Feb. 18, 1941. G. SCHWARZ ET AL 2,232,564

APPARATUS FOR RAISING SUNKEN SUBMARINES

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Fig. 1.

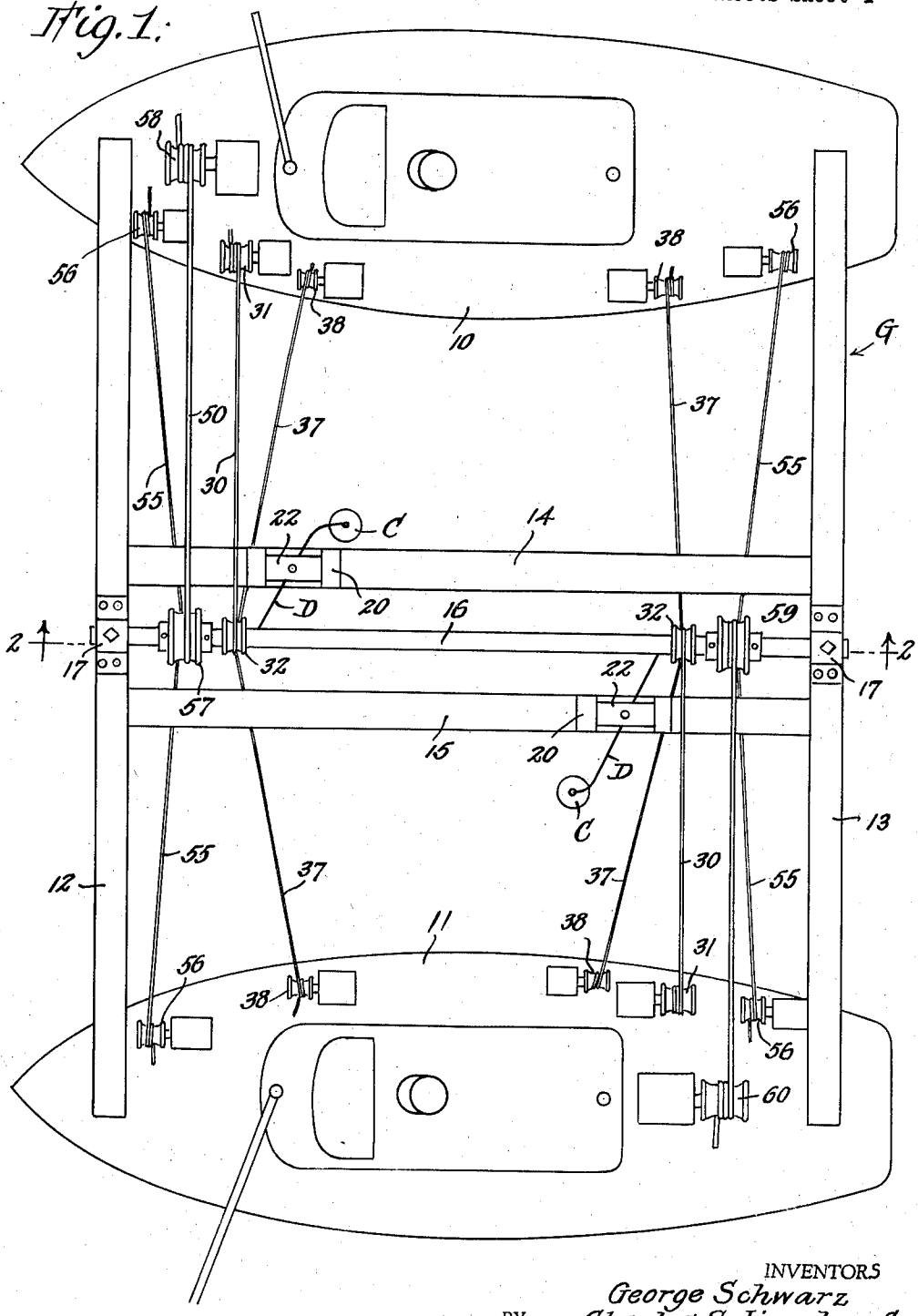

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Fig. 2.

