

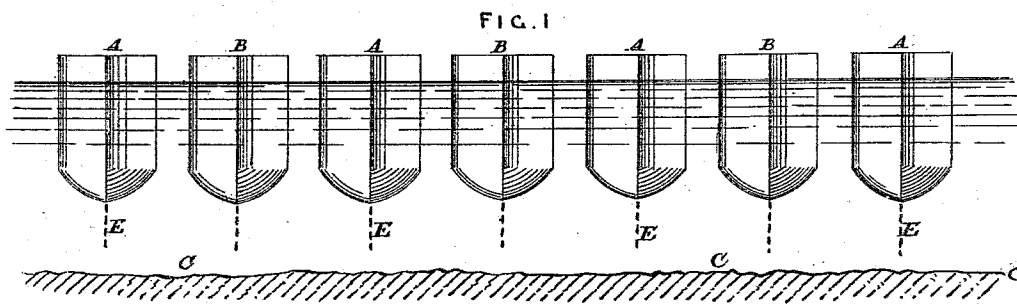
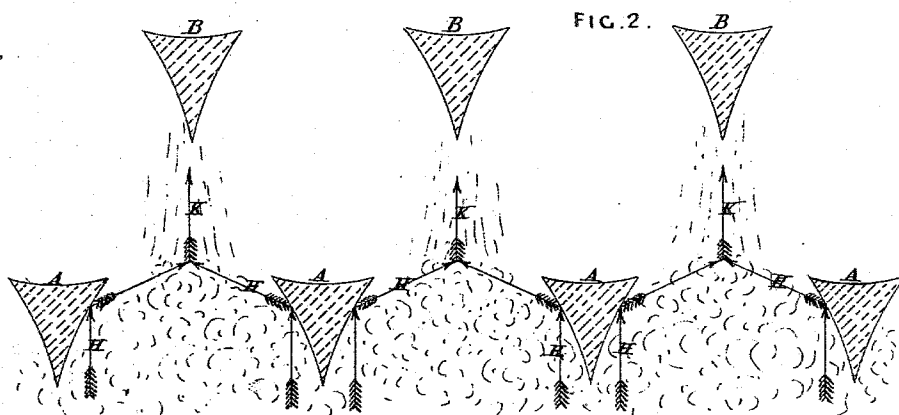
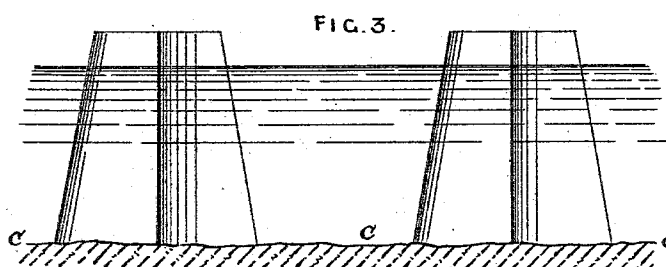
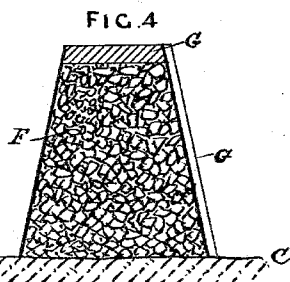
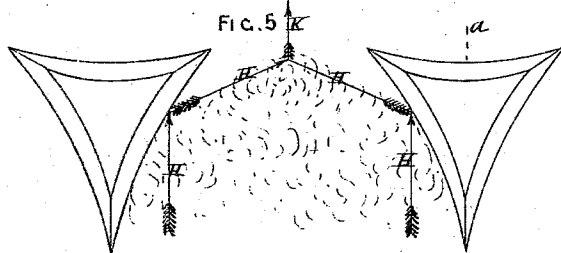
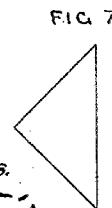
(No Model.)

E. C. G. THOMAS.

BREAKWATER.

No. 283,683.

Patented Aug. 21, 1883.



Witnesses.

Ja. Rutherford
Robert Everett.

Inventor.

Edward C. G. Thomas.

By *James L. Norris.*

Atty.

UNITED STATES PATENT OFFICE.

