

March 29, 1932.

G. BONTEMPI

1,851,892

SALVAGE UNIT

Filed Feb. 19, 1931

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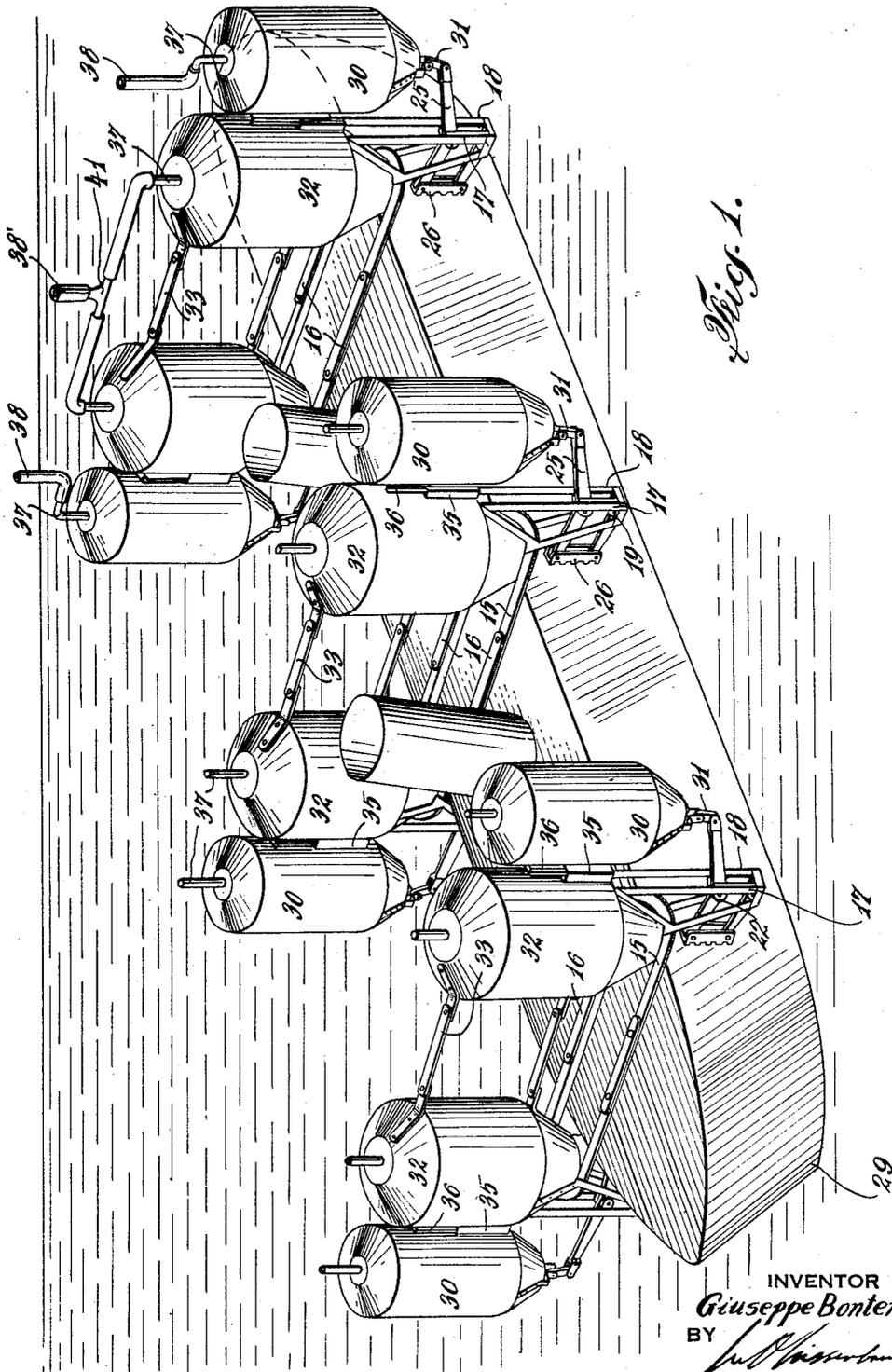


Fig. 1.

INVENTOR
Giuseppe Bontempi
BY *[Signature]*
ATTORNEY

March 29, 1932.

