J. T. Martin.

Dry Dock,

No. 1,518. Patented Mar. 19, 1840.

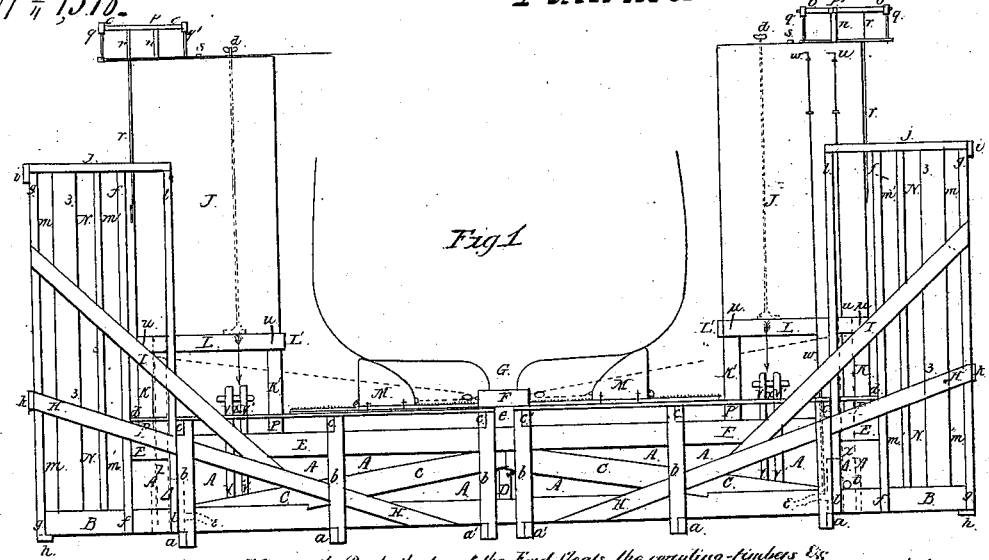
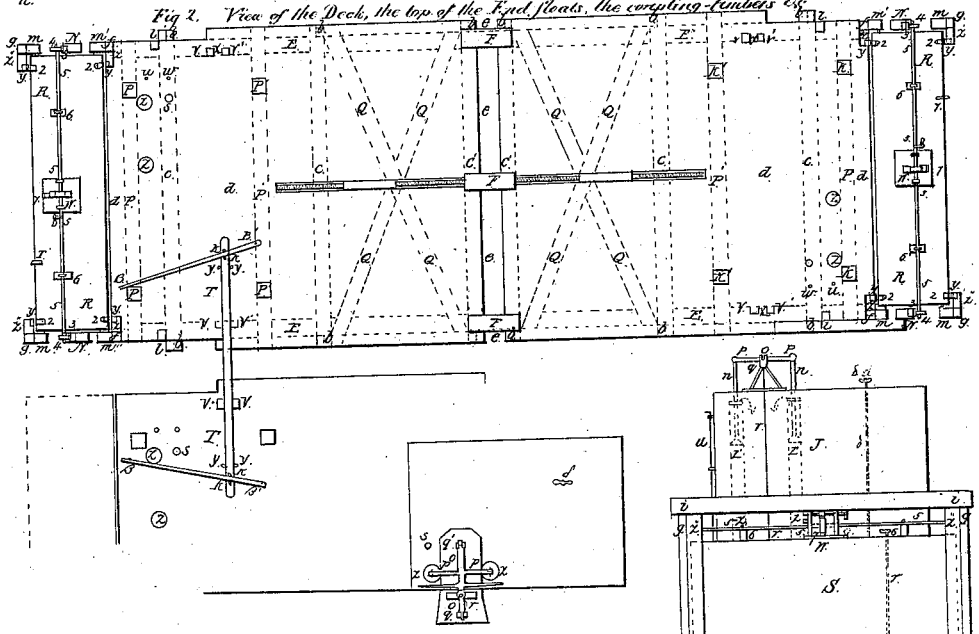


Fig 1

Fig 2. View of the Deck, the top of the Fixed floats, the coupling timbers &c.



