

H. CASE.
Breakwater.

No. 227,483.

Patented May 11, 1880.

Fig. 1.

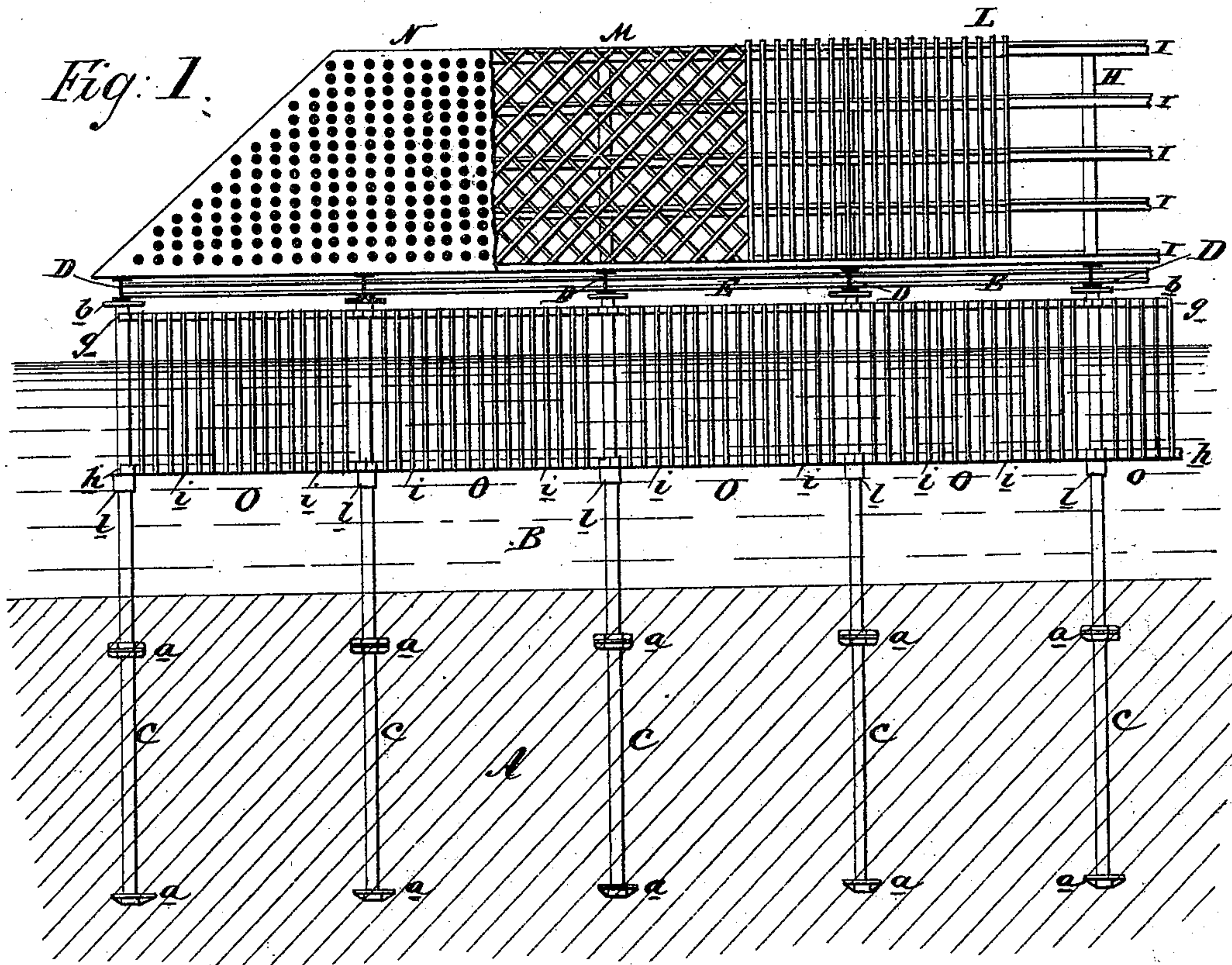
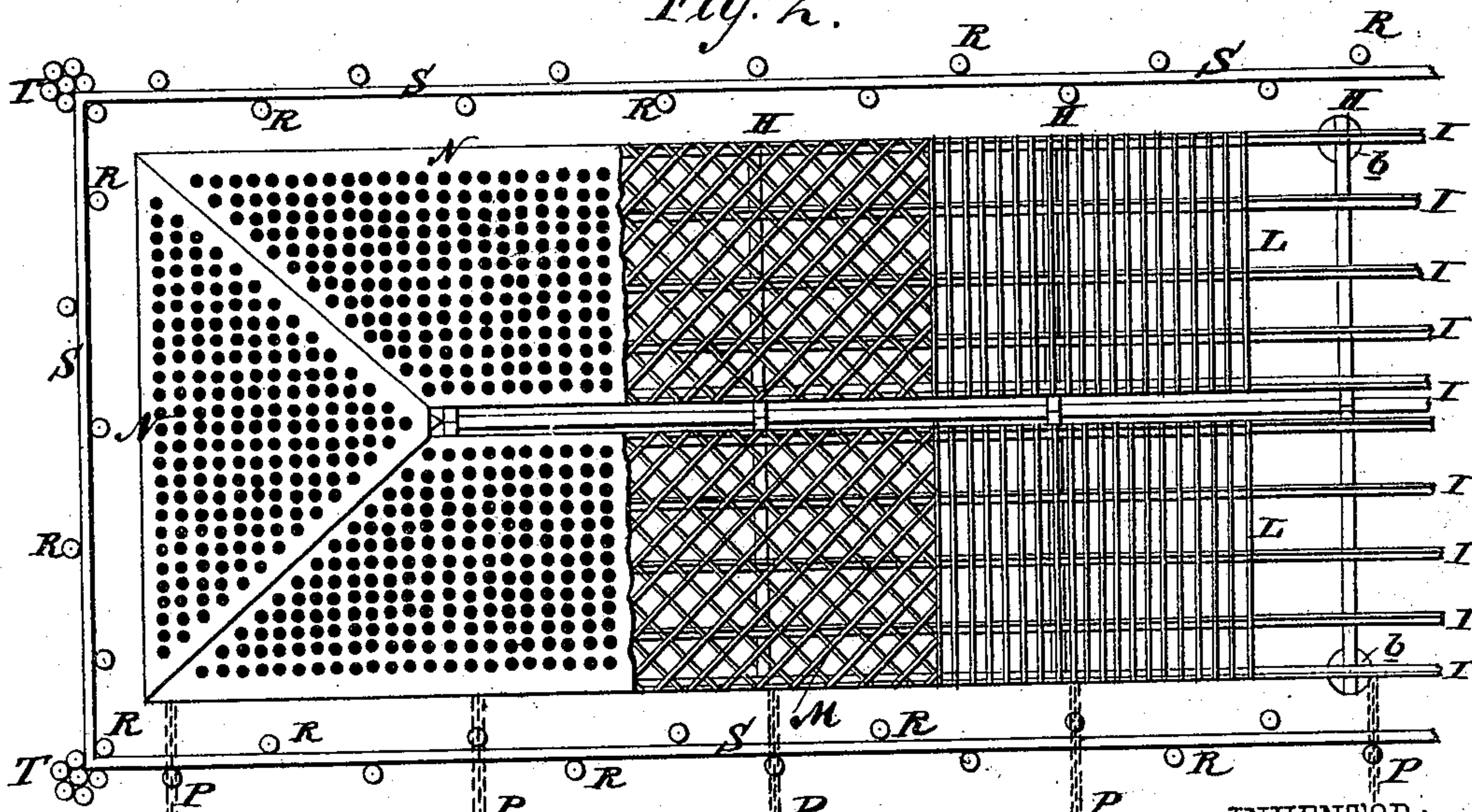


