

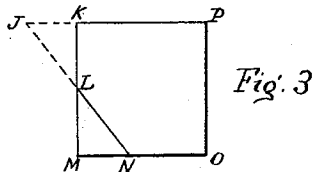
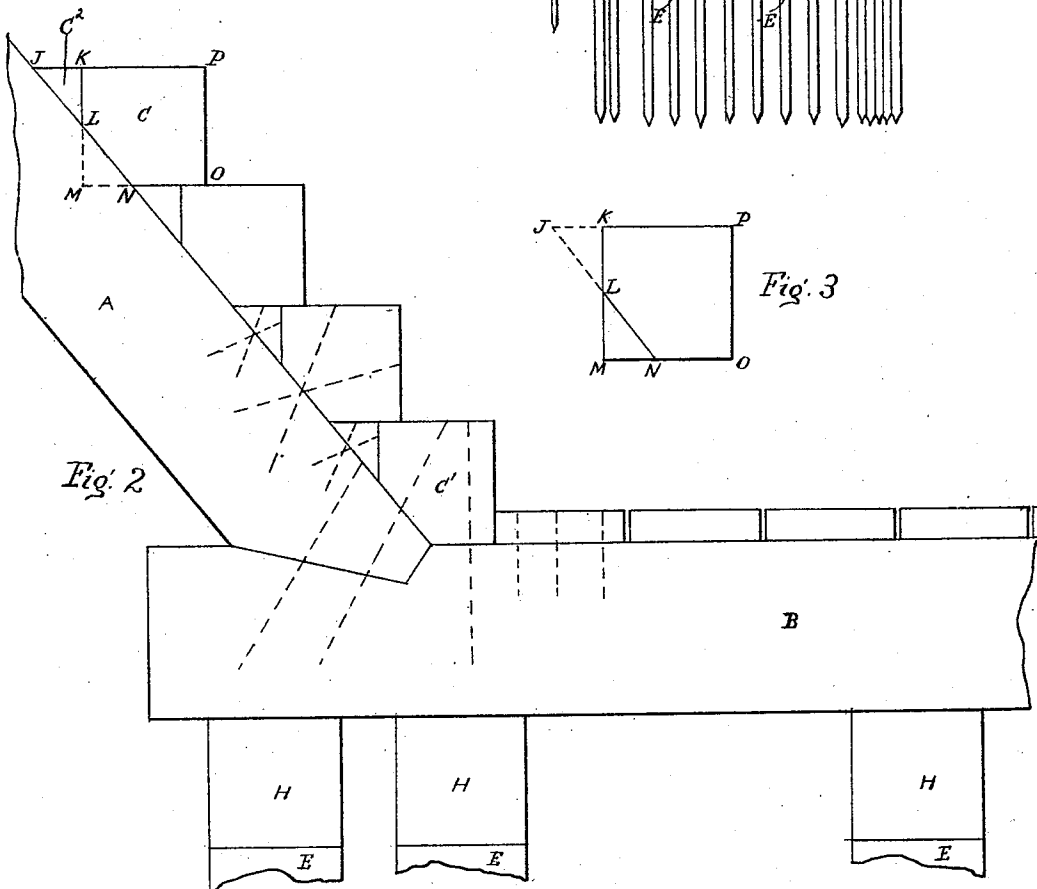
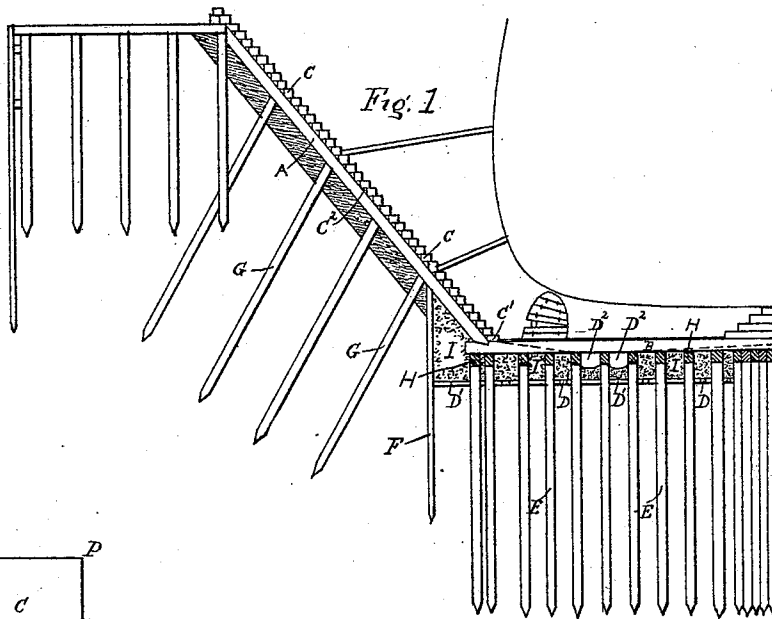
(No Model.)