G. BONTEMPI

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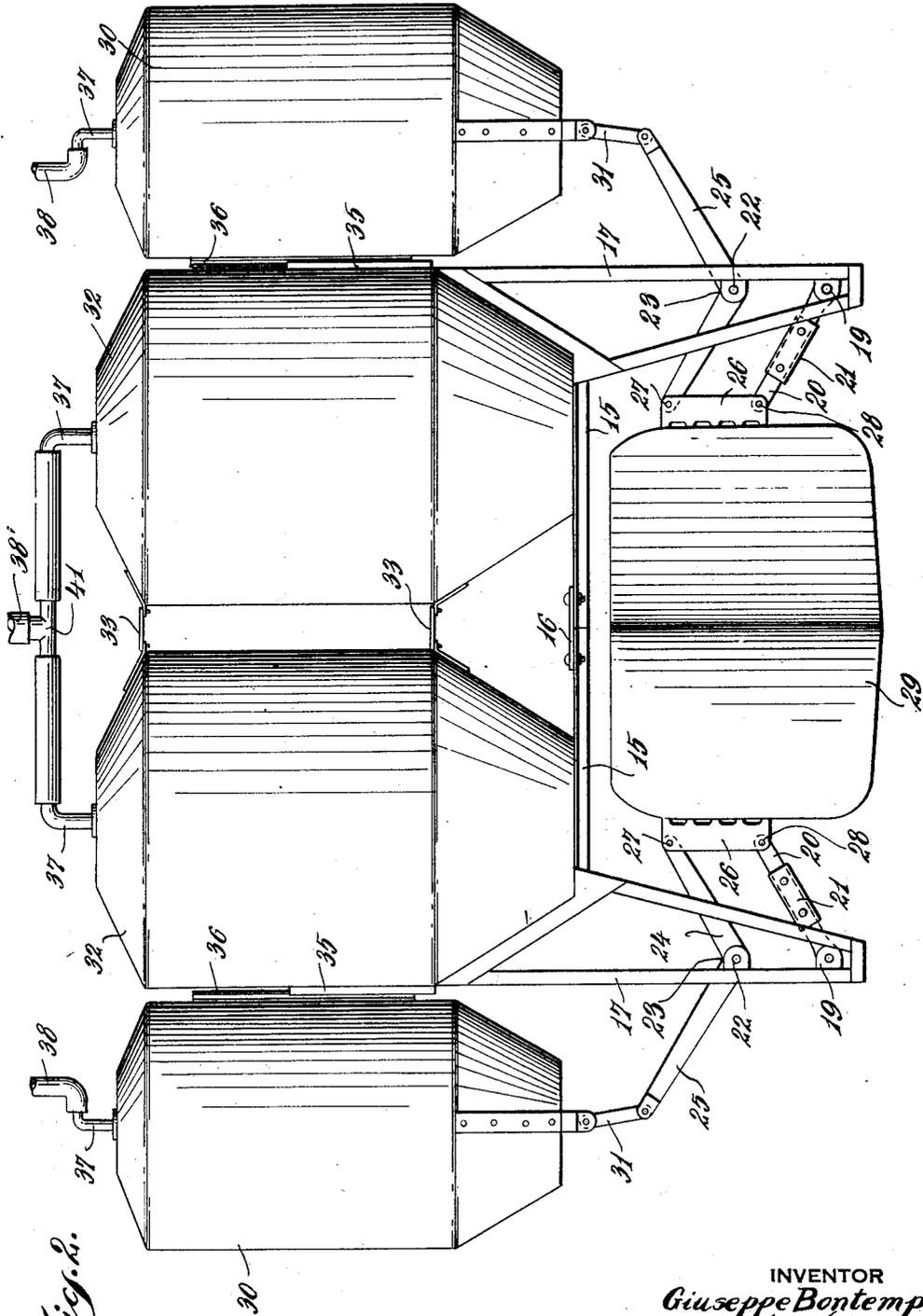


Fig. 2.

INVENTOR
Giuseppe Bontempì.
BY *[Signature]*
ATTORNEY

March 29, 1932.

