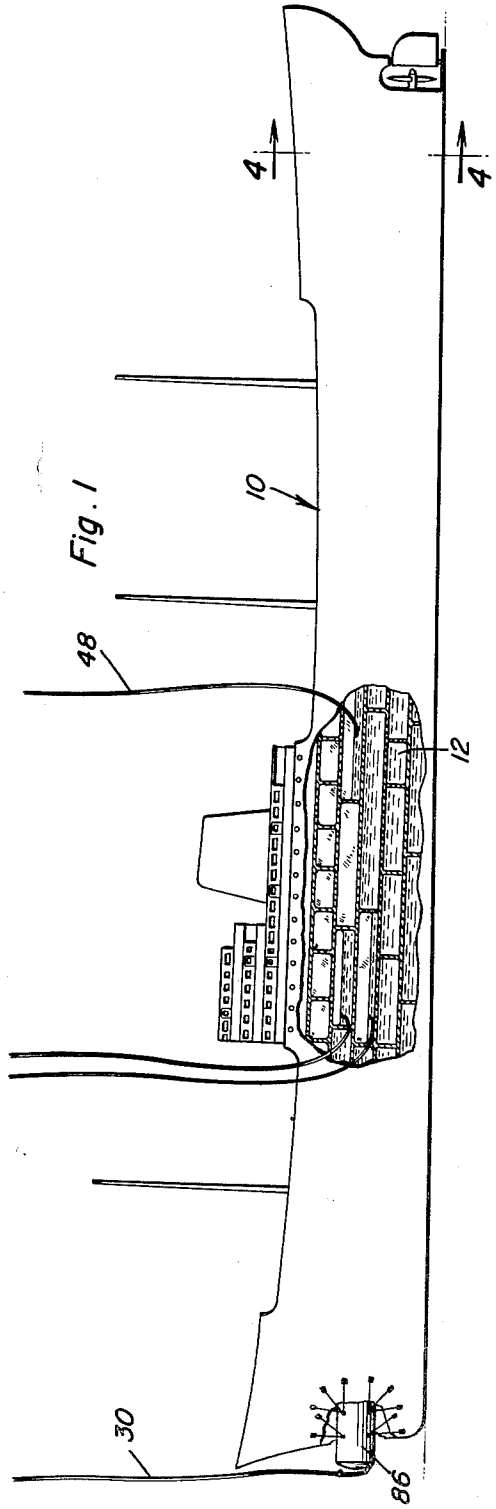

Fig. 1

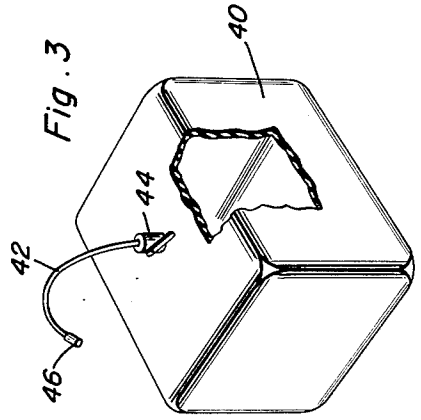

Fig. 3

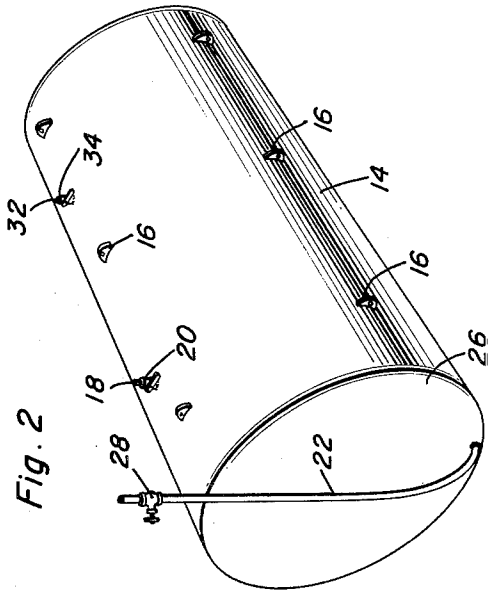

Fig. 2

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2 Sheets-Sheet 2

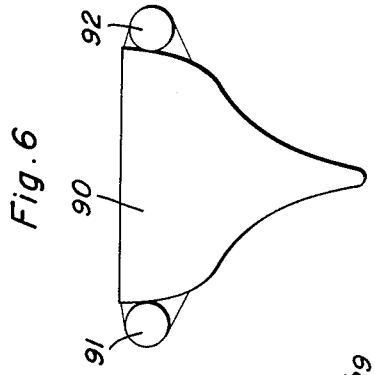

Fig. 6

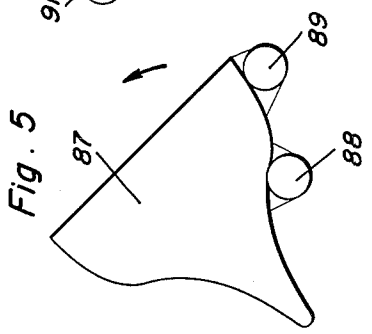

Fig. 5

Fig. 4

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SHIP SALVAGE SYSTEM

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1 Claim. (Cl. 114—54)

This invention relates to ship salvaging processes or systems and more particularly to a system for salvaging sunken ships by the application of containers within the sunken ship and then inflating the containers to provide the necessary buoyancy for elevating the ship.

An object of the present invention is to provide improvements in ship salvaging systems by the placement of containers in the sunken ship where they are individually desired or needed and so arranging them that they are capable of floating freely within a constrained area after the containers are filled with air. Each concontainer is provided with an outlet to which a length of hose is attached, it being presently contemplated that the hose shall be approximately six feet, whereby the container when filled with air is capable of floating freely. This length of hose is left attached to the bag or container when the same is filled with air so that the diver may add or discharge air when necessary.

A further object of the invention is to provide means by which the containers may be filled to a predetermined pressure without burdening the diver with instruments. This is achieved by employing pressure valves at the air inlet for the containers.

Another object of the invention is to provide a method for raising sunken ships, wherein the technique involved in the same may be altered in accordance with the type of ship and the size of ship and its disposition in the water. The process has the steps of applying flexible containers in the sunken ship and this is accomplished by divers. The flexible containers are then inflated without being lashed down so that they are capable of floating to the top of a room in which they