2 Sheets—Sheet 1.

J. E. SIMPSON.
Dry-Dock.

No. 204,689. Patented June 11, 1878.

Fig. 1

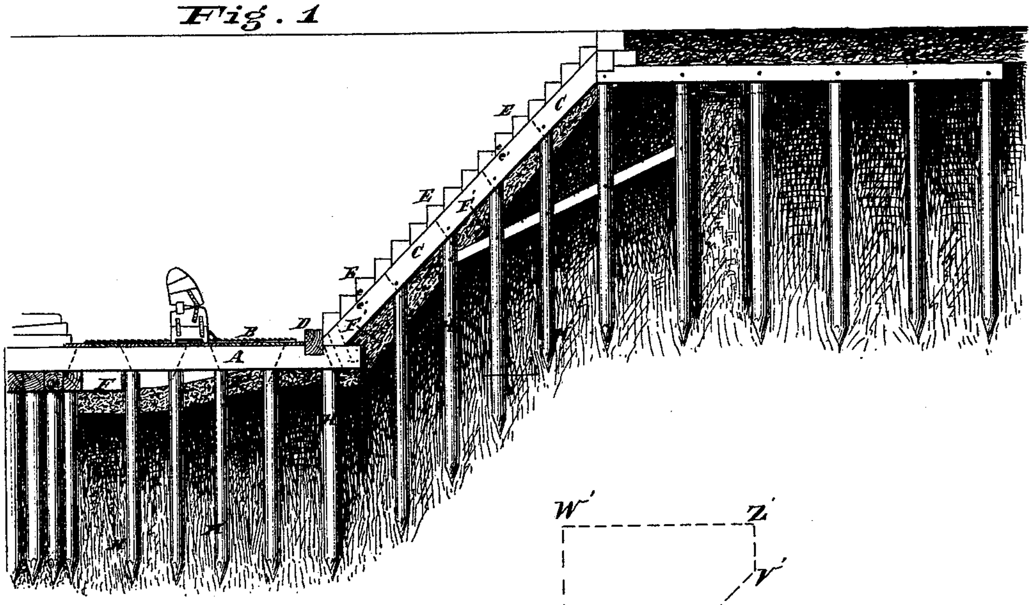
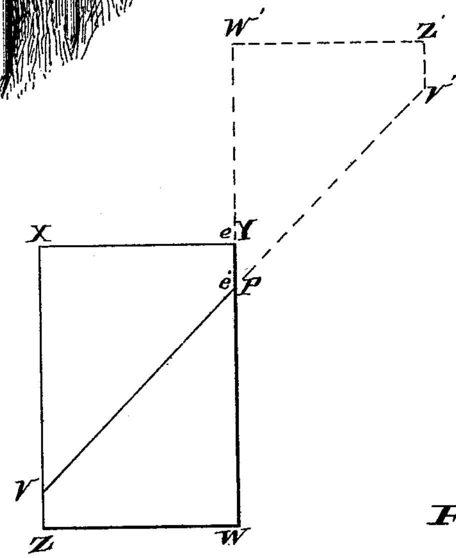


Fig. 4



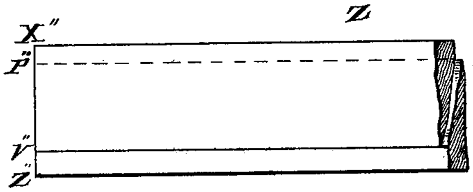
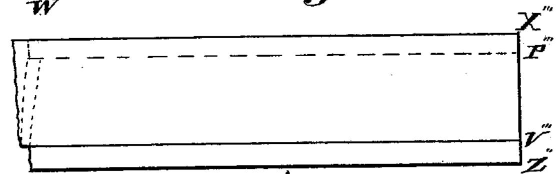


Fig. 5



Attests

Inventor
James E. Simpson

2 Sheets—Sheet 2.

J. E. SIMPSON.

Dry-Dock.

