

[54] **DEVICE FOR RAISING SUNKEN SHIPS
AND OTHER OBJECTS**

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[51] Int. Cl. **B63c 7/24**

[58] Field of Search 114/55, 44, 49, 51; 37/183,
37/188, 54, 55, 73-76; 61/46.5; 294/66 R

[56] **References Cited**

UNITED STATES PATENTS

3,218,739	11/1965	Kaufmann et al.	61/46.5 X
3,629,963	12/1971	Itami	37/54
1,297,132	3/1919	Fandrei	37/188
2,372,347	3/1945	Watson	114/51
1,061,213	6/1913	Arbuckle	114/51
3,554,300	1/1971	Rosenberg	114/55

1,616,410	2/1927	Buell	114/51
775,370	11/1904	Lacey	114/51

FOREIGN PATENTS OR APPLICATIONS

4,527	6/1919	Great Britain	114/53
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Primary Examiner—Milton Buchler

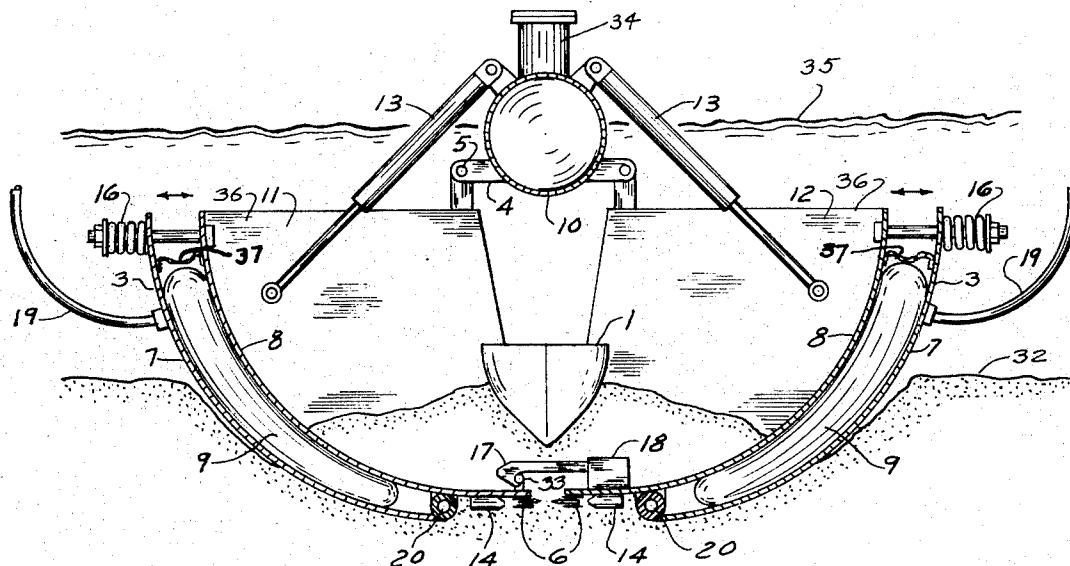
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[57] **ABSTRACT**

A device for raising sunken ships and other objects, in which elongated arcuate buckets, pivoted to a floating supporting member, are placed in position on opposite sides of the sunken ship. A chain saw on the open end of the buckets, assisted by water jets, cuts a path through the silt surrounding the ship, until the buckets meet below the ship, where the buckets are latched together. A plurality of bags, carried by the buckets, are then inflated, providing sufficient buoyancy to raise the ship.

