N. F. CHAMBERLIN.

SUBMARINE TOWER BARGE FOR RAISING SUNKEN VESSELS.

APPLICATION FILED APR. 8, 1918.

1,276,327.

Patented Aug. 20, 1918.

2 SHEETS—SHEET 1.

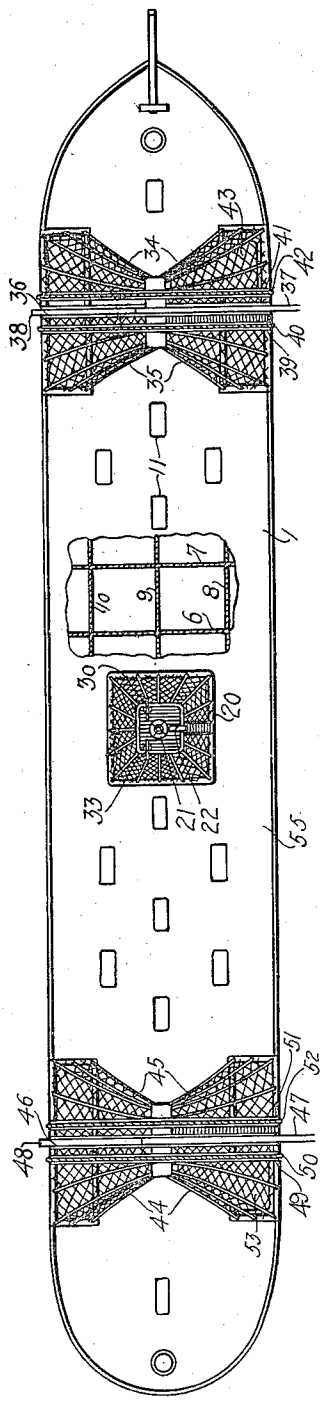


Fig. 1

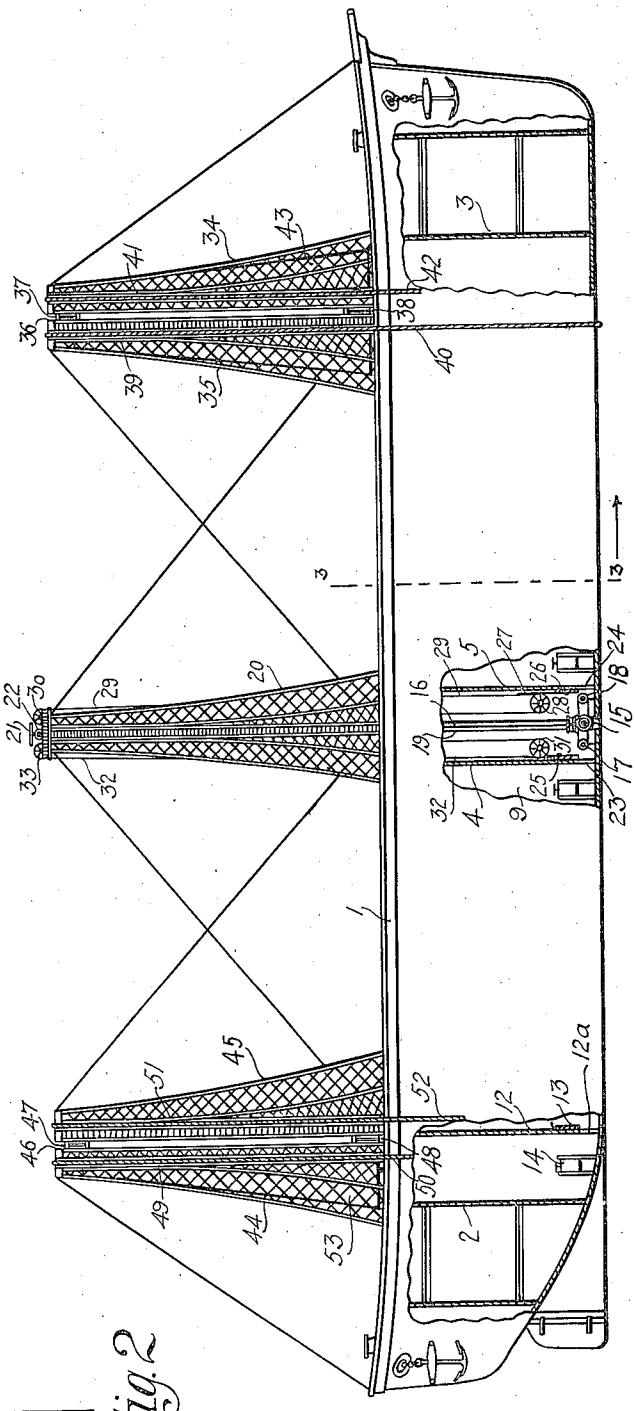


Fig. 2

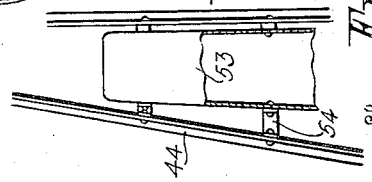


Fig. 9

Inventor

Newton F. Chamberlin,

By Edwin Guthrie,

Attorney

N. F. CHAMBERLIN.

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2 SHEETS—SHEET 2.

