

J. J. BAGNALL.
BREAKWATER.
APPLICATION FILED JULY 23, 1919.

1,385,166.

Patented July 19, 1921.

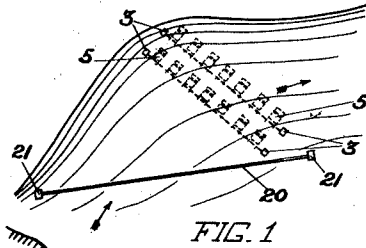


FIG. 1

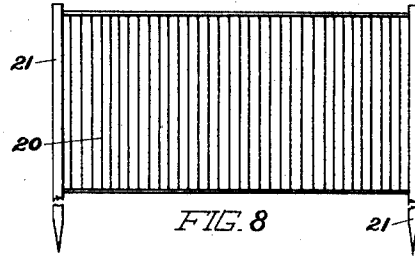


FIG. 8

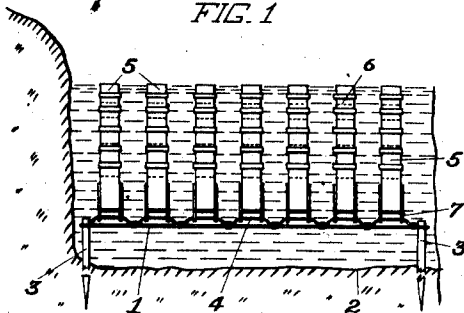


FIG. 2

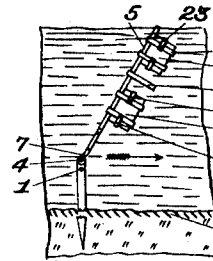


FIG. 3

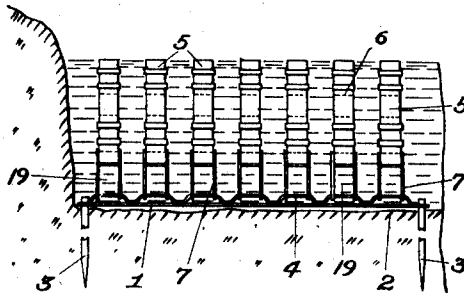


FIG. 4

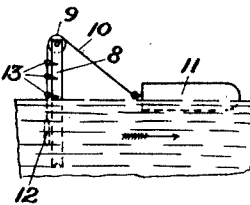


FIG. 6

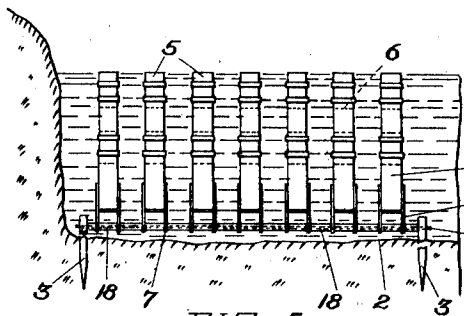


FIG. 5

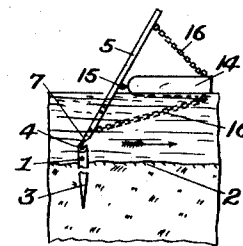


FIG. 7

Inventor
J. J. Bagnall,
By H. R. Kerslake
Attorney

UNITED STATES PATENT OFFICE.

JAMES JERVIS BAGNALL, OF DAY'S BAY, WELLINGTON, NEW ZEALAND.

BREAKWATER.

1,385,166.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES JERVIS BAGNALL, a citizen of the Dominion of New Zealand, and residing at Kotari Road, Day's Bay, Wellington, in the Provincial District of Wellington, a subject of the King of Great Britain and Ireland, have invented certain new and useful Improvements in an Improved Breakwater, of which the following is a specification.

This invention relates to breakwaters and provides an improved construction particularly adapted for employment in rivers to prevent erosion of the banks and the like.

The invention can also be employed in connection with harbor and similar works, and in the prevention of the erosion of a shore, by minimizing the action of the breakers and currents.

According to the invention, a cable rope or rod is anchored where required across the bottom of a river or on the sea bed.

Attached to said cable rope or rod by pivoting or hinging are a number of uprights, on the downstream or lee side of which are secured air tight or other floats.

The action of the water on the uprights is to force the latter with the floats in a downward direction, the floats resisting the action, which results in the destructive power or force of the current in that particular spot being transferred to the structure, the uprights and floats being charged with the potential energy transferred from the water.

Another form of breakwater consists of a support projecting above the water, and floats on the downstream or lee side of the said support, the floats being attached to weighted ropes passing over pulleys in the support. Additional weights can be provided to be picked up as required by the weights on the ropes in obtaining a balance between the force of the current and the weights.