Fig. 2.



WITNESSES:

A. Schuhl.
C. Sedgwick

INVENTOR:

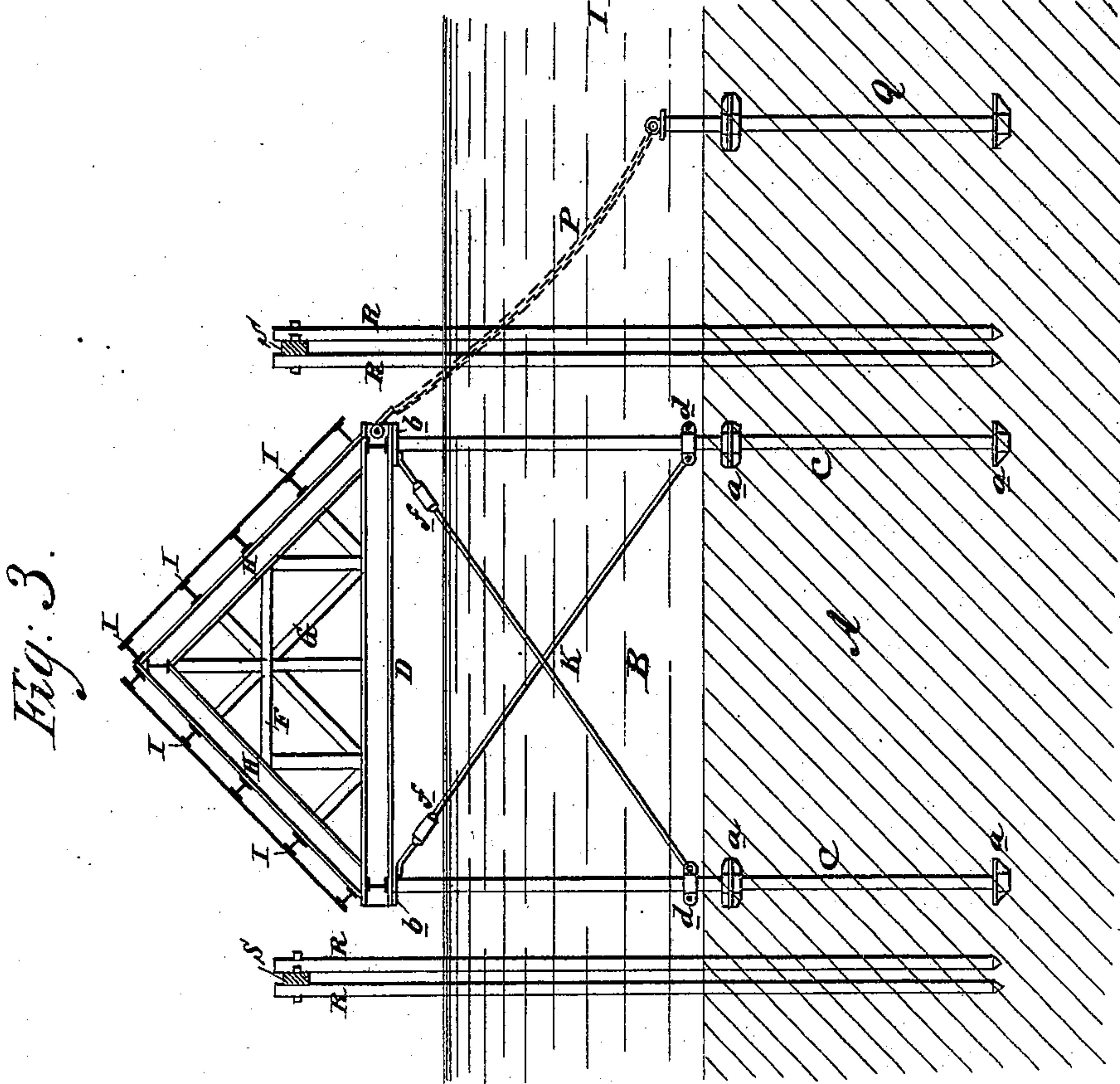
