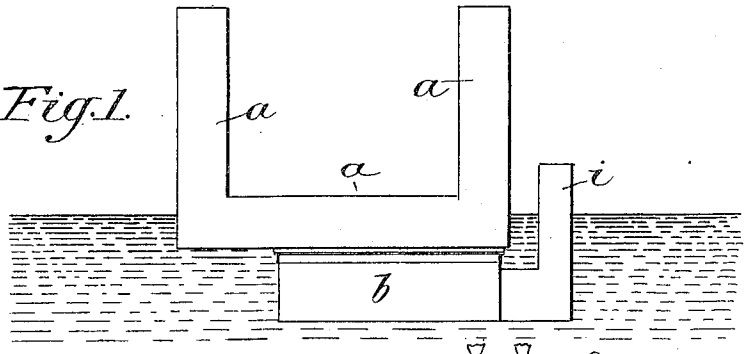
No. 808,638. PATENTED JAN. 2, 1906.

A. C. CUNNINGHAM.

FLOATING CAISSON FOR REPAIRING FLOATING DRY DOCK BOTTOMS.

APPLICATION FILED MAR. 10, 1905.

Fig. 1.



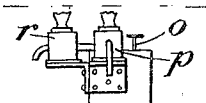


Fig. 2.

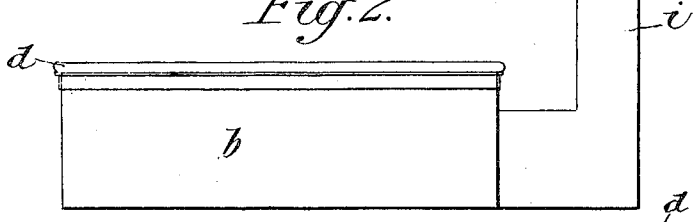


Fig. 4.

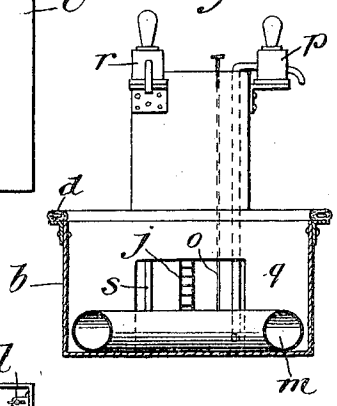


Fig. 3.

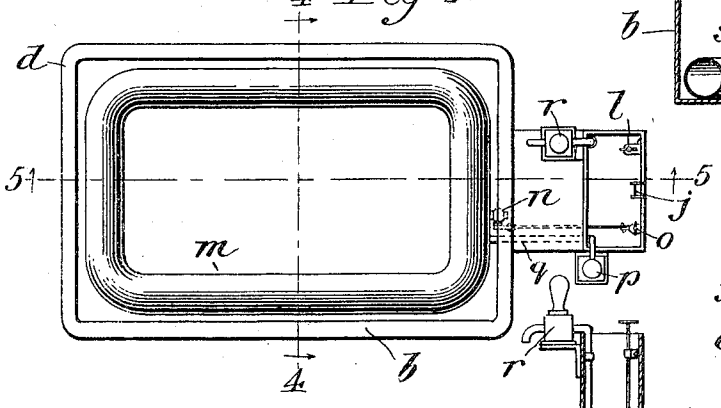


Fig. 6.

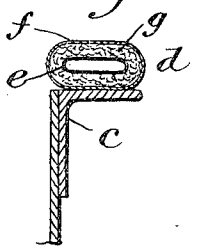
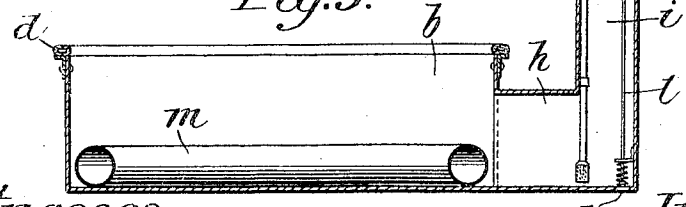


Fig. 5.