EDWARD CROFT GREENWAY THOMAS, OF EPSOM, COUNTY OF SURREY,
ENGLAND.

BREAKWATER.

SPECIFICATION forming part of Letters Patent No. 283,683, dated August 21, 1883.

Application filed February 24, 1883. (No model.) Patented in England August 16, 1881, No. 3,556.

To all whom it may concern:

Be it known that I, EDWARD CROFT GREENWAY THOMAS, a citizen of England, residing at Epsom, in the county of Surrey, England, have invented a new and useful Improvement in Breakwaters, (for which I have obtained a patent in Great Britain, No. 3,556, bearing date August 16, 1881,) of which the following is a specification.

Breakwaters for the protection of harbors or shores, whether they are fixed or movable, are usually so constructed as to offer absolute resistance to the force of the waves, breaking them up or destroying or lessening their force, so that it is wholly or partially expended on the breakwater itself, leaving the water within the breakwater comparatively calm.

The object of this invention is so to construct and arrange a breakwater as to utilize the momentum of the waves themselves for neutralizing their destructive energy by directing them against each other, thus causing them to be deprived of their momentum, and rendering them powerless to destroy or injure the protected harbor or shore. For this purpose I place across the course of the waves a number of wedge-shaped bodies, which may be either fixed or floating, arranged with their edges presented toward the waves, so as to divide them to right and left, like the stem of a vessel. The sides of each wedge-shaped body are formed in such a way that the wave deflected from the side of one of them is made to meet and directly oppose that deflected from the next, so that these opposing forces destroy or neutralize each other, and the water then passes on in a comparatively calm and innocuous condition. I usually employ floating buoys or pontons of the desired form, ballasted to such immersion that they present above the surface a certain extent of free board. These buoys are moored in such positions that the water deflected from the one meets that deflected from the next, as above described. In cases where it is convenient or desirable to have a fixed breakwater, piers or fixed structures of the required form are employed instead of buoys.

The accompanying drawings show modes of

carrying out my invention. Figure 1 is an elevation, and Fig. 2 is a horizontal section, of part of a floating breakwater. Figs. 3 and 5 are respectively an elevation and a plan of stationary caissons, forming a solid resistance, unyielding to the force of waves; and Fig. 4 is a vertical section on the line *a a* of Fig. 5. Figs. 6 and 7 are plans of other forms that might be used instead of those described.

A A A A, Figs. 1 and 2; are the buoys, secured to the bottom C C by mooring-chains—such as are indicated by the dotted lines E E E E—or otherwise. The buoys are rectangular in vertical section, but triangular or wedge-shaped in plan or horizontal section, with curved sides, concave toward the sea. The directions in which the wave forces act on the sides of the buoys are indicated by the arrows H H H. The two sets of forces H H H, deflected from the sides of adjacent buoys, meet and are compounded into a single force, K, very much moderated. In situations exposed to a very violent sea I place an inner row of similar buoys, B B, which act in a similar way on the waves that pass the outer row.

Although I have only shown in the drawings seven buoys, the breakwater may obviously consist of as many as are necessary to extend over the place to be protected.

The caissons represented in Figs. 3 and 5 may be made of a casing of iron plate filled with concrete, rough stone, rubble, or any heavy and inexpensive material, and sunk on a beveled bed at the bottom. G is the outside skin or casing, and F the filling in, C C being the bed on which it rests.

It is obvious that the shapes and proportions of the obstructing bodies might otherwise be varied, so long as their sides, which receive the impact of the waves, are inclined, so as to deflect the water from each toward the other, in order that the two deflected bodies of water may meet, having directions more or less opposed to each other.

Although in what precedes I have spoken only of waves as acting against the obstructing bodies, they are equally applicable for protection against strong tidal or other currents.

Having thus described the nature of my invention and the best means I know of carrying it into practical operation, I claim—

5 A breakwater consisting of one or more rows of floats or caissons having curved or angular sides, their upper parts being above the surface of the water and adapted to deflect the waves or currents against each other, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 2d day of February, A. D. 1883.

EDWARD CROFT GREENWAY THOMAS.

Witnesses:

OLIVER ISMAY,
JNO. P. M. MILLARD.