Fig. 3

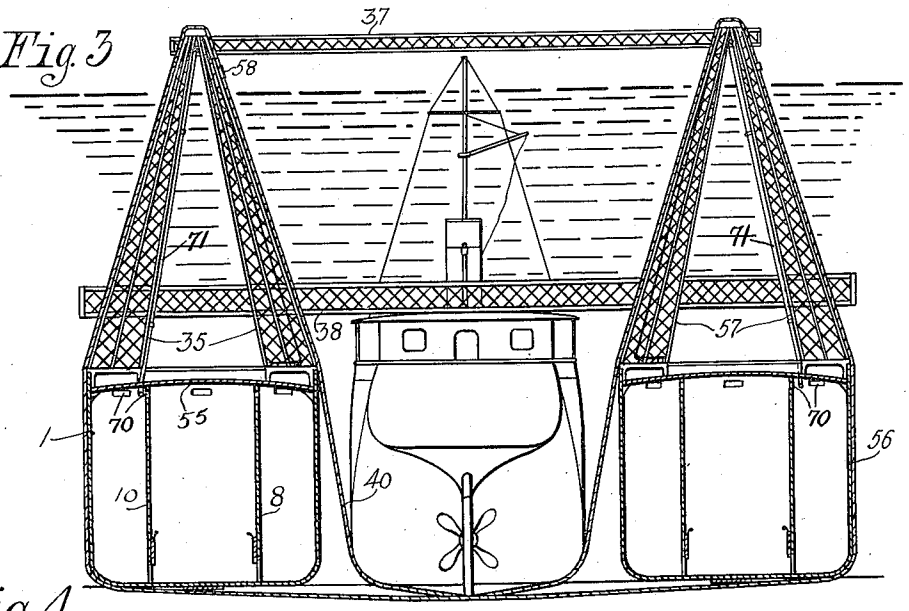


Fig. 4

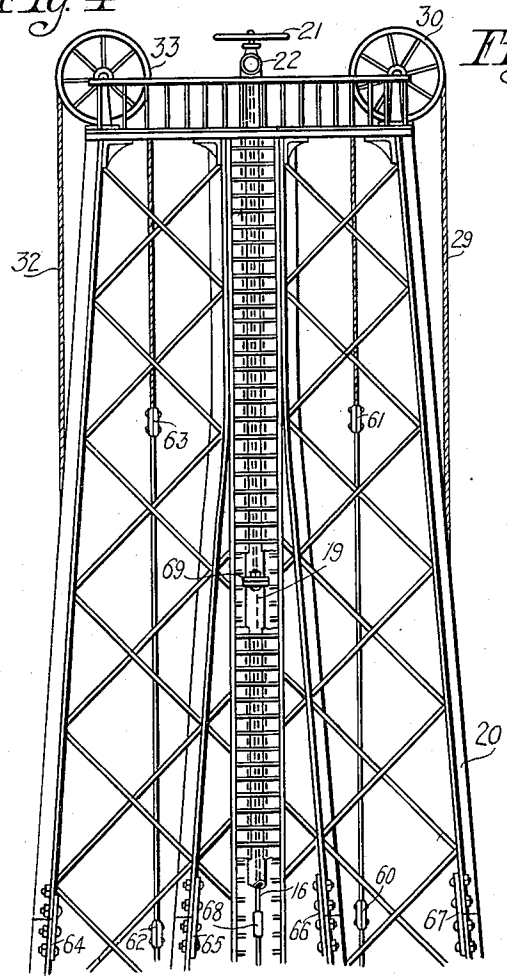


Fig. 5

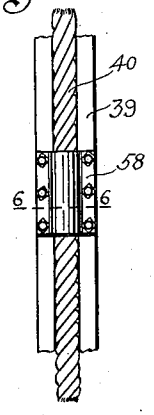


Fig. 6



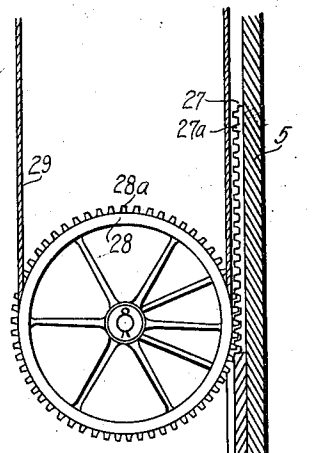


Fig. 7

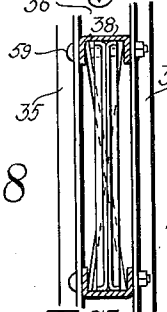
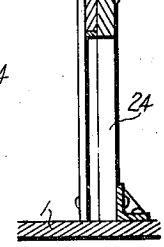


Fig. 8



Inventor

Newton F. Chamberlin,

By Edwin Guthrie,

Attorney

UNITED STATES PATENT OFFICE.

NEWTON F. CHAMBERLIN, OF LIBERTYVILLE, ILLINOIS.

SUBMARINE TOWER-BARGE FOR RAISING SUNKEN VESSELS.

1,276,327. Specification of Letters Patent. Patented Aug. 20, 1918.

Application filed April 8, 1918. Serial No. 227,233.

To all whom it may concern:

Be it known that I, NEWTON F. CHAMBERLIN, citizen of the United States, residing at Libertyville, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Submarine Tower-Barges for Raising Sunken Vessels, of which the following is a specification.

This invention relates to submarine tower barges for raising sunken vessels. More particularly it belongs to that class of wrecking apparatus wherein are comprised vessels capable of being lowered into the water on either side of a sunken vessel by admitting water into them, and, after some attachment has been made to the sunken vessel those at the sides are pumped out and by their buoyancy raise the wreck to or toward the surface of the water enabling it to be towed into a suitable locality or position for salvage.

The object of this invention is the production of barges for the purpose stated, each barge being provided with open-work metal tower constructions having special construction and arrangement. Such towers are arranged near the ends of the barge and between them is erected a middle or working tower from which the various operations may be conducted. It is also an object of this invention to produce a barge divided longitudinally and transversely by bulkheads to prevent the effect of the surging of the water within the barge when sinking, and to provide certain of the bulkheads which are used to form a water-distributing compartment with valves whereby water may be excluded from certain portions of the barge when operating to maintain the same on a desired level at all times. As the barges are sunk along side of a wreck, and finally reach and rest upon the bottom, it is the intention to have the towers of such height that their upper portions will stand above the water, or, the towers and the various operating connections carried thereby may be elongated in case of need. Each tower carries one or more cables that have been previously worked under the ends bow and stern of the wreck as more fully explained hereinafter and the cables are laid in grooved beds borne by the towers on the sides thereof. The cables pass over the tops of the towers and may be attached to the towers by clamping them in their beds as shown and described.