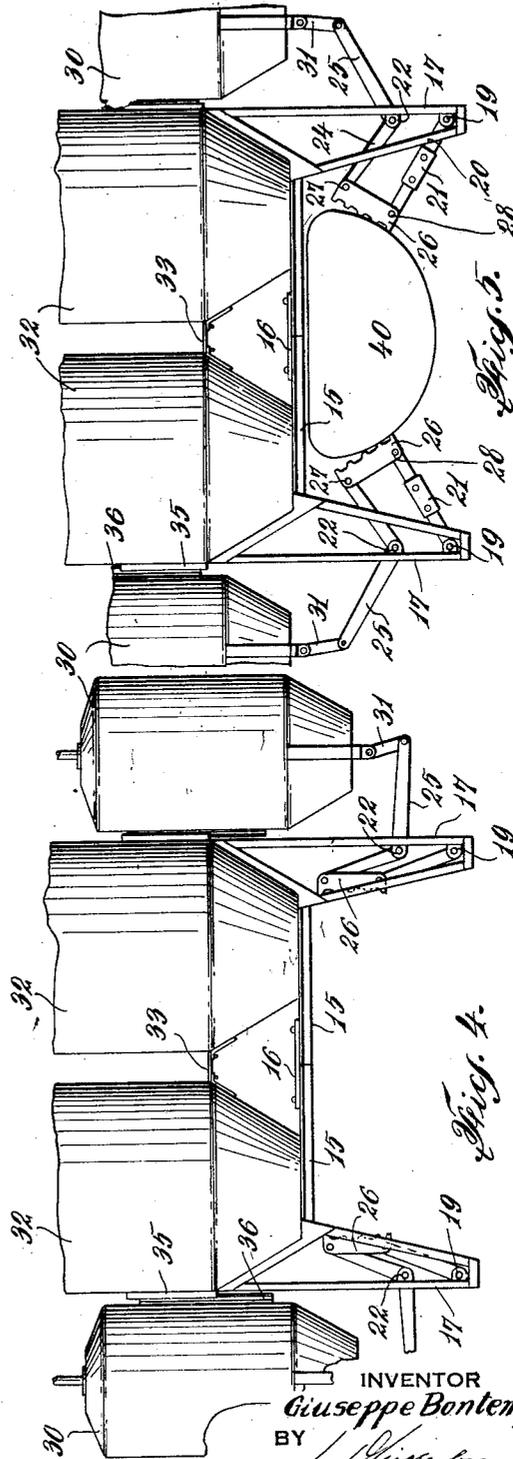
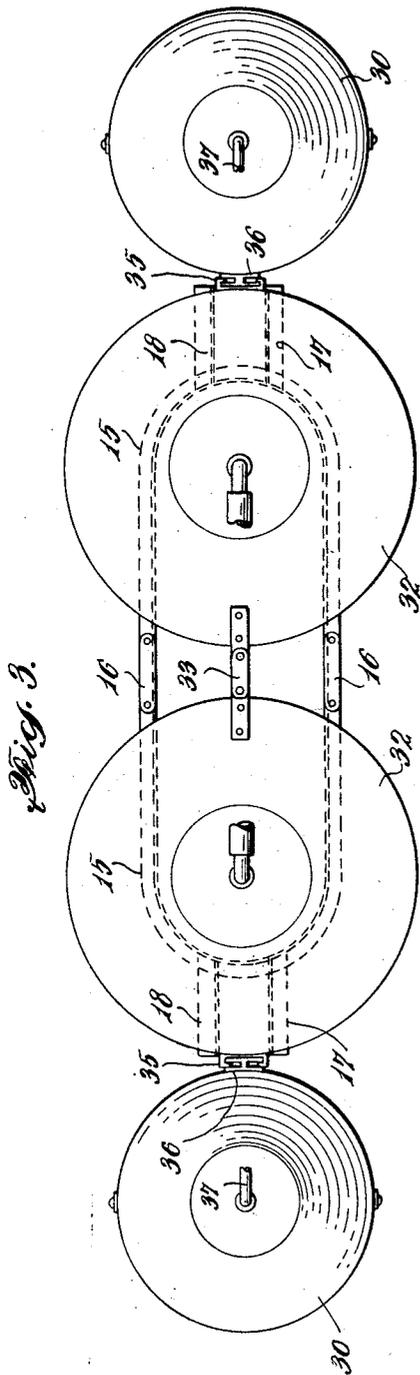
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4 Sheets-Sheet 3