Witnesses:

D. W. Edelin.

J. N. Wynn

Inventor:

A. C. Cunningham

By his attys

Pennie & Goldsborough

UNITED STATES PATENT OFFICE.

ANDREW C. CUNNINGHAM, OF ANNAPOLIS, MARYLAND.

FLOATING CAISSON FOR REPAIRING FLOATING DRY-DOCK BOTTOMS.

No. 808,638. Specification of Letters Patent. Patented Jan. 2, 1906.

Application filed March 10, 1905. Serial No. 249,398.

To all whom it may concern:

Be it known that I, ANDREW C. CUNNINGHAM, a citizen of the United States, residing at Annapolis, Anne Arundel county, Maryland, have invented certain new and useful Improvements in Floating Caissons for Repairing Floating Dry-Dock Bottoms; 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.

In order to repair the bottom of a floating dry-dock, it has heretofore been necessary to dock the dock itself, either in a graving-dock or on another floating dock, or else where the dock to be repaired was a sectional dock it was necessary to dock the section needing repairs on the other sections.

So far as I am aware there has heretofore been no way in which the bottom of a floating dry-dock could be repaired except by docking it in one or the other of the ways above described; and my present invention has for its object to provide means whereby access may be had under water to the bottom of these docks in order that they may be repaired without the employment of divers and without the necessity of docking them.

To this end the invention consists in a movable under-water caisson consisting of an open-topped working chamber having a bottom and closed on all sides, which is adapted to be submerged to the depth required to float it under a dock, the caisson being also provided with means for exhausting the water from the working chamber, so that workmen may enter and work therein. The caisson has also a shaft extending above the water down which the workmen may pass into the working chamber, and preferably it also has a supplemental flotation-chamber, which is separate from the working chamber and whose function is to control the depth of submersion of the caisson and to cause it to make a water-tight joint between the upper edge of the working chamber and the bottom of the dock. The working chamber is provided with means, such as an inlet-valve, to permit the entrance of water to sink the caisson to the depth determined by the displacement of the flotation-chamber, and the flotation-chamber is also provided with means for admitting and exhausting water to and from it in order to enlarge or diminish its displacement for the purpose of regulating the depth of submersion of the working chamber.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is an end view of a floating dry-dock with my repair-caisson applied thereto. Fig. 2 is a side elevation of the caisson detached. Fig. 3 is a plan view of the caisson. Figs. 4 and 5 are vertical sections of the same, taken, respectively, on the lines 4 4 and 5 5 of Fig. 3; and Fig. 6 is a detail view showing the packing around the upper edge of the working chamber of the caisson.

Referring to the views, *a* wherever occurring denotes the dock, which may be of any construction and is here shown diagrammatically only. As illustrated in the drawings, it has a flat bottom; but though this is the usual construction the bottom may be inclined or curved in any preferred manner.

The caisson is indicated at *b*. It is an open-topped chamber having a bottom and closed on all sides. It may be rectangular in shape, as shown in the drawings, or circular, or of any other shape, and the size, depth, and other dimensions will depend upon the requirements of use. This chamber constitutes a working chamber or room into which the workmen may enter and in which they may work after the chamber has been sunk to the proper level and applied to the dock, as hereinafter described. Around its upper edge the chamber has a flange *c*, on which is secured a packing-strip *d* of any suitable flexible material. As here shown, this strip consists of a hollow tube having a rubber hose *e* on the inside and a canvas cover *f* on the outside, with a filling *g* of greasy wool or cotton between the hose and cover. It is secured to the flange *c* in any suitable manner and is sufficiently elastic to make a tight joint between the upper edge of the working chamber and the bottom of the dock when the caisson is adjusted to position. As best shown in Figs. 3 and 5, the working chamber is provided with a lateral offset *h*, and from this offset a shaft or stack *i* extends vertically to a height sufficient to leave its upper end always above the water. This shaft communicates freely with the working chamber through the offset *h* and is for the purpose of allowing the workmen to descend by a stairway *j* or other convenient means and enter the chamber after the caisson has been adjusted to position and after the water has

been pumped therefrom, so as to permit them to work therein.

