

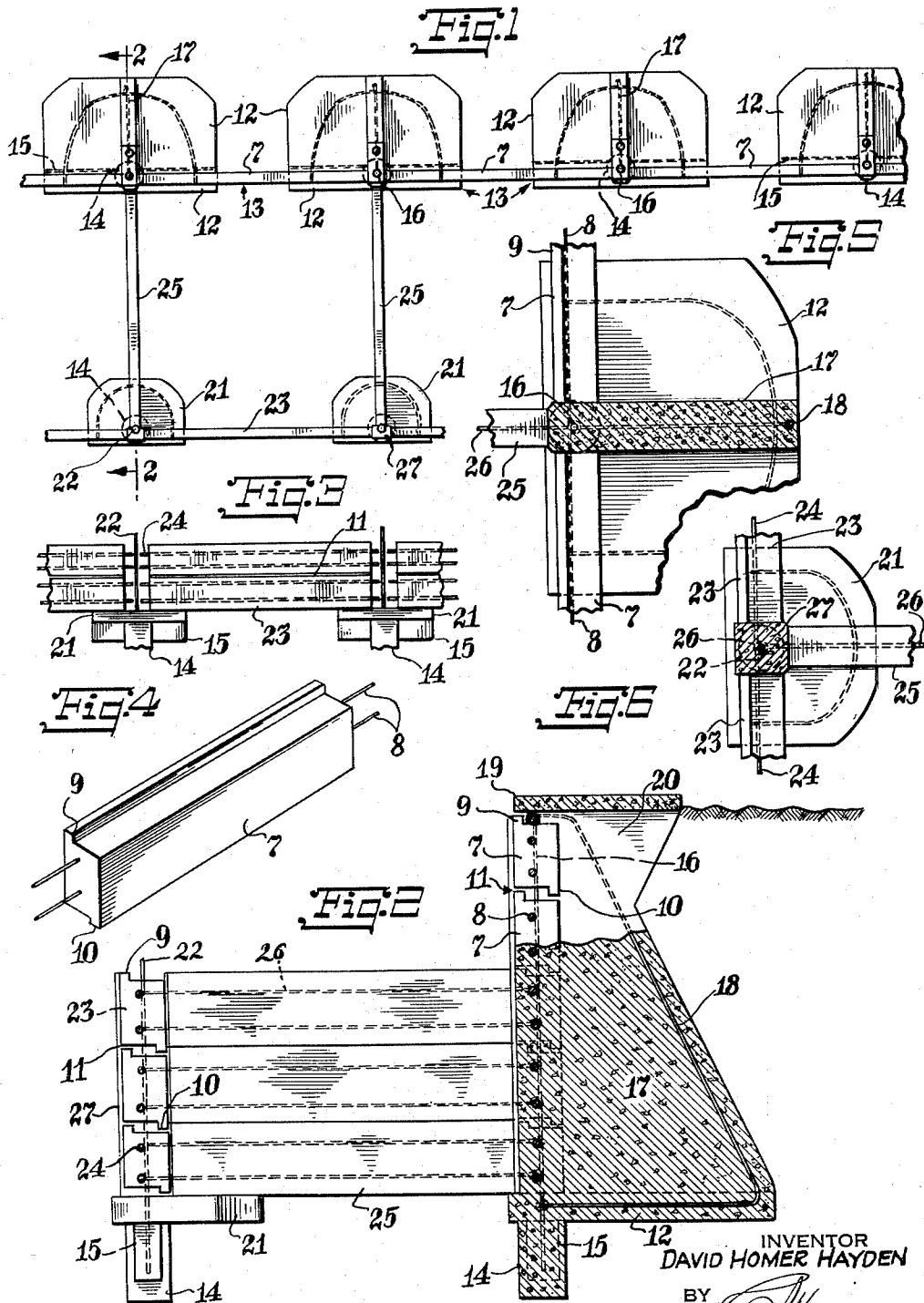
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D. H. HAYDEN

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RETAINING WALL

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INVENTOR
DAVID HOMER HAYDEN

BY
ATTORNEY

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RETAINING WALL

David Homer Hayden, Sarasota, Fla., assignor of one-half to Dorothy Hayden Herald, New York, N. Y., and one-half to Elinor Hayden Mayer, Sarasota, Fla.

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My invention relates to retaining walls that will resist the erosive action of tide, flood or sea as well as retaining a bank.

The main object is to provide a retaining wall with a type of footing that under strain has a means for relieving the strain before the stability of the wall is in danger and when severe action, such as an ocean storm, will cause a churning of the water thereby building up or at least retaining the shore soil.