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UNITED STATES PATENT OFFICE.

JOSEPH T. MARTIN, OF NEW YORK, N. Y.

FLOATING DRY-DOCK.

Specification of Letters Patent No. 1,518, dated March 19, 1840.

To all whom it may concern:

Be it known that I, JOSEPH T. MARTIN, of the city, county, and State of New York, have invented a new and useful Improvement in Floating Dry-Docks, of which the following is a full and an exact description.

The floating dry dock is intended to raise vessels for the purpose of repair; it is composed of several rectangular sections or floating platforms; their number varying according to their size and the weight to be raised, and united together by means herein afterward described. These sections are alike in form and size.

The body of each section is a hollow rectangular parallelopiped or float, say, fifty feet long, twenty feet wide, and five feet deep, more or less, constructed of strong timbers, with all its sides, the top not excepted, impervious to water; or is composed of several hollow vessels, each water-tight, and all firmly united together, so as to form a float of the size just mentioned.

In the accompanying drawing of a section, this float is represented as consisting of two hollow rectangular vessels, each, say, twenty-five feet long, twenty feet wide and five feet deep, more or less, similarly constructed and connected lengthwise; when reference shall be hereafter made to this part of the section the said formation will be presumed.

In order to secure the stability of the flood it is incased within a framework, to which it is firmly bolted. The bottom of this framework consists of cross-beams, each about one foot in breadth and depth, and upon these at right angles the hollow vessels rest.

Figure 1, represents the side view of a section, *a*, *a*, *a'*, *a'*, *a*, *a*, being the ends of the said cross-beams. Two of these beams, *a' a'* are at the middle of the section, about one foot apart, the rest being distant from each other eight feet, more or less; their extremities are secured by joints and bolts to posts, *b*, *b*, *b*, *b*, *b*, *b*, of the same breadth, and, say, half the thickness. The posts are of sufficient height as to admit of their being similarly secured to the extremities of cross-beams, *c*, *c*, *c'*, *c'*, *c*, *c*, laid across the top of the float at right angles to the posts. Between the posts, *b*, *b*, &c., and the float, A, A, A, is a distance sufficient to admit a longitudinal beam, B, B, say, twelve inches broad and eighteen inches deep; this beam (and, be it observed, that the framework on both sides of the section is similarly and equally constructed) rests upon the cross-beams, *a*, *a*, &c., to which and also to the posts, *b*, *b*, &c., it is connected by bolts. Upon this beam, B B, a truss C C rests, suitably fastened by joints and bolts, and strengthened by a king post D, which will be opposite the middle of the float, or the juncture of the hollow vessels. The timbers composing the truss will be of the same breadth with the longitudinal beam, and about the same depth; to the said timbers all the adjacent posts are bolted. This truss supports another longitudinal beam or string piece E E, of the same breadth and depth with that of the lower B B; it is of the same length as the float A A A, and made fast with bolts to the posts and upper cross-beams, *c*, *c*, &c.; its upper surface being on a level with the upper surface of the float, and thus regulating the height of the truss C C. Besides being connected by the posts and cross-beams, the sides of the framework are more firmly bound together by braces Q Q, Q Q, &c., laid across the float, between the cross-beams, and fastened with bolts to the longitudinal beams.

The flooring or deck, *d d*, is formed of plank resting on the cross-beams, but is left open over the space, *e*, between the two central ones, *c'*, *c'*. Across this space the keel-blocks, F, F, F, are laid, and made fast with bolts to the central cross-beams upon which they rest. There are several keel-blocks on each section, say, one near each end of the central cross-beams, and a third over the centers of the said beams. The open space in the deck is to afford access to the keel of the vessel.