Fig. 1 illustrates the manner of using the caisson. Normally it floats upon the surface of the water, and in order to apply it to the under side of a dock it must be sunk until its upper edge is below the bottom of the dock, when it may be moved about freely by guy-lines and pulled into the required position under the dock. In order to sink the caisson, water is let into the working-chamber *b* through an inlet-valve *k*, which is controlled from above water by a rod *l*, extending down the shaft *i*. Letting the water into the chamber through this valve will cause the caisson to sink to a level which will be determined by the displacement of a supplemental or flotation chamber *m*, which is preferably arranged within the working chamber and has a displacement capacity sufficient to float the caisson with its edge just above the water-line when the working chamber *b* is filled with water. Water having been let into the working chamber, as above described, and the caisson sunk until nearly submerged, it is further sunk by letting water into the flotation-chamber through a valve *n*, that is controlled from above by a rod *o*, until the entire caisson is lowered sufficiently to be hauled by the guy-lines under the bottom of the dock, as shown in Fig. 1. It must then be secured to the dock-bottom, and this is effected by pumping the water out of the flotation-chamber by means of a pump *p* through a pipe *q*, so as to lighten the displacement of this chamber and cause the caisson to press upwardly against the bottom of the dock with the edges of the working chamber around its open top compressing the packing *d* against the dock-bottom, so as to close the working chamber at the top and form a water-tight joint with the bottom of the dock. The caisson having thus been adjusted to position under the dock, it is of course necessary to pump the water out of the working chamber in order that the workmen may enter and work therein. For this purpose a pump *r* is provided, communicating by a pipe *s*, extending down the shaft to near the bottom of the offset *h*, which is preferably on a level with the floor of the working chamber. Exhausting the water from the working chamber not only provides a dry place for the men to work in, but greatly diminishes the displacement of the caisson as a whole and causes it to press much more tightly against the bottom of the dock than the mere emptying of the flotation-chamber would do.

It is not intended to limit the invention to any particular form of working chamber nor to any particular form or location of the flotation-chamber, nor, indeed, to any particular form, arrangement, or location of the passage-way or entrance to the working chamber. The shaft here shown is a convenient and effective means for affording access to the interior of this chamber and providing also for the entrance of air and light. Any other means, however, for permitting access to the chamber could be employed.

What I claim, and desire to secure, is—

1. An under-water-floating caisson for repairing the bottoms of floating dry-docks, the same comprising an open-topped working chamber having a bottom and closed on all sides, said chamber being adapted to be entirely submerged and floated under the dock, and provided with means for exhausting the water therefrom, and having a shaft extending above water to permit workmen to enter the chamber after it is in place.

2. An under-water-floating caisson for repairing the bottoms of floating dry-docks, the same comprising an open-topped working chamber having a bottom and closed on all sides, said chamber having a supplemental flotation-chamber and means for admitting and exhausting water from said flotation-chamber.

3. An under-water-floating caisson for repairing the bottom of floating dry-docks, the same comprising an open-topped working chamber having a bottom and closed on all sides, a supplemental flotation-chamber, means for admitting water to the flotation-chamber to give the working chamber the required submersion, means for exhausting the water from the flotation-chamber to cause the open top of the working chamber to fit water-tight against the bottom of the dock, and means for exhausting the water from the working chamber to permit the workmen to enter and work therein.

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

ANDREW C. CUNNINGHAM.

Witnesses:
L. D. GAPAWAY,
JAS. A. WALTON.