

(No Model.)

3 Sheets—Sheet 1.

L. C. WATTS.  
FLOATING DRY DOCK.

No. 256,608.

Patented Apr. 18, 1882.

Fig. 2.

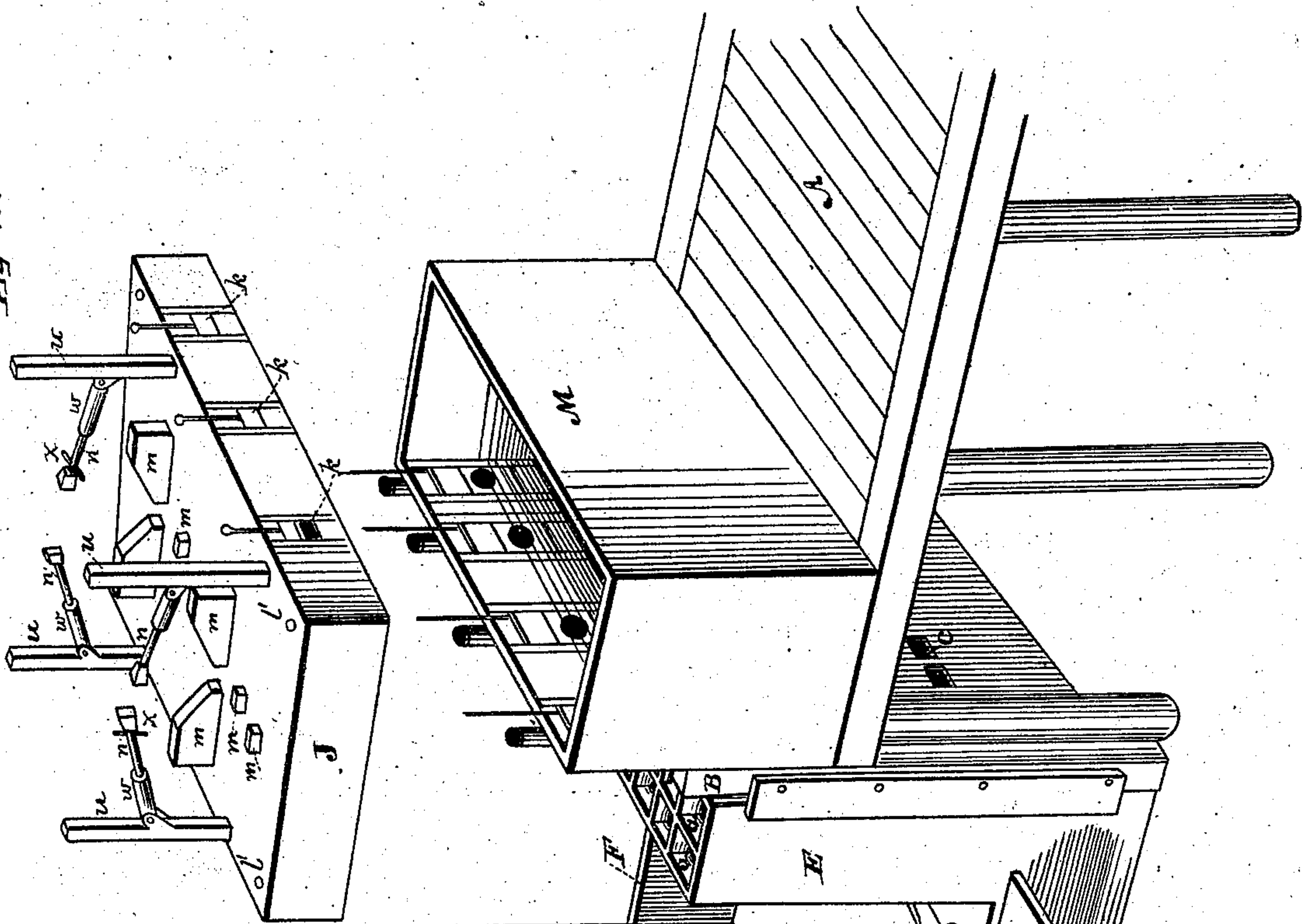
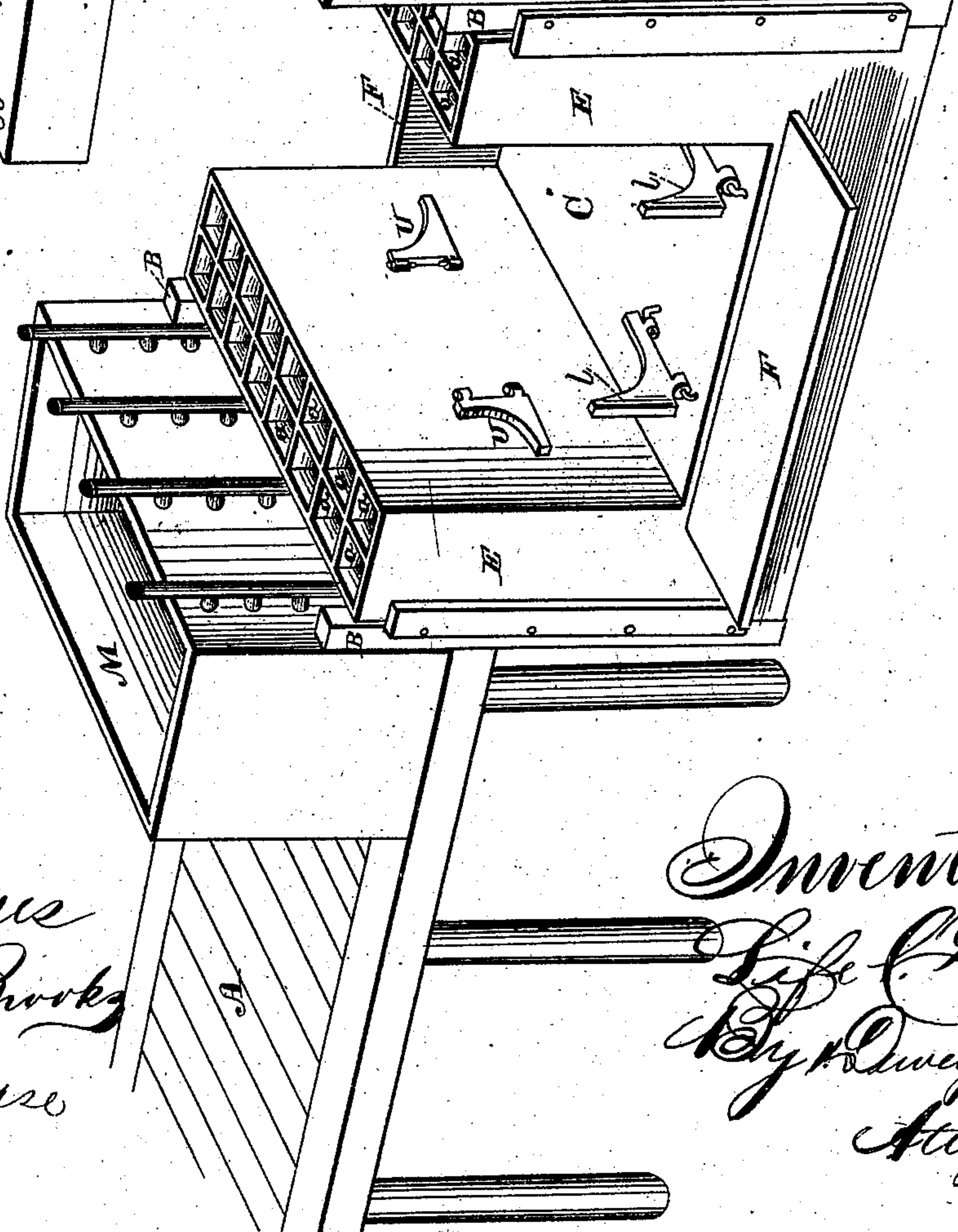