are located. The ship's fuel tanks are to be blown empty and filled with air and metal tanks applied to the ship when found desirable, for example, on the low side thereof and in a large hole which might have been the cause for the ship to sink. Such tanks are welded in place while the flexible containers are held captive in the staterooms, hallways, etc.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a schematic elevational view of a ship on the ocean floor, parts of the ship being broken away to illustrate the equipment installed in accordance with the process;

FIGURE 2 is a perspective view of a metal tank which is used in practicing the invention;

FIGURE 3 is a perspective view of a flexible container which is to be installed in the ship in practice of the invention;

FIGURE 4 is a transverse sectional view taken on the line 4—4 of FIGURE 1;

FIGURE 5 is a schematic representation of a hull of a ship in one position at the ocean floor preparatory to be righted, and;

FIGURE 6 is a schematic representation of a hull of a ship showing the same in the righted position.

In the accompanying drawings there is a ship 10 which schematically represents any type of sunken ship which is to be elevated by utilization of my process. The ship

has many compartments 12, hallways, engine rooms and other enclosed volumes. In the practice of my method divers install certain equipment in the ship 10. Two such equipments are shown in FIGURES 2 and 3, one being tank 14 which is cylindrical and made of metal. Welding or other types of fastening means such as ears 16, are on the tank. In addition, there is a water inlet line 18 with a valve 20 by which to fill the tank 14 with water prior to installing the same in ship 10. Water exhaust pipe 22 is operatively connected with an end 26 of tank 14 and has valve 28 therein. Line 22 is used for exhausting the water from tank 14 after installation of the tank in the hull of ship 10. The discharging of the water from tank 14 is accomplished by air under pressure which passes through a line, as line 30 and the latter connects to air line 32 on tank 14. The valve 34 is in air line 32 and is to be manipulated by the diver.