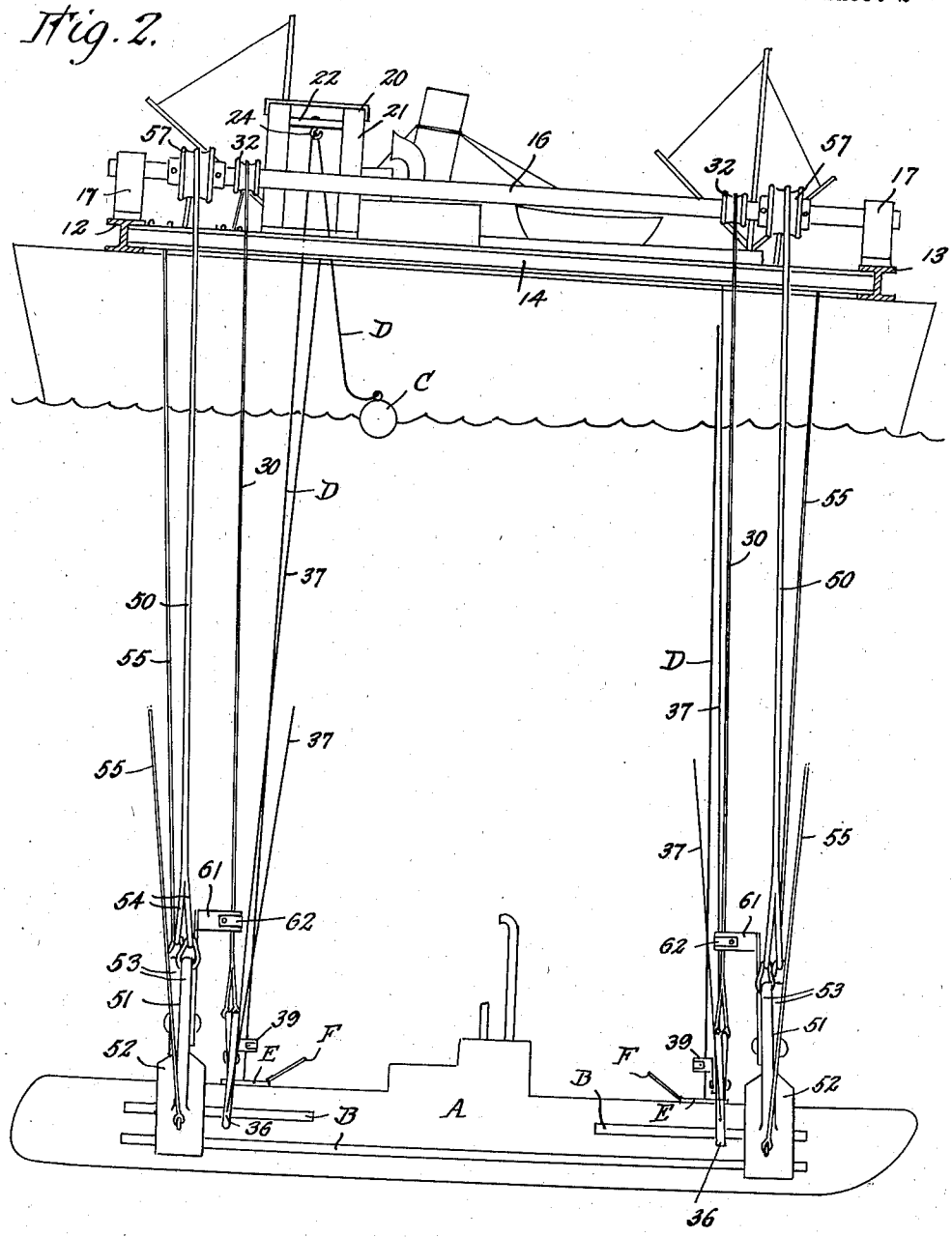

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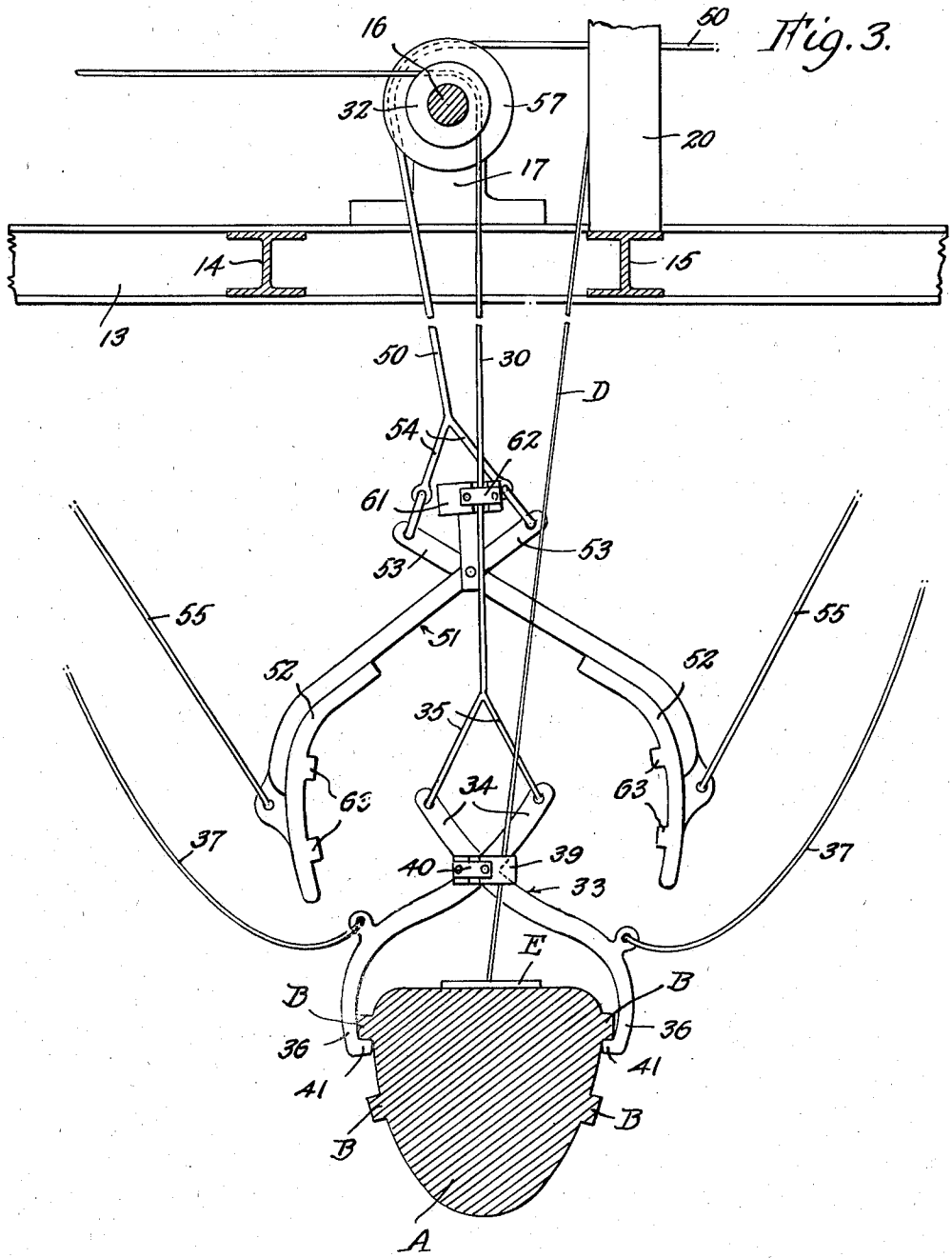
Fig. 3.



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APPARATUS FOR RAISING SUNKEN SUBMARINES

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Fig. 4.

