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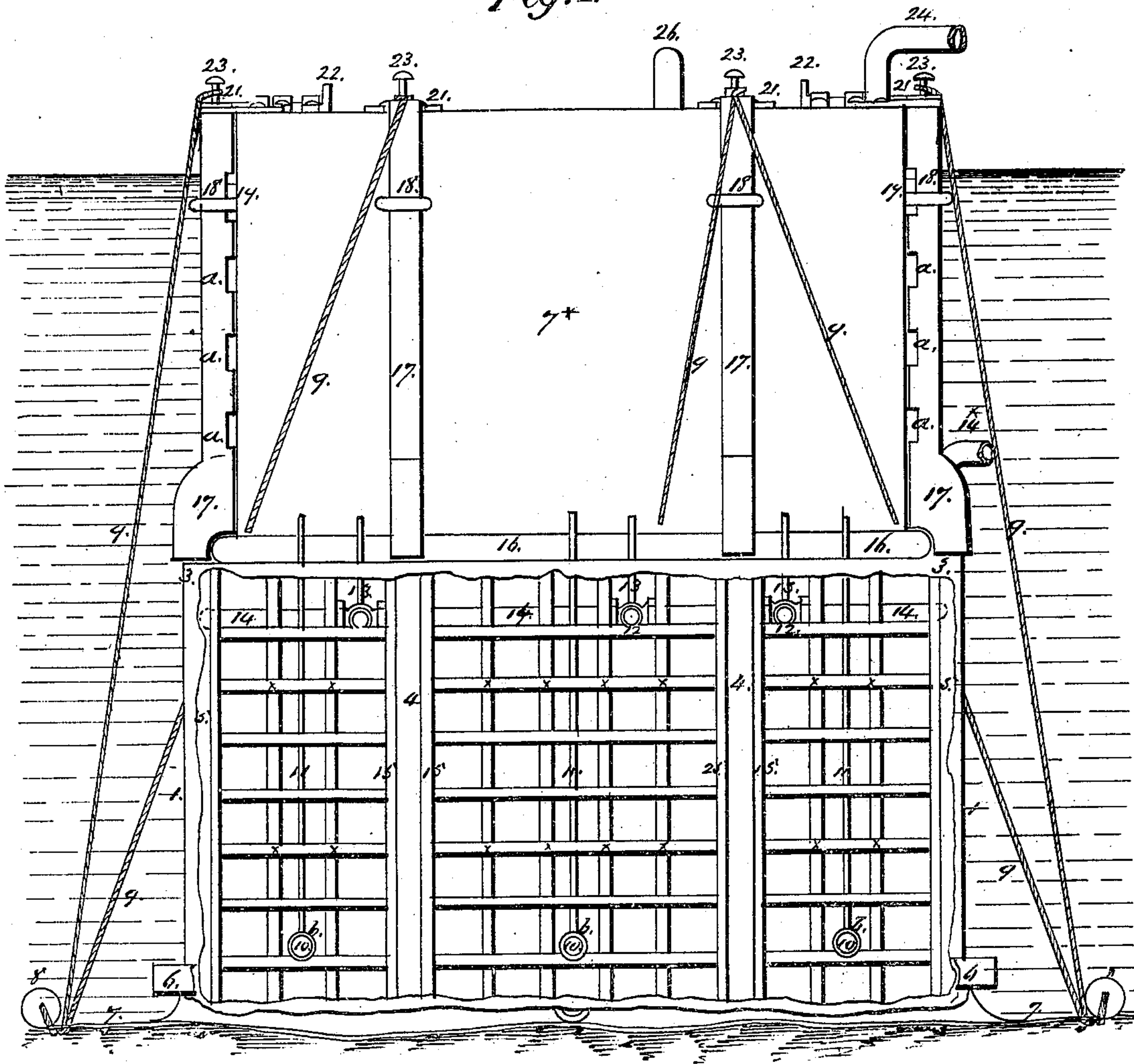
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Nº 92,324.

Patented Jul. 6. 1869.

Fig. 1.



