

J. JOHNSON.
Breakwater or Pier.

No. 214,299.

Patented April 15, 1879.

Fig. 1.

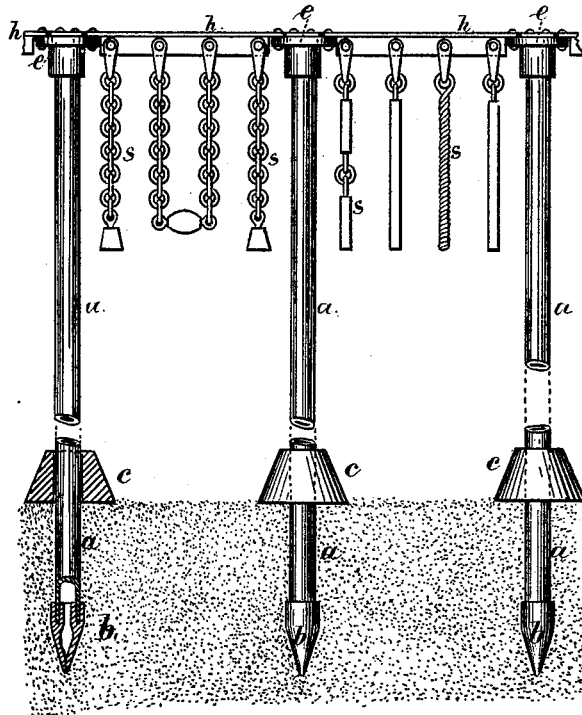


Fig. 3.

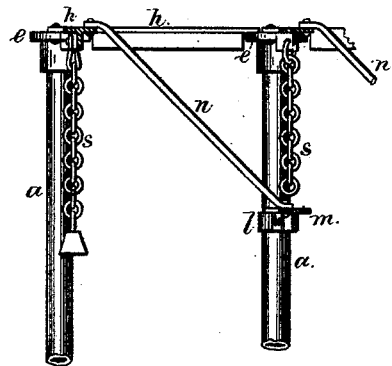


Fig. 4.

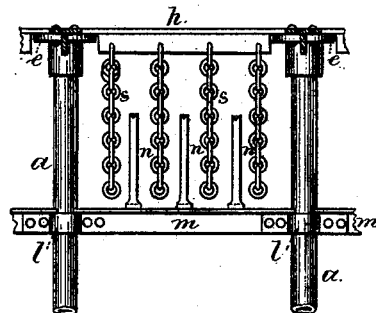
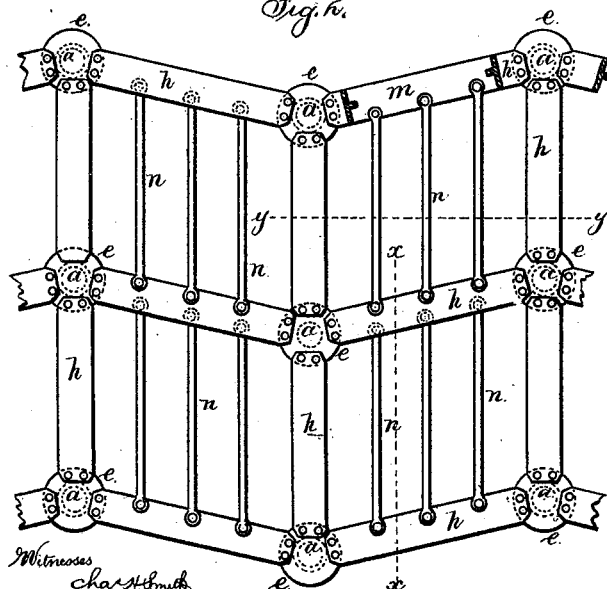


Fig. 5.



Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

JOB JOHNSON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN BREAKWATERS OR PIERS.

Specification forming part of Letters Patent No. **214,299**, dated April 15, 1879; application filed December 26, 1878.

To all whom it may concern:

Be it known that I, JOB JOHNSON, of Brooklyn, in the State of New York, have invented an Improvement in Breakwaters or Piers, of which the following is a specification.

The object of this invention is to divide up and deflect the waves in such a manner that the structure will not be injured by the force of the water, and such structure will act as a breakwater to protect vessels, piers, &c., that are behind such breakwater.