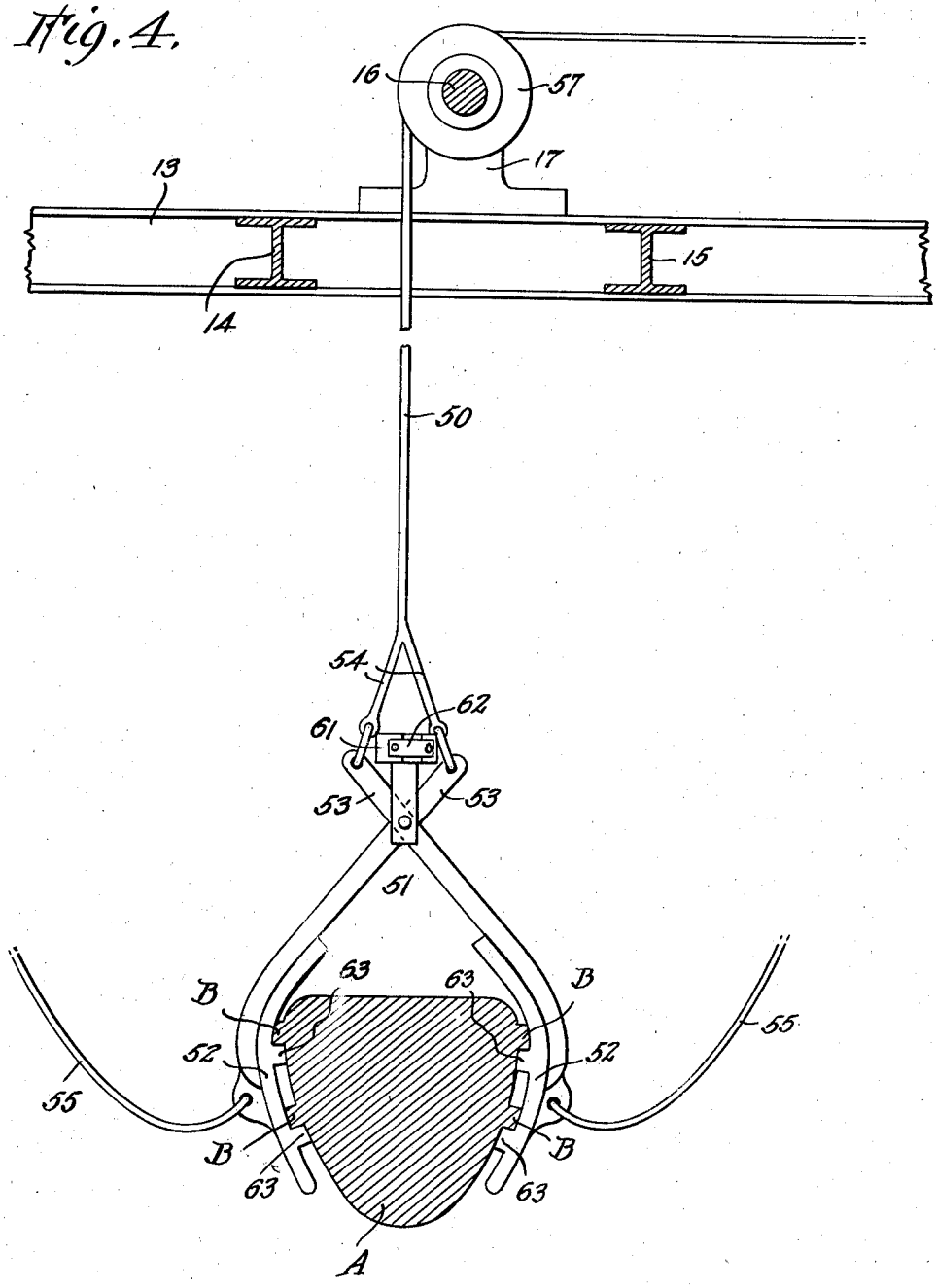

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Fig. 5.