6 Claims, 5 Drawing Figures



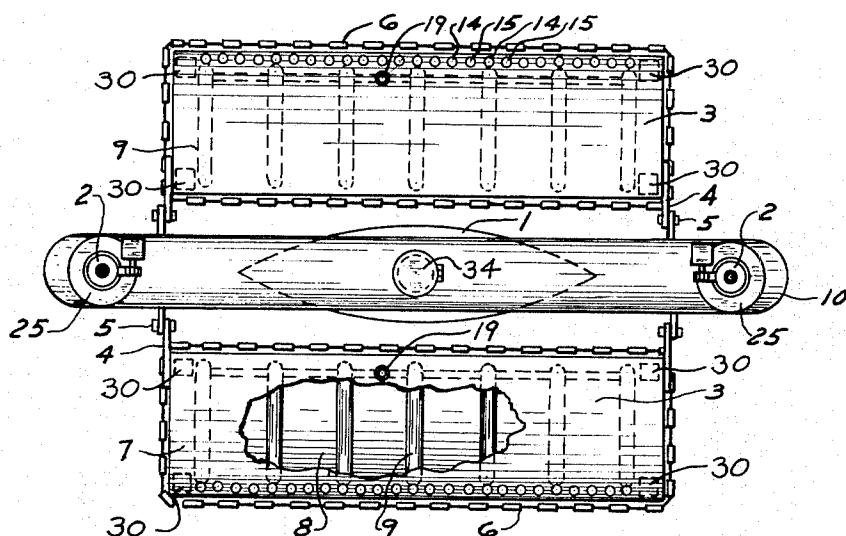


FIG. 1

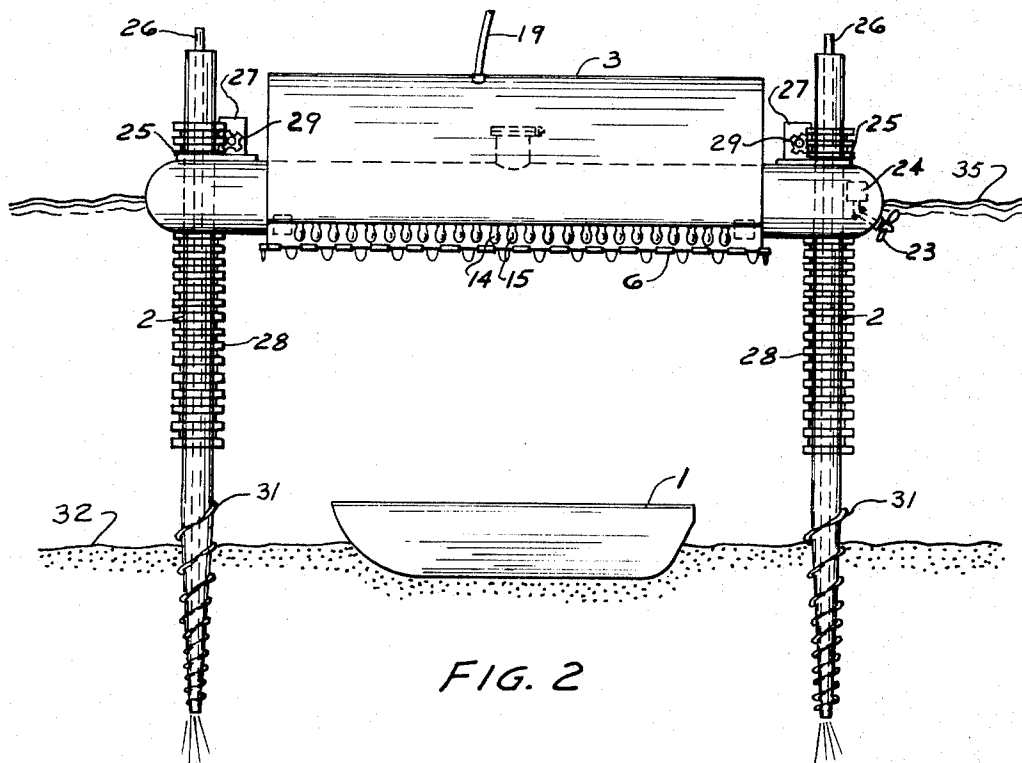


FIG. 2

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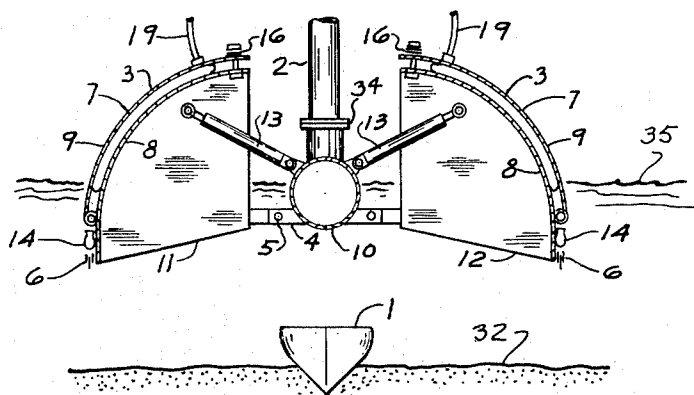


