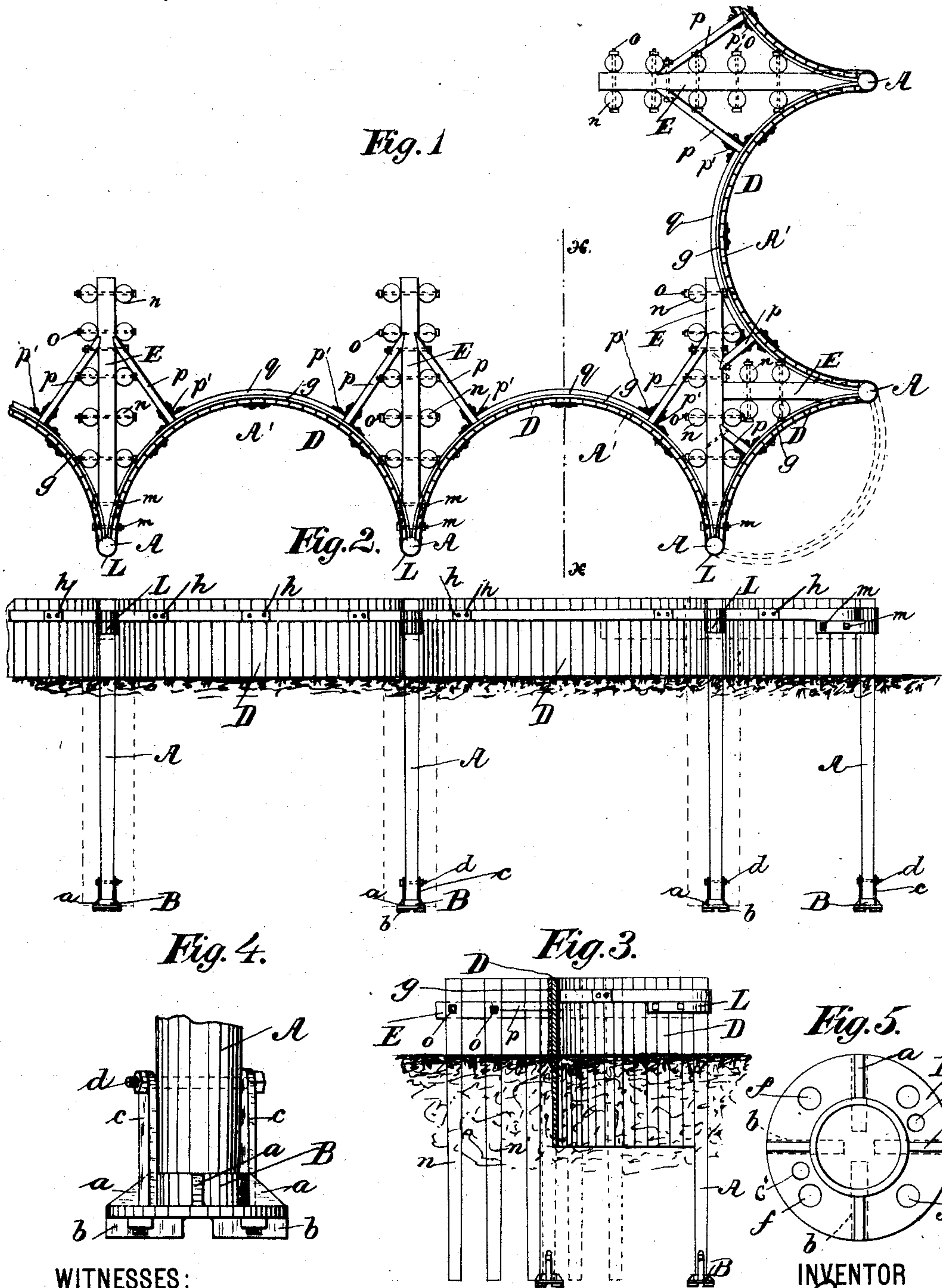


(No Model.)

H. CASE.  
SEA WALL OR BREAKWATER.

No. 420,928.

Patented Feb. 11, 1890.



WITNESSES:  
*Edmond H. Tourtellotte.*  
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# UNITED STATES PATENT OFFICE.

HENRY CASE, OF BROOKLYN, NEW YORK, ASSIGNOR TO MARGARET A.  
CASE, OF SAME PLACE.

## SEA-WALL OR BREAKWATER.

SPECIFICATION forming part of Letters Patent No. 420,928, dated February 11, 1890.

Application filed September 25, 1889. Serial No. 325,016. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY CASE, of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Sea-Walls or Breakwaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of this invention is to provide an improved sea-wall or breakwater possessed of a degree of elasticity that gives it certain great advantages over one of rigid construction; and the invention consists in the peculiar construction, arrangement, and combination of parts hereinafter more particularly described, and then definitely pointed out in the claims.

This sea-wall or breakwater is preferably constructed of piles and timbers faced with plate iron or steel, if desirable, backed with yielding braces or trusses and presenting a sea-front of alternate projecting vertical ribs or buttresses and retreating bays or pockets of curved or semicircular outline.

Reference is to be had to the accompanying drawings, forming part of the specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan of my improved sea-wall or breakwater. Fig. 2 is a front elevation of the same, showing therein below the ground-line only the anchoring-piles. Fig. 3 is a sectional elevation of the same on line *x x*, Fig. 1. Fig. 4 is an enlarged elevation of the lower extremity of an anchoring-pile with a shoe in place thereon. Fig. 5 is an enlarged plan of an anchoring-pile shoe.