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Fig. 2

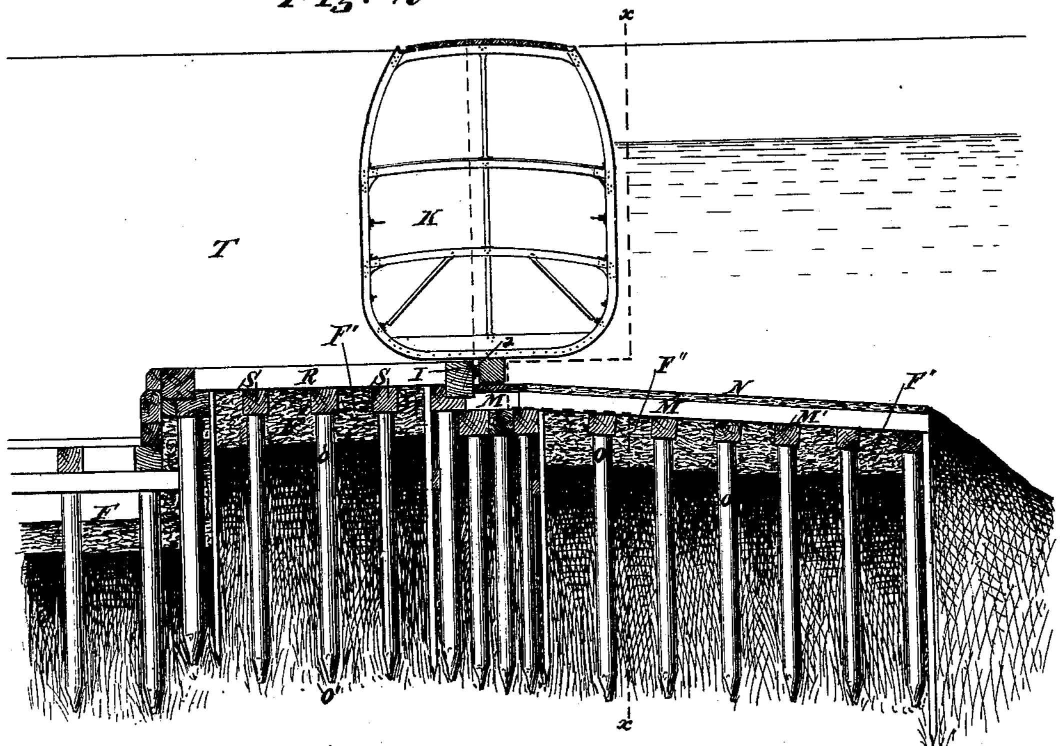
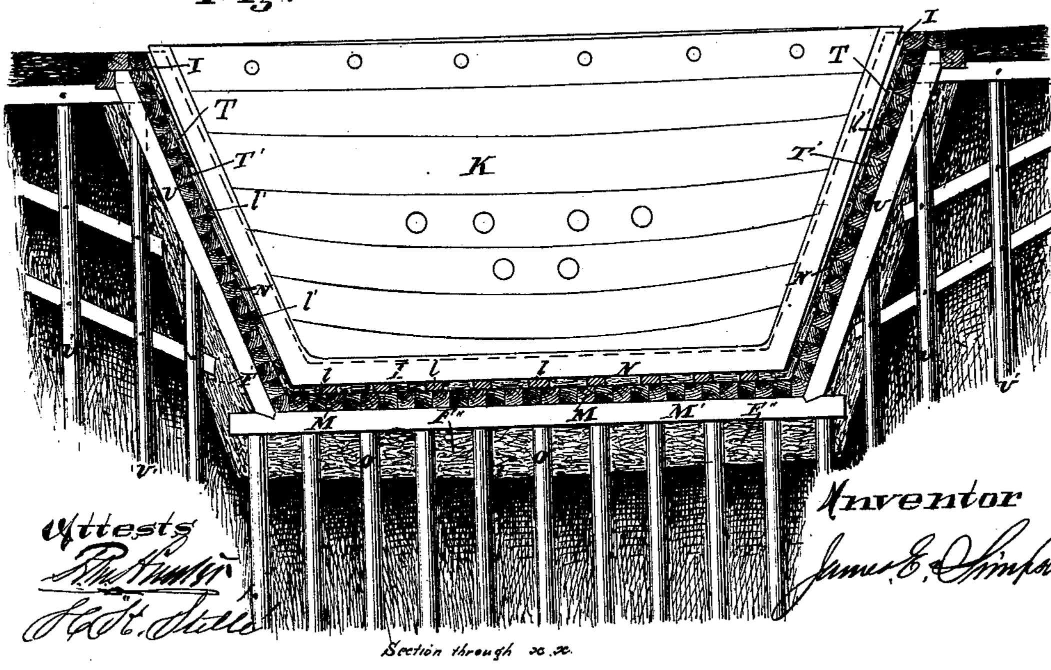


Fig. 3



Section through x.x.