2 Sheets—Sheet 1.

M. T. ENDICOTT.
DRY DOCK.

No. 470,750.

Patented Mar. 15, 1892.



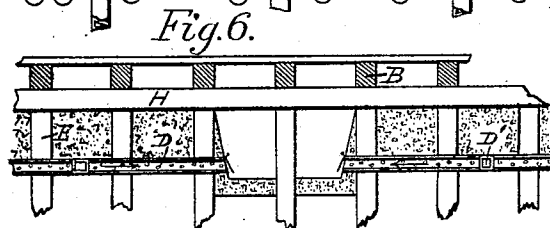
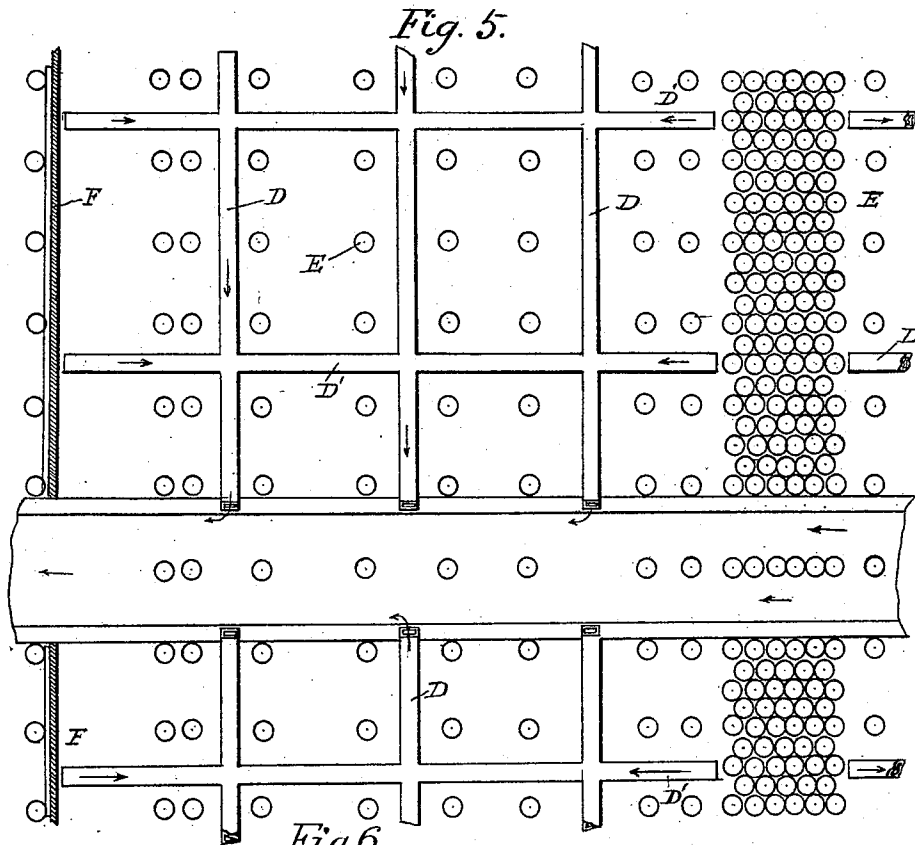
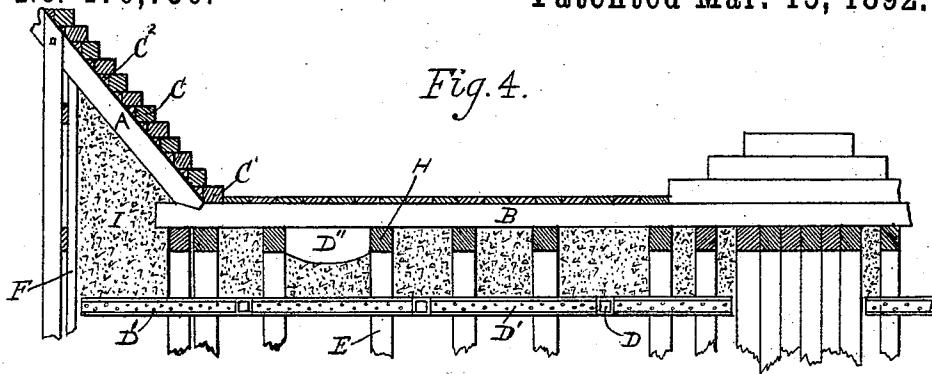
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UNITED STATES PATENT OFFICE.