FIG. 3

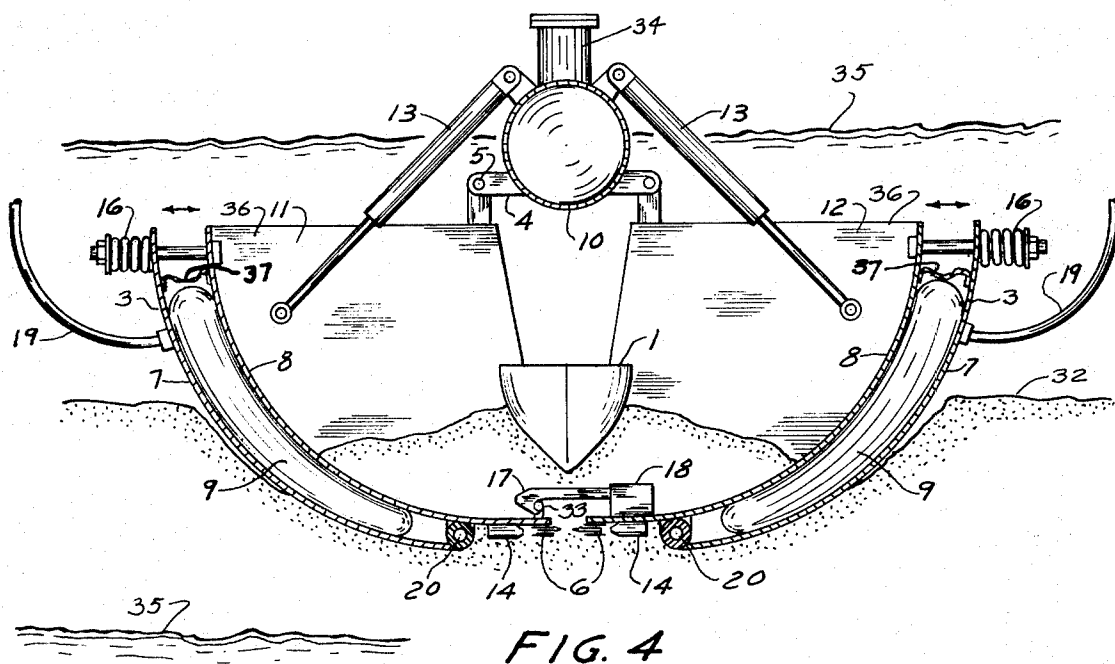


FIG. 4

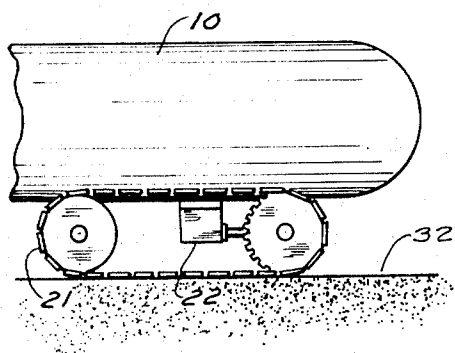


FIG. 5

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DEVICE FOR RAISING SUNKEN SHIPS AND OTHER OBJECTS

BACKGROUND OF THE INVENTION

1. Field Of The Invention

This invention relates to the art of salvaging ships, and more particularly to a novel device for raising sunken ships and other objects lying on the ocean bed in shallow or deep water.

2. Description Of The Prior Art

Many devices have been proposed for raising sunken ships in the hopes of recovering any treasure contained therein and to salvage any metals used in the ship construction or fittings. Some old wooden or metal ships have been located which, because of being quickly covered with silt, are in a remarkable state of preservation and which, if raised intact, would constitute a prize because of their historic value.

Previous attempts to raise sunken ships intact have proven to be failures. One of the methods proposed involves the use of inflatable bags attached to the sides of the sunken ship and then inflated to provide the buoyancy to raise the ship. This method requires the use of divers to attach the bags. These bags are bulky and very difficult to handle, especially under conditions in which there are strong underwater cross currents encountered. In a sunken ship, there are not many places for attachment of bags. Furthermore, divers can work safely and efficiently only at limited depths, and then for only very short periods of time, requiring frequent lowering to the work area and raising therefrom with the use of decompression chambers and the time lost therein. In addition, the sunken ship is usually covered or partly covered with silt and the bags, when inflated, must be able not only to raise the ship but also to break the ship free from the suction effect of the silt.

