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2,639,587

PROTECTION OF BEACHES FROM EROSION

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Fig. 1.

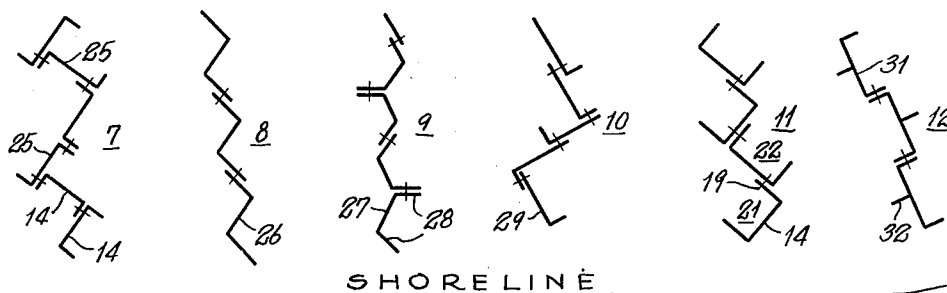


Fig. 2.

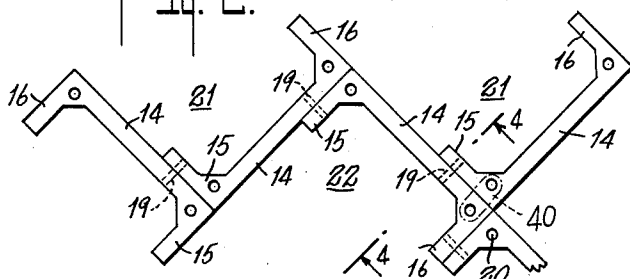


Fig. 3.

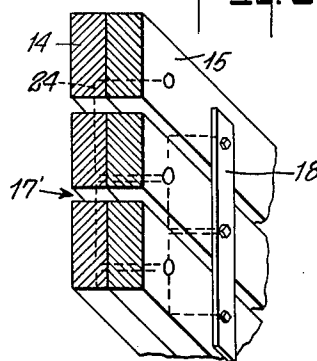


Fig. 4.

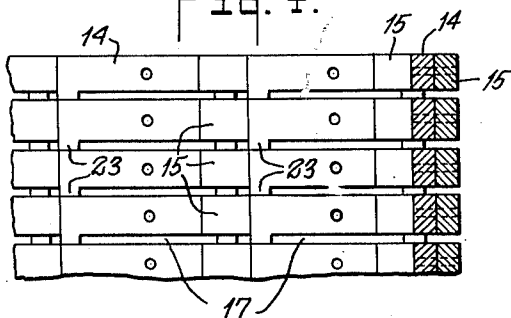


Fig. 5.

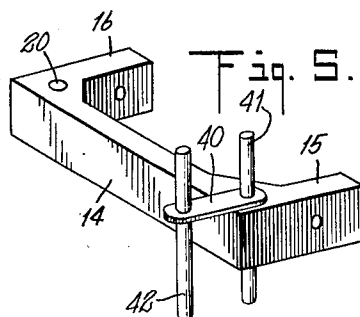
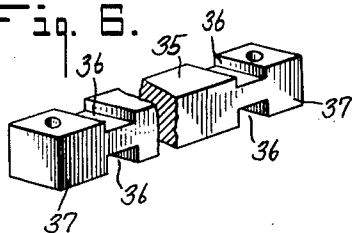


Fig. 6.



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PROTECTION OF BEACHES FROM EROSION

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2 Claims. (Cl. 61—4)

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Wave action alters and destroys extensive beaches causing great financial loss from year to year.

Many attempts have been made to prevent such erosion by the erection of enormous piles of rock and by rows of piling. Such methods are very expensive even when effective and often impractical.

My object is to provide a simple, inexpensive and effective method of protecting shelving beaches.

Another object is to provide a method which can be readily applied with a minimum of simple equipment.

Another object is to provide an effective means which will cause little if any disfigurement of the beach.

Another object is to provide protective means which can be installed in various directions and readily changed in location or direction when desired.

Another object is to provide a form of construction which can be installed by hand without jetting and which will effectively trap sand washed from different directions.

Another object is to provide a system which is not only effective but stable and durable.

Another object is to prevent undercutting of the wall.

Another object is to provide a jetty construction composed of superposed units that by absorbing the shock of the waves prevents the vibration from reaching the bottom units thus preventing sinkage.

Another object is to provide a jetty construction that will permit sand to be washed through openings therein so as to keep an even level of sand on both sides of the construction.

I accordingly provide jetties or breakwaters composed of one or more rows of wall-like structures erected on the beach and extending out into the water at approximately right angles to the shore line.

Such walls stop the force of the waves as they approach the beach by causing a maximum of turbulences whether the waves are approaching from the right or left direction.

