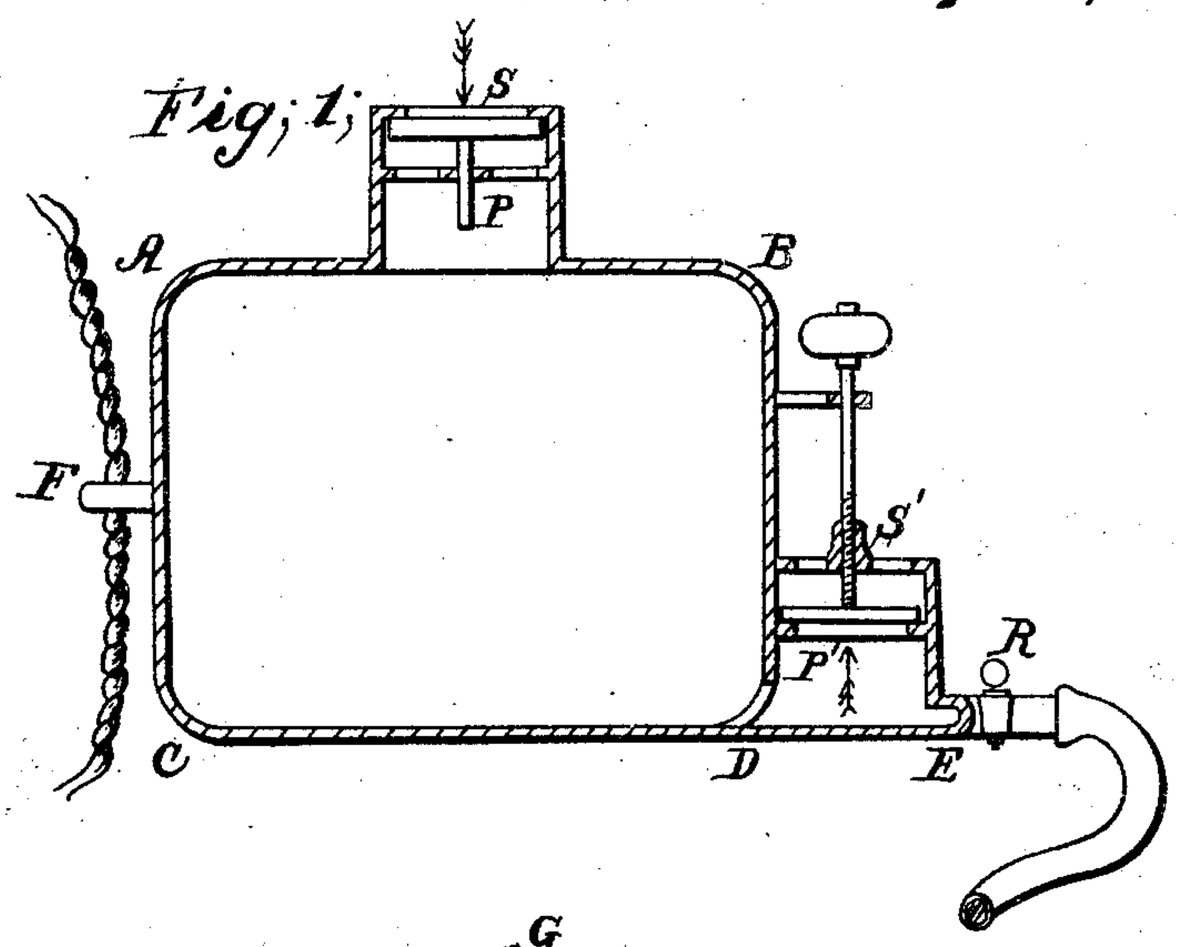
C. A. Dillon,

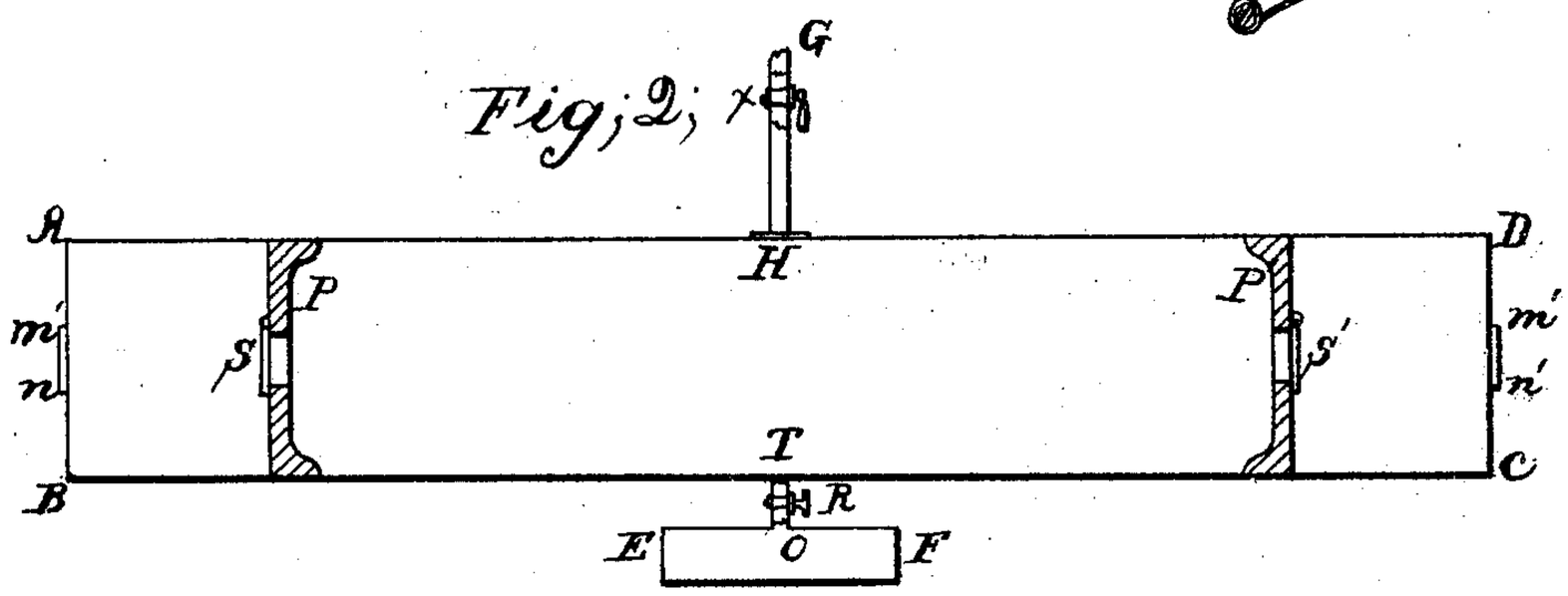
Apparatus for Raising Sunken Vessels.

No. 76,416. Patented Apl. 7, 1868.