Another method involves the insertion of a number of inflatable bags within the ship, in the holds, rooms and passageways thereof. Here again divers must be used, and the same hazards and limitations are encountered. In addition, it is extremely dangerous for a diver, already encumbered with his breathing hose, communication cable and safety line and the like, to undertake the placement of large inflatable bags plus their air supply connections throughout the interior of a sunken ship. The hazards are increased manifold if the sunken ship is lying on its side or with its keel uppermost.

Another suggested method involves the pumping of certain particles of a material which, when wetted, expands and becomes buoyant, into the interior of the ship, such as in the holds, rooms and passageways. It is proposed to pump such material through a relatively large hose, requiring the use of divers. Here again one is confronted with the same hazards and limitations as recited above whenever divers are employed. In addition, it is extremely dangerous for a diver to travel along the numerous passageways of a sunken ship drawing along with him the usual air hose, communication cable and safety line, plus a lengthy and bulky hose or conduit through which the flotation material is to be supplied. This operation becomes even more hazardous if the ship should be lying on one side or with its keel uppermost. Furthermore, the material being pumped into the various holds, rooms, passageways and the like could easily shift and block the escape of the diver.

It is an object of my invention to provide a novel device for raising sunken ships and other objects which is not subjected to any of the above handicaps, dangers or limitations.

It is a further object to provide a novel device for raising sunken ships or other objects which does not call for the use of divers and which can be used at any depth.

It is a still further object to provide a novel device for raising sunken ships and the like which employs a pair of buckets which are remotely operated to remove silt surrounding the ship and which can be used to raise sunken ships lying in any position.

SUMMARY OF THE INVENTION

The attainment of the above objects, as well as other objects and advantages, is accomplished by a novel construction comprising a pair of elongated, arcuate, buckets pivotally connected in a somewhat clamshell fashion to a long hollow member serving as a main support as well as a control means. The hollow member may have living quarters for the crew, control quarters, as well as a place for storage of supplies, and may include ballast tanks for submerging and floating the entire device as needed. Opposite ends of the hollow device are quipped with a pair of guides to accommodate a pair of piles which may be forced into the ocean bed, fore and aft of the sunken ship, to stabilize the entire structure when in operation. The hollow member carries pinions, engaging a rack on each pile, to raise and lower the hollow member and attached buckets relative to the sunken ship during the raising operation.

The open end of each bucket is surrounded by a power driven chain saw which cuts a path through the silt surrounding the ship and through the ocean bed below the ship. A line of nozzles is disposed behind the lower stretch of the chain saw. Some of these nozzles are connected with a supply of water under pressure to direct streams of water at high velocity toward the saw and silt ahead of the saw to loosen the silt, and other nozzles are connected with the inlet of a pump or other suction means to provide a suction to remove the loosened silt, in order to clear a path through the silt for the passage of the buckets. When the buckets meet below the ship, a latch, carried by one of the buckets, engages a cooperating keeper on the other bucket to latch the two buckets together. Each bucket is of hollow construction and contains a plurality of inflatable bags. When the buckets are latched together below the sunken ship, the bags are inflated to provide the buoyancy to raise the buckets and the sunken ship cradled therein.

BRIEF DESCRIPTION OF THE DRAWING

For a better understanding of the invention and its operation, reference is made to the detailed description which follows, and to the annexed drawings, in which:

FIG. 1 is a top plan view of my novel device in position afloat and above a sunken ship, with the buckets in their open position;

FIG. 2 is an elevation view, with the buckets open and elevated;

FIG. 3 is an end view, showing the buckets and hollow member in section;

FIG. 4 is an end view, similar to FIG. 3 but drawn to a larger scale, illustrating the buckets in position below the bottom of the sunken ship; and

FIG. 5 illustrates a modified form of propulsion system for the device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the annexed drawings wherein the same element is designated by the same reference character throughout the several views, the numeral 1 designates the sunken ship to be raised which, as shown, is lying upright resting on the ocean bed 32 and partially covered with silt caused by underwater currents. It should be understood, however, that the invention can be used with the sunken ship lying in any position, that is, with its keel uppermost, or lying on its side.