Besides the posts heretofore mentioned there are four others, *f*, *f*, *f*, *f*, one at each corner of the float, each, say, six inches in breadth and thickness, and, say, twenty-four feet in height; each of these posts is fastened with mortise and bolts to the longitudinal beams, E E, B B, that lie along the sides of the float, so that their outer surfaces are, or are nearly, in the same plane with the outer surfaces of the longitudinal beams. These posts are, consequently, inserted at the outer corners of the upper beams or string-pieces, E E, E E. But the lower beams, B B, project beyond the posts, *f f*, *f f*, and of course beyond the ends of the float A A, each, say, six feet, more or less. Into the corners of the lower longitudinal beams B B,

four additional posts, *g g*, *g g*, are similarly inserted and fixed, of the same dimensions with those just described. The four posts, *g g*, *f f*, thus constructed at each end of the float, are the corner-posts of frames for the reception of two additional vessels afterward described, one at each end of the float. Cross-beams, *h h*, firmly connect together the extremities of the lower longitudinal beams B B, and the outer posts *g g*. The tops of the corner-posts are also firmly bound to each other by longitudinal and cross-beams, *j*, *j*, *i*, *i*; and one or more additional cross-beams, *k*, *k*, bind together the posts *g g*, *g g*, at each end of the section. At the distance of, say, three feet from each post at the corner of the float, another post, *l l*, may be erected, of the same dimensions with the corner-posts *g g*, and fixed to the longitudinal beams exactly in the same manner; these posts are for the purpose of strengthening the framework at the ends of the section, which framework thus also composes part of the framework of the float. This part of the frame is still further secured by means of timbers, H H, H H, bracing together the end posts *g g*, *g g*, and the longitudinal beams of the float frame-work, close to which beams the braces are laid, and made fast with bolts. They are bolted, moreover, to all the timbers along which they pass, and to the posts of the float, *b*, *b*, through which they are mortised. Above these braces there are others, I, I, extending from a point near the center of the former to the outer posts *g g*, *g g*. The lower braces make an angle of, say, twenty degrees with the longitudinal beams, and are joined to the end posts at the height of, say, nine feet. The upper braces are joined to the end posts at the height of, say, eighteen feet, and to the lower braces at an angle of, say, twenty-five degrees. It is only meant to specify the fact that the parts just mentioned are firmly bound together, as the manner may be varied.

It has been already stated that the four extreme posts, *g g*, *f f*, Figs. 1 and 2, at each end of the section, are the corner posts of a frame-work for the reception of an additional vessel or end-float, so called to distinguish it from the main or body float.

The end-floats, R R, R R, Fig. 2, or S, Fig. 3, are hollow rectangular vessels built of strong timbers according to their size, and impervious to water on all sides, the tops not excepted: they are entirely separate, and movable vertically within the framework. Their breadth, measured with the breadth of the main float, is such that they rest, when lowered, upon the lower longitudinal beams B, B, Figs. 2 and 3, but is somewhat less than the entire breadth of the frame; and their depth is such that their upper surface, when lowered, is, or is nearly, in the same plane with the deck. Two posts, *m*, *z*, are secured within each corner of the end-float frames, close or near to the corner posts of said frames, each presenting an interior surface, twelve inches broad, more or less, at right angles to each other. Along these posts the end floats move vertically, not touching them, but running on rollers, six inches in diameter, more or less, which are fixed to the end-floats, and which may be partially inserted within the timbers of the said floats, two or more rollers running on each post. The projection of the rollers and the thickness of the posts, thus limit, so far as not heretofore determined, the length and breadth of the end-floats. To each of the four posts, *z*, *z*, *z''*, *z''*, on which the end rollers run, and to the sides on which they run, metal racks, *y*, *y*, *y*, *y*, are fastened, but so as not to interfere with the rollers; pawls, 2, 2, 2, 2, are fixed on the tops of the end-floats, opposite to the racks; and by means of these pawls the end-floats, when depressed into the water, are retained at any desirable depth.

According to the dimensions herein specified, the length of the end-floats is less than the breadth, but their length is indefinite, and the greater it is, the greater will be the buoyant power of the section. The length of their side framework varies with the length of the end-floats.

To each of the sides of the end-float framework, and between the posts, *m*, *m'*, on which the side rollers run, another post, N, is firmly secured; and to each of these posts a rack, 3, is fixed, along which a cog-wheel, 4, runs as afterward described. The teeth of these racks are, or are nearly, in a line equidistant from the two nearest corner-posts, *g g*, *f f*; and their surface is, like the surfaces of the racks already mentioned, parallel to the ends of the section.

