Dec. 11, 1945. C. E. KITTINGER 2,390,654

RAISING SUNKEN SHIPS

Filed Oct. 6, 1944 4 Sheets-Sheet 1

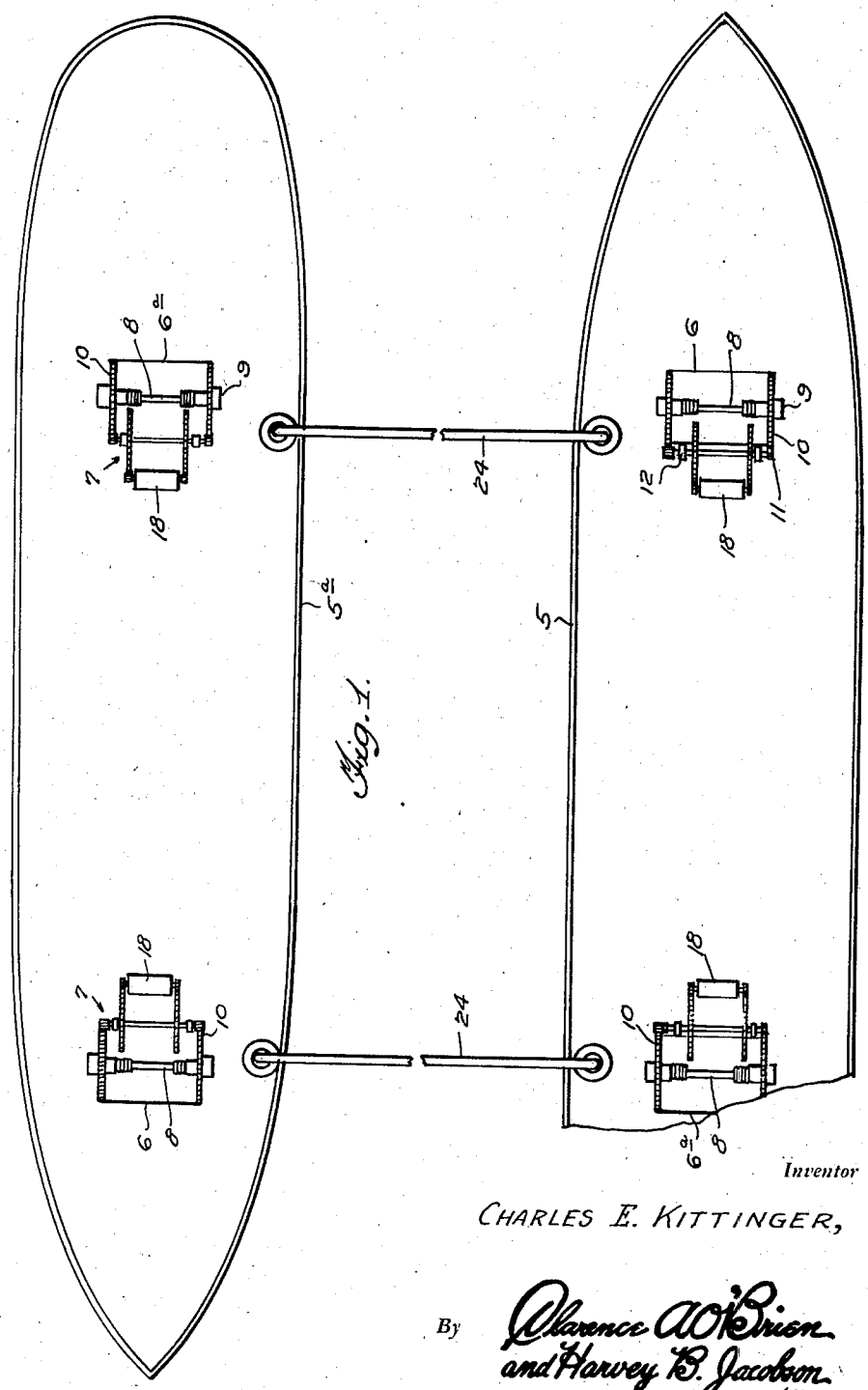


Fig. 1.