A pair of piles 2, carried by the device, are driven into the ocean bed 32 on each end of the sunken ship. The lower ends of the piles 2 carry helical threads 31 to enable the piles to be driven into the relatively soft ocean bed 32 by rotating means, not shown, carried by the device. The piles 2 are not intended as supporting means, but rather as stabilizing means, and need not be driven as deep into the ocean bed 32 as would be the case if they served as supporting means.

A pair of elongated, arcuate, buckets 3 are supported through a pivotal supporting means comprising the pivotal arms 4 and pivot pins 5 to an elongated hollow member 10.

The member 10 is the central controlling means of the device, and would carry the operating machinery for the various parts of the device, as well as quarters for the crew, for storage of operating parts, as well as ballast tanks for controlling the buoyancy of the device, the details of which form no part of the present invention. A covered hatch 34 permits access to the hollow member 10.

Surrounding the open end 36 of each bucket is a movable cutting means comprising an endless chain saw 6 supported by sprockets, not shown, on each corner and driven by an electric motor 30 connected by electrical conduits, not shown, to a source of electricity within the member 10.

Each bucket 3 is made up of an outer arcuate member 7 and an inner arcuate member 8, the two members being pivoted together at their lower ends by a pivotal means 20 to form a water proof connection. The arcuate members 7 and 8 are circular in cross section and extend substantially 90° in angular extent, forming a quadrant. The members 7 and 8 are disposed in spaced relation, and the space between them is filled with a number of inflatable bags 9 which are interconnected by a manifold and pipe 19 adapted to receive compressed gas under sufficient pressure to inflate the bags in a manner to be explained later herein. A resilient means 16 interconnects the upper ends of the members 7 and 8 to permit separation of the members in an obvious manner when the bags 9 are inflated. The opposite ends of the buckets 3 carry a pair of end panels 11 and 12, which are secured to the inner arcuate member 8 and are also connected with the pivotal supporting means as clearly shown in FIG. 4. Servomotors 13 pivotally connected at one end with the hollow member 10 and at the other end with the end panels 12

and 11 control the raising and lowering of the buckets 3 as will appear hereinafter.

As shown in FIGS. 2, 3 and 4, a plurality of nozzles 14 and 15 are disposed in a row immediately behind the lower stretch of the chain saw 6 and directed toward the saw. The nozzles 14 alternate with the nozzles 15 along the length of nozzles, the nozzles 14 being connected with a source of water under pressure in order to direct jets of water at high velocity toward the leading edges of the buckets to assist in cutting a path for the buckets through the silt, while the nozzles 15 are connected with the inlet of a pump (not shown) or other source of suction to remove the loosened silt in an obvious manner.

The forward ends of the buckets 3 carry a latching means comprising a latch 17 and a keeper 33, the latch being operated by means of a latch operating means 18 by remote control in an obvious manner.

The entire device may be propelled from place to place by a propulsion system including a power driven motor 22 and propeller 23, as shown in FIG. 2.

The piles 2 are carried by the member 10 on each end of the latter, and may be moved up and down relative thereto through guides in the member 10. A base plate and guide 25 is disposed on each upper end of the member 10, and serves as a support for a remotely operated motor 27 having a power operated pinion 29 cooperating with a rack 28 surrounding the pile 2. Operation of the motor 27 will raise and lower the piles 2 in an obvious manner.

A water duct extends throughout the length of each pile 2 and terminates in a nozzle at the lower end. A jet of water is supplied through this duct during the driving operation of the pile, loosening the sand on the ocean bed 32 and facilitating the driving of the piles.

FIG. 5 illustrates a modified form of propulsion system, which can be used on relatively level and smooth ocean beds 32. Each end of the hollow member 10 carries an endless track system 21 driven by a power means 22. In such a system, the ballast tanks in the hollow member 10 are filled to cause the device to sink so that at least part of the weight of the device is carried by the propulsion system.

When not in use for raising sunken ships, the device floats on the surface 35 of the ocean as shown in FIG. 3 with the buckets 3 in their elevated position. The hollow member 10 has sufficient buoyancy to support the buckets and piles, but the bags 9 within the buckets will ordinarily be partially inflated so that the two buckets, one on each side and partially immersed in the water, will serve as a pair of outriggers to give stability to the device. Propulsion is obtained through the propeller 23 and driving motor 24.