Another object is to make a wall that can be quickly installed without the use of special equipment.

Another object is to make a wall so that the angle of retention of the soil will be of a wavy form with relation to the wall thereby giving added anchorage.

Another object is to make a wall that though of light mass is suitable with a very small additional material to support a coping wide enough for use as a walk.

Another object is to make a wall that will not slip away from the bank even if completely submerged in surging water.

Another object is to make a wall with a toe-hold at the front of the supporting members.

Another object is to make a wall that will easily conform to an irregular shore or bank.

Another object is to make a wall that is practical for terracing hill sides or embankments with a wall at each terrace.

The accompanying drawings and following specification illustrate and disclose the preferred form of the invention.

Figure 1 is a plan view on a small scale illustrating the invention.

Fig. 2 is a vertical sectional view on the plane of the line 2—2 of Fig. 1 on a somewhat larger scale, showing the invention.

Fig. 3 is a part elevation of a fragment of the wall.

Fig. 4 is an isometric of a precast reinforced concrete unit for use in the practice of my invention.

Figs. 5 and 6 are fragmentary plan views of details of the construction.

The main part of the wall is made up of a number of units such as 7 which are formed of reinforced concrete containing one or more rods 8 which extend throughout the length of the unit and project beyond. These units are provided with flanges 9 and 10 along opposite edges which are adapted to overlap when installed as shown in Fig. 2, but leaving a space 11 between adjacent edges through which water may seep.

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In the main part of the wall, these units are assembled on footings such as 12, 12 which are preferably reinforced and spaced apart along the length of the wall with spaces 13 between adjacent footings. Each footing is of concrete preferably reinforced and preferably has a depending post portion 14 and in some cases, especially in clayey soil a depending flange 15. This footing together with the post and flange when employed has a vertical rod 16 which extends from the footing to the full height of the wall. When two footings have been installed along the line of the wall, the units 7 are to be emplaced, the lower one resting upon the adjacent footings and the other units being superposed with spaces between them to permit seepage of water and suspended soil.

Successive footings are then emplaced and connected by the superposed precast units. The ends of the rods 8 are curled or bent around the vertical rods 16 so as to tie them together.

A buttress 17 is cast in a form at each of the footings so as to fill in the space between the ends of adjacent units about the vertical rod 16 and the tie rods 8. This buttress is also preferably reinforced with a rod or rods 18 which may be tied to the reinforcement in the footing and to the vertical rod 16 so that a reinforcing slab is provided at each of the footings which also serves to unite and hold in place the horizontal units 7, 7. If desired, a coping 19 may be formed connecting the upper ends of the buttresses and such a coping may, if desired, be extended and supported by flanges 20 of the buttresses.

Such a construction may be erected along any length desired and may in fact follow an irregular contour where the situation demands. Such a wall has been tested under severe conditions where the soil had been frequently damaged by the action of tides and wave action due to storms and movement of speed boats. A wall of over two hundred feet in length has withstood severe hurricane and severe flood conditions without appreciable effect upon the wall.

In some situations where the wave action is particularly powerful, I employ a crib breakwater which is attached to the front of the main wall especially for use on sandy beaches. Such a crib breakwater is shown at the left of Figs. 1 and 2 and is formed by placing footings 21, 21 similar to 12, 12 but of smaller size. These footings have vertical reinforcing rods 22 and are connected by units 23 which may be identical with units 7. The tie rods 24 of these units are bent around the vertical rods 22. I also

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provide the transverse connecting units 25 of the same form as 7 and 23. These units are supported on the footings 12 and 21 and provided with reinforcing rods 26 which are bent around the vertical rods 16 and 22. The space between the ends of adjacent units 23, 23 and at the end of unit 25 is filled with concrete so as to form a vertical reinforced post 27 which rests upon the footing 21.

The function of the cribs is to break up the front of the waves and cause a churning of the water which prevents the cutting action of the waves at the base of the wall and tends to retain the soil which is carried in the water. The retention of the soil in the cribs will vary in amount. The transverse partitions 25 prevent oblique cutting action and movement of the soil and since the waves strike the shore line at varying angles, the churning action holds the soil in protective quantities.

The spaces 13 between adjacent footings provide a safety feature which relieves strain on the wall under flood conditions when the joints 14 between the units are insufficient to run off the seepage. Under such conditions, if the water is turbulent it can find its way under the wall at these places without effecting the strength or stability of the wall.

In locations, such as terraced hill sides or embankments and where the wave action is not great such as along certain rivers and in bayous, canals and the like, a single main wall is sufficient. In other locations where the wave action is more severe, it is desirable to employ the crib breakwater construction and provide for trapping of water and soil and reinforcing the main wall.