Inventor

CHARLES E. KITTINGER,

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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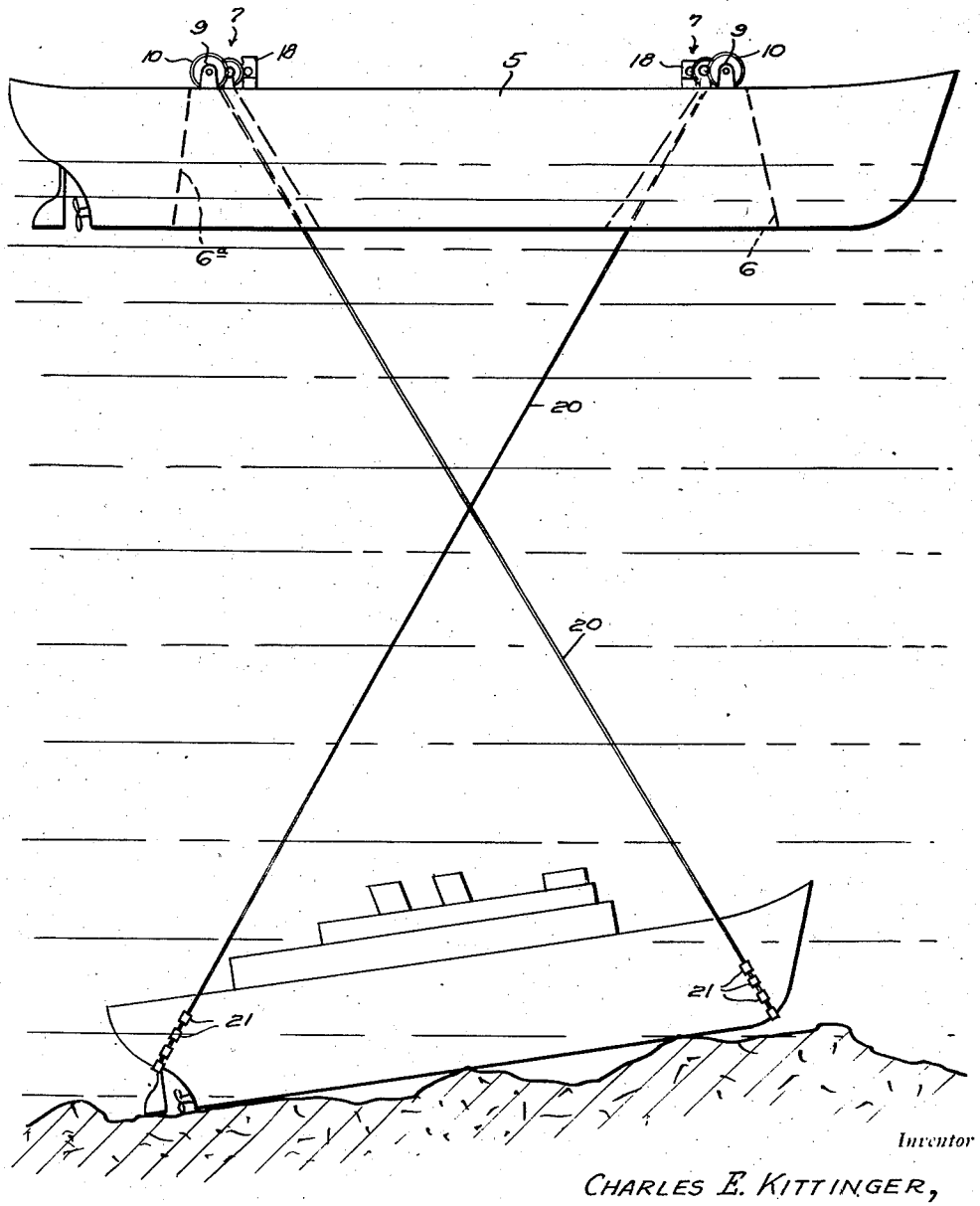


Fig. 2.