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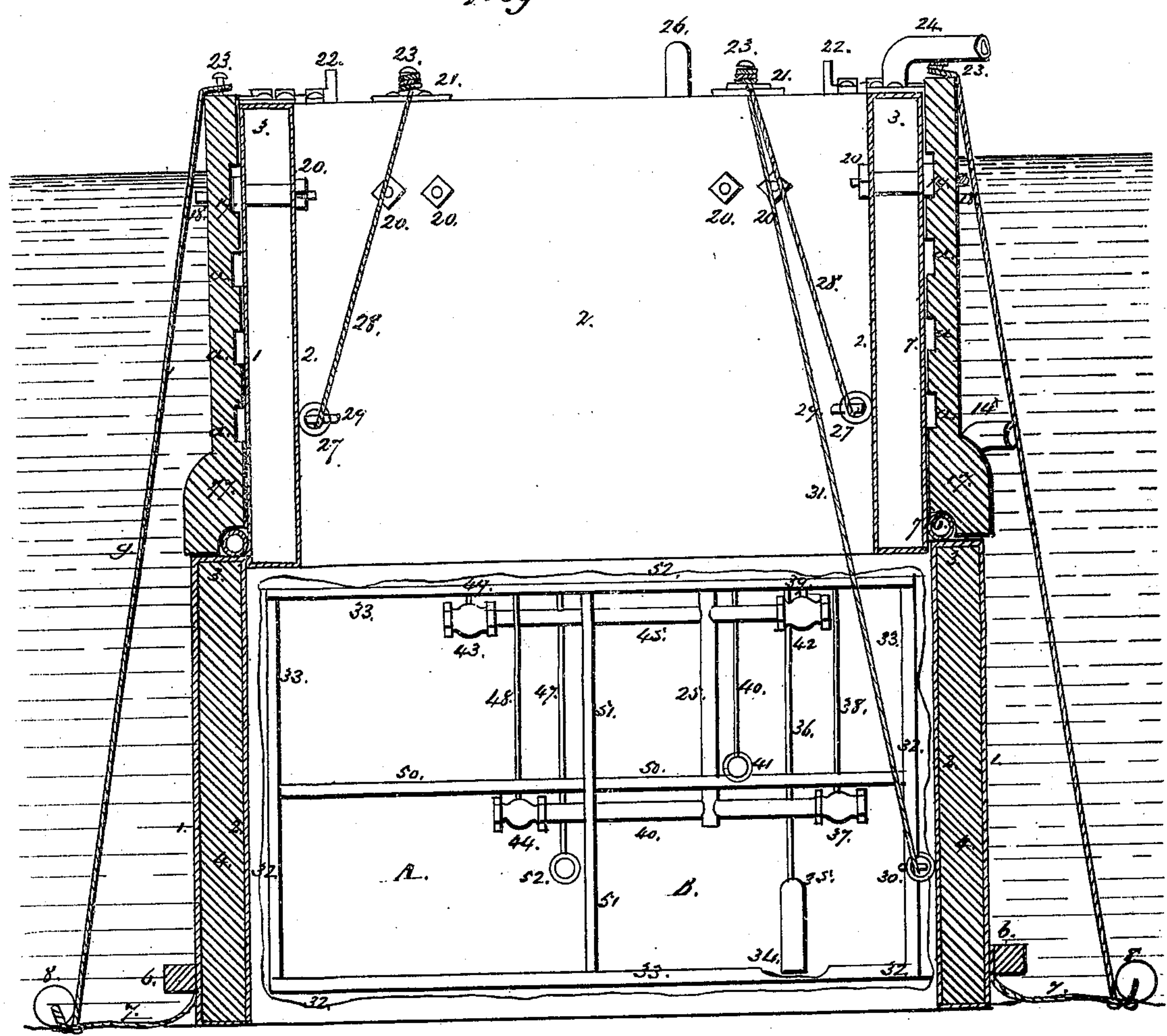
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Fig. 2.