Changes in details of construction might be resorted to without departing from the principle of the invention.

I claim:

1. A sea wall comprising a row of spaced discrete concrete footing slabs, each having a vertical reinforcing member extending upwardly of the wall and a concrete post extending downwardly therefrom, a number of precast units superposed upon adjacent footing slabs and each having horizontal reinforcing members extending adjacent the vertical reinforcing members of the footing slabs on which the units rest and a poured concrete buttress extending upward from each footing and enclosing its vertical reinforcing member and the adjacent horizontal reinforcing members.

2. A sea wall comprising a row of spaced discrete concrete footing slabs, each having a vertical reinforcing member extending upwardly of the wall and a concrete post extending downwardly therefrom, a number of precast units superposed upon adjacent footing slabs with overlapping edges providing seepage spaces and each having horizontal reinforcing members extending adjacent the vertical reinforcing members of the footing slabs on which the units rest and a poured concrete buttress extending upward from each footing slab and enclosing its vertical reinforcing member and the adjacent horizontal reinforcing members.

3. A sea wall comprising a row of spaced discrete concrete footing slabs, each having a vertical reinforcing member extending upwardly of the wall and a concrete flange extending downwardly therefrom, a number of precast units superposed upon adjacent footing slabs and each having horizontal reinforcing members extend-

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ing adjacent the vertical reinforcing members of the footing slabs on which the units rest and a poured concrete buttress extending upward from each footing slab and enclosing its vertical reinforcing member and the adjacent horizontal reinforcing members.

4. A sea wall comprising a row of spaced discrete concrete footing slabs, each having a vertical reinforcing member extending upwardly of the wall and a concrete post extending downwardly therefrom, a number of precast units superposed upon adjacent footing slabs and each having horizontal reinforcing members extending adjacent the vertical reinforcing members of the footing slabs on which the units rest and a poured concrete buttress extending upward from each footing slab and enclosing its vertical reinforcing member and the adjacent horizontal reinforcing members, said buttress having reinforcing means in its rear portion extending into the footing slab and into the area adjacent the upper part of the vertical reinforcing member.

5. A sea wall comprising two rows of concrete footing slabs, each having a depending post portion and a vertical reinforcing rod extending upwardly therefrom, a number of precast reinforced concrete units superposed on the adjacent slabs in each row and each having at least one reinforcing rod projecting longitudinally therefrom at each end, and a number of precast reinforced concrete units superposed on adjacent slabs in the respective rows to form a crib and poured concrete in the spaces above the slabs at the ends of the respective precast units enclosing the vertical and horizontal reinforcing rods.

6. A retaining wall of reinforced concrete comprising reinforced concrete footing slabs extending from the exterior of the wall into a bank to be retained, each slab having a concrete member extending downwardly therefrom with a vertical reinforcing member extending the height of the wall, a reinforced concrete buttress extending from the rear of each slab to the top of the wall, horizontal precast units supported in vertical relation at their ends on the respective adjacent footing slabs and having reinforcing members extending from their ends, each buttress enclosing a vertical reinforcing member and the ends of the reinforcing members of the adjacent precast units to form a homogeneous structure.

7. A retaining wall comprising a series of connected cribs, each crib being composed of superposed slabs with open spaces between the lower and adjacent upper slabs, each slab having a downwardly extending flange along its lower inner edge and an upwardly extending flange along its upper outer edge, said slabs being so constructed and arranged that the upper flange of each slab overlaps the lower flange of each immediately superposed slab so that water and soil can flow inwardly between adjacent slabs and water can flow outwardly but soil is trapped inside the crib.

8. A sea wall comprising a row of polygonal cribs open at the bottom and connected together, each crib consisting of a stack of superposed concrete slabs forming the sides of a polygon, each slab having a downwardly projecting flange along a lower edge and an upwardly projecting flange along a diagonally opposite upper edge, the downwardly projecting flange of each upper slab overlapping the upwardly projecting flange of the adjacent lower slab.

9. A sea wall comprising a row of polygonal cribs open at the bottom and connected together,

each crib consisting of a stack of superposed concrete slabs forming the sides of a polygon, each slab having a downwardly projecting flange along a lower edge and an upwardly projecting flange along a diagonally opposite upper edge, the downwardly projecting flange of each upper slab overlapping the upwardly projecting flange of the adjacent lower slab and concrete footings for the corners of the respective cribs.

10. A wall as set forth in claim 6 having in addition a coping extending along the top of the wall and connected to the buttresses.

DAVID HOMER HAYDEN.

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