MORDECAI T. ENDICOTT, OF WASHINGTON, DISTRICT OF COLUMBIA.

DRY-DOCK.

SPECIFICATION forming part of Letters Patent No. 470,750, dated March 15, 1892.

Application filed August 28, 1891. Serial No. 404,014. (No model.)

To all whom it may concern:

Be it known that I, MORDECAI T. ENDICOTT, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Dry-Docks; and I do hereby declare the following to be a full, clear, and exact specification of the same.

My invention relates to improvements in the construction of "permanent" dry-docks, wherein vessels are built or repaired, which are located near or on the margins of water-ways or harbors; and the object of my invention is the improvement of the construction, so as to render dry-docks stronger and more durable.

To accomplish the above results the invention consists of certain novel features of construction and detail and certain combinations and arrangements of parts herein described, and further illustrated in the accompanying drawings, which form a part of this specification.

In the drawings, Figure 1 is a transverse section of one-half of a dry-dock constructed according to my invention. Fig. 2 is an enlarged view of a portion of one side shown in Fig. 1. Fig. 3 is a cross-section of a piece of timber from which the altars or steps forming the interior lining in part are formed. Fig. 4 is a cross-section of a part of the dock, showing the sub-drains. Fig. 5 is a plan view showing the arrangement of the sub-drains underneath the concrete, and Fig. 6 is a detail transverse section showing the connection of the sub-drains with the culvert or drain leading to the pump-well.

Similar letters refer to similar parts throughout the several views.

In the construction of a dock in accordance with my present invention, where the material underlying the floor of the dock is yielding, foundation-piles E E are driven over the area of the floor and cut off at the proper level, and on the tops of these piles are secured longitudinal timbers H H. The soil around the heads of the said piles is excavated to the desired depth and longitudinal perforated or porous drains D D, of wood, iron, earthenware, stone, or any other suitable material of any convenient or desired cross-section or shape, are then laid over the area, as many as are desired, intersecting similar transverse drains D' D', extending outwardly as far as

the row of sheet-piling F. A mass of concrete I I is then rammed in the space excavated, covering the drains D D and D' D', and longitudinal drainage-culverts D² D² are formed where desired, preferably in the center of each half of the dock or at the sides near the altars. Transverse joists B B are then laid on and secured to the longitudinal timbers H H. Another layer of concrete is then rammed upon that previously laid to the tops of the transverse joists B B at the lowest altar and to one-half the height of the same at the center of the dock along the keelway and sloping from these points to the drainage-culverts D² D². The longitudinal drains D D are extended to and connect with a much larger cross-drain leading to the sump or well. The longitudinal drains D D and the transverse drains D' D' intersect and connect with each other, thus forming a net-work and system of sub-drains underlying the entire floor-area and conveying the sub-drainage to the aforesaid sump or well, whence it is pumped and discharged into the water-way or harbor, thus relieving the floor of the dock and the base of the altar system within the sheet-piling F from the hydrostatic pressure of the water underneath, tending to force it up, rupture it, or cause leaks. It also avoids the use of the vertical relief-valves along the culverts usually employed, and horizontal flap-valves on the sides employed to relieve the hydrostatic pressure also, all of which are local in their operation, and generally choke up and fail to afford the relief and benefit intended. The said relief-valves and flap-valves can, however, be used in the same dock with the sub-drains, as proposed, if desired.