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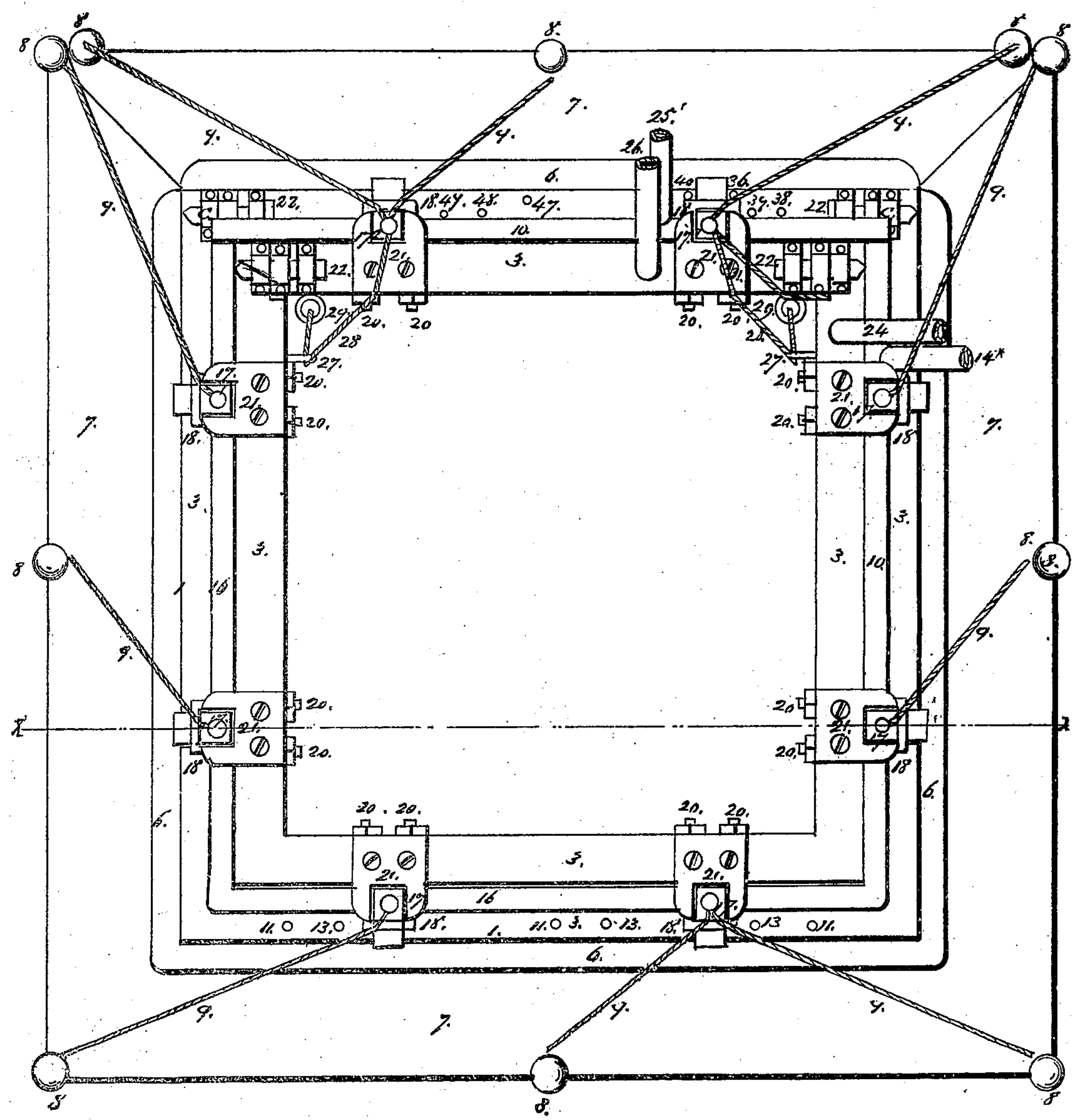
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Fig. 3.



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SAMUEL LEWIS, OF WILLIAMSBURG, NEW YORK.

Letters Patent No. 92,324, dated July 6, 1869.

IMPROVED PORTABLE AND CONVERTIBLE COFFER-DAM.

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, SAMUEL LEWIS, of Williamsburg, in the county of Kings, and State of New York, have invented a new and improved Portable and Convertible Coffe-Dam ; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a new and improved method of constructing coffer-dams for building piers and other submarine structures, and in making the same convertible into other forms, for raising sunken vessels; and

It consists in forming the coffer-dam in two or more sections, the sides of which are partitioned off into water and air-tight compartments, each section having a removable side, and all the sides being provided with suitable tubes and other appliances for filling the compartments with either air or water at all times, whereby the sections may be submerged or floated, as may be desired.

It also consists in so constructing the coffer-dam, that it may be made (with two of its sections) to enclose a sunken vessel, thereby affording means for raising the same, as will be hereinafter more fully described.

The perishable and temporary character of the piers and docks along the water-fronts of our seaboard cities has long been the basis of disparaging comparison between our own ports and those of countries far below and behind us in wealth and constructive skill. One cause of our backwardness in this respect has been the absence of any means of constructing more permanent works, unless at an expense entirely incommensurate with any anticipated advantages.

