

WAVE DISSIPATION CAISSON

This invention relates to a permeable wave dissipation caisson made mainly of concrete and placed on a seabed to dissipate the energy of waves passing therethrough.

Background Art

5 Wave dissipation has been achieved thus far by using tetrapods or concrete blocks. This method has the disadvantage that the tetrapods or concrete blocks used are moved by the energy of waves or that a multitude of such units are required for preventing such movement. This
10 results in an increased cost therefor.

Moreover, obstruction of the movement of waves by the blocks prevents the alternating flow of seawater through the blocks, which causes corruption of the seawater.

15 It is true that there have been blocks having permeable structure, but they are built only of beams stretched in the shape of a box with walls inside and, therefore, there is the possibility that they may be turned round by the energy of the waves. Furthermore, the place wherein the blocks are set is dug deep by the waves,
20 which makes a caisson unstable. The present invention is intended to provide a stable wave dissipation caisson which is not moved by the energy of waves.

25 In addition, the present invention has the purpose of providing a caisson which not only improves the alternating flow of seawater therethrough but also can be utilized as a fishing rock owing to its permeable structure.

Furthermore, the present invention is intended to provide

a caisson which can be piled one on top of the other due to its box-shaped structure.

Disclosure of Invention

According to the present invention there is provided a wave dissipation caisson comprising:-

5 a frame having a bottom wall adapted to rest on the floor of a body of water, said bottom wall having a plurality of openings therethrough, said frame including a plurality of vertical frame members extending upwardly from said bottom wall and a plurality of horizontal frame members connected to said vertical frame members to form open sides and an open top of said frame;

15 a first pair of trapezoidal wing pieces each having a large edge and a small edge, said first pair of trapezoidal wing pieces connected to each other at said small edges thereof and diverging outwardly toward said large edges thereof; and

20 a second pair of trapezoidal wing pieces each having a large edge and small edge, said second pair of trapezoidal wing pieces connected to each other at said small edges thereof and diverging outwardly toward said large edges thereof;

25 each of said wing pieces having a plurality of openings therein with said first and second pair of trapezoidal pieces connected to each other at said connected small edges thereof with said first pair of trapezoidal wing pieces rotated by 90° with respect to said second pair of trapezoidal wing pieces;

30 said connected first and second pair of trapezoidal wing pieces connected into said frame with each large edge of said first pair of trapezoidal wing pieces connected to and extending along one of said vertical frame members on one side of said bottom wall, one of said large edges of said second pair of trapezoidal wing pieces connected to and extending along
35 one of said horizontal frame members on an opposite

side of said bottom wall, and the other of said large edges of said second pair of trapezoidal wing pieces connected to and extending along an edge of said bottom wall at said opposite side of said bottom wall.

5 By this constitution, the waves advancing in between the diverging bottom sides of the wing body housed in the frame (as shown by an arrow in Fig. 1) are shifted and divided in the vertical direction A by a vertical space and in the horizontal direction B by openings provided
10 in the wing body and are further broken up vertically and horizontally by the rear wing body joined to the front wing body with a turn at an angle of 90 degrees. Thus, the waves are broken up and made turbulent in the caisson and thereby the energy of the waves
15 is scattered and dissipated completely.

Moreover, the holes made in the bottom absorb the energy of waves, whereby the possibility of the caisson being upset by the waves is eliminated. In addition, the existence of the bottom in addition to the holes prevents
20 the waves from penetrating into the place wherein the caisson is installed and from digging up the seabed at this place, whereby the stability of the installed caisson can be maintained. Furthermore, since the caisson has a permeable structure and , in
25 addition, each wing piece is provided with holes, the ratio of a space inside the caisson is high and this makes the caisson inhabitable for fish and shellfish. Therefore, the caisson may also be utilized as a fishing rock.

In addition to the aforesaid effects, the permeable
30 structure and the existence of holes in each wing piece in the caisson which has a volume of 4 - 500m³ usually make it possible to reduce the quantity of concrete to be employed and thus the cost therefor.

Further the caisson in the present invention does not obstruct the alternating flow of seawater through the caisson, whereby the corruption of the seawater at the back of the caisson is prevented. Moreover, the condition of the box-type caisson makes it easy to pile it up, and thus stable piling thereof can be assured.

Brief Description of Drawings

Figure 1 is a perspective view of the wave dissipation caisson which is an embodiment of the present invention, while Figure 2 is a perspective view of the structure of the junction of two sets of wing bodies housed in the wave dissipation caisson.

Best Mode for Carrying Out the Invention

For the purpose of more detailed description of the present invention, further explanation is made hereunder in accordance with the attached drawings.