INVENTOR
Giuseppe Bontempi.
BY *[Signature]*
ATTORNEY

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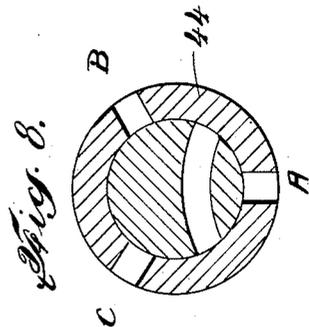
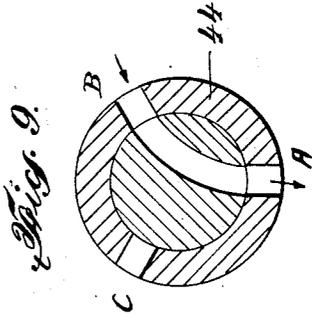
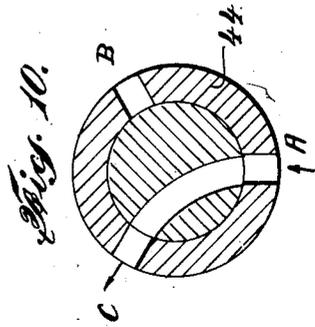
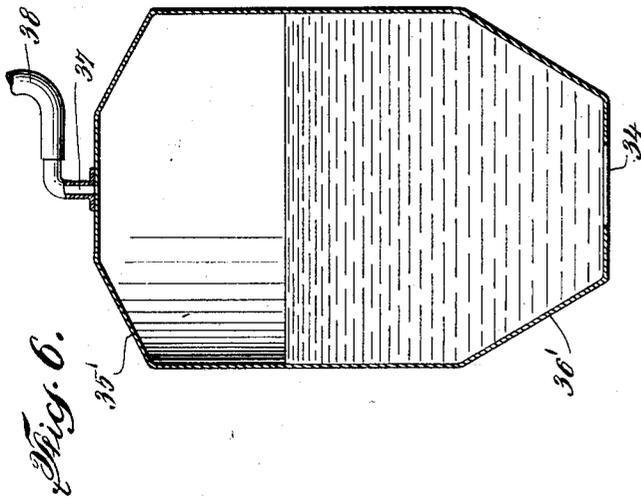
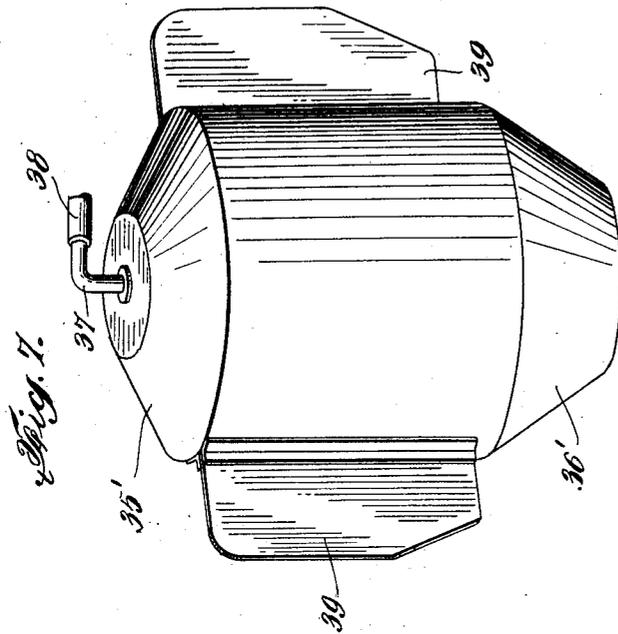
G. BONTEMPI

1,851,892

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4 Sheets-Sheet 4



INVENTOR
Giuseppe Bontempi.
BY
[Signature]
ATTORNEY

UNITED STATES PATENT OFFICE

GIUSEPPE BONTEMPI, OF COYTESVILLE, NEW JERSEY

SALVAGE UNIT

Application filed February 19, 1931. Serial No. 516,924.

The present invention relates to improvements in apparatus for raising sunken vessels, and more particularly of the type in which means are provided for gripping the object to be raised without the necessity of having divers to physically attach or secure the salvage apparatus to the sunken object, and of the type which is in itself capable of being made buoyant.

10 The principal object of this invention is to provide a novel and improved salvage unit of the character mentioned, which is adapted to be floated upon the water to a position directly above the vessel to be raised, said unit then to be submerged so that when it sets on the sunken vessel, the latter is between the gripping elements of the apparatus which are actuated by buoyant means to grip or grab the vessel, and then the unit to be made buoyant, thus lifting itself and the vessel it holds, to the surface.