In order to replace our present style of piers and docks by enduring and substantial structures of stone, a distinct coffer-dam would be needed for each pier, the cost of constructing which, would, in many cases, exceed that of the pier itself, while the dam, excepting some portions of its material, perhaps, would be utterly useless in the erection of another pier.

In order to reduce this large element of cost within such limits as no longer to deter practical minds from the contemplation of a change in our system of building piers and other structures requiring subaqueous foundations, the undersigned has devised the apparatus herein described, which is intended to obviate all the expenses of dam-construction after the first outlay, however many piers soever it may be desired to build, thus reducing the cost of all such work by about one-half, and giving to New York and other of our ports a magnificent line of imperishable piers and wharves, at about the same cost as that of our present miserable and decaying structures.

In this department of its uses, the apparatus here-

with submitted is designed mainly as a portable means of erecting fortifications, piers, and the foundations of bridges, whether abutting on the shore or in mid-stream, and generally as an inexpensive and ready way of exposing the bed of a current or other water for any purpose whatever.

The other branch of service to which this apparatus is applicable, is the raising of sunken ships or other vessels from a depth of fifty to a hundred feet.

The special provisions for this work, and the manner of performing it, will be explained in their proper places. It will suffice to say here, that for such purposes the buoyant power of the sections is depended on, with certain exceptions, such as where a vessel lies in comparatively shallow water, and has been filled with sand or other drift, in which case it would be advisable to use the apparatus as a coffer-dam, in order to get at the vessel and empty her hull either of said drift or cargo.

In the drawings—

Figure 1 is a view of the dam in its working-position, with the outer skin of the lower section removed, to show the vertical, horizontal, and diagonal bracing and timbering, to give strength and stability to the whole; the water-tight compartments into which each of the three sides of each section is divided; the manner of admitting and forcing out the water; the flap-packing for the bottom of the dam; the round packing between the two sections; the supports by which the upper section rests on the lower; the weights for spreading the lower packing, and the ropes by which these are operated, &c.

Figure 2 is an inside vertical view of the door, or removable side, as seen from the red line *y y*; fig. 3, the inner face of the lower door being shown removed, in order to exhibit the compartments, and the manner of filling them with water or air, as may be desired; the attachments for drawing said doors into their places, with the manner of fastening the supports, &c.

Figure 3 is a plan or top view, showing, besides a number of parts already enumerated, the upper face of the sections; the manner of fitting and fastening the door; the upper guides for the supports; the tubes for exhausting or filling the spaces between the outer and inner plates of the sections; the timber trimming by which the flap-packing is held in place, &c.

The dam is constructed, as shown, of plate-iron, of suitable thickness, set apart in two vertical planes, 1 and 2, at such a distance as to give the desired buoyancy, say from three to ten feet; and of such height and length as may be required for the particular work to be done.

Each section will be about fifty by forty feet square, larger or smaller, according to the contemplated uses of the dam. The manner of bracing these large plates is shown in the lower section of the drawing, (marked *x x* in two lines thereof.)

The main plates are then sealed water-tight, by the horizontal plate 3 connecting their top and side edges, and by strong timbers, 32, all around the bottom.

The two sections are alike in general construction, only differing in the perforations in the upper section, for the passage of the staples 18, which clasp the supports 17.

The upper section, as shown, is sufficiently reduced in horizontal area to slide easily within the lower one.

The supports 17 are stout timbers, resting on the lower section, on which the upper section is suspended by the staples 18 and the plates 19, which latter are riveted through the outer face of the section, and set into the recesses in the supports marked *a a a*, according to the height at which it is desired that the inner section shall stand.

The staples 18 pass through tubes, which are expanded at their ends, and fit on the inner and outer plates in the same manner as a boiler-tube. The ends of said staples are secured by nuts 20, under each of which an appropriate packing is inserted.

Each side of each section is divided into several air-tight compartments, as seen in the lower part of fig. 1, and 5 5 being stout timbers, vertically on a line with the supports 17, as shown, and forming the partition between said compartments.

15 15 are the flanged edges of plates, similar to 51 and 51, fig. 2, which lie up to each upright timber from the inner to the outer sheets 1 and 2, riveting through the same. The object of these compartments is to render the sections self-buoying, whatever accident may happen to any one of said compartments.