Each wall is formed of interconnected columns of superposed concrete elements having passages between them and so constructed and arranged as to provide return pockets on both sides of the wall for collecting the sand which washes through the passages. Such elements are inexpensive, easily made and handled and installed. These elements are strong enough to absorb the shock

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of the waves and so flexibly connected as to avoid breakers and prevent vibration from reaching the bottom of the wall. These elements may be cast in various shapes and sizes such for instance as suggested in the accompanying drawings.

Fig. 1 is a diagrammatic view showing a shore line with a number of jetties extending outwardly therefrom, each jetty showing a different arrangement of concrete elements.

Fig. 2 is a plan view of a fragment of a single jetty formed of elements of channel-shaped form.

Fig. 3 is a perspective and vertical section of one form of wall.

Fig. 4 is an elevation and section of a fragment of such a wall.

Fig. 5 is a perspective view of one form of element.

Fig. 6 is a perspective view of another form of element.

Fig. 1 shows diagrammatically walls 7, 8, 9, 10, 11 and 12 extending outwardly from a shore line, each wall being formed of a number of various interconnected units or elements so as to show various forms of elements and various ways in which they can be connected.

Wall 11 is formed of elements 14 such as illustrated in Fig. 2. Each such element is formed of cast concrete which may if desired be reinforced in any suitable manner. This element is of rectangular U-shape and has two arms 15 and 16 extending at right angles to the main elongated body portion or central arm. These elements are laid horizontally on the sand and piled to a desired height to form a wall. The elements are constructed or supported so as to provide passages, such as 17 or 17' between the elements in superposed layers. The elements of each stack or column are suitably connected together, for instance, by ties or connectors 18 and the elements of adjacent columns are suitably connected as for instance at 19. The elements may have passages 20 for insertion of vertical connecting members.

From this Fig. 2, it will be seen that end portions 15 of one stack lie adjacent and parallel and are connected to body portions 14 of an adjacent stack and that pockets 21 and 22 are formed on opposite sides of the wall by the free standing portions of the U-shaped stacks and that sand and water can wash back and forth from side to side of the wall through the passages between the units.

These passages 17, 17' between the elements may be provided by forming spacing lugs 23 on

the elements or by the tie members 18. Adjacent units may be connected by hair pin ties 24 as indicated in Fig. 3.

In the wall form 7, most of the elements 25 are of Z-shape although elements 14 are of channel-shape.

Wall 8 of Fig. 1 is also formed of substantially Z-shaped elements 26 but the arms make different angles to each other.

In wall 9 of Fig. 1, each element has a main arm 27 with two integral arms 28, 28 at the ends thereof diverging at angles of approximately 100°.

The elements 29 of wall 10 are of L-shape.

The elements 31 of wall 12 are of channel-form with a projection 32 from the back of each.

Fig. 6 shows an element 35 having notches 36 permitting such elements to be assembled in a form resembling a zig-zag rail fence in which the projecting ends 37 will form the pockets on opposite sides of the wall.

According to my invention, the wall is formed of units which can be readily made on the shore, at the job, or at a remote yard, conveniently stored and carted to the job when required.

The erection requires no special equipment more than is necessary for laying an ordinary stone wall.

Such a wall does not disfigure the beach and can be readily removed or relocated if desired.

Such a wall can be set up on the beach and worked into position manually.

The concrete units can be connected together in various ways and provide sufficient flexibility to prevent rupture.

One form of connection between adjacent elements is shown in Fig. 5. Here a link 40 is hinged at one end to a pin 41 inserted in a hole 20 in member 14. The other end is hinged to a pin 42 to be inserted into an adjacent element. Such a link may also serve to space vertically superposed elements from each other so as to leave a passage between the elements. As each element is added, the link is swung into place and a pin dropped through the link into the lower element.

When in use the top elements may sometimes tend to lift slightly in heavy weather. The move-

ment caused by the wave action is substantially horizontal. The pin and link type of tying is thus effective.

By the use of such a wall, a beach is protected against erosion and in fact the wall when suitably installed may actually build up or reclaim a beach.

I claim:

1. A breakwater wall comprising, in combination, a plurality of stacks, each stack being constituted by a plurality of superposed, substantially rectangular U-shaped elements, the portions of the elements at one end of the U in one stack lying adjacent and parallel to and being connected to the central portions of the elements of the adjacent stack, to form a wall in which pockets are formed on each side thereof, said pockets being defined by the free standing portions of the respective stacks.

2. A breakwater wall comprising, in combination, a plurality of stacks of discrete elements, each stack comprising a plurality of elements superposed one on the other and flexibly connected together to form the stack, said elements comprising an elongated body portion and portions at each end of the body portion integral with said body portion and extending at an angle thereto, the end portions of said elements of one stack lying parallel and adjacent the body portions of the elements of the adjacent stack, and the stacks being flexibly interconnected by connecting means extending between said last mentioned parallel and adjacent end and body portions of neighboring stacks.

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