Fig. 1.



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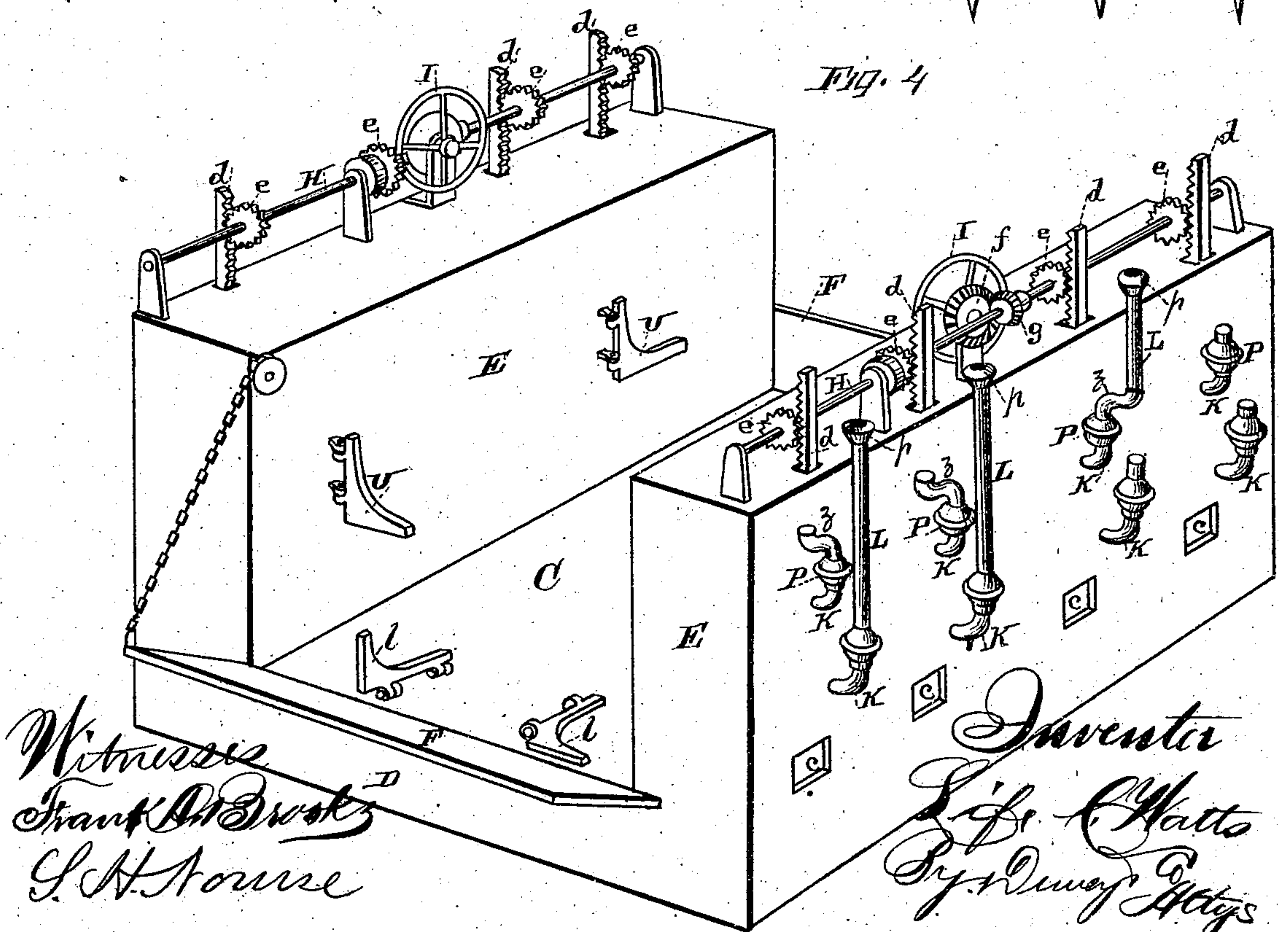
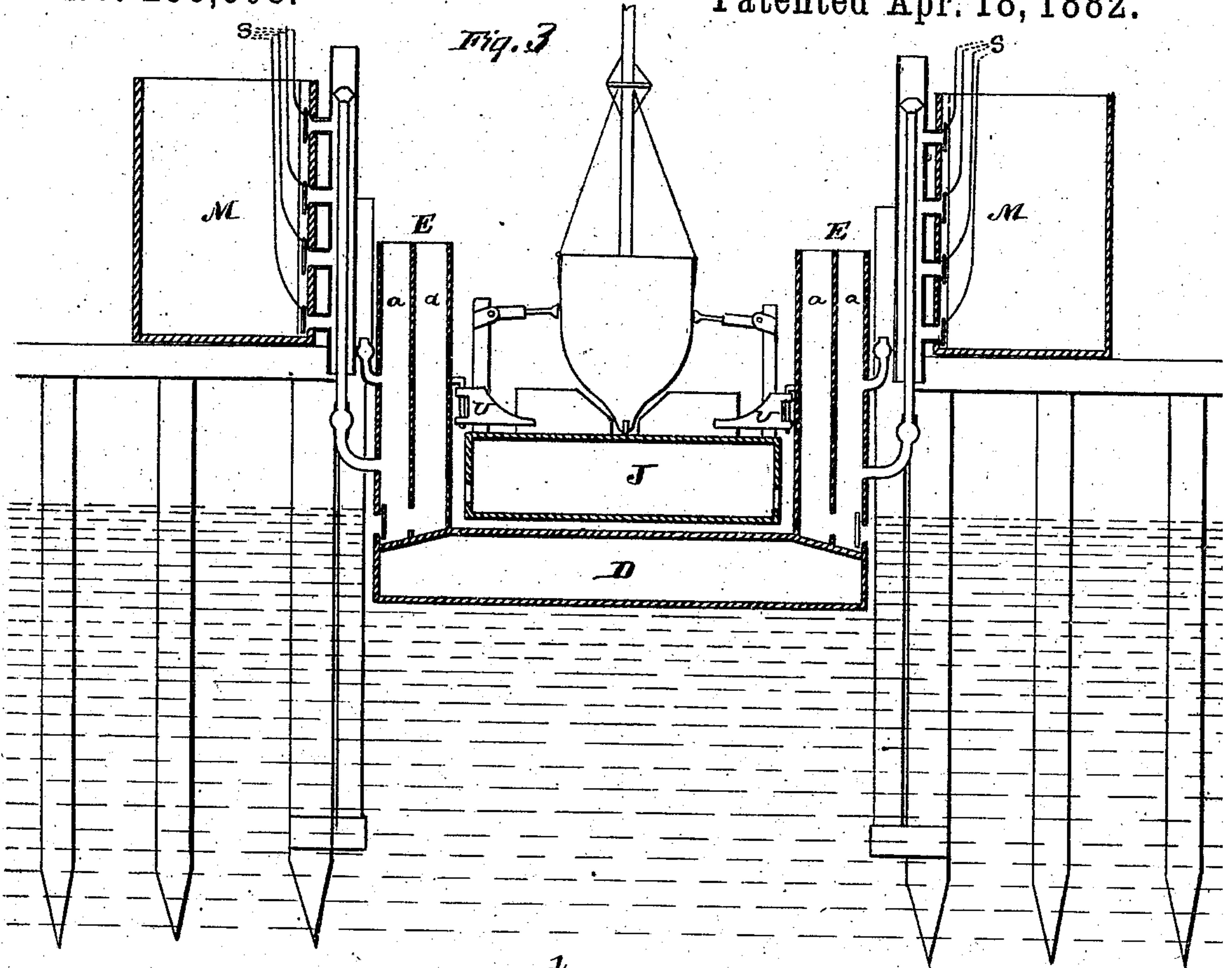