Referring to the drawings in conjunction with which the invention will be more particularly described:—

Figure 1 is a diagrammatic view of portion of a river showing the breakwater in position.

Fig. 2 is an elevation of the breakwater on a larger scale and

Fig. 3 a cross sectional elevation of same.

Figs. 4 and 5 are elevations and

Figs. 6 and 7 end views of modifications. Fig. 8 illustrates a screen for protecting the breakwater.

In the drawing 1 represents a cable, rope or rod anchored at an angle to a river or sea bed 2 preferably by being attached to piles 3.

A wire or wires or the like according to the strength that may be required is or are secured at intervals along the cable rope or rod 1, so as to provide a series of loops (Figs. 2 and 4).

Uprights 5 of hollow metal or wood and each with one or more floats 6, secured thereon on the downstream or lee side are flexibly connected to the loops 4, by means of hooks or catches 7, at each side of the lower end of each upright 5, the latter being of a width equal to or more than the width of the floats.

The uprights 5 are spaced apart at such distances as will be most effective in dealing with the current and are kept in opposition thereto, and being connected at each side to the loops 4 are secured against turning or twisting movements and at the same time providing a yielding resistance.

The uprights 5 can be attached directly to the cable, rope or rod 1 by the hooks 7 (Fig. 5), ferrules 18 being used to keep the uprights and the hooks the required distances apart.

The cable rope or rod 1 is shown in Figs. 2 and 3 some distance above the river bottom or sea bed 2. This is for the purpose of allowing an uninterrupted flow of water below the breakwater, to prevent silt being deposited about the latter.

The same object can be obtained when the cable rope or rod 1 is anchored close to the bottom or bed 2 by providing a space 19 (Fig. 4) below each upright 5 for the passage of water.

The force of the current striking the uprights 5, causes the latter to be forced downward, the floats resisting the action which results in the destructive power or force of the current being transferred to the uprights and the floats.

Referring to Fig. 6, a row of piles 8 or other support is placed in the desired position, the piles or support having pulleys 9 mounted thereon and over which pass ropes or cables 10.

One end of each rope or cable 10 is fas-

tened to a float 11 on the downstream or lee side of the support, and the other end has attached thereto a weight 12. Other weights 13 are conveniently supported directly over the weight 12 so as to be capable of being lifted thereby as the latter is raised and left when the weight 12 descends; and thereby giving automatically the resistance.

The action of the current on the float 11 is to force the latter downstream, and raise the weight 12, until a balance between the force of the current and the weights 12 and 13 is obtained, the weights 13 being picked up one by one as required by the weight 12 as the latter rises.

The floats 6 can be secured to the uprights 5 either as fixtures or so as to be capable of adjustment on same. In the latter case loops 22 are equally spaced on the downstream side of the uprights 5 (Figs. 2 and 3) and the requisite number of floats 6 may be slid in the loops, cross bars or wires 23 being used to retain the floats in the loops 6.

When the floats rest one on the other cross bars 23 are only required one at the top and one at the bottom of each upright, but when the floats are spaced a cross bar 23 is necessary above and below each float 6.

In the construction illustrated in Fig. 7, floats 14 are hinged or pivotally connected at 15 to the uprights 5 on the downstream or lee side of the latter, chains 16 attached to the float being secured to the uprights 5 above or below the floats, as desired.

Any number of breakwaters constructed as described can be employed one behind the other. A screen 20 attached to piles 21 (Figs. 1 and 8) and set at an angle to the breakwater on the upstream or exposed side as shown can be employed to divert floating debris and prevent the latter coming in contact with and injuring the breakwater.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A breakwater of the character described comprising an anchoring element adapted for arrangement at the bottom of a body of water, spaced loops carried by the anchoring element, a plurality of rigid uprights, spaced hooks carried by each upright and engaged with one of the loops forming a flexible connection between said loop and upright, and floats secured to the down stream side of said uprights.

2. In a breakwater of the character described, an anchoring element adapted for arrangement adjacent the bottom of a body of water, a plurality of uprights, flexible joints connecting the uprights to the anchoring elements and maintaining said uprights in spaced relation to the bottom of the body of water to provide a passage for the flow of water thereunder, loops carried by the upper portions of the uprights and floats carried by said loops.

3. A breakwater of the character described comprising an anchoring element adapted for arrangement at the bottom of a body of water, uprights flexibly connected at their lower ends to said anchoring element, floats carried by the down stream portions of the uprights, and a screen arranged on the upstream side of the breakwater and disposed in angular relation thereto.

In testimony whereof I have signed my name to this specification in the presence of two witnesses.

JAMES JERVIS BAGNALL.

Witnesses:

E. S. BALDWIN,
P. S. BYRNE.