On or near the central part of the top of each end-float, a winch is fixed, at a convenient height and of any suitable gearing. In the accompanying drawing this winch, W, consists of two cog-wheels, the smaller giving motion to the larger. The axis, 5, 5, of the larger cog-wheel is extended and supported by gudgeons, 6, 6, fastened to the top of the end-float. On the ends of this axis small cog-wheels, 4, 4, are fixed, and revolve with the said axis on the racks last above described. The small cog-wheel of the winch is turned by a handle; and by this combination of machinery the end-floats are raised or lowered at pleasure. By means of a pawl, 7, falling into the teeth of the larger cog-wheel, the end-float is retained at any desirable height.

A stout rectangular frame or stand, the corner posts of which, K, K', K', K, are, say, each twelve inches in breadth and thickness, is fixed to the deck at each end. The

ends of these stands are parallel to the ends of the deck, at the distance of twelve inches, more or less; and their sides are distant from the sides of the deck, four feet, more or less. Their height is, say, five feet, and should not be less than the depth of water drawn by the vessels which are proposed to be raised upon the dock. The length of the stands is nine feet, more or less, but this length is indeterminate, and in no fixed proportion to their breadth. These stands are for the support of retangular reservoirs, J, J, the corners of which rest upon, or are near to, the corner-posts of said stands. Should the said corner-posts not rest upon the cross-beams on which the deck is laid, additional cross-beams P, P, should be laid on the float, in a line with and directly under the said corner-posts; and to these cross-beams the stands are firmly bolted. The reservoirs, J, J, are built of strong timbers, and secured to their stands with dogs or bolts, *u*, *u*. Their height is, say, seventeen feet, or such that the capacity of each shall be equal to, say, from one-fourth to one-third the capacity of the main-float, A A A.

The reservoirs, J, J, are filled by means of pumps fixed within them, and worked by persons standing on the boards that cover the said reservoirs. In the accompanying drawing there are two pumps, *z'*, *z'*, Fig. 3, in each reservoir, the diameters of which are, say, four feet apart, and equidistant from, or close to, one end of the reservoir—say, the end of the reservoir farthest distant from the center of the section, as in Fig. 4,—or they may be thus situated at any side of the reservoir, so that the pipes, *z*, *z*, which feed the pumps, do not interfere with the lever, B B, Fig. 2, which moves the coupling-timbers, as afterward explained. Their piston-rods, *n*, *n*, Fig. 3, project equally to a convenient height above the cover of the reservoir; a bar, *p p*, with hinge joints connects the ends of the piston-rods, to the center of which another bar, *o o*, Fig. 4, is fixed at right angles. This bar, *o o*, is the fulcrum to any part of which the lever or handle is fixed to work the pumps, and is supported by suitable props or gudgeons, *q*, *q'*, Figs. 1, 3 and 4; one end of the fulcrum, *o o*, projects beyond the end of the reservoir, the gudgeon, *q*, which supports this end, resting on a board which also projects beyond the end of the reservoir, as in Fig. 4; at this end of the fulcrum, within the gudgeons, a heavy pendulum, *r*, Figs. 1, 3 and 4, is attached, which moves as near as may be to the end of the reservoir, and serves to aid and regulate the action of the pumps.