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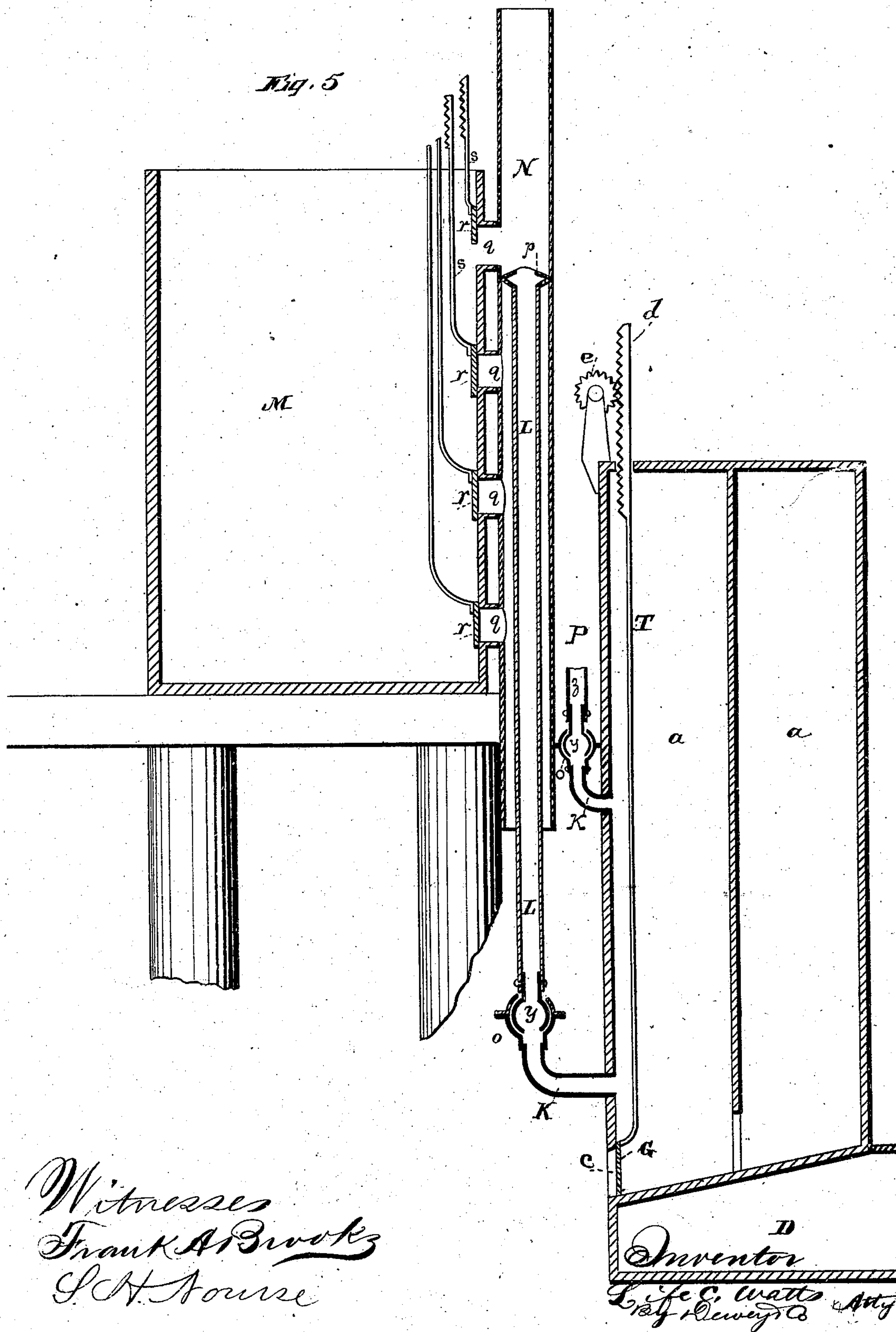
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3 Sheets—Sheet 3.

