C. H. CURTISS.

DEVICE FOR RAISING SUNKEN SHIPS.

APPLICATION FILED FEB. 26, 1917.

1,239,260. Patented Sept. 4, 1917.

Fig. 1.

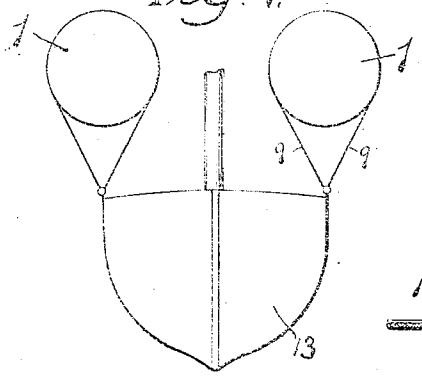


Fig. 4.

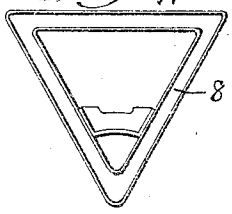


Fig. 5

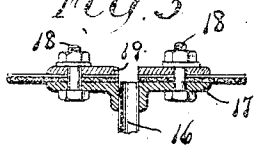


Fig. 2.

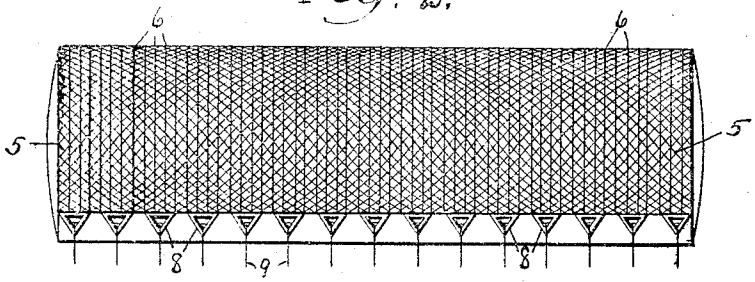


Fig. 3.

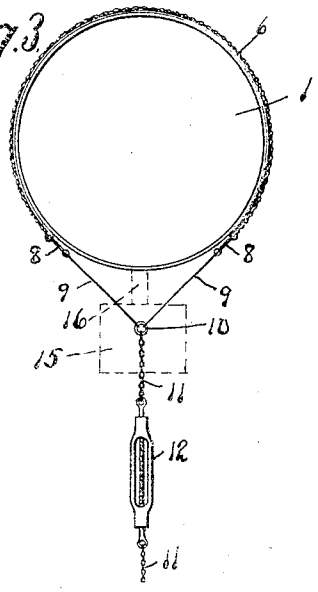
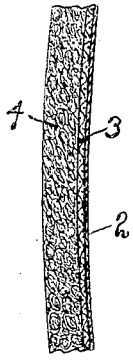


Fig 6



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DEVICE FOR RAISING SUNKEN SHIPS.

1,239,260. Specification of Letters Patent. Patented Sept. 4, 1917.

Application filed February 26, 1917. Serial No. 150,866.

To all whom it may concern:

Be it known that I, CHARLES H. CURTISS, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Device for Raising Sunken Ships, of which the following is a specification.

This invention relates to means for raising sunken ships and other heavy weights from the bottoms of bodies of water, and its object is to provide a structure in the nature of an air bag which will have great lifting capacity, which may be collapsed and stored in a small space, which will be durable, and which may be easily handled.

This invention consists in the construction of a deflatable bag formed of an inner layer of air-proof material, an intermediate layer of strong water-proof fabric, and an exterior covering of thick fabric in the form of a blanket extending circumferentially partially around the bag. It further consists in placing series of chains, ropes or other tension members circumferentially around the bag and uniting the lower ends of cables or ropes in groups. It also consists in forming a network of diagonal cables or ropes, properly spaced, between the main cables and the blanket in order to bridge the spaces between the main cables.

In the accompanying drawings Figure 1 is a front elevation of the hull of a ship with two of these improved air bags attached to it at about the line of the bulwarks. Fig. 2 is a side elevation of this improved air bag. Fig. 3 is an end elevation thereof on a larger scale. Fig. 4 is a view on a larger scale of one form of device for connecting the lower ends of the main circumferential cables in groups. Fig. 5 is a cross section showing one form of connection between the air bag and the pipe for filling it. Fig. 6 is a vertical section through the wall of this improved air bag.

Similar reference characters refer to like parts throughout the several views.

The raising of sunken ships by means of air bags and other containers has been practised to a limited extent but the obstacles to a more general use of such devices have been usually inherent in the construction of the containers themselves. Rigid structures such as tanks and casks of metal or wood have been tried out but the difficulty in transporting them to the place where they are to be used and the attaching of the same to the ship to be raised has been in many cases too difficult to permit such devices to be effective. Deflatable air bags have been tried and have usually failed because they would not hold their shape after being filled with air in deep water where the external pressure is often very great. The present construction avoids the defects inherent in rigid inflexible drums and also avoids the difficulties heretofore encountered in connection with deflatable bags.