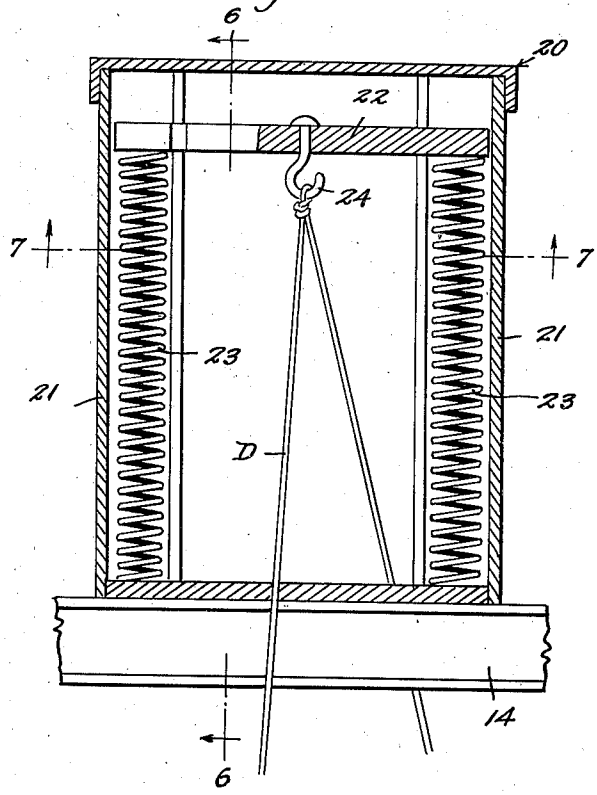


Fig. 6.

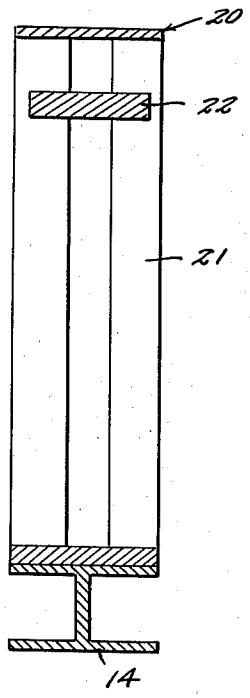
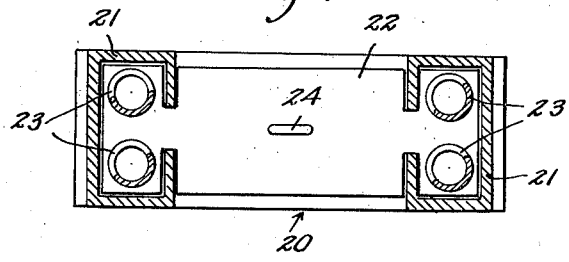


Fig. 7.



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UNITED STATES PATENT OFFICE

2,232,564

APPARATUS FOR RAISING SUNKEN SUBMARINES

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Application July 28, 1939, Serial No. 286,950

5 Claims. (Cl. 114—51)

This invention relates to a method of and apparatus for salvaging sunken vessels and refers more particularly to a method of and apparatus for raising sunken submarines.

The invention broadly comprehends a novel means for guiding a plurality of anchoring tongs carried by hoisting cables into juxtaposition to embrace the hull of a sunken submarine which hull is preferably provided with suitable cooperative ribs and which presupposes the equipment of the submarine with locating buoys and ropes by means of which ropes guide cables having anchoring tongs are guided into juxtaposition with the submarine.

The invention is also directed to a salvaging craft of the catamaran type having spaced parallel hulls bridged by a frame work to provide guide means located midway between and parallel to said hulls over which guide means the hoisting cables are trained to suitable hoisting engines on the salvaging craft so as to raise and suspend the submarine between the hulls of the salvaging craft for towing the same away.

The invention further resides in a novel means for attaching the submarine locating buoy ropes to the salvaging craft so as to compensate for the rise and fall of the sea during the preliminary operations of guiding by means of said buoy ropes, guide cables and tongs so as to dispose said tongs in grasping relation to the hull of the sunken submarine.