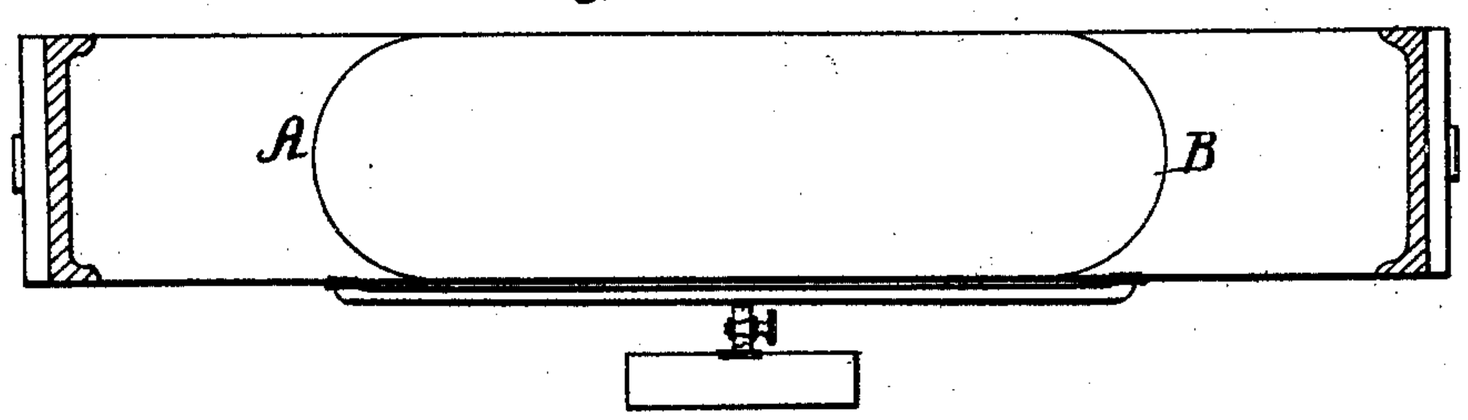
Fig; 1;



Fig; 2;



Fig; 3;



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United States Patent Office.

COUNT ARTHUR DILLON, OF PARIS, FRANCE.

Letters Patent No. 76,416, *dated April* 7, 1868.

IMPROVED APPARATUS FOR RAISING SUNKEN VESSELS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, COUNT ARTHUR DILLON, of Paris, in the Empire of France, have invented a new and improved Apparatus for Raising Sunken Vessels; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan of the pneumatic shell.

Figure 2 is a longitudinal section of air-cylinder.

Figure 3 is a modification of fig. 2.

Figure 4 is a plan of pontoons in position.

Figure 5 is a longitudinal vertical section of my improved pontoon through the line *x x'*, fig. 1.

Figure 6 is a cross-section through the line *y y'*, fig. 1.

Figure 7 is a diagram of the chains.

Similar letters of reference indicate corresponding parts in the figures 1, 2, and 3, collectively, and 4, 5, and 6, collectively.

This invention relates to certain improvements in pontoons for raising sunken or grounded vessels; and consists in constructing the pontoons with an internal cylinder, having pistons, by the action of which the displacement of the pontoon is augmented or diminished, and thus the raising and sinking of the pontoons is effected; also providing the said pontoons with ballast-compartments, having trap-bottoms for discharging the ballast, together with other devices, perfecting the whole apparatus, as will be hereinafter more fully set forth.

In figs. 4, 5, and 6, the pontoons, A, are long, keelless vessels, and may be built of wood or plate iron. The compartments B are located on each side of a central cylinder, C, and are furnished with hinged bottoms or traps, D, which are hinged at *d*, and held closed by links or rods *e*. These links are attached to eye-bolts in the bottoms D, and their upper ends have eyes, *i*, for slipping on to pins *p*, projecting from long rods *m*, running fore and aft on the deck of the pontoon, near the inboard edges of the compartments B. These rods *m* have secure bearings, *n*, bolted to the deck, as shown. Larger and longer arms, P, projecting from the side opposite those of *p* of the same rod *m*, serve to hold the arms *p* firmly horizontal, and thus enable them to support the bottoms D; for the rods *m* have a partial rotation in their bearings, whereby, when the pins *p* are deflected downward by the partial rotation of the said rods, the eyes of the links *e* slip off from the said pins *p*, and the bottoms are liberated and permitted to swing downward, and discharge their ballast.

One or both rows of compartments may be emptied. The former case is sometimes requisite, to alter the centre of gravity when the pontoon is to be keeled over or otherwise brought out of trim, the better to accommodate the pontoon to the position of the wreck.

The arms P are held in position by a horizontal bolt, P', which passes through eye-bolts *a*, and over the arms P, thus confining them. Chain cables, E, are attached to strong eye-bolts, *f*, in the stems, F, at each end of the pontoons. These chains are rove crosswise through ring-bolts G, firmly bolted through the stems F, as shown. These chains serve to enclose the hull or wreck to be raised within the two pontoons, as shown in fig. 4.