In FIGS. 2 and 3, the device is shown in operation over a ship lying in relatively shallow water, within the operating range of the piles when the device is afloat. Assuming that the sunken ship can be clearly seen from the surface, the device is maneuvered into a position in which the piles 2 can be lowered through operation of the pinions 29 and racks 28 to points fore and aft of the sunken ship as shown in FIG. 2. Having lowered the piles, water is supplied under pressure through the ducts 26 while the piles 2 are rotated to cause the helical threads 31 to screw into the ocean bed 32. As explained above, it is not essential that the piles 2 be bu-

ried deep, as they serve merely as stabilizing means during operation, and not as supporting means.

Having driven the piles 2, the buckets 3 may be lowered by operating the servomotors 13. In relatively shallow water, as shown, the member 10 need not be submerged, but can continue to float on the surface. The buckets 3, when lowered, have their leading edges on opposite sides of the sunken ship 1. The motors 30 are energized to set the chain saw 6 in motion, and water is supplied under pressure to the nozzles 14 and silt and water are withdrawn from the nozzles 15. The weight of the buckets 3 is sufficient to apply the necessary force to burrow them below the sunken ship. If additional force is required, fluid pressure can be applied through the servomotors 13. The action of the chain saw 6 will cut through any coral rock or any other obstacle that may be encountered. When the leading edges of the buckets 3 are sufficiently close to one another, as shown in FIG. 4, the buckets may be latched together through the latch means 17. The bags 9 can then be inflated, which provides the buoyancy needed to raise the sunken ship 1. Additional lifting force, if needed, can be obtained by operation of the power driven pinions. The silt surrounding the ship that is raised in the buckets will fall from the buckets through the space between the latched leading edges of the buckets, assisted by the jets of water through the nozzles 14, thereby lightening the load in the buckets. Having raised the sunken ship 1 from the ocean bed 32, the entire structure can be floated by raising the piles 2, the ship being cradled within the two joined buckets. The raised ship can then be deposited in a dry dock or the like.

In deeper water, the entire device can be sunk to the appropriate level to drive the piles 2 in place. Closed circuit television with sufficient lighting can be used to locate the sunken ship 1 and to sink the piles 2. It is not necessary to carry large capacity storage batteries for power purposes, as snorkel tubes can be employed to supply the air needed to operate the engines and to inflate the bags 9, as well as to purge the ballast tanks, and to carry away the exhaust gases.

As shown in FIG. 4, a flexible diaphragm 37 extends between the upper ends of the arcuate members 7 and 8, to limit the upward expansion of the bags 9 when in-

flated.

It is evident that the novel buckets described above could be used as a clamshell bucket for excavating and raising material, either on land or under water, or as a power driven shovel for the same purpose, such as in strip mining and the like. It is further evident that such a device, when used on land, would be equipped with wheels or an endless track as is customary in the art.

I claim:

1. A device for raising sunken ships and other objects, comprising: a pair of elongated buckets, each bucket having an open end, cutting means comprising a chain saw connected with the open end of each bucket; and means pivotally supporting each bucket with the open end of one bucket facing the open end of the other bucket.

2. A device for raising sunken ships and the like as defined in claim 1, in which the chain saw surrounds the open end of each bucket.

3. A device for raising sunken ships and the like as defined in claim 2, including a plurality of nozzles along one edge of the open end of each bucket.

4. A device for raising sunken ships and the like as defined in claim 3, in which said nozzles are disposed behind said chain saw along the lower edge of each bucket, some of the nozzles directing jets of water toward the chain saw, and other nozzles withdrawing sand and water therefrom.

5. A device for raising sunken ships and the like, comprising: a pair of elongated buckets, each bucket having an open end, and each bucket including a pair of spaced, arcuate, members, pivotal means interconnecting the lower ends of said arcuate members, and resilient means urging the upper ends of said arcuate members toward one another; cutting means connected with and movable relative to the open end of each bucket; and means pivotally supporting each bucket with the open end of one bucket facing the open end of the other bucket.

6. A device for raising sunken ships and the like as defined in claim 5, including a plurality of inflatable bags disposed between each pair of said spaced arcuate members, and means for supplying a compressed gas to said bags.

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