In the drawings forming a part of this application and illustrating the particular construction and arrangement of the parts of this invention, Figure 1 represents a top plan view of a barge constructed in accordance wth this invention. Fig. 2 is a side view, parts of the hull being broken away to disclose internal devices. Fig. 3 shows two barges provided with towers constructed in accordance with this invention and sunk at the sides of a wreck which it is desired to raise. The upper portions of the towers are illustrated as projecting above the surface of the water. Fig. 4 is a side view on an enlarged scale of the upper portion of the middle or working tower, setting forth the devices for operating the bulkhead valves and the sea-cock, and showing also the upper end of the water pipe by which the barge is pumped out when raising the sunken vessel. Fig. 5 is a front view of a portion of one of the grooved beds for the cables, and shows a clamp whereby the cable may be secured to the bed. Fig. 6 is a cross-section on broken line 6—6 of Fig. 5. Fig. 7 is a vertical sectional view of one of the bulkheads forming the water-distributing compartment in the middle of the barge, with the opening through the bulkhead, the valve for controlling the opening, and the rack and geared and grooved pulley and cable by which the valve is operated. Fig. 8 illustrates one of the cross-ties in cross-section and shows the mode of bolting the cross-tie to the vertical parts of the frame of the members constituting one of the towers. Fig. 9 is a view of the upper portion of one of the closed air tanks located within one of the members of a tower, and shows the means of attaching the tank to the tower for supporting it within the tower.

Throughout the description and drawings, the same number is employed to refer to the same part.

Considering the drawings, a barge 1, of appropriate form and size, usually in the shape of a sailing vessel, as it is the intention under certain conditions to apply sails to the several towers and move the barge under its own sail, is provided at the ends with closed air chambers 2 and 3. These chambers always retain their air even when the barge is sunk, and they have the effect

of steadying the barge as it descends and, so far as the weight of the barge itself is concerned, to maintain it in a horizontal position. Any departure from the normal horizontal position of the barge may be additionally rectified by the action of the pumping operation and the manipulation of the valves in the water-distributing compartment or chamber as hereinafter explained.

A part of the bulkheads, such as bulkheads 4 and 5 amidships, are made to form a compartment which may be termed for the purposes of this description the water-distributing compartment, inasmuch as the water first enters this compartment and is thence distributed to the other parts of the hull of the barge when the same is sunk to the side of a wreck. Other transverse bulkheads are referred to by numbers 6 and 7, and the numbers 8, 9 and 10 mark the bulkheads running lengthwise of the barge. Any number of deck hatchways 11 may be provided.

Near the stern will be noted one of the transverse bulkheads marked 12, which has an opening 12ª at the bottom, controlled by a valve 13. A similar valve 14 is shown in the longitudinal bulkhead, and, it will be observed that these valves are open. They are left open in order that the entering water may find its way freely to all parts of the interior of the hull of the barge.

Located in the water-distributing compartment mentioned is a sea-cock 15, and the rod for turning the sea-cock extends upwardly and is marked 16. Near the sea-cock is shown in Fig. 2 the lower open ends 17 and 18 of a vertical pipe 19 by way of which water is pumped out of the hull of the barge when the raising part of the operation is in progress. The sea-cock rod 16 and the pipe 19 pass upwardly through the middle or working tower 20, of this invention. This tower is an open-work braced steel construction, and has at its top a hand-wheel 21 by which the rod 16 may be turned to open and close the sea-cock 15. The top of the tower 20 also supports the upper end 22 of the pipe 19, and to this upper end of the pipe the pumping machinery is connected in the operation. In Fig. 2 it will be noted that the bulkheads 4 and 5 forming the sides of the water-distributing compartment, are provided at the bottom with the openings 23 and 24, and that the valves 25 and 26 control those openings. These valves and the means for operating them are of the same construction, and the explanation of one and of the devices appertaining thereto will answer for both. In Fig. 7 it will be observed that the valve 26 has an extension upwardly which takes the form of the rack 27 having teeth 27ª. Those teeth engage like teeth 28ª peripherally formed upon the grooved pulley 28 about which passes an operating rope 29. By moving the rope the valve 26 is raised and lowered. The rope 29 passes upwardly to the top of the working tower 20, where it passes around a grooved pulley 30 suitably mounted within reach of the operator at the top of the tower. The valve 25 upon the bulkhead 4 is operated by the wheel 31 that has the same features as the wheel 28, and a rope 32 passes upwardly to the top of the working tower and about the hand wheel 33. While the parts illustrated and described for turning the sea-cock open and shut, and for operating the valves in the water-distributing compartment are simple, convenient and practical, it is not intended to confine this invention to them or to any special form of such adjuncts of which many forms are in common use.