The pumps are fed by pipes, *z z*, Fig. 3, which are led perpendicularly through the bottom of the reservoir, the deck and the top of the main-float, into a small cistern, that is fixed within the main-float, directly under the pumps; all its sides, the top not excepted, being impervious to water. From this cistern, an air-pipe, *s*, is led in any manner to the top of the reservoir. Another pipe, *t*, Figs. 1 and 3, which feeds the cistern, is led from its interior through the side of the main float at any convenient point, say, above and close to the lower longitudinal beam, B. A perpendicular rod, *u*, accessible with the hand from the top of the reservoir, lies along the outside of the reservoir, passing through the deck and top of the float, in the direction of the inlet-pipe, *t*, and serves as the handle of a cock or sluice-gate that is fixed in the said pipe at this point; this cock or sluice-gate is used to stop the ingress of the water and enable all the water to be pumped out of the cistern; it is called the cistern-cock or sluice-gate. Another pipe, *e*, Fig. 1, leads from the interior of the cistern to the interior of the main-float, and lies along its bottom. A cock or sluice-gate, called the float cock or sluice gate, is attached to this pipe at such a point that its handle, *w*, may lie along the outside of the reservoir in the same manner as the rod or handle, *u*, already described. When the cistern-cock is shut and the float-cock open, the leakage of the main float, if any there be, can be pumped out; the float cock is never opened except for this purpose.

The cisterns are each as small as may be; but of a size sufficient to admit the pipes described, and to admit a volume of water sufficient to feed the pipes connected with the pumps. All the aforesaid pipes, where they pass through the timbers of the main float, the reservoirs, or the cisterns, are to be fitted into the said timbers so tightly that the said reservoirs, cisterns, or main-float, may be each separately still impervious to water as hitherto described, excepting through the said pipes as already explained. No water, leakage excepted, is ever inside the main-float. To let the water out of the reservoirs, there is an opening, *n*, Fig. 3, at the bottom of each, at any convenient point, covered by a valve or gate; and to the said valve or gate there is a rod or rope, *d*, *d*, fixed, stretching to a point accessible with the hand from the top of the reservoir, and serving to open the said valve or gate.

To let the water out of the end-float, there is an opening, G, at the bottom of each, at any convenient point, into which a cock is inserted; this cock is opened or shut by a rod, *t*, stretching to a point accessible with the hand from the top of the end-float. If the said rod be fixed within the end-float it must pass through the timbers of the end-float, in such a manner that it may be still impervious to water, as hitherto described.

Along the deck at an equal distance from

the sides of the section, the rack is laid, upon which the bilge-blocks, M, M, Figs. 1 and 2, rest and slide. These bilge-blocks are constructed and adjusted in the same manner as in other docks. Projecting above the deck at both sides and both ends of each section, are two perpendicular stanchions, V, V, Figs. 1 and 2, say, six inches apart, and seven feet from the end of the deck, these stanchions are above the longitudinal beams, E E, B B, of the float frame work, mortised through both, and through the truss timber, C C, if necessary, and secured with bolts. At the height of, say, eight inches above the deck, they are bound together by a timber or tie-piece, secured by joints and bolts; thus leaving an opening, *x*, above the deck and between the stanchions and tie-piece. To tie the sections together, a coupling-timber, T T, runs through each of these openings into the similar opening of the next section; the openings on the adjacent sides of the sections being exactly opposite, each to each. The said coupling-timbers are not so large as to prevent their being easily pushed within the openings: their breadth is as near the breadth of the openings as may be, to keep the sections from moving from each other in a lateral direction, but their depth is as much less than the height of the openings, *x*, *x*, as will suffer the deck of any one section to settle a few inches lower, if necessary, than the deck of the section adjacent. When the adjacent sides of the sections exactly coincide, the coupling-timbers are at right angles to the plane of contact, and extend from the stanchions to an equal distance on the deck of each adjacent section, say, eight feet, more or less; at the distance of, say, two feet from each end, the said coupling timbers being secured in a direction at right angles to the side of the deck by iron bands or by bolts, *y*, *y*, *y*, *y*, Fig. 2, projecting from the deck on each side of, and close to, the said coupling-timbers. In the direction just mentioned each may be moved by a lever of the second order B B, the fulcrum of which is a horizontal joint fixed to the deck. There is a lever of this kind at both ends of each coupling-timber; one on one section, and the other on the section adjacent. The lever is not jointed to the coupling-timber, but passes through an iron band or between two bolts, *k*, *k*, fastened to its end. The handle of the lever projects toward the nearest end-float, but does not touch it; to its end two ropes are attached which run separately through tackle-blocks just fixed to the extreme corner-posts of the reservoir-stand, or to the deck, as may be judged most convenient. These ropes may be pulled, and, consequently, the sections may be farther separated or brought nearer each other, by persons standing on the top of the end-float: the rope-ends are then tied fast to cleats, conveniently fixed to the end of the reservoir. By aid of this machinery the entire dock may be lengthened or shortened while the deck is under water.