Another object is to provide a salvage unit of the character described, including novel and improved means for gripping or grabbing the sunken vessel, which does not rely upon any agency other than the weight of the vessel to be raised for the gripping or grabbing action, after initial contact between the gripping elements and the vessel is once made by buoyant means controlled from the surface of the sea, which means after establishing the initial contact aforesaid, may thereafter be used to augment the lifting power of the main buoyant components of the unit, or else, any further action on its part capable to be performed, may be dispensed with. In fact, in the within apparatus, the heavier the vessel raised, the tighter is the grip of the gripping elements thereon. The grip may be said to be independent of collaterally operated mechanism for retaining the hold on the vessel, after a small initial grip is once established by the mere contact of the gripping elements and the vessel.

Another object of this invention is to provide a salvage unit of the character mentioned, including a novel and improved means for gripping the sunken vessel to effect a pressure or squeeze grip upon opposite substantially parallel sides of a sunken vessel, or

a grapple grip, as would be required and desirable in raising submarines or other marine structures with substantially circular cross-sections.

A further object of the present invention, is to provide an improved salvage unit of the character mentioned, including a novel and improved gripping mechanism in which the action of each gripper shoe can be independently controlled so that an un-symmetrical section of the vessel to be raised can be securely gripped.

A further object is to provide a salvage unit of the character described, including novel and improved pontoons which will descend in a substantially vertical direction and thereby prevent the whole unit from overturning while it is being submerged. Each of said pontoons is valve-less. No valve is secured to any of them as part thereof, yet each pontoon is positive in its action and is controlled by valve mechanism located on and operated from a ship on the surface.

Another object is to provide a salvage unit of the class described, including means comprising fins to prevent objectionable tilting of the apparatus while it moves up to or down from the surface of the water.

A further object is to provide a salvage unit of the character described, which can be adapted to be used for raising ships of various widths.

A further object is to provide a salvage unit of the character mentioned, having a low centre of gravity while afloat.

A further object is to provide a salvage unit of novel and improved construction of the class mentioned, which permits marine salvage operations to be conducted and completed within a short interval of time.

Another object of the present invention, is to provide a marine salvage unit of the character described, which is simple in construction, easy and dependable in operation, and the cost of construction of which is very reasonable in view of the nature of its capability, usefulness and adaptability.

These objects are attained with apparatus embodying in substance an inverted U frame, which when submerged, shall have the vessel

to be raised between its downwardly extending arms, each of which has pivotally secured thereto, a link arrangement forming a quadrilateral unit, having as its innermost element, a gripper shoe. There will therefore be two such gripper shoes, as components of opposite quadrilateral link units, facing each other, one on each side of the vessel to be raised, and capable of being brought independently towards each other to grip the vessel, by actuating a bell-crank lever included in each link arrangement aforesaid, by a vertically moveable pontoon, preferably one for each gripper shoe link unit, which pontoon is in slidable relation with main lifting pontoons, which latter are suitably secured onto the horizontal member of the frame.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiment shown herein be deemed illustrative and not restrictive, and that the patent shall cover whatever features of patentable novelty exist in the invention disclosed, reference being had to the appended claims rather than to the specific description herein to indicate the scope of the invention.

In the accompanying drawings, forming a part of this application, similar characters of reference indicate corresponding parts in all the views.

Fig. 1 is a perspective view showing a number of salvage units, embodying the present invention, gripping a sunken vessel ready to be raised.

Fig. 2 is a front elevation illustrating a unit of apparatus which is a preferred embodiment of this invention, showing the grippers in closed position holding a vessel.

Fig. 3 is a plan view of such unit.

Fig. 4 is a fragmentary front elevation of the unit, showing the grippers in their open position.

Fig. 5 is a similar view, which however shows the grippers arranged to grab a vessel having circular cross-section.

Fig. 6 is a vertical section through any of the pontoons.

Fig. 7 is a perspective view of a pontoon provided with vertical fins.

Fig. 8 is a section through a three-way valve showing its closed position.

Fig. 9 is a similar section showing the valve set in position so that compressed air may pass into the pontoon.

Fig. 10 is a similar section showing the valve set in position so that air may pass from the pontoon and exhaust into the atmosphere.