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James E. Simpson

UNITED STATES PATENT OFFICE.

JAMES E. SIMPSON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN DRY-DOCKS.

Specification forming part of Letters Patent No. **204,689**, dated June 11, 1878; application filed April 5, 1878.

To all whom it may concern:

Be it known that I, JAMES E. SIMPSON, of Brooklyn, Kings county, and State of New York, have invented new and useful Improvements in Permanent Dry-Docks, of which the following is a specification:

My invention consists in the construction of several portions of a dry-dock in such a manner that strength shall be given to those portions of the dock, and also that the dock shall be more durable.

The class of dry-docks upon which the improvements are claimed is a permanent dry-dock; and hence, when the materials of which it is constructed are placed and secured in their respective places, they should be protected as much as possible from all sources of destruction.

From the nature of the construction, as set forth in the following description, these sources of destruction are as much as possible eradicated.

The construction of the altars or steps insures both cheapness and durability, and, by forming water-tight joints with each other, they prevent the passage of water behind them.

The outer coating of concrete which lies between the steps or altars and the natural bank prevents the washing of the natural bank by any water that might percolate through the steps. This concrete is also spread under the flooring of the dock.

The addition of the longitudinal timber, against which the braces find considerable support, is an important feature of the improvements. It insures strength and stability to the entire structure.

The manner of constructing dry-docks of this character at present is to use floating gates, which fit into grooves formed in the sides and bottom of the mouth of the dock, offering to the gate both an inner and outer bearing, the grooves being a foot or more in depth. To remove a gate, therefore, from its seating its water-ballast has to be removed until its buoyancy has increased sufficiently to lift it clear of the sills.

My improvement consists in the use of only one sill to receive the bearing inward of the caisson-gate, as shown in the accompanying drawing. Now, it is evident from this arrangement and construction that it is all that is required, as all of the pressure comes from without the dock; and, furthermore, the necessary amount of pumping is lessened, it being merely required to release the bottom of the gate. Here again we have economy in the construction, and also in the operation, as less steam, and consequently less consumption of fuel, is required, and the wear and tear of the pumping-machine is lessened.

A layer of concrete six inches in depth is spread on the table end of the abutments, which I use to prevent the depredations of the sea-worm and other destroying influences upon the timbers.

The spot having been selected for the location of the dry-dock, an excavation is made to the necessary depth. The location may be upon the bank or within a river or harbor. In either case water must be excluded by the use of coffer-dams. Earth, mud, alluvium, or other strata having been removed to the depth required, piles are driven at short distances apart throughout the whole bed of the dock. Upon these piles rest the floor-timbers, to which is secured the floor.

The walls or sides of the dock are similarly formed by piles driven into the ground, and secured by timbers upon which the altars or steps rest. These timbers rest at their lower ends upon the floor-timbers, and press against the longitudinal timber which is let into the floor-timbers, and which constitutes a part of the improvements set forth in the following description. This longitudinal timber is continued all around the base of the dock, with the exception of the space taken up by the gateway. I call them "the longitudinal timbers" because the greater part of them run longitudinally.

Referring to the accompanying drawings, Figure 1 is a cross-section of one-half of the dry-dock. Fig. 2 is a longitudinal section through the gateway of the dock. Fig. 3 is a cross-section of the gateway of the dock. Fig. 4 is a cross-section of the timber from which the altars are cut. Fig. 5 is a longitudinal elevation of the timber from which the altars are cut.

A A are the floor-timbers of the dock.

They rest upon the bearing-piles H H, and support the floor B of the dock. D is the longitudinal timber. It is set in the floor-timbers A A by gaining. The wall-timbers C C rest upon the piles H′ H′, and are secured to them by pile-bolts. The end of the timbers C C rest upon the floor-timbers A A as an abutment, and also press against the longitudinal timber or stringer D.

The altars or steps E E E are set upon the timbers C C, as shown in Fig. 1. They press against each other for a depth, *e e′*, which in practice is about two inches. This pressing of the surfaces together insures a water-tight joint. The lower altar presses against the stringer D, and the bearing-surface in this case is the same as in the others, and hence the stringer also acts as a step.