It it not intended to limit the construction of the lever which moves the coupling-timber to the form herein detailed.

It may be well here to repeat, what has been already said in substance, that the entire machinery of each section, on each side of the open space, *e*, between the central beams, Figs. 1 and 2, is exactly similar and equal. The floating dry-dock is formed by uniting the sections as above described.

To raise a vessel the dock is sunk, so far that the vessel may float above the keel-blocks. To effect this the end-floats are depressed as low as possible, and water is pumped into the reservoirs simultaneously and equally. The weight of this water causes the dock to sink; and, the cocks of the end-float being open, the said end-floats fill with water in proportion to the sinking of the dock. As soon as the end-floats are full, or as soon as they contain so much water as may be judged sufficient, they are raised above the water by the means herein already described, water continuing to be pumped into the reservoirs until the dock settles at the depth required. The vessel is then floated over the keel-blocks, and the bilge-blocks brought to bear, as much water being allowed to escape from the reservoirs or end-floats, as may be necessary in order to effect an equal pressure of the bottom of the vessel upon all the keel-blocks and bilge-blocks. The reservoir-cocks or sluice-gates, which are all of an equal aperture, are then simultaneously opened, and the water allowed to escape. The end-floats are emptied in the same manner, and at the same time; as soon as empty, their cocks are shut, and they are forced downward into the water, simultaneously and equally, by the machinery already described, as far as the said machinery will permit. For further security, the vessel may be then shored in the usual way. From this description it is plan that the distance between the reservoirs of each section, limits the size of the vessels to be raised by the dock, as far as the breadth of the vessels is concerned.

A dock formed of four sections, each of the numeral dimensions herein specified, will be suitable for raising vessels, the registered burden of which does not exceed three hundred tons. But, by increasing the length of the main-float, and the other parts in proportion to said increase, a dock may be constructed to receive vessels of the largest size. Perhaps, in this case, a variation in the manner of constructing the frame work might be necessary, but this difference any carpenter will be able to determine from the

specifications herein set forth. It is also plain, that, with the same length of main-float, the power and buoyancy of each section may be illimitably increased by increasing the length of the end-floats; the increased weight of the timbers comprising the said end-floats, and the increased weight of the water within them, at the same time materially helping to sink the dock, whenever it may be required. In fact, the size of the end-floats may be such that the weight of them alone, and of the water within them, would be sufficient to sink the dock, without the aid of the reservoirs. Hence, the size of the reservoirs may be diminished in proportion to the increased capacity of the end-floats. In this case also, a variation of the manner may be necessary in constructing the end-float framework, but this variation any carpenter will readily determine. It may also be stated that two or more end-floats may be advantageously constructed at each end of the section.

I do not claim as my invention the formation of a floating dry dock by the union of sections or floating platforms. I claim as my invention the construction and use of end-floats, or any of the separate parts of the above-described floating dry-dock. But the end-floats heretofore in use have had no machinery attached to them by which they might be filled with water, when necessary, for the purpose of causing to sink, or of aiding to sink, the floating dry dock; and have in fact been so constructed with the intention that no water should ever be admitted within them; and

Therefore, I do claim as my invention and wish to secure by Letters Patent—

1. The new and useful improvement, hereinbefore fully described, or any other method substantially the same, by which they are filled with water and emptied of the same for the purposes herein set forth.

2. In combination with this, I do further claim the application of racks and pawls for securing the position of the end-floats, as herein set forth.

3. I do also claim the above described combination of machinery, or any other substantially the same, by which the dock is lengthened or shortened while the deck is under water.

4. And, moreover, I do claim the application of the cisterns within the main-floats, with their appendages, in combination with the reservoirs, whereby the same pumps that are used for filling the reservoirs, may pump out the leakage of the main-floats, if any leakage there may be.

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