Around the upper part of the inside of each section runs a tube, 14, fig. 1, the outer ends of which may be seen at 14* and 24.

These tubes are provided with cocks, 12, one for each compartment. These cocks or valves are opened or closed by the rods 13 13, which are proposed to be operated from above by socket-wrenches, or in any other suitable way.

10 10 are the waste-openings, through which the water passes, as air is injected into the several spaces.

These openings are furnished with valves, *b b*, as shown, which valves are operated by the rods 11 11, in the manner just described.

Attached to the bottom of the lower section is the flap-packing 7, designed to exclude the water at that point.

This packing may be connected, as shown, by the surrounding timbers 6, or attached further up, so as to allow for the sinking of the edge of the dam without dragging the flap from its rectangular direction.

This flap is extended by the lines 9 9, being carried off to a proper distance as the lower section is sinking, and the weights 8 8 keep the flap extended till the ordinary ballast or sand-bag packing is let down upon it from above. The ropes 9 9 are then brought home, and hitched to appropriate pins, 23, in the heads of the supports, or elsewhere.

The flap 7, attached to the removable side, fig. 3, it will be seen, laps over that connected with the main dam, thus compensating for the unavoidable break at two of the angles.

When the dam is in the position seen in fig. 1, it is as plain as it is inevitable that there will be some horizontal space between the upper and lower sections. The packing 16 is provided to close this space, and the weight of the external water is the power relied upon to press the tubing into water-tight contact with the two sections along its entire length.

In fig. 1, the chocks 22, by which the doors are retained in position till the outside pressure begins to operate, are seen to pass under their straps till they enter the straps *c c* on the main dam, fig. 3.

The parts 21, fig. 3, are flat guides, for the supports

17, screwed on to the upper face of the upper section, as shown.

Such is the construction of the dam, in its three-sided form, the door or removable side being a single flat, and liable to a different behavior in the water, and being, moreover, differently fitted up, requires a separate description.

The upper and lower removable sides are seen in fig. 2, the latter, marked A, having its inner plate removed, in order to expose its peculiar system of compartments, cocks, and tubing, the method of filling and exhausting the compartments, the means of placing the doors in working-position, and of removing the same when desirable. The view of these doors is from the red line *y y*, fig. 3.

33, 50, and 51, are metallic partitions or timber bulkheads, to divide the space into four compartments, two only of which, those on the right-hand side, are shown complete.

Each of these divisions is provided with a valve or cock, 37, 42, 43, and 44, operated by rods 38, 39, 48, and 49.

These valves connect with the air-pump, through the pipes 45, 46, 25, and 26, the latter being the mouth of the pipe in the upper section, corresponding with 25 in the lower section.

41 is a valve, provided with its rod 40, and 35 is an elbowed tube, reaching nearly to the bottom of the compartment, and containing a valve, 34, in its horizontal length, operated by the rod 36, in the manner before described.

27 and 29 are rings or eyes, as seen in figs. 2 and 3, the first attached to the inner side of the main dam, and the latter to the door, as shown in fig. 2.

The rope 28, fastened to the ring 29, is seen drawn through 27, and hitched on to the pin 23, as shown in fig. 2.

The opening marked 52, in the lower left-hand square of A, is for the purpose of letting in the water around the pier, when the work is completed. This opening is placed at some distance from the bottom of the section, so as to keep the aperture above the mud, sand, or weeds. The valve in this opening is connected with its rod 47, and operated as before described.

Having thus described the construction and parts of this dam, I will now proceed to explain the manner of placing it in position, and its operation.

The sections having been prepared as above, the upper section, minus the supports 17, is inserted in the lower, and the door of the latter drawn into its place by the ropes 31, running through eyes 30, similar to 27 and 29 in the upper section, and fastened by the chocks 22, and, if necessary, by a similar locking below.

The dam, with its sections thus put together, is then towed to the place where the building is to be done, and the exact line of submersion being ascertained, the structure is fixed in the proper position by lines from the shore, anchors, or otherwise.

The valves in both sections are then opened, with the exception of 52, when each lower valve admits the water into its own compartment, the air escaping through the upper valves at 14*, 24, and 26.

When both sections have received sufficient water to submerge them to the depth of the upper section, as seen in fig. 2, the valves in that section are closed, while those in the lower section are left open till its upper edge is level with the surface of the water, when its valves are likewise closed, and the further sinking, for the time, stopped.