Inventor

CHARLES E. KITTINGER,

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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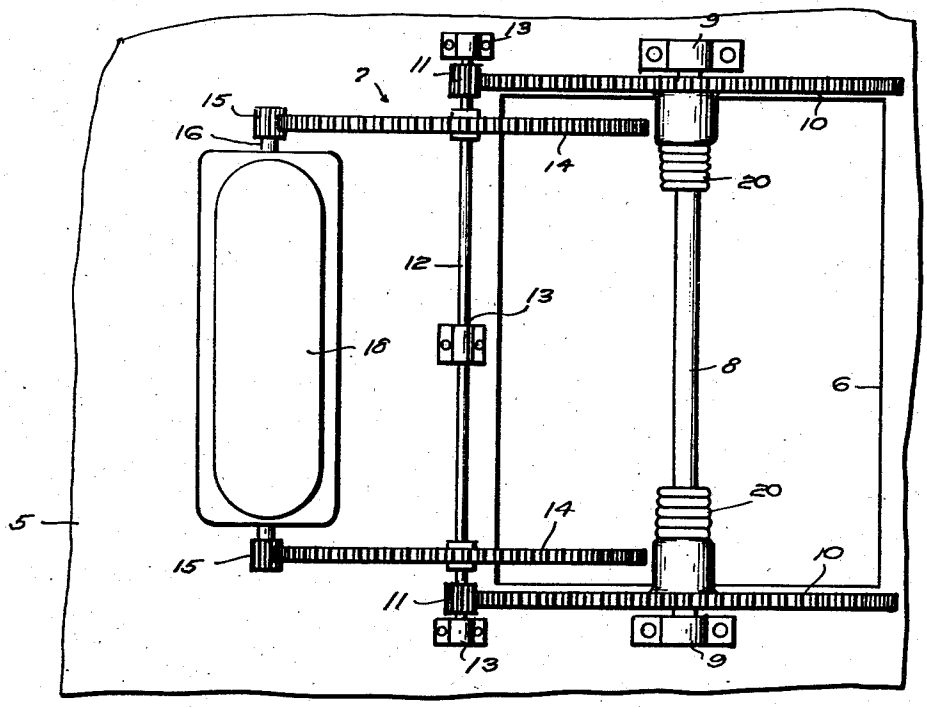


Fig. 3.

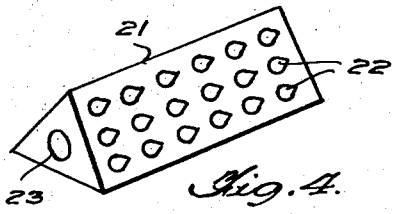


Fig. 4.

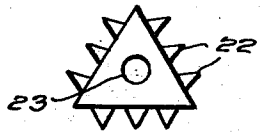


Fig. 5.

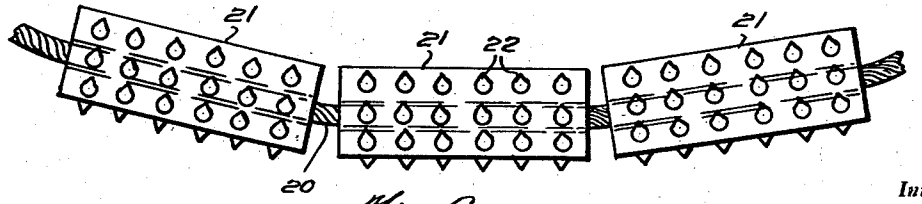


Fig. 6.

