

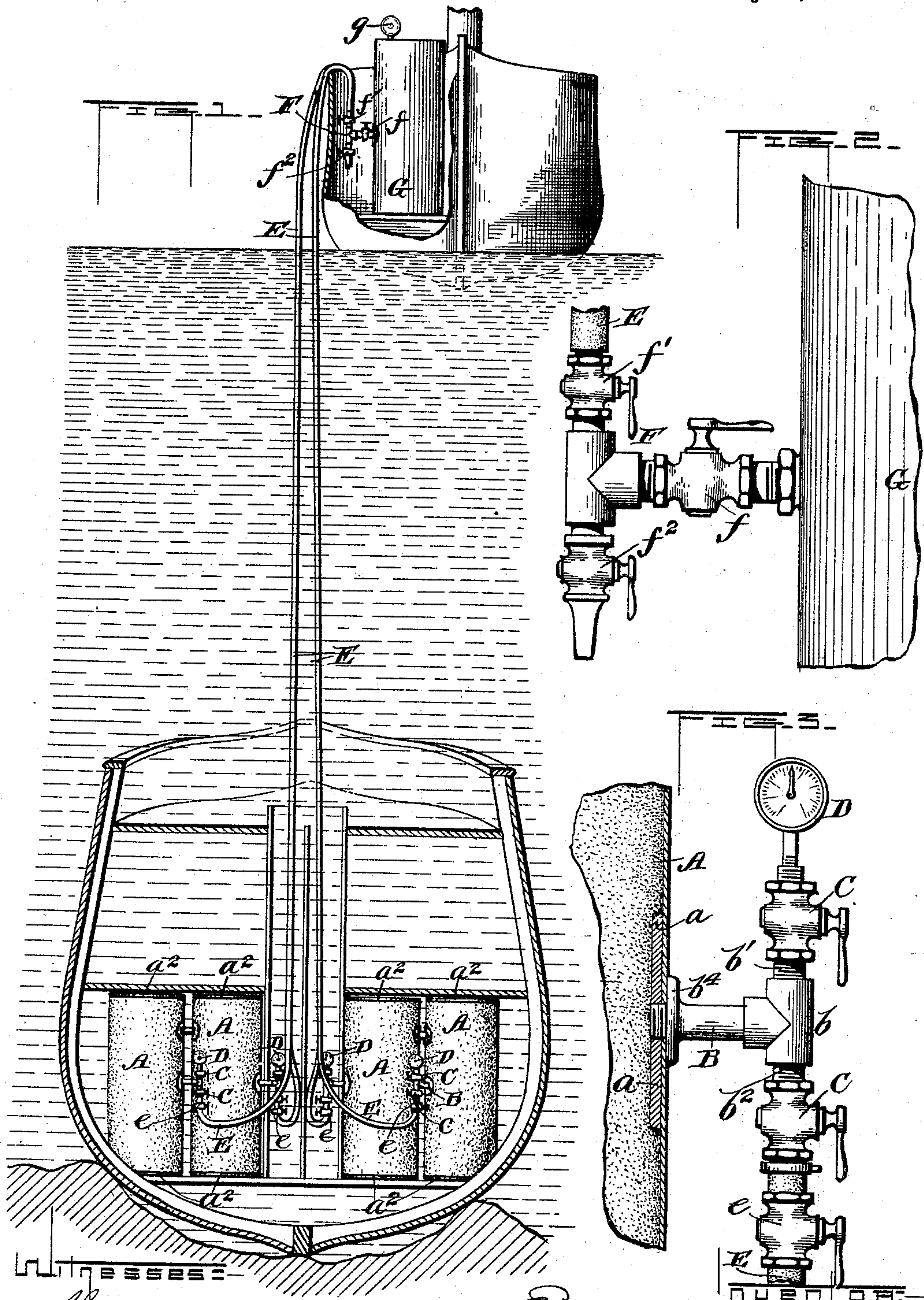
(No Model.)

E. NIEHOFF.

APPARATUS FOR RAISING SUNKEN VESSELS.

No. 497,249.

Patented May 9, 1893.



*W. H. Rance.*  
*Calcutt & Hines*

*Ernest Niehoff*  
*by his Attorneys*  
*Mason, Fenwick & Rance*



# UNITED STATES PATENT OFFICE.

ERNEST NIEHOFF, OF TACOMA, WASHINGTON, ASSIGNOR OF ONE-HALF TO  
HENRY T. D'ENTREMONT, OF PUBNICO, CANADA.

## APPARATUS FOR RAISING SUNKEN VESSELS.

SPECIFICATION forming part of Letters Patent No. 497,249, dated May 9, 1893.

Application filed October 4, 1892. Serial No. 447,787. (No model.)