The supports 17 are then placed in position, and left so that they will slide freely in the staples over the plate 19.

When this has been done, and the packing 16 care-

fully and accurately placed, the valves of the lower section are again opened, and it is allowed to sink till it lies on the bottom of the water.

While this section is sinking, the ropes 9 9 are taken to a distance, so as to keep the flap-packing 7 extended, and to deposit the weights 8 8 at as great a distance from the dam as the width of the packing will allow.

The ropes are then brought home, and made fast to their appropriate pins, and the ballast-packing, for the lower edge of the lower section, is let down and placed in the usual way.

When this has been done, the supports are brought home, with their proper recess on the plate 19.

If the sinkage of the lower section has been such as to require the raising or lowering of the upper section, in order to bring a recess opposite the plate, that is effected by the admission of a little more water, as before, or by the injection of a proper amount of air to give the requisite additional buoyancy. The nuts 20 are then screwed home, and the dam is ready for pumping out.

The pumping is then commenced, and continued till the dam is empty, when the operations preliminary to building are begun.

When the pier or other structure has reached above the high-water line, the valve 52 is opened, and the water rushes in from the outside till the space between the pier and the dam is filled.

The supports are then removed, the ballast cleared from the flap, and the air-pump connected with 14* and 25.

The valves of the lower section being all open, and the air-pump set to work, the water is forced out of the section at 34 and 41, fig. 2, and at 10, 10, 10, fig. 1, till its upper line emerges from the water, when its valves are all reclosed, and the like treatment applied to the upper section, till all the water it contained has been forced out, when it will float with its original draught.

The remaining water in the lower section is then expelled, and the whole dam is in the condition in which it was floated to its work.

The next operation is the detachment of the doors, (on the landward side,) which is effected by simply withdrawing the chocks 22, and easing the ropes 28 and 31, when the door will float away by its own buoyancy.

It is desirable that the door, thus leaving the dam, should retain an edgewise or vertical position in the water, both for the purposes of placing it in working-position, and for its removal and after-handling; otherwise a large amount of power would be required to raise and manipulate so large a slab in the water.

It is with reference to this necessity that the peculiar system of compartments, tubing, &c., of this side, has been adopted.

Thus, by filling or partly filling the lower compartments, A and B, fig. 2, a weight is given to the bottom, which maintains them in just the desired position for attachment or removal.

When the doors have been thus floated off, the main dam is drawn away, either into a position for building another length to said pier, or to any other spot where it may be designed to use it.

In the case of building additional lengths to the same pier, or a long dock or bulkhead, the doors may be used to close the spaces between the open ends of the main dam and the finished masonry, with two additional and appropriate slabs, where the work is in such a depth of water as to require the use of both sections.

The joints of these attachments would be packed by the means already described, or in any other appropriate manner.

When this apparatus is used for raising sunken vessels or other bodies, its form and application will be somewhat modified.

For instance, the doors will be dispensed with, and two three-sided dams let down, one at each end of the vessel. These will be connected by extension-flats or sections, compartmented, tubed, and operated similarly to said doors, and of sufficient length to enclose the vessel when the sections are sunk around the wreck, and the water driven out, as already described.

The buoyancy of the exhausted sections—the wreck having been firmly connected with the dam—raises the vessel, so that she can be towed, along with the dam, into port; or, in the case of a vessel being sunk in shallow water, and filled with drift, as before supposed, the dam would then be used, as in the case of building a pier, as already described, in order to get at the wreck, and by clearing it of its contents, to put it in a condition in which it might be raised.

Having thus described my invention,

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

1. The portable and extensible coffer-dam, constructed of double walls, laid off into the water-tight and air-tight compartments, furnished with the tubes and valves, and braced and timbered as shown, all constructed and arranged as specified, and for the objects set forth.

2. The adjustable supports 17, for supporting the upper sections of the portable and extensible coffer-dam, said sections being adapted to slide one within the other, as herein described, for the purpose specified.

3. The removable side, with its special compartments, tubes, and valves, with the objects and for the purposes explained.

4. The dam, constructed and arranged, in its several parts, as herein shown and described, for the purpose specified.

The above specification of my invention signed by me, this 25th day of November, 1868.

SAMUEL LEWIS.

Witnesses:

FRANK BLOCKLEY,
E. GREENE COLLINS.