Both pontoons being exactly alike, the construction and principle of one only will be described.

The internal cylinder, C, is placed longitudinally within the pontoon, as shown. Pistons H fit with smooth, air-tight contact within the section of the said cylinders, and can be forced along back and forth in any part of the same by the introduction of air or gas within the cylinder, or the pressure of the water without, according as the force of either preponderates. The mechanical mode and appliances for getting the pontoons attached to the grounded or sunken vessel will be hereinafter described.

I will now explain the pneumatic action of my improvement. In fig. 1, A B C D represents a section of a metallic pontoon-shell, furnished with an eduction-valve, S', within a chamber, P', and an induction-valve, S, within a chamber, P. The valve S opens inward from external pressure, and the valve S' opens outward from internal pressure. A set-screw, as shown, confines the valve S' against the internal pressure.

When this shell is to be sunk, a ring and rope, as shown, guide the shell to its destination on the bottom; for the lower end of the rope is to be secured to an anchor, and the rope stretched tight, whereby the shell in

sinking will, by means of the ring attached to it, follow the rope to the anchor, which would be placed suitably in contiguity to the wreck.

Before sinking, a quantity of air is forced into the shell through the chamber, P, until the pressure within the shell is expressed by N+1, (N being the pressure in atmospheres which a body would sustain when immersed at the depth to which the shell is to descend.) Then, through the same chamber, a sufficient quantity of water is forced to make the shell sink. The shell descends, and, guided by the rope, reaches the wreck, to which it is secured by any means known to submarine engineering. The aforesaid set-screw is then turned, and the valve, S′, being thus liberated, permits the escape of the water within the shell, which escape is due to the aforesaid pressure, N+1. When the said water is ejected, the shell ascends to the surface, and, if made sufficiently large, will bring with it the wreck.

The method just described is attended with some difficulties, as, first, the great thickness of the metal required in a shell of large diameter to sustain the desired pressure; second, the difficulty of forcing water into a bulk of highly-compressed air.

To obviate these difficulties, and render this principle more practically available, a pontoon provided with an internal cylinder is adopted, and the said cylinder to have movable pistons and other connections, as shown at figs. 2 or 3, where P and P′ are the pistons, S S′ valves in the same, opening outwards, E F a chamber connecting with the cylinder at some central point of the same, by means of the pipe O T and cock R. Opposite to this pipe is another, lettered H G, provided with a cock, X.

Within the chamber E F are placed chemicals for generating gas, as bicarbonate of soda and sulphuric acid, which materials, though comparatively small in bulk, will evolve by their chemical reaction a gas of great expansive tension.

The ends of the pontoon are open, as shown at *m n m′ n′*, fig. 2, and also as exhibited, unlettered, in the drawing of figs. 5 and 6, whereby the water can exert its pressure directly upon the pistons.

When the pontoon is ready for submerging, the cocks X and R are closed, and the pistons are at the extremities of the cylinder. The ballast-compartments are duly filled with stone, and the cock, X, opened. The displacement of the pontoon is diminished by the recession of the pistons, which yield to the pressure of the water, and are brought finally in contact with each other in the middle of the cylinder. The pontoon having sunk to some desired position contiguous to the wreck, it is attached thereto by means of the chains, before described, and the sponson-timbers T on the exterior of the pontoons, (see figs. 6 and 7.) When all is ready, the cock R, communicating with the generating-chamber E F, figs. 2 and 3, is opened. The sulphuric acid is then, by suitable device, brought in contact with the bicarbonate of soda, and the gas evolved enters the cylinder and drives the pistons outward again, thus increasing the displacement of the pontoon, which, having discharged its ballast by the mechanism before shown, rises to the surface, bringing with it the wreck to which it was attached.

Atmospheric air may be substituted for any chemically-evolved gases, and pumped into the cylinder at some middle point, as the pipe O T. It will force out the pistons, and produce the same effect as above shown by the gas.