There are two cable-carrying towers, and each tower is composed of twin members such as the members 34 and 35 of the tower near the bow of the barge. Between the members is a space 36 extending from bottom to top of the tower, and the cross-ties 37 and 38, which are long, cross-braced steel girders, enter the space 36 and extend from one barge to its fellow upon the other side of a wreck, as illustrated in Fig. 3. On the member 35 of the forward tower and located externally is a grooved cable bed 39 running from bottom to top of the member and the groove is occupied by the cable 40. The member 41 supports a like grooved bed 41 for the cable 42. This invention is not limited to any number of grooved beds or cables, but two cables for each main tower are found in practice to be quite capable of performing the raising operations ordinarily demanded in most instances. In Fig. 1 it will be noted that each member of the cable towers is a bifurcated structure that spans the barge from side to side, and in one portion or leg of the member 34 is located the closed air tank 43. The purpose of the air tanks such as the tank 43 is to keep the towers perpendicular while the barge sinks, and each cable tower is provided with one or more of the air tanks. Usually they extend from bottom to top within the metal bracing of the member as shown in Figs. 1, 2, and 3. The tanks are shown within that side or leg of the bifurcated member toward the wreck to be raised, but that arrangement while preferred may obviously be departed from within the purview of this invention.

The after cable tower is made up of the members 44 and 45, the same in structure, form and size as the members of the forward cable tower described. There is a space 46 between them, and the cross-ties 47 and 48 enter the space. The member 44 has the grooved cable bed 49 for the cable 50, and the member 45 has a like bed 51 for the cable 52. Within the leg of the member 44

nearest the observer in Fig. 2 is shown the air tank 53. Considering Fig. 9, it will be seen that the tank 53 is secured to the irons of the tower 44 by brackets 54.

The deck 55 of the barge is supported and braced by the bulkheads beneath it in the customary manner, to withstand contained air pressure and external water pressure. The whole is made strong enough for the work expected of it.

In Fig. 3 the second barge is referred to by number 56, and the tower upon it comprises the member 57 shown. The barges in Fig. 3 are in cross-section upon the broken line 3—3 of Fig. 2.

Next considering Fig. 5, it will be seen that the grooved bed 39 is occupied by the cable 40, and a clamp plate 58 secures the cable to the bed. The same parts are shown also in Fig. 6.

Considering Fig. 8, it will be noted that the cross-tie 38 occupies the space 36 between the members 34 and 35 of the tower, and that the cross-tie may be secured to the tower by a bolt 59.

Considering Fig. 4, which represents a side view of the top of the working tower 20 on an enlarged scale, it will be observed that the lengthening of the tower is provided for by including in the rope 29 the couplings 60 and 61, which, it will be understood, may be unfastened and a longer piece of rope introduced. The rope 32 includes the couplings 62 and 63. The main angle irons of the tower 20 are provided with the joints 64, 65, 66 and 67 for like purposes of extension. The rod 16 by which the sea-cock is operated from the tower 20 includes a coupling 68 and may be furnished with an additional piece to add to its length, and the pipe coupling 69 in the water pipe 19 permits an extra length of pipe to be inserted when desired.

To permit the air to leave the hull and to reënter it during the operation, the bulkheads are provided with the upper openings 70, and an airpipe 71 extends from the interior of the hull to the top of the tower, as shown in Fig. 3. Any number of air pipes may be employed.

In the practical operation of this invention there are used two or more tugboats provided with adequate pumping machinery, hoisting derricks for arranging the cross-ties as shown in the spaces between the members of the fore and aft towers, and winches for drawing upon the cables. After finding a sunken vessel that is to be raised, the two tugs take each an end of a cable and work it back and forth in the usual manner until the cable is dragged under the bow of the wreck a desired distance. Then buoys are attached to the ends and another cable is worked under the stern in the same way. Now, the two barges having been connected by the cross-ties to space the barges apart the required distance, they are towed into proper position so that in sinking they will go down one upon one side and the other upon the other side, of the wreck. The anchors with which the barges are provided are next put down to hold them in place. The operator upon the working or middle tower opens the sea-cock on each barge and the water enters the hulls and finds its way through the openings in the bulkheads to all the compartments. If it is discovered that in spite of the effect of the closed chambers 2 and 3 at the end of a barge or barges one end is sinking faster than the other end, the water is temporarily shut off from the lower end by working either of the valves 25 or 26 in the water-distributing chamber depending upon which end is the lower. It is believed to be clear that if one barge is found to be sinking faster than the other, the entering water may be shut off by the sea-cock or by the valves until the balance is again attained. Manifestly, a corresponding balancing operation may be carried out during the rising movement of the two barges by working the valves suitably after the sea-cocks are closed.