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# UNITED STATES PATENT OFFICE.

LIFE C. WATTS, OF SAN FRANCISCO, CALIFORNIA.

## FLOATING DRY-DOCK.

SPECIFICATION forming part of Letters Patent No. 256,608, dated April 18, 1882.

Application filed July 18, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, LIFE C. WATTS, of the city and county of San Francisco, and State of California, have invented an Improvement in Floating Dry-Docks; and I do hereby declare the following to be a full, clear, and exact description thereof:

My invention relates to a floating dry-dock, the object of which is to conveniently raise vessels out of the water when necessary.

It consists in a large lifting dock or float, the whole bottom of which is an air-chamber. It has upright sides divided into compartments designed for holding water to sink the dock. Between the upright sides is a wide channel or space large enough to receive a vessel. A smaller float or ponton provided with appropriate devices for receiving and sustaining the vessel is adapted to be sunk upon the large dock, and the vessel is hauled in upon this ponton. The large dock is adapted to be raised or sunk in vertical ways or guides and between two wharves on which are supported water-tanks provided with gates, from which the upright compartments of the large dock are filled with water, and sunk to the required depth. These compartments are provided with gates operated from above, which, when opened, allow the escape of the water and the consequent lightening and raising of the large dock, together with the small ponton, from which the water is allowed to escape, and the vessel. There are minor points of construction which are required for the operation of the device. These, with the full and complete description, will now follow.

Referring to the accompanying drawings, Figure 1 shows a view of water-tanks and lifting-dock in position. Fig. 2 shows a view of the ponton. Fig. 3 shows a cross-section of lifting-docks, tanks, and ponton. Fig. 4 shows lifting-dock. Fig. 5 shows enlarged cross-section of lifting-dock and tank.

Let A A represent two wharves, separated as shown, and between them, at their corners, are the vertical ways or guides B.

Let C represent a large lifting dock or float in the water, set between the wharves and fitted within the vertical guides B. The whole bottom of the dock is entirely closed and forms an air-chamber, D, which is permanent, and

gives to the dock its buoyancy. The dock has upright hollow sides E, which are divided by vertical, longitudinal, and transverse bulk-heads, into a number of compartments, (marked a,) the bottoms of which are inclined downwardly toward the outside. These compartments are designed to contain water. On the inside of these sides E are pivoted knees U, adapted to be parallel with the sides and against them, and to swing out at right angles therewith.