Inventor

CHARLES E. KITTINGER,

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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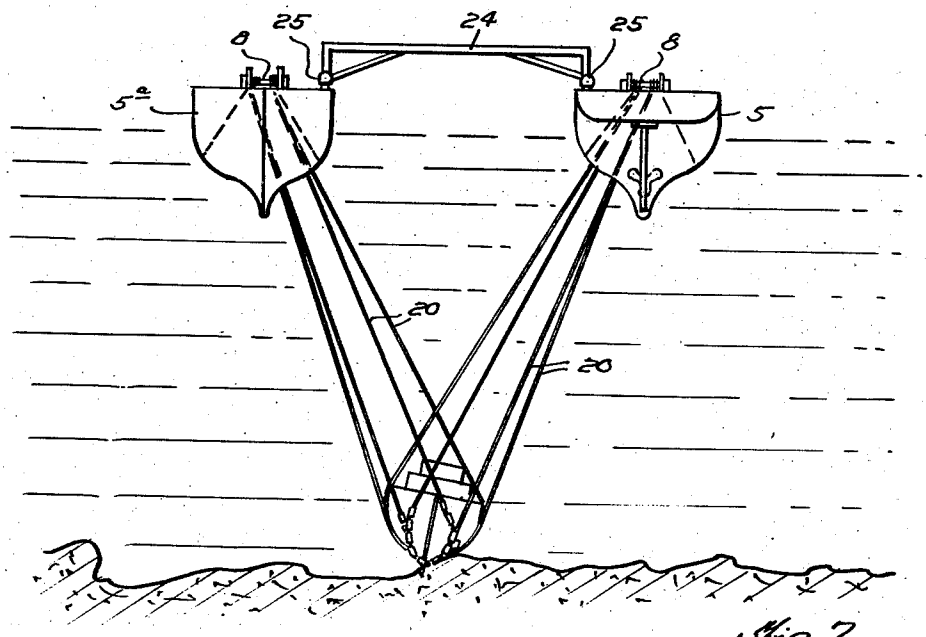


Fig. 7.

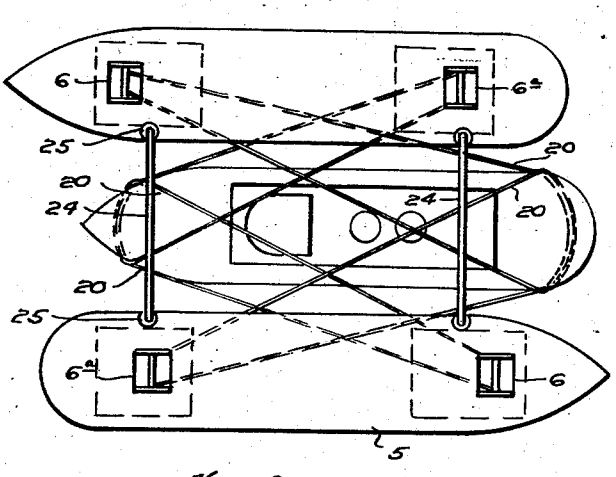


Fig. 8.

Inventor

CHARLES E. KITTINGER,

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Patented Dec. 11, 1945

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UNITED STATES PATENT OFFICE

2,390,654

RAISING SUNKEN SHIPS

Charles E. Kittinger, Missoula, Mont.

Application October 6, 1944, Serial No. 557,441

4 Claims. (Cl. 114—51)

The object of the present invention is to provide an improved method of and apparatus for raising sunken ships.

In the accompanying drawings, wherein like reference characters indicate corresponding parts throughout the several views:

Figure 1 is a top plan view, partly broken away, showing two salvage ships coupled together so as to be maintained in spaced side-by-side relation in accordance with the present invention, said salvage ships being also specially constructed and equipped with hoisting mechanism as contemplated by the present invention.

Figure 2 is a vertical sectional view of a body of water showing a vessel sunk therein and the salvage ships located upon the surface of the water directly above the sunken vessel, hoisting loops lowered from the salvage ships being engaged with the sunken vessel in accordance with a step of the present method.

Figure 3 is an enlarged fragmentary top plan view more clearly showing the hoisting mechanism, two of which are provided on each salvage ship.

Figure 4 is a perspective view of one of the hull contacting members which are employed on the hoisting loops to prevent slipping of the latter relative to the hull of the sunken vessel during the act of raising the latter.

Figure 5 is an end elevational view of the device shown in Figure 4.

Figure 6 is a fragmentary view showing the central portion of one of the hoisting loops and the hull contacting members mounted thereon.

Figure 7 is a view looking toward the right of Figure 2 to more clearly show how the salvage ships are coupled in spaced side-by-side relation and how the hoisting loops of the salvage ships are extended to and engaged under the sunken vessel.