The invention also contemplates a method of raising and salvaging sunken submarines which consists in guiding guide cables having anchoring tongs to the submarine by means of the locating buoy ropes and effecting the gripping of said tongs to the hull of the submarine; then guiding into juxtaposition to the hull hoisting cables having attaching tongs by means of said guide cables; effecting the gripping of said anchoring tongs to the hull, and then hoisting said submarine by means of said hoisting cables.

With the above enumerated and other objects in view, the invention is set forth in greater detail in the following specification and illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of a salvaging apparatus.

Fig. 2 is a longitudinal sectional view taken approximately on the line 2—2 of Fig. 1, and illustrating the guide and hoisting cables and tongs in connected relation to the submarine.

Fig. 3 is an enlarged fragmentary transverse sectional view illustrating the guide cable and tongs in juxtaposition to the submarine.

Fig. 4 is a similar view illustrating the hoisting cable and tongs in attached relation to the submarine.

Fig. 5 is an enlarged vertical sectional view through one of the devices to which the locating buoy ropes are attached.

Fig. 6 is a vertical transverse sectional view therethrough taken approximately on the line 6—6 of Fig. 5.

Fig. 7 is a horizontal sectional view therethrough taken on the line 7—7 of Fig. 5.

Referring to the drawings by characters of reference, A designates a submarine, the hull of which is provided with longitudinally extending ribs B on the opposite sides thereof and which submarine is equipped with a pair of locating buoys C each of which is attached by means of a rope D to the submarine in spaced fore and aft relation. The buoys and their ropes are normally housed respectively within hatches E and retained in place by hatch covers F adapted to be released from within the submarine so as to float to the surface and indicate the position of a sunken submarine.

The apparatus for raising and salvaging sunken submarines includes a salvaging craft G of the catamaran type which is composed of a pair of surface vessels 10 and 11 secured together in spaced parallel relation by means of a framework consisting of transverse beams 12 and 13 secured at their opposite ends to the surface vessels 10 and 11 which framework further includes longitudinally extending beams 14 and 15 connected with the transverse beams 12 and 13, the framework being suitably braced and trussed to afford the requisite strength. A shaft 16 parallel to the surface vessels 10 and 11 extends fore and aft and is supported adjacent the opposite ends thereof by bearings 17 carried by the transverse beams 12 and 13 intermediate the ends thereof.

The beams 14 and 15 are each provided with a device 20 which are spaced fore and aft with reference to each other and which are adapted to have attached thereto respectively, the ropes D of the locating buoys C so that the salvaging craft may be disposed directly over the sunken submarine A. The devices 20 consist of a fixed upstanding frame 21 having a cross head 22 mounted therein for guided vertical movement and normally urged upwardly by means of springs 23. The cross head is provided with a depending attaching hook 24 to which the locating buoy rope D is initially made fast so that the spring pressed cross head will rise and fall with the sea during the preliminary salvaging operations. After the locating buoy ropes D have been at-

tached, a pair of guide cables 30 are lowered from each of the surface vessels of the salvaging craft, the guide cables being trained around motor driven winches 31 and thence around guide pulleys 32 rotatably mounted on the shaft 16. The guide cables 30 carry anchoring tongs 33, the terminals of the upper arm portions 34 of which are connected to the guide cable by branch cable sections 35 by means of which the lower jaw portions 36 of the anchoring tongs are normally swung towards each other to a clamping relation when suspended from the guide cable.

In order to hold the jaw portions 36 in an open relation and to maneuver the same into straddling relation to the submarine A, a hold open cable 37 is attached to each of the jaw portions 36 and said cables lead therefrom in opposite directions respectively to motor driven winches 38 on each of the surface vessels 10 and 11. Each pair of tongs 33 is provided with a split guide ring 39 which is engaged around the locating buoy rope D after which a latch bar 40 on the guide ring is swung to a position to bridge the split portion thereof. This serves to guide the tongs 33 to the sunken submarine as they are lowered and insures a proper straddling of the submarine by the jaw portions 36 of the tongs. The jaw portions 36 are provided with hooked lower terminals 41 which are adapted to engage under the longitudinal ribs B on opposite sides of the hull of the submarine A so that when the hold open cables 37 are slacked and an upward pull is exerted on the guide cables 30, the same will be properly anchored by the tongs 33 in clamping relation with the hull of the submarine.