*To all whom it may concern:*

Be it known that I, ERNEST NIEHOFF, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Apparatus for Raising Sunken Vessels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in apparatus for raising sunken vessels, and it consists in a novel bag and in combination with suitable bags which are adapted to be placed in or on a sunken vessel and filled with air, of certain novel means for filling the bags and regulating the internal pressure of the air on the inside of the bags as the external pressure on the outside of the bags is decreased, by reason of the sunken vessel "lifting" or rising and coming nearer the surface of the body of water, as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a transverse section through a portion of a sunken vessel and a broken rear end view of a portion of a floating vessel, the latter being supplied with an air receiver and piping leading from the receiver to air bags placed in the sunken vessel. Fig. 2 is an enlarged detail view of a portion of the air receiver having attached to it suitable pipes and cocks for letting air into a bag from the receiver and permitting an escape of the air from a bag when desired, and Fig. 3 is an enlarged sectional view of the side of a bag with a pipe secured in the same and provided with suitable cocks and a gage for indicating and regulating the internal pressure of air on the inside of the bag.

The object of this invention is to provide means for indicating and regulating the pressure of air on the inside of the bag as the vessel rises, either by an attendant on the floating vessel operating an escape cock or valve located near the air receiver, or by a diver opening one of the cocks near the mouth of the bag. It is well known that at a depth of one hundred feet the pressure of the water is eighty pounds to the square inch

and I have found by practical tests that in order to make the apparatus operate satisfactorily a gage must be employed to indicate the internal pressure of air on the inside of the bag at different depths so that as the sunken vessel rises the escape valves connected with the bag will be employed to lessen the pressure.

A in the drawings represents an air bag which is made of rubber or any other suitable material and made air tight. The bag is preferably cylindrical in form and of considerably greater length than width. It is provided with a mouth which is very strongly reinforced around its edges, and in addition is provided on its inner surface around the periphery of the mouth with a metal plate *a* having a screw threaded opening, into which opening is screwed a coupling tube B and strengthened at its ends by metal plates *a*<sup>2</sup>. This coupling tube is preferably made T-shape in formation and consists of an outwardly extending portion *b* having branching portions *b'* *b*<sup>2</sup>, each of which latter is provided with a cock C. A gage D is secured onto one of the branches for the purpose of indicating to the diver the pressure of the air in the bag. This is of great importance as heretofore stated, and its being located at this point avoids any liability of the bags bursting if proper attention is paid to the gage, and the coupling tube being provided with an escape cock, enables the diver to let out a portion of the air without the necessity of disturbing the position of the bags or himself coming to the surface of the water. The tube coupling is also provided on its inner end with a collar *b*<sup>4</sup>, which, together with the metal plate secured on the inside of the mouth of the bag, renders the bag air and water tight. A rubber pipe E provided at its lower end with a screw nozzle and a cut-off cock *e* is screwed onto the end of one of the branches of the tube coupling, and is provided at its upper end with a T-coupling tube F somewhat similar in construction to the T-coupling tube B, only that a gage may be dispensed with at this point and placed on the air receiver G, to which latter the upper end of the piping is attached.

In Fig. 2, I have shown the tube coupling



F provided with three cocks  $f$   $f'$   $f^2$ , and the pipe E connected to one of the branches of the coupling tube, while the other end of the branch is provided with a spigot nozzle for a purpose presently described. The cock  $f$  is employed to cut off all air from the reservoir, the cock  $f'$  to cut off all air entering the branch in which said cock is located and the cock  $f^2$ , when the spigot is employed, can be opened, and, by properly opening the cocks on the coupling tube on the bag, a portion of the air from said bag can escape at this point, if desired. If the air receiver G and the bag A were of the same size, the gage  $g$  on the receiver would register with the gage on the tube coupling B, so that if the pipe E connected the bag and receiver, and the cocks on the tube coupling on the bag were properly arranged, an attendant on the floating vessel could regulate the pressure of air in the bags as the sunken vessel rises.

Instead of having a pipe for every bag and leaving the pipe always connected with the same, I usually employ only one or two pipes, but provide every bag with a tube-coupling B. The air receiver G is kept supplied by an ordinary air pump which I do not think necessary to show.

I contemplate joining several bags by short pipes as shown and attaching the pipe E to one of the bags, so that a number of bags can be filled at one operation, and the air from one or more bags allowed to escape at the same time, thus saving considerable time and labor.

In use the air bag is placed in the vessel in a vertical position with its lower end resting on the bottom of the vessel or other support

and its upper end against a beam or other support. This causes a pressure on the ends of the bag which if the bag was not reinforced by the metal end plates, would burst the same, and consequently I regard these end plates of great importance.

What I claim as my invention is—

1. An apparatus for raising sunken vessels comprising a suitable air bag provided with a T-coupling, one of its branches C provided with a cut off and a means of attachment to the supply pipe E and its other branch C provided with a pressure gage, whereby the attendant under water is enabled to regulate the pressure of the air in the bag; an air receiver B provided with a T-coupling, the branch  $f$  of which is provided with a cut-off, the branch  $f'$  with a cut-off and means of attachment to the supply pipe E, and the branch  $f^2$  with a cut-off and an escape passage to the atmosphere, a pipe E connecting the air receiver and bag and provided with a cut-off near its lower end which can be operated by an attendant under water to prevent water entering the said pipe when it is disconnected from the bag, substantially as described.

2. An air bag for use in raising sunken vessels provided with a suitable mouth, end strengthening plates and means for attaching the bag to a pipe, substantially as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

ERNEST NIEHOFF.

Witnesses:

E. T. FENWICK,

WM. A. EASTERDAY.