F F represent gates at each end of the dock. They are adapted to be opened from above. Braces l, pivoted to the deck of the float and adapted to be raised against the gates F F, support them and prevent them from being pressed in by the water.

At the bottom of the water spaces or compartments a in the outer walls of the sides are openings c, which are covered by gates G, lined with rubber, sliding up and down in guide-flanges on the inside, so that the press of water will force them out against the openings c and hold them tight. These gates are operated by vertical rods T, attached to their tops and extending upwardly on the inside through the top. (See Fig. 5.) They are there provided with teeth, (marked d,) thus forming a rack, and with them engage pinions e upon a shaft, H, which is supported above.

I is a vertical-operating crank-wheel carrying a bevel-gear-wheel, f, which meshes with a bevel-pinion, g, upon the shaft H. Thus by turning the wheel I all the gates G are operated at once.

A clutch or retaining-pawl upon the shaft H may be adapted to be thrown in gear with one of the pinions e, and then hold the gates in whatever position desired.

I can have as many compartments a as desirable, and by properly connecting them by openings at the bottom I can divide them into sets for receiving the water, and thus reduce the number of gates and openings, so that I may have any suitable number of gates or means to allow the water to escape.

Let J represent a ponton-dock, of a size capable of being easily fitted upon the dock C, between its upright sides. This ponton is hollow, and is provided with gates k on its sides, adapted to be raised or lowered in the



same manner as the gates G. It has small holes *l'* on top to allow the escape of the air when the ponton is sinking.

Upon top of the ponton are appropriate keel and bilge blocks *m*, to receive and hold the vessel. Attached to its sides are upright supports *u*, to the inner sides of which are hinged arms *w*, in which a central socket provided with screw-threads is made. These sockets receive the adjusting-rods *n*, which are screwed therein and are known as "shores." They are provided with cross-levers *x*. Their object is to adjust and steady the vessel against the wind and tide until it rests upon the keel and bilge blocks on the ponton. They are adjusted by means of the levers *x*, and press against and support the vessel.

Upon the sides of the dock C are fastened elbow-joints K, which pass through the walls and open into the compartments *a* within. To these elbows are screwed shells *o*, into which fit the smaller shells *y*, to which the pipes L are screwed. These pipes extend upwardly above the tops of the sides E, and are provided with large heads or followers *p*, which have packing around their peripheries. The purpose of this construction will be fully seen hereinafter.

Upon the wharves are the tanks M, one on each wharf. In their sides are openings *q*, arranged in a vertical series and covered by gates *r* on the inside. These are adapted to slide up and down by means of independent rods *s*, which proceed upwardly to the top of the tank. These rods *s* may be operated by means similar to those already shown for operating the gates G in the compartments *a*. To do this appropriate clutch mechanism should be provided to throw each row of rods in and out of gear when necessary. Each gate is thus adapted to be raised independently of the others. These openings *q* communicate with vertical pipes N on the outside of the tanks. These pipes N are supported from the sides of the tank, and are large enough in diameter to fit over the wide head or follower *p* of the inside pipes L. The tanks M and the dock C are connected by having the pipes N fit over the pipes L.

There must be an allowance made for the side and end movement of the floating-dock C, and for this purpose the pipes L have a loose ball-joint below, as described, and being so much smaller than the pipes N, they can move therein without bending. Their large followers, with the packing, make the joint between the two pipes water-tight, and yet allow the vertical play of the pipes L in moving up or down with the dock. A description of the operation of the invention will fully explain these matters.

The lifting-dock may be supposed to be floating well up in the water between the wharves, its air-chamber D below giving it buoyancy. Its pipes L are fitted in the pipes N of the side tanks, which are supported on the wharves and are extended up within said pipes. The