The salvaging apparatus further consists of hoisting cables 50 each of which carries at its lower end a pair of hoisting tongs 51 having pivotally connected jaws 52, the upper terminals 53 of which are connected by branch cables 54 to the lower end of the hoisting cable so that the jaws 52 normally tend to swing towards each other to grip the hull of the submarine when suspended by the hoisting cables.

Each jaw of each pair of hoisting tongs 51 is provided with a hold open cable 55 which lead respectively to motor winches 56 to opposite surface vessels 10 and 11 of the salvaging craft G. The hoisting cables of one pair of tongs are trained around a pulley 57 and thence laterally to a motor driven winch 58, while the hoisting cable of the other pair of tongs is trained around a pulley 59 on the shaft 16 and laterally to a motor driven winch 60 on the opposite surface vessel 11.

The hoisting tongs 51 are each provided with a split guide ring 61 which is engaged around the guide cable 30 after which a latch bar 62 is secured over the split portion of the guide ring to retain the same in relation to the guide cable 30 to guide the tongs into juxtaposition to the submarine as the same are lowered by means of the hoisting cables 50. As the hoisting tongs approach the submarine A, the hold open cables 55 are employed to swing the jaws 52 to open relation and to maneuver the tongs so that the jaws 55 will straddle the hull of the submarine. When the jaws have been properly positioned, the hold open cables are slacked to permit the jaws to swing towards each other into gripping relation with the hull of the submarine.

As illustrated, the jaws of the hoisting tongs are provided with ribs 63 which are spaced apart so as to cooperatively engage with the longitudinal ribs B on the opposite sides of the hull of the submarine. After the tongs are closed into gripping relation with the submarine hull, an upward pull is exerted on the hoisting cables to retain the same in gripping relation and prior to the actual raising operation, the locating buoy ropes D are loosened and the locating buoys permitted to float as the hoisting operation proceeds. When the submarine has been raised so as to clear bottom, the salvaging craft may be propelled so as to tow the submarine suspended therebetween to shallow water for the purpose of completing the salvaging operation.

The method of raising and salvaging sunken submarines consists in employing the locating buoy ropes as a means for guiding guide cables having anchoring tongs into juxtaposition to the hull of the submarine so as to cause the anchoring tongs of the guide cables to straddle and grip the submarine, in order to attach said guide cable to the submarine. The method then consists in guiding into juxtaposition to the hull of the submarine hoisting cables having attaching tongs by employing the guide cables as a means for guiding the tongs and hoisting cable and then effecting the gripping of the anchoring tongs of said hoisting cable to the submarine hull while finally employing the hoisting cables as means for raising the submarine.

What is claimed is:

1. In an apparatus for salvaging sunken submarines which are equipped with locating buoys having ropes extending therefrom and attached to the submarine hull, a salvaging craft including spaced parallel surface vessels, a framework secured to and bridging said vessels, guide means supported by the framework and located thereon intermediate said vessels, guide cables leading respectively from said vessels and trained around said guide means, anchoring tongs carried thereby and guide elements carried by said anchoring tongs and engageable around said locating buoy ropes for guiding said tongs into clamping engagement with the hull of the submarine to secure the guide cables thereto, hoisting cables leading respectively from each of said surface vessels and trained around said guide means, hoisting tongs carried by said hoisting cables, guide elements carried by the hoisting tongs and engageable around said guide cables for directing said hoisting tongs into juxtaposition to the hull of the submarine for embracing engagement therewith so as to anchor the hoisting cables thereto, and means on said surface vessels for raising said hoisting cables.