The pistons are formed with flanges, as shown in the figs. 2, 3, 5, and 6, so that their inner surfaces shall not come completely in contact, but leave a space for the ingress of the gas or air that is to actuate them outward.

Any mechanical device, as a ring or projection placed within the cylinder at its middle point, will prevent the passage of either piston beyond the middle, if by friction the other piston is retarded from reaching the middle position of the cylinder contemporaneously with the first.

In order to maintain the equilibrium of both the internal and external pressure, the pistons P P′, fig. 2, are provided with valves, S S′, opening from within outwards, so as to let the gas within escape, if its pressure exceeds that of the water without, when the pistons have reached the ends of the cylinder. Each pontoon contains such a cylinder substituted for the shell shown at fig. 1, in which water and compressed air were introduced. The principle is still the same, the only difference being the separation of the two fluids (gas and water) by a solid medium acting as a piston.

Fig. 3 exhibits a modification of the cylinder for the purpose of producing a lesser volume of gas. A B is a secondary cylinder within the first. This is completely closed, and its purpose will now be described. Suppose it is required to sink the pontoon to a depth of fifty yards, at which a body sustains an external pressure of about six atmospheres. I make the secondary cylinder of such thickness as will sustain an external pressure of three atmospheres. I then compress air or gas within the cylinder to a tension of three atmospheres, which gives the aggregate resistance of six atmospheres. The pipes from the generating-chamber extend beyond the secondary cylinder, as shown at fig. 3. Previous to the immersion, the excess of the internal strain over the external pressure will be two atmospheres, but as the cylinder sinks down, the external pressure increases, until, at about twenty yards, the internal and external pressure will be *in equilibrio*. Beyond this point the external exceeds the internal pressure, and at a depth of fifty yards it exceeds it by three atmospheres, which was the force for which the said cylinder was constructed.

By this device I am enabled to partially replace the metallic by the gaseous resistance, and at the same time to employ a much less heavy and yet quite as much resisting cylinder. In case this constant cylinder A B is used, the ballast in the pontoon should equal in weight that of the volume of water displaced by this cylinder, so as to render the immersion possible.

In the employment of these pontoons for recovering sunken vessels, one or more ropes, each having one end suitably fixed at the wreck, and the other on board the tug-boat or boats are employed in the work. These ropes serve as guides when the pontoons are sunk, as before described. The pontoons are brought to embrace the wreck in the manner shown at figs. 4 and 6. The ballast is discharged, and the chemicals employed in the

generating-chamber brought into intimate contact. The gas thus evolved augments the displacement of the pontoons, as before shown, and they rise to the surface, bringing with them the wreck.

Mechanism for discharging the ballast, opening the cocks, and bringing about the chemical action, can be arranged, so as to be operated from the surface by lines or ropes, or from diving-bells sunk on or near the wreck or pontoons.

A flexible pipe, E, communicates with the compressed gas or air within the cylinder, for the purpose of clearing the pontoon or wreck from the sand which may drift and impinge against its sides when remained sunk for a time in a tidal or other current. By means of the cock R the pressure can be liberated, and the pipe, as shown, directed against the junction of the sand and sides of the wreck or pontoon. This action can be assisted by the explosion of any proper amount of nitro-glycerine at a distance from the wreck. The surge or undulation thus produced will act to loosen both or either from the sand in which it is partially embedded, by the surge's impact against the exposed broadside surface.

The advantages of this improvement consist in its simplicity, facility of practical application, and the thorough accomplishment of the purpose intended in a short space of time, and at a comparatively small cost.

I claim as new, and desire to secure by Letters Patent—

1. The ballast-compartments B, with the hinged traps D, for discharging the ballast from a submerged pontoon, substantially as and for the purpose shown and described.

2. The apparatus, as shown and described, consisting of a cylinder, with pistons and generating-chamber, for employing the buoyant force for raising the pontoon after it has been carried down in a latent state, all substantially as shown and described.

CTE. A. DILLON.

Witnesses:

DEMOS.

A. GUION.