This sea-wall may be built up against a bank or bluff to protect it from the encroachment of the sea, or be fixed at high or low water mark or at any other point along the shore, or at a distance therefrom, where a sea-wall or breakwater may be desirable, and because of its yielding qualities—similar to those of a ferry-rack—it is in many instances better adapted than a rigid sea-wall to withstand the beating of heavy seas and to serve as a rack for boats and vessels to lie alongside of.

The anchoring-piles *A* may be of wood or iron tubes, and preferably they are shod with

circular shoes *B*, strengthened with radial top ribs *a a*, and provided with bottom webs *b b*, which latter serve to excavate the soil beneath the pile when the latter is rotated in the sinking process. These shoes *B* are held to the piles by iron straps *c c*, whose screw-threaded ends are passed down through holes *c' c'* in the shoe and have nuts secured thereon, and whose broader upper portions are held to the sides of the pile by bolt *d*, passing through straps and pile and having a nut secured thereon.

Holes *f f* (shown in the shoe, Fig. 5) are designed for the introduction, when desirable, of tubes, (not shown,) through which water may be forced down under pressure for the removal of the soil, to facilitate the sinking of the pile.

The piles *A*, that form the buttresses of the wall, are designed to be set singly or in groups, (shown singly in the drawings,) say twenty feet apart, in which case the intermediate loops or bays *A'* will have an extreme depth of, say, ten feet, as it is desirable that they be semicircular, or nearly so. On the proposed lines of these curved loops or bays strong timber sheathing *D* is then driven close together to proper depth in the earth, the said sheathing extending up on a level with the tops of the piles, say from six to twelve feet above high water, or at any desired height. The convex faces of the bays or loops are preferably sheathed with tarred paper, (not shown,) and outside of this is fastened a sheathing *g*, preferably arranged horizontally, of boards or planks held in place by bolts *h*, or in other suitable manner, and strong clevis-straps *L*, bent around the piles *A*, are extended a short distance along the fronts of these bays and secured in place by bolts and nuts *m*.

Directly rearward of each pile or buttress *A* two parallel rows of piles *n* are sunk at right angles to the general line of the wall, and between these rows of piles stout timbers or stringers *E E*, with one end fashioned to fit against the pile *A*, are secured horizontally by bolts *o* passing through both piles *n* and stringers, as shown in Fig. 1, whereby the whole structure is stiffened and strengthened, but is nevertheless sufficiently yielding



to make a slight inward and outward motion, like the swaying of a tree in a wind, when exposed to heavy seas and severe storms. For further strengthening the structure diagonal braces  $p p$  may be extended from the stringers  $E$  to the rear faces of the bays or pockets, and be secured in place by angle irons and bolts  $p' p'$ , and a heavy band or bands  $q q$ , of iron or wood, may also be secured horizontally on the convex faces of said bays.

When one section of this sea-wall or breakwater is set at right angles to another, as best shown in Fig. 1, the corner bay may have less of an inward curve than the others, as shown; or, instead of a bay being formed there, a projecting pier or circular buttress, as indicated in dotted lines, may be constructed of piles  $A$  at the corner, upon which a light-house may be placed or an iron-clad turret for guns, and the whole face of the wall above water may, if desired, be made bullet-proof with iron or steel plates.

It is obvious that piles may be substituted for the timber sheathing  $D$  in the construction of this breakwater, and that it may be constructed chiefly or entirely of iron.

I do not confine myself to the precise construction herein shown and described, aiming especially to construct an inexpensive, durable, and elastic sea-wall or breakwater for the protection of our coast-line in many places where it now suffers from the constantly-encroaching seas—a wall that is especially durable because of its elasticity and especially adapted for its purpose because of its face-line, that presents alternate buttresses and bays to the sea; for it is obvious that waves advancing from any direction will interfere with each other in these pockets, pile up therein, and create a powerful outflow, that will tend in a great measure to keep the line of breakers outside the line of buttresses.

In some instances I may dispense with the braces or trusses rearward of the breakwater—in moderately-quiet waters, for instance.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An elastic or yielding sea-wall or breakwater having its face formed of a series of alternate projecting buttresses and retreating bays, the projecting buttresses being formed of piles and the intervening bays of sheathing securely connected to the buttress-piles, substantially as described.

2. The combination, in a sea-wall or breakwater, of the buttress-piles  $A$ , the vertical sheathing  $D$ , arranged in bays between the piles, backed by boards or planks  $g$ , arranged horizontally, and the whole connected together by clevis-straps  $L$ , substantially as described.

3. The combination, in a sea-wall or breakwater, of the buttress-piles  $A$ , the sheathing  $D g$ , arranged in bays between the piles, and the stringers  $E$ , connected to the piles  $n$ , substantially as described.

4. The combination, in a sea-wall or breakwater, of the buttress-piles  $A$ , sheathing  $D g$ , arranged in bays between the piles, the stringers  $E$ , the piles  $n$ , connected to the stringers, and the braces  $p$  between the stringers and the sheathing, substantially as described.

5. The combination, in a sea-wall or breakwater, of the buttress-piles  $A$ , sheathing  $D g$ , arranged in bays between the piles, the stringers  $E$ , the piles  $n$ , connected to the stringers, the braces  $p$  between the stringers and the sheathing, and the bands  $q$  on the back of the sheathing, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand, in the presence of two witnesses, this 23d day of September, 1889.

HENRY CASE.

Witnesses:

JACOB J. STORER,

HERBERT VALENTINE.