Fig. 1 is to show an embodiment of the wave dissipation caisson in the present invention, which is made of

concrete.

The box-type frame¹ is a frame wherein no closed side or upper walls are provided but only a bottom surface wall 5 is provided. The other parts thereof are constituted only by angled sections of a framework. Inside the frame, a set of two trapezoidal wing pieces 2 and 3 are arranged with the lower bottom sides 2a and 3a thereof being expanded or diverging as shown in Fig. 2. The smaller top sides or edges 2b and 3b of the wing pieces are made to face each other and joined to form a wing body 4, while, on the other side, the top sides of two trapezoidal wing pieces 6 and 7 are also made to face each other in the same fashion and joined to form the other wing body 8. The top parts 4b and 8b of the two wing bodies 4 and 8 are opposed and joined to each other in their shown positions taken with a turn at an angle of 90 degrees to each other, and a structure thus constituted is housed in and fixed to the frame.

The fixation is made in such a manner that the bottom sides of each wing body are fixed to the respective angled sections of the framework, that is, the bottom sides 2a and 3a of the wing body 4 are fixed to the angled sections 9 and 10 of the framework and the bottom sides 6a and 7a of the other wing body 8 to the horizontal angled sections or frame members 11 and 12 thereof.

Frame member 11 is formed by one edge of wall 5. In each of wing pieces 2, 3, 6 and 7 and in the bottom surface 5 are provided an appropriate numbers of holes 13, 13', 14, 14' and 15, respectively.

The frame 1 is thus formed by the bottom wall 5 having a plurality of openings 15 therein, which bottom wall has a front edge over which water flows in the direction of the straight arrow in Fig. 1, a rear edge 11, and side edges. The frame includes vertical frame members which extend upwardly and are connected by horizontal frame members to form the open side and top of the frame.

23

The industrial applicability of the wave dissipation caisson involved in the present invention is that it is fitted for the use as a breakwater, a revetment or a pier in a harbor, on a coast and in a river, as well as for use as a fishing rock which is inhabitable by fish.



24

CLAIMS

1. A wave dissipation caisson comprising:

5 a frame having a bottom wall adapted to rest on the floor of a body of water, said bottom wall having a plurality of openings therethrough, said frame including a plurality of vertical frame members extending upwardly from said bottom wall and a plurality of horizontal frame members connected to said vertical frame members to form open sides and an open top of said
10 frame;

a first pair of trapezoidal wing pieces each having a large edge and a small edge, said first pair of trapezoidal wing pieces connected to each other at said small edges thereof and diverging outwardly
15 toward said large edges thereof; and

a second pair of trapezoidal wing pieces each having a large edge and small edge, said second pair of trapezoidal wing pieces connected to each other at said small edges thereof and diverging outwardly toward
20 said large edges thereof;

each of said wing pieces having a plurality of openings therein with said first and second pair of trapezoidal pieces connected to each other at said connected small edges thereof with said first pair of
25 trapezoidal wing pieces rotated by 90° with respect to said second pair of trapezoidal wing pieces;

said connected first and second pair of trapezoidal wing pieces connected into said frame with each large edge of said first pair of trapezoidal wing
30 pieces connected to and extending along one of said vertical frame members on one side of said bottom wall, one of said large edges of said second pair of trapezoidal wing pieces connected to and extending along one of said horizontal frame members on an opposite



- 7a -

side of said bottom wall, and the other of said large edges of said second pair of trapezoidal wing pieces connected to and extending along an edge of said bottom wall at said opposite side of said bottom wall.

5 2. A wave dissipation caisson according to claim 1 wherein said frame includes four vertical frame members and four horizontal frame members to form a rectangular frame, an open side of said frame adjacent said one
10 side of said bottom wall defining a front of said caisson for receiving incoming waves which are dispersed and deflected upwardly through said open top of said frame and between said first pair of trapezoidal wing pieces, and sideways through two of said open
15 sides through said apertures of said first pair of trapezoidal wing pieces.

3. A wave dissipation caisson according to claim 1 or claim 2 wherein said bottom wall includes three openings and each of said trapezoidal wing pieces of said first and second pair of trapezoidal wing pieces
20 includes two openings.

4. A method of dissipating a wave moving in a body of water comprising:

25 providing a caisson as claimed in any preceding claim, and positioning said caisson in the body of water with said bottom wall thereof resting on the floor of the body of water.

5. A method according to claim 4, including positioning said caisson in the body of water with said first pair of trapezoidal wing pieces facing a direction for
30 receiving the wave as it moves in the body of water.

6. A caisson substantially as herein described and shown in the accompanying drawings.

7. A method of dissipating a wave moving in a body of water substantially as herein described with reference
35 to the accompanying drawings.