gates G of the dock are closed, and there is no water in the compartments *a*. The gates *r* of the tanks M are closed, and water is pumped up into the tanks until they are full. The ponton J is floating off to one side. I open the upper row of gates *r* in the tanks M, and allow the water to flow out into the pipes N and down through the pipes L into the compartments *a* of the dock. As they fill with water the dock settles down between its guides B, and when the pipes L are low enough I open the second row of gates *r*, and the water continues to pass through. This continues until the water in the compartments has settled the dock down to a depth sufficient to float the ponton J upon it. The ponton J is then floated in between the sides of the dock and the knees U are moved around to press upon top of the ponton to secure it to the dock, and its gates *k* are opened. The dock is then sunk lower down. The air escapes through the holes *l'* of the ponton, and the water flows in, and the ponton and dock settle down together to the depth required to receive the vessel. The vessel is then hauled in and fitted upon the keel and bilge blocks of the ponton and adjusted by means of the side shores, *n*. I now open the gates G of the dock C, and the water in the compartments *a* flows out and lightens up the dock, so that its air-chamber D causes it to lift up, bearing with it the ponton and vessel. When raised so that the bottom of the ponton is level with the water and the water has flowed out its gates are closed, water is let out of the tanks into the dock to lower it slightly, and the ponton, with the vessel upon it, is floated out. If the vessel is very large and heavy, the gates F may be kept closed and the water from the ponton allowed to flow out into the dock, from whence it may be pumped out, thus lightening the dock enough to raise the vessel. This, however, is necessary only in the case of very heavy vessels.

The advantage of having a separate float or ponton, J, is that when one vessel is raised by the dock C the ponton with the vessel can be floated off and another ponton brought in to receive another vessel without delay. This could not be done if the vessel lay upon the dock itself, and if she required three weeks repair others would have to wait; but by my invention the pontons may be as numerous as desirable, and the vessels raised without delay and each removed to be attended to.

The amount of water necessary to sink the dock, the degree of buoyancy necessary for the pontons to sustain the vessel, and the depth to which they have to be settled are all matters of experience and depend upon circumstances. By this arrangement of gates the dock may be settled to any required depth or its rise checked where desired. Now suppose a vessel drawing very deep water requires to be raised, it may be that the pipes L are not long enough to allow the dock to be settled the required depth without parting with the pipes



N. To adjust this matter I have a second series of joints communicating with the compartments *a*, situated higher up and marked P. These joints are constructed as shown. They consist of an elbow-joint, K, to which is secured the shell *o*, and into which is fitted a smaller shell, *y*, to which is screwed the S-shaped joint *z*. The pipes L are screwed into these joints *z*. By this construction the ball-joint is preserved for the purpose explained, and the joints *z* may be turned out of the way to avoid the pipes when secured to the elbows below. Suitable braces may be arranged to support the elbows. When the dock has been settled as far as it can be with the pipes L attached to the lower joints the flow of water may be stopped and the pipes L removed and secured to the upper row, P, thus giving to the dock a further fall down to the required depth. In raising it the pipes L may be transferred again. When not in use the elbows K are closed with caps. As before described, the side or end movement of the lifting-dock is provided for by the ball-joint in the pipes L, and by the wide heads thereof and the large pipes N, whereby the pipes L will not be bent or strained by the side or end movement of the dock.

I am aware that lifting-docks have been used into the bottoms of which water is allowed to enter to settle them and then pumped out to raise them. I do not claim such; but

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

1. In a floating dry-dock, provided with the hinged brackets U and *l*, the lifting-power of which is a dock adapted to be sunk and raised, the hollow ponton or float J, with its side gates,

*k*, adapted to be sunk upon the lifting-dock and to receive the vessel upon itself, substantially as and for the uses and purpose herein described.

2. The floating dry-dock C, in combination with the ponton J, having side gates, *k*, and keel and bilge-blocks *m*, designed to receive a vessel, the side shores, *n*, supported by the uprights *u*, and rendered adjustable by means of the hinged arms *w*, into which they screw, substantially as and for the purpose herein described.

3. In combination with the lifting-dock C, with its air-chamber D and upright compartments *a* and openings *c*, the loose-jointed inner pipes, L, outer pipes, N, and water-tanks M, with their openings *q* and sliding gates *r*, when arranged substantially as and for the purpose herein described.

4. In a floating dry-dock having a lifting-dock adapted to be sunk or raised, and water-tanks connected with said lifting-dock for filling it with water, the outer connecting-pipes, N, attached to the tanks and in open connection therewith, and the inner pipes, L, attached to the lifting-dock and in open connection therewith, and adapted to have a vertical play in the pipes N, and a side and end play by means of the ball-joint O, and the wide follower *p*, with its packing, when arranged substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

LIFE C. WATTS.

Witnesses:

S. H. NOURSE,  
J. H. BLOOD.