The proposed combination and arrangement in a dry-dock of a system of foundation-piles, longitudinal timbers, and transverse joists filled in with concrete having a net-work or a system of sub-drains underneath to relieve the concrete and floor from the upward hydrostatic pressure of the spring and other waters, with a drainage culvert or area above under the wooden-floor surface for the passage of the surface water, is intended to avoid the injurious and sometimes disastrous effects of the unequal and greater upward pressure underneath and the disintegrating effects and cavities caused by continued leaks from be-

low or by the passage upward to the dock of the water through pipes, and thereby increase the stability and durability of the part of the dry-dock affected and render the floor and lower parts of the altar system drier and in better condition for use in the repair and construction of vessels. The same system of sub-drains may be used where no piles are driven in the bottom and the floor and loads are sustained by the layer of concrete resting upon a firm stratum of earth or rock.

The sides of the dry-dock are constructed by securing the inclined timbers A to the heads of the inclined brace - piles G, previously driven, also to the cap-timbers and piles at the top and the transverse joist B at the bottom, all as shown, and then securing to the inclined timbers or altar-carriages A the altars C C². The space back of the altars may then be filled to any desired depth with clay puddle, concrete, or any other suitable material.

The object in driving the piles G G at an angle with the vertical is to bring the center line or direction of these piles nearer to the direction of the strains upon them, whether from the thrust of shores from a vessel, or from the thrust of the embankment in the rear, or from the hydrostatic pressure of water in the rear or in the front when the dry-dock is full of water.

The piles driven at an angle with the vertical, which may vary from the angle shown, will resist all these strains much more effectively than when driven vertically, and therefore renders the dry-dock more substantial and the side construction less liable to failure or distortion and resultant leakage. According to my plan the corresponding piles in the sides of the entrance and abutments are driven in the same manner at any angle from the vertical.

The altars C C² are shown more clearly in Figs. 2 and 3. In the latter the timber K L M O P is one from which the altar K L N O P is sawed. The line L N is the line of cut, bisecting the side K M at L, and is sawed at the same angle with that side that the altar-carriage A in Figs. 1 and 2 makes with the vertical. The two triangles J L K and M L N are then always equal, and the piece L M N, cut from the timber, when revolved through one hundred and eighty degrees about the apex L, occupies the position J L K in Fig. 3, corresponding with its position J L K in Fig. 2, which shows it filling exactly the space in the rear of the altar C when the latter is secured to the altar-carriage A in its proper position, and which piece (marked C²) when secured forms a carriage-block for the altar next above which rests upon it and also overlaps it, resting partly upon the main altar below. The pieces thus sawed off from the timber may be cut into short lengths to form car-

riage-blocks to fill only the space immediately between the large altar-timbers C and the inclined brace-timbers or altar-carriages A, or they may be laid forming continuous lengths behind the large altars C, thus increasing the dimensions and strength of the altar system to resist the hydrostatic pressure from either face, the thrust from the earth behind and shores in front, and rendering it less liable to leakage.

If preferred, the altars C may be laid and secured, as shown, but dispensing with the pieces C² and filling in the space with puddle, concrete, or other material. In my plan the lowest altar C', secured to the transverse joists B and the altar-carriage A, from its shape and dimensions performing the duty of the ordinary stringer, is the base of the altar system and assists in securing the foot of the altar-carriages A.

I am aware that sub-drains have been laid under masonry dry-docks, and I do not claim any patent upon the same. My present claim is an improvement in timber dry-docks (which from their material and method of construction need relief from the upward passage and pressure of the water) by the application of a system of sub-drains to them, forming the combination hereinbefore set forth.

I claim—

1. In a dry-dock, the inclined piles driven at an angle from the vertical, forming a part of the side structure of the dock, substantially as described.

2. In a dry-dock, the altars or steps C C of the form substantially as shown and arranged, the bottom of one to lap upon the next below and secured to the altar-carriages A A.

3. In a dry-dock, the combination of the altars C C and the filling-in timbers C² C², together forming the altar system and side lining, substantially as shown and arranged.

4. In a dry-dock, the longitudinal and lowest altar C' of the form shown resting partly upon the joist B and partly upon the altar-carriage A and secured to the said joist B and the said altar-carriage A and forming the base and a part of the altar system, the said altar C' also securing the foot of the altar-carriage A.

5. In a dry-dock, the combination of a bottom or floor constructed partly of wood and partly of concrete with a system of transverse and longitudinal drains underneath the concrete, conducting the sub-drainage water to the well without its passing up through the bottom or floor, as and for the purposes described.

MORDECAI T. ENDICOTT.

Witnesses:

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FRED. G. CALVERT.