When the barges have been sunk beside the wreck, the cables are drawn taut over the tops of the towers and made fast. The tops of all towers are as stated above the surface of the water even if they must be extended to bring them so. Next the hulls of the barges are pumped out, the water passing upwardly through the pipe 19 in the working tower of each barge, and the wreck is either brought to the surface and temporarily repaired to make it float, or it and the attached barges as well are towed into shallow water where the wreck may be conveniently worked upon. It is believed that by the use of this invention as set forth, much time may be saved, and that many sunken ships may be raised without the employment of coffer-dams or like expensive and necessarily slow processes. Furthermore, this invention is capable of being taken from one point of operation to another and the same appliances are useful to the same degree for raising ships of practically any size large or small.

Having now described this invention and explained the mode of its operation, what I claim is:—

1. In apparatus for raising sunken vessels, the combination with a hull having air-tight sealed compartments at the ends, of open work towers arranged at the bow and stern of the said hull, the said towers having cable grooves passing over the top and upon the sides thereof, the said hull having an operating compartment, an open-work operating tower erected upon the said hull

above the said operating compartment, a sea valve opening into the said operating compartment, means for actuating the said sea valve and extending to the top of the said operating tower, the said compartment having bulkheads separating the compartment from the interior of the hull, openings in the lower parts of the said bulkheads near the bottom of the hull, water valves arranged to control the said openings, means extending to the top of the said operating tower for opening and closing the said water valves individually, and a water pipe opening in the said compartment and extending to the top of the operating tower.

2. In apparatus for raising sunken vessels, the combination with a hull, of towers arranged at the bow and stern of the said hull, the said towers having downwardly and outwardly inclined sides extending to the side surfaces of the hull, the said towers having cable grooves upon the said inclined sides and extending over the tops, the said hull having an operating compartment, a sea valve opening into the said operating compartment, an operating tower erected upon the hull above the said operating compartment, means for actuating the sea valve and extending to the top of the said operating tower, the said compartment having bulkheads separating the compartment from the interior of the hull, openings in the lower parts of the said bulkheads near the bottom of the hull, water valves arranged to control the said openings, means extending to the top of the said operating tower for opening and closing the said water valves individually, and a water pipe opening in the said compartment and extending to the top of the said operating tower.

3. In apparatus for raising sunken vessels, the combination with a hull having air-tight sealed compartments at the ends, of open-work towers arranged at the bow and stern of the said hull, the said towers having cable grooves upon the sides and passing over the tops, the said hull having a middle compartment provided with bulkheads separating it from the interior of the hull, an open-work operating tower erected upon the hull over the said middle compartment, a sea valve opening into the said middle compartment, means for actuating the said sea valve extending to the top of the said operating tower, openings in the lower parts of the said bulkheads, water valves arranged to control the said openings, means extending to the top of the said operating tower for opening and closing the said water valves, and a water pipe opening in the said middle compartment and extending to the top of the said operating tower.

4. In apparatus for raising sunken vessels, the combination with a hull, of means carried by the said hull for engaging a sunken vessel, the said hull having an operating compartment provided with bulkheads partitioning it from the interior of the said hull, an operating tower erected upon the hull above the said compartment, a sea valve opening into the said compartment, means for actuating the sea valve and extending to the top of the said operating tower, openings in the lower parts of the said bulkheads, water valves arranged to control the said openings, means extending to the top of the said operating tower for opening and closing the said water valves, and a water pipe opening in the said compartment and extending to the top of the said operating tower.

In testimony whereof I affix my signature.

NEWTON F. CHAMBERLIN.