W. M. TORRANCE.

FILLED-IN CONSTRUCTION.

APPLICATION FILED MAR. 22, 1913.

1,067,950.

Patented July 22, 1913.

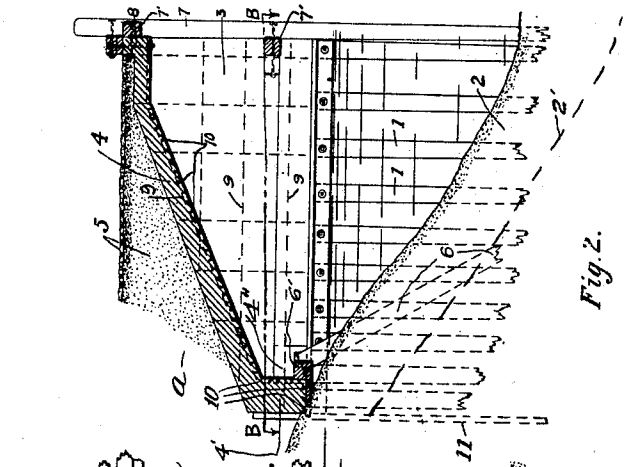


Fig. 2.

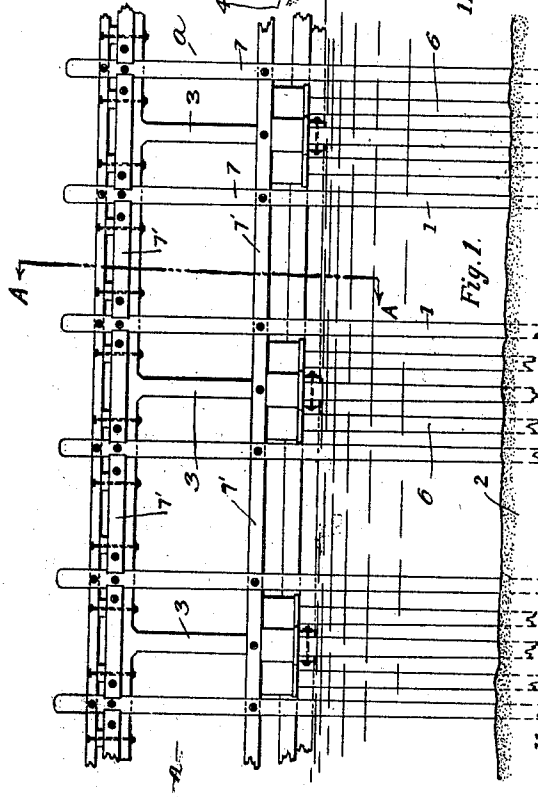


Fig. 1.

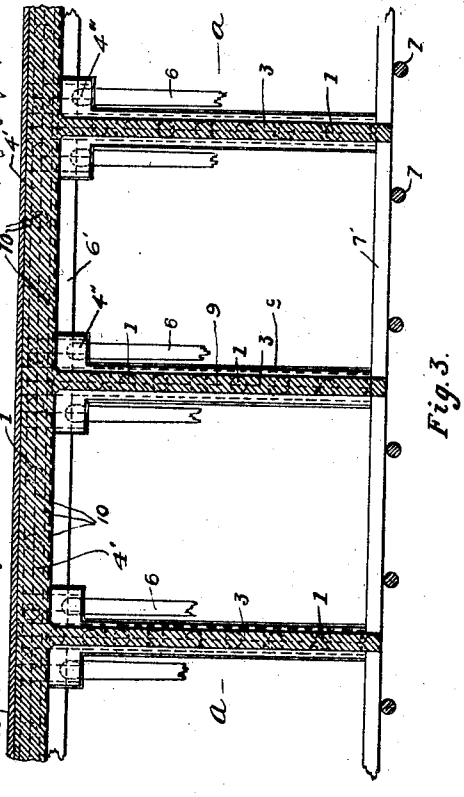


Fig. 3.

Witnesses:
M. Reimer.
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By his Attorney,
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UNITED STATES PATENT OFFICE.

WILLIAM M. TORRANCE, OF EAST ORANGE, NEW JERSEY, ASSIGNOR OF ONE-HALF TO WAYNE CUNNINGHAM, OF SAVANNAH, GEORGIA.

FILLED-IN CONSTRUCTION.

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To all whom it may concern:

Be it known that I, WILLIAM M. TORRANCE, a citizen of the United States of America, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Filled-In Constructions, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in filled-in constructions and particularly to improvements in structures in which earth or other filling material is to be confined. As examples of such structures one may mention permanent pier constructions for the sides and ends of piers between slips; and wharf bulkheads for retaining a wharf line in front of filled or paved areas in harbors and so constructed as to enable a sufficient depth of water to be maintained in front of the wharf line for the proper reception of boats or other craft to be loaded or unloaded from the paved area of the wharf. Generally speaking this invention may be used to advantage wherever it is desired to make a permanent filling and to maintain in the immediate proximity thereof a depth of clear water sufficient for the reception of boats (or for any other purpose).

In the construction of filled bulkheads the approved practice heretofore in use contemplates and requires the provision of a heavy, solid masonry wall at the very front of the bulkhead, which wall is supported on a wooden platform that caps the piling and extends back toward the rear. This solid wall is so constructed as to support and retain a solid filling of earth or other material, with which the space immediately behind this solid masonry wall is also filled. In this construction the foremost or most advanced piling, which is of the greatest length, receives the heaviest load, which load is due not only to the great weight of the masonry wall but results also from the fact that the thrust of the earth which is filled in behind the latter tends to tip the same over toward the front.