The present device is in the form of a cylinder 1 having closed ends of any desired shape, but preferably approximately flat. The cylindrical body of this bag or container embodies the present invention in that it is made of flexible material so that it can be folded for storage but is at the same time so strong that it will bridge the spaces between the reinforcing cables without tearing out. It consists of an inner bag or layer 2, preferably of what is known as balloon fiber, that is, closely woven cloth filled with flexible india rubber or other material which is substantially impervious to air. Inclosing this inner bag is an outer layer 3 of heavy strong fabric, preferably of duck treated with oil or other suitable filler to render it waterproof. Extending around the outer bag and secured thereto is a blanket or saddle 4, formed of bands of heavy fabric, preferably of the character of material now used to make cotton belts for driving machinery. This saddle is substantially rectangular and extends about 270 degrees around the air bags, and the bands may be of any desired width, their edges being firmly sewed or otherwise secured together. Overlying this saddle of heavy fabric is a net-work of diagonally extending tension members 5 in the form of wire or cotton ropes or small chains. The spacing of these reinforcing members should be no more than can be bridged by the material of which the saddle is composed, that is, the spaces between the reinforcing members should not be so large that the two inner layers of the air bag together with the saddle can be forced up by the pressure within the bag and thus distort the general structure.

Extending circumferentially around the bag from one horizontal edge of the saddle to the other is a series of parallel cables 6 which may be connected to the diagonal reinforcing members if desired and which may consist of strong cotton or wire ropes

or chains. These main cables are connected in groups, preferably by triangular stirrups 8 such as shown in Fig. 4. The horizontal edges of the saddle are likewise secured to these stirrups and with them the diagonal reinforcing members. In this manner the saddle and the two groups of cables become one united structure which receives all the upward thrust of the air within the inner air bag.

Connecting to the stirrups are chains or ropes 9 which are united in pairs by rings 10. These rings may be connected to any portion of the ship 13 to be raised, or may be connected to chains 11 which are passed underneath it. If desired, turnbuckles 12 may be employed to properly adjust the length of the chains 11 relative to the rings 10 in order that the entire structure may be under the same stresses.

Any desired method of inflating air-bags may be employed. It has been suggested that this be done by means of air pumps or by means of gas generators. In Fig. 3 a generator 15 is indicated by dotted lines and the pipe 16 is shown connecting this generator to the bottom of the air bag. A pipe 16 of this character may be connected to the bottom of the air bag in the manner shown in Fig. 5, where the pipe is connected to a disk 17 and bolts 18 unite this disk to the ring 19 with the two thicknesses of the inner and outer air bags between them. This construction forms no part of the present invention which is limited to the construction of the bag itself. The proportions of the various parts, the spacing of the diagonal reinforcing and the main cables and the methods of connecting these main cables to the sunken objects may be changed without departing from the spirit of this invention.

To make use of this invention, the deflated air bags are moved to the sunken vessel and are lowered down to divers who have already placed chains below the vessel or who attach the rings 10 to such portions of the vessel as are available for this purpose. After the air bags are attached, air or other gas is admitted, and the bags will expand, whereupon the connections between the main cables and the wreck will be properly adjusted so as to cause the bags to assume a position as nearly horizontal as possible. The bags are then fully inflated, which causes them to exert lifting stresses on the sunken vessel and if these stresses are sufficient the vessel will be raised until the air bags extend such a distance above the surface of the water that these bags together with the load carried thereby will be in equilibrium. The distance from the deck of the sunken vessel to the surface of the water will depend upon the point of attachment of these bags to the vessel being raised.

I claim:—

1. A deflatable bag for raising sunken ships which consists of an inner member of substantial cylindrical shape, an outer member of similar shape entirely inclosing the entire member, a saddle extending partially around the outer member and consisting of heavy woven fabric, interlaced reinforcing members extending diagonally in opposite directions around said air bag, main cables extending circumferentially around said air bag, and means to group the lower ends of said cables.

2. A deflatable bag for raising sunken ships which consists of an inner substantially cylindrical air-tight bag, a second bag of similar shape of strong water-proof fabric inclosing said inner bag, a rectangular saddle of heavy fabric extending partially around said second bag, circumferential cables extending over said saddle, and means to connect the lower ends of these cables into groups.

3. A deflatable bag for raising sunken ships which consists of a water-tight and air-tight cylindrical structure, a saddle extending over said bag and secured thereto, a series of diagonal tension members extending transversely of the saddle from one longitudinal edge to the other, a series of main parallel tension members placed over the diagonal members and extending circumferentially of the air bag from one longitudinal edge of the saddle to the other, and means extending between the opposite ends of each main tension member to transmit the lifting stresses of the bag.

4. A deflatable bag for raising sunken ships which consists of a substantially cylindrical air-bag, a saddle of heavy fabric extending over the top and down the sides of the air-bag, cables extending over said saddle, and means to connect the lower ends of these cables into groups.

CHARLES H. CURTISS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."