Figure 8 is a somewhat diagrammatic top plan view of the construction shown in Figures 2 and 7, drawn on a smaller scale.

Referring in detail to the drawings, the present invention contemplates the provision of two similar salvage vessels 5 and 5*a*, each having formed entirely therethrough adjacent the bow and stern portions thereof vertical downwardly flaring passages 6 and 6*a*, respectively. Mounted on the deck of each salvage vessel adjacent each of its passages 6 and 6*a* is a hoisting mechanism generally indicated at 7. As shown more clearly in Figure 3, each hoisting mechanism 7 includes a hoisting or winding drum 8 journaled in bearings at the upper ends of uprights and standards 9 fixed upon the deck of the salvage ship at opposite sides of the associated opening 6 or 6*a* so that the winding drum is mounted transversely of said opening 6 or 6*a* centrally of the latter. At its ends, the drum 8 has large gears 10 that mesh with pinions 11 on the ends of a transverse countershaft 12 journaled in bearings 13 at the inner side of the associated opening or passage 6 or 6*a*. A further pair of relatively large gears 14 are secured on the end portions of countershaft 12 and mesh with pinions 15 secured on the projecting ends of the drive shaft 16 of a motor or engine 18 mounted on the deck of the salvage ship adjacent the shaft 12.

Attached to and adapted to be wound upon each drum 8 are the opposite ends of a cable 20 forming a hoisting loop adapted to be raised and lowered through the associated passage 6 or 6*a*. The operation and speed of the engine or motor 18 may be suitably controlled. Threaded onto the intermediate portion of each of the hoisting loops 20 are a plurality of hull contacting blocks 21 which are preferably of triangular form, as shown clearly in Figures 4 to 6, inclusive, and which are preferably provided upon each of the faces thereof with a plurality of pointed spurs or teeth 22. Each block 21 has a central longitudinal bore 23 through which the hoisting loop 20 extends, and it will be apparent that the blocks 21 will readily present a face to contact the hull of the sunken vessel regardless of any twisting that the hoisting loops may undergo in use. The spurs or teeth 22 will prevent undue shifting of the hoisting loops relative to the hull of the sunken vessel after the hoisting loops become taut during the raising operation.

Means is provided to separably couple the two salvage ships so as to maintain them in predetermined spaced side-by-side relation during the raising operation and to also aid in preventing lateral capsizing of said salvage ships. For this purpose, a coupling bar 24 is provided between each of the opposite end portions of the salvage ships, and separable ball and socket joints are provided at 25 between the opposite ends of each coupling bar 24 and the decks of the salvage ships at the adjacent sides of the latter. The ball and socket joints 25 may be of any suitable specific construction that will permit removal of the coupling bars when desired and that will permit relative rising and falling of the salvage ships relative to each other in rough water.

In carrying out the present method, the two salvage vessels are located at a point above and to opposite sides of the sunken vessel parallel

with the latter and coupled together by means of the coupling bars **24**. The hoisting loops **20** of the two salvage vessels are lowered and engaged under the sunken vessel, the loops **20** at corresponding ends of the salvage ships being engaged under the remote end of the sunken vessel and the remaining loops **20** of said salvage ships being engaged under the other remote end of said sunken vessel. In other words, the hoisting loops **20** of each salvage ship are extended downwardly and crossed, as shown clearly in Figure 2, so that each hoisting loop is extended from one end of a salvage ship and engaged under the remote end of the sunken vessel. This arrangement is followed in connection with each salvage ship so that two sets of crossed hoisting loops are provided, one of each set being engaged under one end of the sunken vessel, and the other loop of each set being engaged under the other end of the sunken vessel. The hoisting mechanisms of both salvage ships are then all set in operation so as to simultaneously and similarly wind the hoisting loops **20** upon the drums **8** with a corresponding portion of the weight of the sunken vessel imposed upon each hoisting loop. Also, the pull on each hoisting loop is in a direction toward the transverse center of the sunken vessel so that the loops will positively remain in engagement with the sunken vessel and will be prevented from slipping from beneath the bow and stern ends of the latter as might readily take place if the hoisting loops were extended vertically in uncrossed relation. When the sunken vessel has been raised to a desired degree, the salvage ships may be moved to bring the raised vessel to a desired destination for completing raising and salvage thereof. Where circumstances permit, the engagement of the hoisting loops with the sunken vessel may be effected by a diver. Other means for effecting such engagement can be arrived at and resorted to where the vessel is sunk to a depth at which a diver cannot successfully operate. It will be noted that each salvage ship has complete control and operation of its respective hoisting loops, a more effective arrangement than that of extending one end of a hoisting loop from one salvage ship, under the sunken vessel and then to the other salvage ship. Also, the hoisting loops or cables **20** may be freely movable through the hull contacting blocks **21** so that the latter may not be shifted after tightly engaging the hull of the sunken ship, even though movements of the salvage ships may effect longitudinal movement of the cables **20** through said blocks **21**.