In FIGURE 3 there is a flexible container 40. Although this container is shown as being square, it is to be distinctly understood that the shapes of my flexible containers may vary in accordance with the demand of the ship. For example, it is contemplated to have a long slender container for a hallway, rectangular container for rectangular compartments, square containers for square compartments, and other shapes of containers in accordance with the necessity of the particular compartment that is to be filled.

The container 40 is constructed of rubber or flexible plastic possessing characteristics much like rubber. An air line 42 is attached by means of an automatic or manual valve 44 to a wall of the container 40. Valve 44 is of the type that allows air under a predetermined and preset (by setting the valve) pressure to enter the tank after which the valve becomes automatically closed. A quick disconnect coupling 46 at the extremity of line 42 in order to connect to an air line, as at 48. The air line is to be supplied by the salvage boat at the surface.

Reference is now made to FIGURE 4, showing the cross-section of boat 10. Containers 60, 62 and 63 are at one level in the hold of the ship and they have been completely inflated by their air inflation hoses or pipes or lines 64, 65 and 66, respectively. The container 68 is only partially filled with air, thereby partially filling the compartment 70. Flexible container 72 is more completely filled thereby more completely filling its compartment 74. Air lines 77 and 78 for containers 68 and 72 are used in the inflation of these containers. Air line 80 for container 82 in the compartment 84, is used for inflating the container 82. This last container is shown when inflation has just commenced.

The hole in the hull made by collision, explosion, a warhead, etc., may be filled by welding tank 86 therein or a number of tanks. This would be one of the last stages of the process. When a hull, as at 87 is laying on its side, additional tanks as at 88 and 89 are attached to the outside of the hull and blown out to provide the additional buoyancy. When in a more favorable position, for example, hull 90, additional tanks 91 and 92 may be attached on the outside but on both sides to have a balance in the buoyancy.

After the sunken ship 10 is located and explored by divers, tanks as at 14 are fastened securely to the inside of the bottom of the ship to prevent motion of the water from tearing the tanks on the inside of the ship apart. The containers as at 40, 60, 62, etc., are not fastened but allowed to expand freely with about six feet slack in the air feed line to allow for the sway in motion of the ship. The bags are large enough to expel, most of the water from the volume which they occupy. Although, containers are to be placed in all of the compartments deemed necessary, more containers are installed in the inside of

the low side of the ship in order to first right the ship and make it convenient to expose the collision damaged hole for easier accessibility to take more bags into the ship.

The fuel oil and water supply tanks of the ship are blown empty with compressed air to assist in the lifting. Of course, the quantity of bags necessary is determined by the engineer from a plan of the ship that is sunk. When placing the tanks in position on the sunken ship the water outlet valves are left open and are closed when the tanks are blown empty and filled with air.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

In combination with a sunken ship having a plurality of flooded compartments of various sizes and shapes, a plurality of flexible inflatable containers, a single container disposed in at least some of said compartments, the container in each of said some of said compartments being of a size and shape complementary to the corresponding compartment and capable of substantially filling the latter when fully inflated and being freely movable therein when in the uninflated or partially inflated state, an air inlet line connected to each container by which the container may be inflated for substantially filling the corresponding compartment unless the container is prevented from inflating fully by water trapped in the compartment whereby each

one of any partially filled containers may be capable of seeking new positions within the corresponding compartment as the ship shifts its position whereby in the event a partially filled container prevented from being inflated fully by water entrapped in a compartment may, upon shifting of the container to a new position in the compartment become fully inflated if movement of the container in the compartment uncovers a means for venting the compartment such as a doorway or port hole, rigid tanks containing water, means securing said tanks to said ship in addition to said flexible containers, means including fluid outlet and inlet means for expelling water from said tanks and for introducing air under pressure into the tanks after they are attached to the ship, said tanks being secured to the exterior of the ship, and additional rigid tanks secured in the interior of the ship.

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