In the drawings is shown a preferred embodiment of this invention which includes essentially an inverted U-shaped structural

steel frame, composed of a normally horizontal member comprising the U-shaped elements 15, the arms of which are suitably connected by the braces 16, and two opposite pairs of downwardly extending spaced members designated by the numerals 17 and 18.

Because the apparatus herein concerned with, as shown, is symmetrical, and parts are in duplicate, a description of one set will be specifically given, it being understood that reference letters apply equally to both sets of mechanism.

Between the members 17 and 18, near the bottom of same, on a pin 19, is pivotally secured one end of a link 20, the length of which is adjustable in a coupling 21. In direct vertical line, above the pin 19, on a pin 22, is pivotally secured a bell-crank lever 23 at its mid-fulcrum, so that one of its arms 24 is inwardly extending with respect to the frame, while the other arm 25, is outwardly extending in respect thereto, and these arms will be hereafter so designated.

A gripper shoe 26, is pivotally secured to the ends of the inwardly extending arm 24 of the bell-crank lever 23, and the link 20, by pins 27 and 28 respectively; the distance between said pins 27 and 28, being equal to the distance between the pins 22 and 19.

There is thus formed a quadrilateral link mechanism to be operated by a movement of the outwardly extending arms 25 of the bell-crank lever 23. When a downward motion is imparted to the arms 25, the gripper shoes 26, will recede from each other, while when an upward motion is imparted to said arms 25, the gripper shoes 26 will approach each other. And so this pair of directly oppositely positioned quadrilateral link mechanisms, constitute the gripping device of the within salvage unit. When the apparatus is submerged, it is set on to the vessel 29 to be raised, in a position such that the latter is between the gripper shoes 26.

These quadrilateral link gripper mechanisms are actuated by vertically moveable pontoons 30 through the links 31. These pontoons 30, are slidably associated with main lifting pontoons 32, the latter of which are suitably secured to the frame elements 15, while braces 33 serve to more rigidly secure these pontoons 32 in their fixed position on the frame of the apparatus. An I bar 36, secured along the side of the pontoon 30, and slidable in an inwardly flanged channel 35, secured along the side of the pontoon 32, is a preferred construction to insure easy sliding.

Sunken vessels set on the bottom of the sea in a nearly upright position, and when the opposite sides thereof to be gripped are nearly parallel, it is desirable to have the gripper shoes 26 in parallel relation. To accomplish this, the length of the links 20, are adjusted so that the distance between the pins

19 and 28, shall be equal to the distance between the pins 22 and 27, when the centres of the said four pins shall be the vertex points of a parallelogram, and the gripper shoes 26 will always be parallel to each other regardless of the relative position of the pontoons 30 and 32 to each other.

For lifting a vessel 40, having a substantially circular or partly circular cross section, it is desirable that the same shall be grappled or grabbed, so to speak, instead of squeezed-gripped. To accomplish this, the length of the link 20 shall be lengthened in coupling 21, so that the distance between the pins 19 and 28, shall be greater than the distance between the pins 22 and 27, then when the gripper shoes 26, are brought nearer to each other by an upward motion of the pontoons 30, in respect to the pontoons 32, they will grapple or grab the vessel 40 between them, as shown in Fig. 5, instead of the squeeze-grip contact, as is the case as shown in Fig. 2. While the vessel or submarine 40, is being lifted, the downward reaction due to its weight will tend to further close the gripper shoes 26 towards each other, thereby obtaining a better grapple or grabbing grip.

After initial contact of the gripper shoes 26, and the vessel 29, is once established, the action of the pontoons 30, may be dispensed with, for the weight of the vessel 29, in pulling downward, while the salvage unit is rising upward or is afloat will insure a tight grip. In fact, the heavier the vessel 29, the tighter will be this gripping. However, the lifting capacity of the pontoons 30, when bouyant, may be used as auxiliaries to augment the lifting power of the main pontoons 32.

In the within apparatus, all braces 16 and 33, are demountably secured to the several parts which they serve to connect, and are to be replaced with longer or shorter braces, in accordance with the width of the vessel to be raised.

The pontoons used in this apparatus, while sinking, will remain in practically an upright position. Should it be desired, however, to further insure such condition in the operation of this apparatus, along the sides of the pontoons, there are suitably secured vertical fins 39, which tend to avoid tilting of the apparatus when descending from or emerging towards the surface of the sea.