An important feature of this invention resides in the economy to be obtained in the number and arrangement of the supporting piles; and this economy results from and is mainly attributable to the fact that a wharf-bulkhead built in accordance with the invention is of comparatively small weight at the front where the channel depth is the greatest and is of no greater weight at the rear than is the approved type of filled bulkhead heretofore in common use.

An object of this invention is to provide a filled-in construction which will be absolutely permanent and rigid and which will represent a large saving in first cost over filled-in constructions built according to methods heretofore followed. A structure of this type embodying the present invention will require a less total number of piling, a less amount of masonry construction and a less amount of filling and will possess increased stiffness and rigidity (1) by reason of the absence of any substantial forward thrusting action from the earth-fill behind the masonry structure and (2) by reason of the increased horizontal depth of the masonry construction itself.

In carrying out my invention I prefer to use cementitious material, such as reinforced concrete, the main object of such material being to have no perishable parts above the water; but I do not desire to be understood as limiting myself to the use of cementitious material, although as I now believe and contemplate, the best results in practising this invention will be obtained by the use of reinforced concrete or other equally premanent material in the construction.

I shall now proceed to explain this invention as applied to and embodied in a wharf bulkhead.

In the drawings illustrating the principle of this invention and the best mode now known to me of applying that principle in a wharf bulkhead, Figure 1 is a front view of such a bulkhead embodying this invention, the view being taken from the water side thereof; Fig. 2 is a vertical section on the line A—A of Fig. 1 and shows the use of reinforced concrete and the method of placing the same on the piling; and Fig. 3 is a horizontal section on the line B—B of Fig. 2 and shows the method of construction.

The bulkhead *a* is supported upon piles 1 which may be of wood, concrete or other suitable material and which are driven into or set in the bed 2 of the harbor. This pil-

ing 1 is so arranged as to support a system of deck-supporting walls 3 which run substantially at right angles to the bulkhead line from rear to front of the structure (Figs. 2 and 3). These walls 3 in turn support a deck 4 which is so constructed as to carry the superimposed load of earth and paving 5, forming the paved area of the wharf, together with the merchandise or other load material which is to be supported by the wharf safely from wall to wall of the series of walls 3.

An important feature of this invention is the downward inclination of the deck 4 toward the rear, which inclination is given thereto in order to eliminate any tendency on the part of the bulkhead to slide forward because of the weight of the superimposed material. This downward inclination to the rear is always less than the angle of repose of the filling material when the same is loaded. With a deck so constructed there will be practically no tendency upon the part of the bulkhead to move forward or toward the water with the load in position; but in order to safeguard the bulkhead against any such tendency however slight in degree inclined or battered piles 6 are provided (Fig. 2). The upper ends of these piles 6 support a chock beam 6′ which extends along and within the back wall 4′ of the deck; and the piles 6 are so driven that they do not encroach in the least upon the depth of clear water immediately in front of the bulkhead.

In order to prevent a boat when coming alongside the bulkhead from rubbing against the forward ends of the deck-supporting walls 3 or the front edge of the deck 4, there are provided fender piles 7 which are suitably fastened to horizontal beams 7′ forming thereby a fender system. At the front edge of the deck 4 a curb 8 is provided for confining the pavement of the wharf. In rear of the back wall 4′ of the deck, sheet piling 11 is driven for the purpose of retaining the earth in case the river-bed should change, as indicated by the dotted line 2′, for example.

Projecting forwardly from the rear wall 4′ of the deck 4 and formed integral therewith are concrete caps 4″ which lie above the upper ends of the battered piles 6. The deck 4 is reinforced, the lengthwise-extending reinforcing members being marked 9 and the transverse reinforcing members being marked 10.

As hereinbefore stated the inclination to the horizontal of the main portion of the top of the deck 4 is less than the angle of repose of the filling material when loaded with the paving or other roadbed material, from which it results that the filling will rest on the deck with substantially no tendency to slip and with only the vertical gravity resultant force coming into play or acting against the deck.

The transverse reinforcing members 10 give stiffness and stability to the structure and to prevent buckling of the same in case the structure is subjected to forces acting in the direction of the bulkhead line, such as the stresses occasioned by the striking or rubbing of vessels in coming alongside the structure.

The deck-supporting walls 3 may be omitted and the piles 1 (in this case preferably of concrete or in the form of concrete columns) extended upward until they take the load off and support the deck 4; or other suitable ways of supporting the deck 4 may be provided.

I claim:

1. A filled-in construction comprising an inclined deck; means supporting the same; and filling supported by the deck.

2. A filled-in construction comprising an inclined deck; piling supporting the same; and filling supported by the deck.

3. A filled-in construction comprising an inclined deck; piling supporting the same; walls interposed between the piling and deck; and filling supported by the deck.

4. A filled-in construction comprising an inclined deck; and filling supported by the same; the inclination of the deck to the horizontal being less than the angle of repose of the filling.

5. A filled-in construction comprising an inclined deck; filling supported by the same; and retaining means for preventing the displacement of the filling by the shifting of the bed of the body of water in front of the construction.

6. A filled-in construction comprising an inclined deck; and means for resisting the forward movement of the same; said means lying wholly within the area covered by the deck.

7. A filled-in construction comprising an inclined deck; and battered piles for resisting the forward movement of the same; said piles lying wholly within the area covered by the deck.

8. A filled-in construction comprising an inclined deck having transverse reinforcing members; filling supported by the deck; and means for supporting the deck.

Signed at New York city, this twentieth day of March, A. D. 1913, in the presence of the two undersigned witnesses.

WM. M. TORRANCE.

Witnesses:
EMMA I. MCCARTHY,
JAMES HAMILTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."