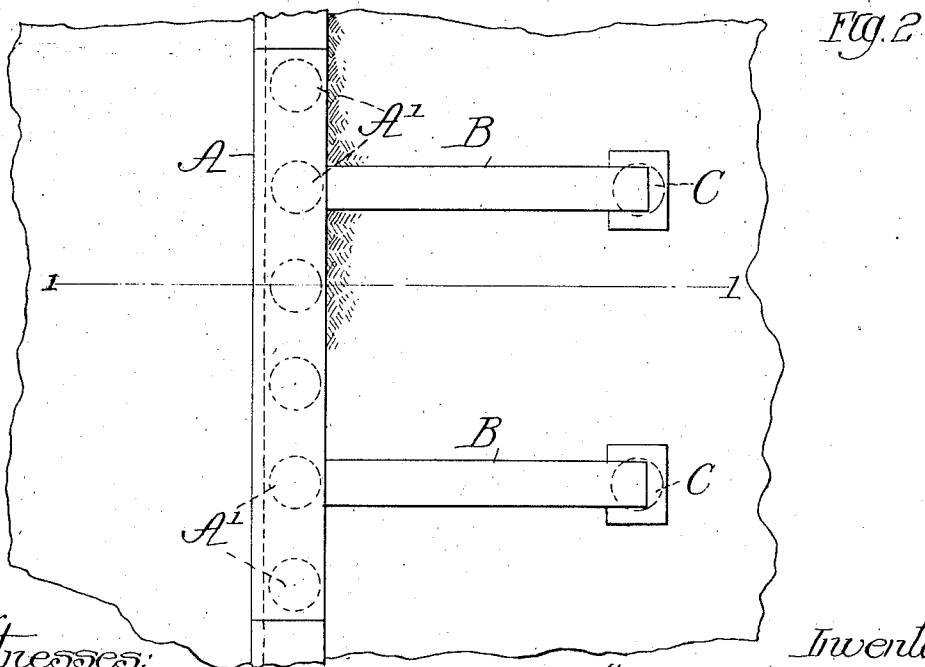
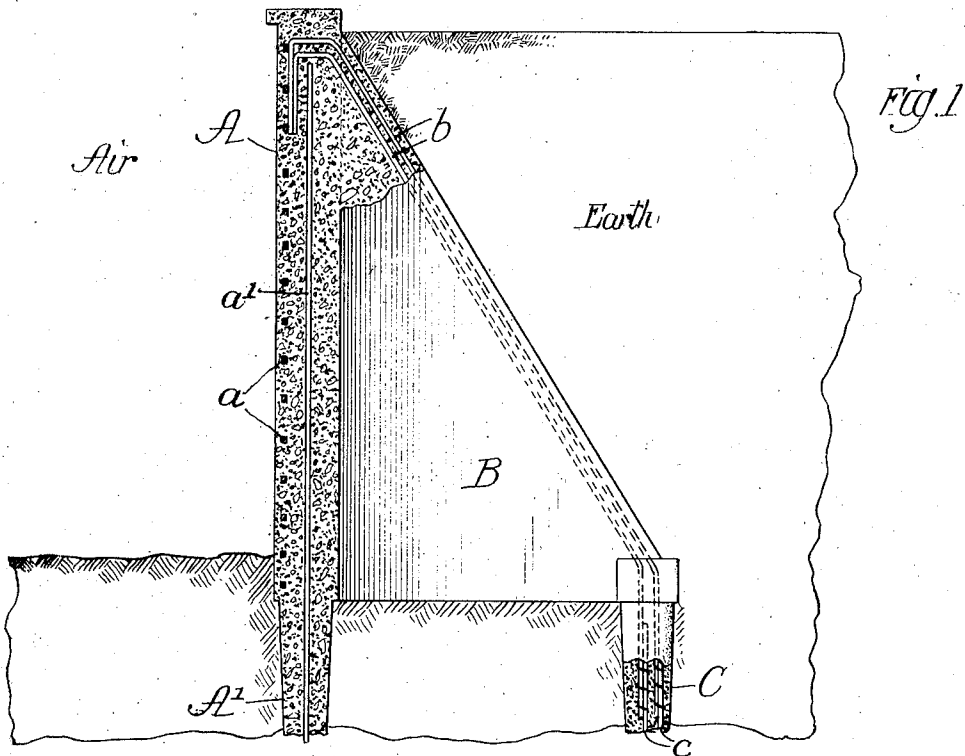


M. M. UPSON.
RETAINING WALL.
APPLICATION FILED NOV. 30, 1907.

905,771.

Patented Dec. 1, 1908.



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UNITED STATES PATENT OFFICE.

MAXWELL M. UPSON, OF NEW YORK, N. Y., ASSIGNOR TO RAYMOND CONCRETE PILE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

RETAINING-WALL.

No. 905,771.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed November 30, 1907. Serial No. 404,549.

To all whom it may concern:

Be it known that I, MAXWELL M. UPSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Retaining-Walls, of which the following is a specification.