The pontoons 30 and 32, are of the vertical type with conical portions 35' and 36', respectively top and bottom, provided as shown, with a port opening 37 in the head thereof, serving as both inlet and outlet for the passage of air, while in the base, is an orifice 34, to permit the passage of water into and from the pontoon.

When the pontoon, referring to any pontoon in the within apparatus, is filled with air under pressure, it is bouyant, and no

water can enter it through the orifice 34, while when the pressure of the air in the pontoon is relieved or exhausted, water will enter the pontoon through the orifice 34 therefor provided, and soon, enough water will have been admitted to sink the pontoon.

A hose line 38, connects to the port 37, from air pumping machinery located on and operated from a boat (not shown) on the surface of the sea where the salvage operation is being carried out, and interposed in each hose line 38, on said boat, is a three-way valve 44 which is controlled by an operator. The hose line 38, at its upper end connects to port A, of the said valve, while an air compressor line connects to port B, and an air exhaust pump connects to port C of said valve. These latter are all of standard kind, and so far as herein concerned with, may be referred to as the pontoon control means, to make them bouyant or non-bouyant, as the operation may require.

In operation, the salvage unit is floated to a position directly above the vessel 29, to be raised. The pontoons 30 are then allowed to fill with water, whereby they will slide to their lowest position with respect to the pontoons 32, and the gripper shoes 26, will then be furthest apart in their opened position. Slowly, the pontoons 32 are allowed to fill with water, by permitting the compressed air therein to escape, and the whole apparatus will sink to set on the vessel 29 in a position such that the latter should be between the gripper shoes 26. Now the pontoons 30 are made bouyant, by compressed air being allowed into them to force the water out thru the orifices 34, and said pontoons will thereby slide upward with respect to the pontoons 32, and the gripper shoes 26 will approach each other until they grip the vessel 29. The main lifting pontoons 32 are now made bouyant, and the whole unit together with the vessel 29 which is within its grip, will rise to the surface of the water, ready to be towed to drydock.

In order to provide sufficient lifting power, a number of the salvage units herein described would be used as shown in Fig. 1, to furnish the required pontoon capacity for any particular salvage operation.

The pontoons 30, may be operated either jointly or independently, and the same may be done with the main pontoons 32. As shown in Fig. 2, the pontoons 30, have connected to each of them, individual hose lines 38, so that each may be independently controlled, while both pontoons 32 are arranged to be jointly operated, being that the hose line 38' feeding same, connects to both of them through the T fitting 41.

An advantage for the pontoons 30, independently operated, is that when the section, at which the gripper shoes 26, are to be in contact with the vessel 29, is not sym-

metrical, the gripper shoes 26, will need to be moved into an unsymmetrical position, which is possible only when they are individually controlled. Should said pontoons 30, be arranged to be jointly controlled, then the gripper shoes 26, will always be directly opposite each other, point for point.

An advantage for the pontoons 32, to be independently controlled, is that if only one of them is made bouyant, the whole apparatus will tilt in one direction, which may be desirable depending upon the position of the vessel 29, resting on the bottom of the sea, while if the other pontoon previously non-bouyant is made bouyant, the whole apparatus will tilt in the opposite direction. This manner and method of manipulation may be used to alter the lateral position of the unit with respect to the vessel to be raised.

Having thus described this invention, I claim:—

1. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a pair of links pivotally secured at one of their respective ends to one of said arms, in spaced relation and inwardly extending towards the other of said arms, another pair of links pivotally secured at one of their respective ends to the second of said arms, in spaced relation and inwardly extending towards the first of said arms, a gripper shoe pivotally secured to the other ends of one of said pairs of links, the latter being in spaced relation, another gripper shoe pivotally secured to the other ends of the second pair of links, the latter being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, means to move the gripper shoes relative to the frame, and means to lift the entire apparatus when the gripper shoes hold between them the object to be raised.

2. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending

arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, means to move the outwardly extending arms of said levers, and means to lift the entire apparatus when the gripper shoes hold between them the object to be raised.

3. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link, comprising two bar elements and a coupling, said bars being adjustably secured in said coupling, pivotally secured at one end to one of said arms, inwardly extending towards the other of said frame arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link, comprising two bar elements and a coupling, said bars being adjustably secured in said coupling, pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, means to move the outwardly extending arms of said levers, and means to lift the entire apparatus when the gripper shoes hold between them the object to be raised.

4. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end

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of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, means to move independently the outwardly extending arms of said levers, and means to lift the entire apparatus when the gripper shoes hold between them the object to be raised.

5 5. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, means to move the outwardly extending arms of said levers, a pontoon secured to said frame, means for making the said pontoon buoyant, and means for making same non-buoyant.

6. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to

receive a sunken object between them, means to move the outwardly extending arms of said levers, a number of pontoons secured to the frame, means for independently making any of said pontoons non-buoyant, and means for independently making any of said pontoons buoyant.

7. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, a pontoon slidably associated with the frame, connected to and adapted to move the said levers, means for making the pontoon buoyant, and means for making the same non-buoyant; said pontoon when fully buoyant is adapted also to lift the entire apparatus after the gripper shoes have been shifted to position gripping the object to be raised.

8. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in

spaced relation, said gripper shoes being adapted to receive a sunken object between them, a pontoon slidably associated with the frame, connected to and adapted to move the said levers, means for making the pontoon non-buoyant, means for making said pontoon bouyant, and means to lift the entire apparatus when the gripper shoes hold between them the object to be raised.

9. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to said second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, a pontoon slidably associated with the frame, connected to and adapted to move the said levers, a second pontoon secured to the frame adapted to lift the entire apparatus when the gripper shoes hold between them the object to be raised, means for independently making said pontoons non-buoyant, and means for independently making said pontoons buoyant.

10. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to the second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to

the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, a pontoon slidably associated with the frame, connected to and adapted to move the said levers, a number of pontoons secured to the frame, adapted to lift the entire apparatus when the gripper shoes hold between them the object to be raised, and also adapted to tilt the apparatus, means for independently making the pontoons buoyant, and means for independently making the pontoons non-buoyant.

11. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms extending inwardly and outwardly respectively relative to the second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, a pontoon slidably associated with the frame, connected to and adapted to move one of said levers, a second pontoon slidably associated with the frame, connected to and adapted to move the other of said levers, another pontoon secured to the frame, adapted to lift the entire apparatus when the gripper shoes hold between them the object to be raised, means for independently making said pontoons non-buoyant, and means for independently making said pontoons bouyant.

12. An apparatus of the class described, embodying a frame including a pair of downwardly extending arms, a link pivotally secured at one end to one of said arms, inwardly extending towards the other of said arms, a lever pivotally secured to the same arm above said link, said lever having its arms extending inwardly and outwardly respectively relative to said frame arm, another link pivotally secured at one end to the second frame arm, inwardly extending towards the first frame arm, another lever pivotally secured to the second frame arm above said second link, said second lever having its arms ex-

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tending inwardly and outwardly respectively relative to the second frame arm, a gripper shoe pivotally secured to the other end of the first link, and to the end of the inwardly extending arm of the first lever, said points of connection being in spaced relation, a second gripper shoe pivotally secured to the other end of the second link, and to the end of the inwardly extending arm of the second lever, said points of connection being in spaced relation, said gripper shoes being adapted to receive a sunken object between them, a pontoon slidably associated with the frame, connected to and adapted to move one of said levers, a second pontoon slidably associated with the frame, connected to and adapted to move the other of said levers, a number of pontoons secured to the frame, adapted to lift the entire apparatus when the gripper shoes hold between them the object to be raised, and also adapted to tilt the apparatus, means for independently making the pontoons bouyant, and means for independently making the pontoons non-bouyant.

13. An apparatus of the class described embodying a frame including a pair of downwardly extending arms, a pair of links pivotally secured at one of their respective ends to one of said arms, in spaced relation and inwardly extending towards the other of said arms, another pair of links pivotally secured at one of their respective ends to the second of said arms, in spaced relation and inwardly extending towards the first of said arms, a gripper shoe pivotally secured to the other ends of one of said pair of links, another gripper shoe pivotally secured to the other ends of the second pair of links, said gripper shoes being adapted to receive a sunken object between them, and means to lift the apparatus when it sets onto the sunken object; the downward reaction of the sunken object being adapted to tighten the grip thereon.

In witness whereof, I affix my signature.

GIUSEPPE BONTEMPI.