I make use of vertical piles, that are placed zigzag in rows and connected by angle-iron girders from the cap of one column to the next, so as to brace the columns firmly together; and I also use horizontal tie-bars between the columns, the same being attached to collars that are around the columns near the water-line, and inclined combing-bars are introduced between the lower tie-bars and the upper girders to break the force of the waves by producing a counter or backward flow of water broken into foam, that meets and lessens the force of the incoming storm-wave; and I also hang chains, or bars, or wire ropes from the girders or bars, which I term "tranquilizers," against which the waves beat and lift or swing such tranquilizers until their weight overcomes the force of the water, and the water is thereby combed or chopped up into spray and its force partly destroyed before coming into contact with the rigid parts of the structure, thus availing of the inertia of the moving portions of the structure to lessen the unity of the movement of the water and the consequent concussion upon the breakwater or pier.

I prefer to leave the breakwater-pier open and unobstructed below low-water line, so as to avoid the filling up of the same with sand or mud that would prevent vessels approaching the pier; and to lessen the downward wash of water as it rushes against the vertical piles, I employ loose tubular cones around the piles and resting upon the sand or earth, so that the water is deflected upward and does not wash the sand away.

In the drawings, Figure 1 is an elevation of the shore side of the breakwater. Fig. 2 is a plan of the breakwater. Fig. 3 is a sectional elevation of the same at the line *x x*, Fig. 2. Fig. 4 is a similar view at the line *y y*, Fig. 2;

and Fig. 5 is a section of the cap and top of the pile.

I prefer to make the entire structure of iron, thoroughly coated with asphalt or similar water-proof material.

The piles *a a* are tubular, with pointed ends *b*, driven or screwed into the sand or bottom to the proper depth. I prefer and have represented the point *b* with an annular groove, into which the column-tube is inserted, so as to connect the parts and prevent the end of the tube being bent or battered in forcing the point into the sand or earth. This point is also, by preference, tubular.

Around each column there is the loose tubular cone or deflector *c*, that rests upon the sand, for the purposes aforesaid of preventing the sand being washed away around the column by lateral currents, because the cone deflects the currents upwardly.

The rows of piles are not in line with each other; but they are placed zigzag, as illustrated in Fig. 2, so as to give a firmer base to the pier or breakwater, and prevent the rows of piles vibrating or swinging at their upper ends by the action of the waves.

At the top of each pile there is a cap, *e*, made with an annular recess at the under side of the cap to receive the upper end of the column, and from these caps the T-shaped bars or girders *h* extend to the adjacent columns, and are bolted or riveted so as to firmly connect the piles at their upper ends. Upon these girders timbers or flooring may be laid if the structure is to be used as a pier; but if employed only as a breakwater such flooring will not be used.

Around the piles, near the water-line, the collars *l l* are secured, and to these the ends of the T-shaped bars *m* are fastened; and between the girders *h* and these bars *m* there are inclined combing-bars *n*, that are also T-shaped by preference, so that the wave, as it sinks, will be divided and a counter-current set up by the water running down these inclined bars, which current of water, in the form of foam, moves in the opposite direction to the incoming storm-wave and lessens its force, as aforesaid.

The suspended tranquilizers are represented in the form of hinged bars or chains *s*, that

hang below the girders *h*, and may also be employed below the bars *m*. These tranquilizers may be made of single or double chains, or ropes, or hinged bars or links, and weights may be connected at their lower ends. As a wave rushes against the structure these suspended tranquilizers are swung with it until the weight resting upon the water is greater than the impact of the water, when such tranquilizers act as separators to divide up the water and comb the same into spray and foam, which reacts against the rush of the next succeeding waves, and so lessens the concussion upon the structure and prevents the waves rolling past the breakwater; hence the surface behind the breakwater will be comparatively quiescent.

I am aware that a breakwater has been made with plates that are hinged at their upper ends, and against which the waves act. They, however, are not free to swing in all directions, and the structure is strained by the concussion of the waves against the plates, and the latter are liable to injury, and do not act simply as tranquilizers to the water as it flows past.

It will be apparent that the tranquilizers

are free to swing in any direction in consequence of being sustained by links or linked together; and hence that they are adapted to act upon the waves regardless of the direction in which the waves may be running, and the pier only has to support such tranquilizers and is not strained by them.

I claim as my invention—

1. The vertical piles placed zigzag in the longitudinal ranges, in combination with the caps *e* and girders *h*, substantially as set forth.

2. The combination, with the piles *a*, of the loose tubular cones *c*, for the purposes set forth.

3. The suspended tranquilizers formed of chains, links, ropes, or jointed bars, that are free to swing in any direction, in combination with the breakwater or pier, substantially as set forth.

Signed by me this 20th day of December,
A. D. 1878.

JOB JOHNSON.

Witnesses:

HAROLD SERRELL,
GEO. T. PINCKNEY.