In practice, the stringer D projects above the floor-timbers A ten inches, and it is also ten inches wide. The altars E E are twelve inches deep in the front and two inches deep in the back, and have a ten-inch tread, and, as the next lower altar laps the next higher one two inches, there is a rise of ten inches to every step. From these points it is readily seen that the angle of inclination in the above case would be forty-five degrees. It is not necessary that this angle should be taken; but I merely used it as an example to explain the construction of my improved altars. These altars are cut from timbers of the proper dimensions without any loss. This is shown in Figs. 4 and 5. X Y Z W represent cross-section of the timber, and X″ X‴ Z″ Z‴ a side elevation of the same. Let us suppose that the timber is ten inches by fourteen inches cross-section, and that it is cut longitudinally, as shown, V P V″ V‴ P″ P‴ making Y P equal to two inches, and P W equal to twelve inches; also, X V equal to twelve inches and V Z equal to two inches. Now revolve the section P V Z W about P as an axis until it takes the position P W′ Z′ V′. The distance W′ Y will then be equal to ten inches, and the tread X Y also equal to ten inches, as in the case previously given. For any change in the inclination of the side or of the tread and rise, the size of the timber must also be changed to suit; but in every case it can be obtained so that there shall be no loss

F F represent the concrete layer under the floor-timbers and around the head of the floor-piles H H. F′ F′ represent the layer of concrete beneath the sides or walls of the dock. This concrete serves the purpose of a water-tight wall, and prevents the rotting of the piles, and prevents the washing of the bed and the undermining of the structure by the water when it is in the dock.

In Figs. 2 and 3, the extreme end of the dock or gateway has two abutments, T′ T′, which are built in the most solid and substantial manner, and which receive the thrust or pressure of the caisson-gate K. These abutments, in addition to their solidity of structure, are supported and backed up by the entire strength of the dock proper, thereby forming an unyielding front well calculated to receive without strain the pressure brought to bear against the caisson-gate by tide-water.

The abutment-timbers T′ T′ are secured to timbers V V, which rest upon piles U′ U′. Running horizontally across the bottom or table end of the dock, and perpendicularly up either side of the abutments, is a sill, I. This sill I rests upon and is gained into the table-timbers M. These timbers M rest upon cross-timbers M′ M′, which, in their turn, rest upon the piles O O. The sill I also rests against the timbers R R, which rest upon the cross-timbers S S, which, in their turn, rest upon the piles O′ O′. The sills up the sides rest upon piles and against timbers T′ T′. The outer side of the sill I has a strip of rubber, *a*, semi-cylindrical in shape, which is firmly secured to it. The keel of the caisson-gate K presses against this rubber, and forms a water-tight joint, and also regulating any inequalities in the surface of the sill I or gate-stem or keel.

The timbers M M may be replaced by heavy planking; and to prevent the said timbers or planking and the side timbers of the abutments from being eaten by worms, I cover the said timbers or planking of the table end and of the sides of the abutments with a coating or composition, N, made of asphaltum and gravel, or other substance impervious to worms or water. This layer of composition N is about six inches thick. It may be extended, if desired, a little beyond the table end upon the original strata. To keep it in its place, and to prevent it from being broken away by the caisson-gate, there are a number of short plates, *l l l′ l′*, secured to the floor and sides and next to the sill I. When the caisson-gate K is floated into place it presses against these plates, and hence the concrete is preserved.

By this arrangement of the sill I the gate K has only to have buoyancy enough imparted to it to raise it a couple of inches at most from off the floor or table M, when it may be floated away. There is also a layer of concrete, F″ F″, under the timbers R R and M M and around the heads of the piles O O and O′ O′. The piles directly under the sill I are inclosed by sheeting-piles. There are also sheeting-piles at the extreme ends of the timbers M M and R R. By this arrangement, with the layer of concrete, it is almost impossible for any water to pass under the table end of the dock.

The object of the foregoing constructions is to provide a permanent dry-dock capable of sustaining extraordinarily heavy vessels, and keeping the same in good repair at a very slight cost.

I claim—

1. The timber D, running longitudinally at the foot of the braces C and gained into the cross or floor timbers A A, substantially as described.

2. The altars or steps E E, of the form sub-

stantially as shown and arranged, the back of one to lap upon the next above and secured to the braces C C, as and for the purpose described.

3. A single sill or inner seating, I, provided with a facing or packing of elastic material, in combination with a floating gate, K, operating substantially as and for the purpose described.

4. The table end and the abutments of a dry-dock coated with a composition, N, impervious to worms and water, substantially as described.

In testimony of which invention I hereunto set my hand.

JAMES E. SIMPSON. [L. S.]

Witnesses:
R. M. HUNTER,
H. K. STILLÉ.