My invention relates to retaining walls and the like which are used for dock purposes, railroad embankments and the like, where fluid, soils or deposits of any character are to be held in a vertical plane, and the object thereof is to provide a novel and efficient construction of wall of this character.

According to the present embodiment of my invention, my retaining wall consists of a vertical wall of concrete which is reinforced and is attached and rigidly supported by a series of wing walls extending at right angles thereto, the retaining part of the wall as well as the wings resting upon piles and connected therewith. As a result of the employment of a retaining wall of this character I am enabled to provide an efficient retaining wall at a considerably decreased cost as compared with that of the ordinary so-called gravity retaining wall, as well as a wall which will maintain its proper position and alinement.

In the accompanying drawing, Figure 1 is a sectional elevation of my retaining wall taken on the line 1—1 of Fig. 2, showing a portion of one of the wing walls and its supporting pile in section; and Fig. 2 a plan view of my retaining wall.

As shown, the retaining wall proper marked A is formed of concrete or the like and is supported by a concrete pile A' which practically forms a part of the wall, such pile being formed or sunk into the soil in any suitable manner. The retaining wall is preferably strengthened or reinforced by a series of horizontal metal bars *a* and also by a series of vertical bars *a'* which also, by preference, extend into the concrete pile. The retaining wall is provided with a series of wing walls B extending laterally at right angles thereto and spaced suitable distances apart. By preference each of these wing walls is triangular, as clearly illustrated in Fig. 1, and each is moreover supported by and anchored at its outer end to a pile C preferably of concrete. Moreover by preference each wing wall is reinforced by means of

strengthening bars *b* which not only are anchored to the retaining wall but also to the supporting piles C, with the result that the wing walls and the retaining walls are rigidly held together and with the further result that said pile C not only forms a fixed foundation to insure a vertical alinement of the wall, but also affords a resistance to the vertical pull which the horizontal thrust against the retaining wall exerts. As shown in Fig. 1, and by preference, a series of these strengthening bars *b* are employed, the same being reversely bent at their upper ends and positioned between the series of strengthening or reinforcing bars *a a'* of the retaining wall. The other ends of these reinforcing bars *b* extend into the pile C for a certain distance and are secured to a series of reinforcing bars *c* extending vertically in the pile C.

A retaining wall constructed according to my invention embodies numerous advantages over the ordinary gravity retaining wall in that the cost is considerably decreased, and a better retaining wall produced. Moreover footings of large area, which are commonly required, are dispensed with and a retaining wall is formed which cannot settle or be forced out of alinement, for the provision of the wing walls and their fixed foundations or supports takes care of the horizontal thrust against the retaining wall, such foundations or concrete piles taking care both of the lifting component of the wing walls and the settling component thereof. Furthermore, by means of the reinforcement through the piles of the retaining wall, a stiffening action is obtained, due to the pressure of the earth exerted against the piles beneath the ground.

It will be understood that instead of concrete piles wooden piles may be employed, but it is preferred to use concrete piles inasmuch as this construction is entirely independent of water levels, whereas, wooden piles must be used below the water line to insure permanency.

As shown in the drawing the top of the concrete walls at the end of the buttresses or wing walls is provided with caps in order to form a table to catch the weight of the earth that may be above and in that way assist the friction of the pile in taking care of the vertical reaction.

The retaining wall illustrated in the draw-

ing is of the type intended to hold the earth on one side without there being any pressure on the other side except air pressure. In Fig. 1 I so indicate these facts by using the words "earth" and "air" respectively. However, while as stated the retaining wall may be employed to hold back the earth which is located on the buttress side of the wall, yet such wall may be employed to hold back water on the smooth side of the wall.

I claim:

1. A retaining wall comprising a vertical wall, wing walls connected therewith, and piles to which the wing walls are secured and which provide for the lifting component of the wing walls as well as the settling component.
2. A retaining wall comprising a vertical wall, wing walls connected therewith, piles by which the wing walls are supported, and by which both upward and downward action is resisted, and reinforcing bars in such wing walls and anchored at their ends to the vertical wall and the piles respectively.
3. A retaining wall comprising a vertical wall, a series of triangular wing walls connected therewith, and piles to which the wing walls are connected at their outer ends and which resist both upward and downward re-action.
4. A retaining wall comprising a vertical wall, a series of triangular wing walls con-

nected therewith, piles to which the wing walls are connected at their outer ends, and reinforcing bars in said wing walls and anchored at their ends to the vertical wall and the piles respectively.

5. A retaining wall comprising a vertical wall, and a series of piles on which such wall is supported and to which it is connected, said piles being located at intervals along the width of the wall and dispensing with footings and the like.

6. A retaining wall comprising a concrete vertical wall, and a series of concrete piles supporting such wall and forming a part of the wall.

7. A retaining wall comprising a vertical wall, a series of piles supporting such wall, and forming part thereof, and reinforcing bars extending through the wall and the piles.

8. A retaining wall comprising a vertical wall, a series of piles supporting such wall, and forming part thereof, a series of wing walls connected with the vertical wall, and a series of piles connected with the outer ends of such wing walls for supporting and holding the latter walls.

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Witnesses:

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