2. In an apparatus for salvaging sunken submarines which are equipped with locating buoys having ropes extending therefrom and attached to the submarine hull, a salvaging craft including spaced parallel surface vessels, a framework secured to and bridging said vessels, guide means supported by the framework and located thereon intermediate said vessels, guide cables leading respectively from said vessels and trained around said guide means, anchoring tongs carried thereby and guide elements carried by said anchoring tongs and engageable around said locating buoy ropes for guiding said tongs into clamping engagement with the hull of the submarine to secure the guide cables thereto, hoisting cables leading respectively from each of said surface vessels and trained around said guide means, hoisting tongs carried by said hoisting cables, guide elements carried by the hoisting tongs and engageable around said guide cables for directing said hoisting tongs into juxtaposi-

tion to the hull of the submarine for embracing engagement therewith so as to anchor the hoisting cables thereto, and hold open cables respectively attached to said guide cable tongs and said hoisting tongs and leading to the surface vessels for holding open the jaws of said tongs and for maneuvering the same from the surface into straddling relation to the submarine hull.

3. In an apparatus for salvaging sunken submarines which are equipped with locating buoys having ropes extending therefrom and attached to the submarine hull, a salvaging craft including spaced parallel surface vessels, a framework secured to and bridging said surface vessels, means on said salvaging craft for attaching the locating buoy ropes thereto, guide means supported by the framework and located thereon intermediate said vessels, guide cables leading respectively from said vessels and trained around said guide means, anchoring tongs carried thereby and guide elements carried by said anchoring tongs and engageable around said locating buoy ropes for guiding said tongs into clamping engagement with the hull of the submarine to secure the guide cables thereto, hoisting cables leading respectively from each of said surface vessels and trained around said guide means, hoisting tongs carried by said hoisting cables, guide elements carried by the hoisting tongs and engageable around said guide cables for directing said hoisting tongs into juxtaposition to the hull of the submarine for embracing engagement therewith so as to anchor the hoisting cables thereto, and means on said surface vessels for raising said hoisting cables.

4. In an apparatus for salvaging sunken submarines which are equipped with locating buoy ropes extending therefrom and attached to the submarine hull, a salvaging craft including spaced parallel surface vessels, a framework secured to and bridging said surface vessels, spring urged means on said salvaging craft for attaching the locating buoy ropes thereto so as to compensate for the rise and fall of the sea, guide means supported by the framework and located thereon intermediate said vessels, guide cables leading respectively from said vessels and trained around said guide means, anchoring tongs carried thereby and guide elements carried by said anchoring tongs and engageable around said locating buoy ropes for guiding said tongs into clamping engagement with the hull of the submarine to secure the guide cables thereto, hoisting cables leading respectively from each of said surface vessels and trained around said guide means, hoisting tongs carried by said hoisting cables, guide elements carried by the hoisting tongs and engageable around said guide cables for directing said hoisting tongs into juxtaposition to the hull of the submarine for embracing engagement therewith so as to anchor the hoisting cables thereto, and means on said surface vessels for raising said hoisting cables.

5. In an apparatus for salvaging sunken submarines which are equipped with locating buoys having ropes extending therefrom and attached to the submarine hull and which submarine hull is provided with longitudinally extending ribs on the opposite sides thereof, a salvaging craft including guide cables leading downwardly therefrom, anchoring tongs carried by said guide cables having cooperative ribs thereon and guide elements carried by the anchoring tongs and engageable around the locating buoy ropes for guiding said tongs into clamping engagement with the hull of the submarine with the ribs on the tongs engaging the ribs on the hull so as to secure the guide cables thereto, hoisting cables leading downwardly from said salvaging craft, hoisting tongs carried by said hoisting cables, ribs on said hoisting tongs, guide elements carried by the hoisting tongs and engageable around said guide cables for directing said hoisting tongs into juxtaposition to the hull of the submarine for embracing the same with the ribs on said hoisting tongs engaging the ribs on the submarine, and means on said salvaging craft for raising said hoisting cables.

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