From the foregoing description, it is believed that the construction and operation, as well as the advantages of the prevent invention will be readily understood and appreciated by those skilled in the art. Minor changes may be resorted to such as fairly fall within the spirit and scope of the invention as claimed.

What I claim is:

1. The method of raising a sunken ship, which consists in disposing two salvage ships on the surface parallel with and to opposite sides of the sunken vessel, coupling said salvage ships so as to maintain them in spaced parallel relation and permit them to relatively rise and fall with the waves, lowering hoisting loops from each salvage ship and through the latter respectively adjacent the bow and stern thereof, crossing the hoisting loops of each salvage ship beneath the latter and above the sunken ship and engaging them under opposite ends of the sunken vessel so that an upward pull upon the hoisting loops will tend to draw the same toward the transverse center of the sunken vessel, and simultaneously winding all of the hoisting loops of the two salvage ships at a substantially uniform speed to raise the sunken vessel in a substantially horizontal position adjacent and between the salvage ships.

2. The method of raising a sunken ship, which consists in disposing two salvage ships on the surface parallel with and to opposite sides of the sunken vessel, coupling said salvage ships so as to maintain them in spaced parallel relation and permit them to relatively rise and fall with the waves, lowering hoisting loops from each salvage ship and through the latter respectively adjacent the bow and stern thereof, crossing the hoisting loops of each salvage ship beneath the latter and above the sunken ship and engaging them under opposite ends of the sunken vessel so that an upward pull upon the hoisting loops will tend to draw the same toward the transverse center of the sunken vessel, simultaneously winding all of the hoisting loops of the two salvage ships at a substantially uniform speed to raise the sunken vessel in a substantially horizontal position adjacent and between the salvage ships, and providing for constant gripping engagement of the loops with the hull of the sunken ship while permitting longitudinal shifting of the hoisting loops relative to the latter hull while the hoisting loops are taut during the raising operation.

3. Apparatus for raising sunken ships comprising two similar salvage ships each having downwardly flaring passages therethrough adjacent the bow and stern thereof, a hoisting mechanism mounted on the deck of each salvage ship adjacent each passage of the latter and including a winding drum, a hoisting loop associated with each hoisting mechanism and having its opposite ends connected to the winding drum thereof and movable through the associated passage, and means for coupling the salvage ships to maintain them in spaced parallel relation, said coupling means being flexibly connected to the respective salvage ships to permit relative rising and falling of the latter in rough water.

4. Apparatus for raising sunken ships comprising two similar salvage ships each having downwardly flaring passages therethrough adjacent the bow and stern thereof, a hoisting mechanism mounted on the deck of each salvage ship adjacent each passage of the latter and including a winding drum, a hoisting loop associated with each hoisting mechanism and having its opposite ends connected to the winding drum thereof and movable through the associated passage, and means for coupling the salvage ships to maintain them in spaced parallel relation, said coupling means being flexibly connected to the respective salvage ships to permit relative rising and falling of the latter in rough water, and toothed hull contacting blocks freely threaded on the intermediate portions of said hoisting loops.

CHARLES E. KITTINGER.