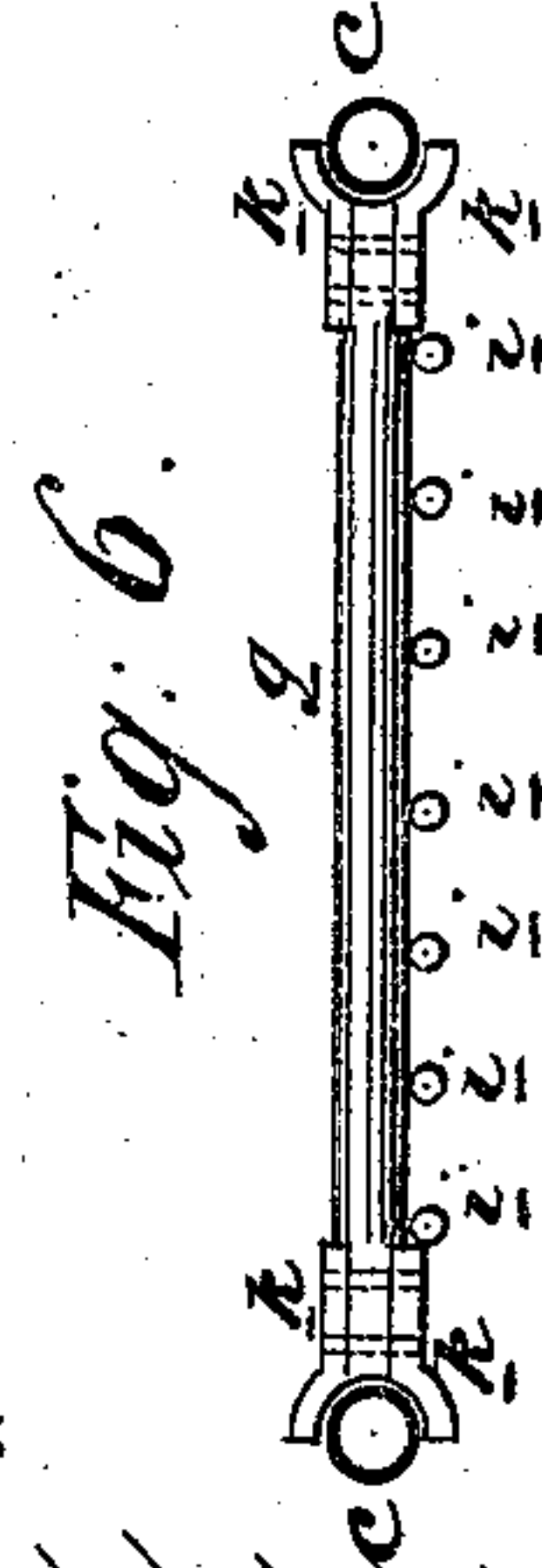
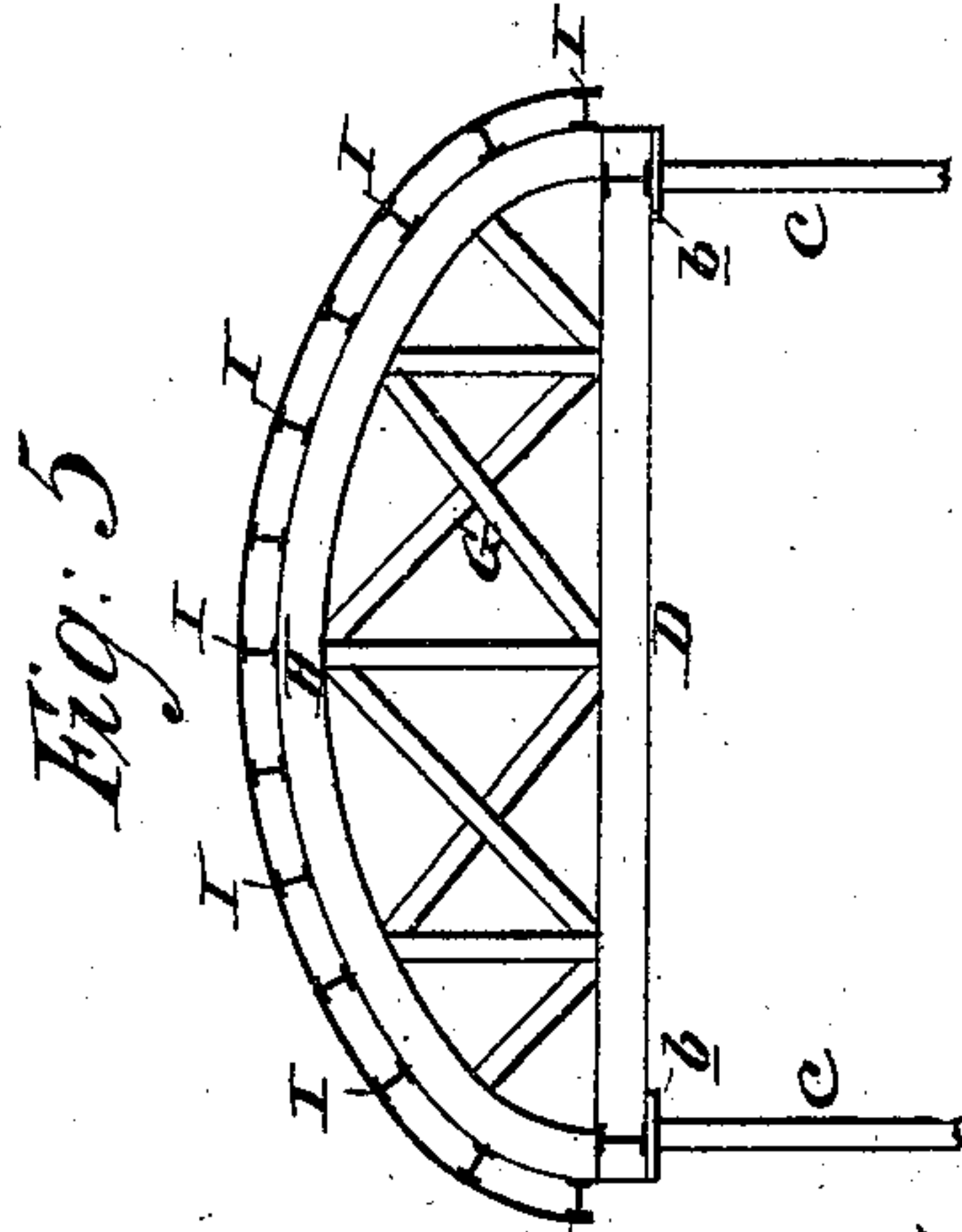
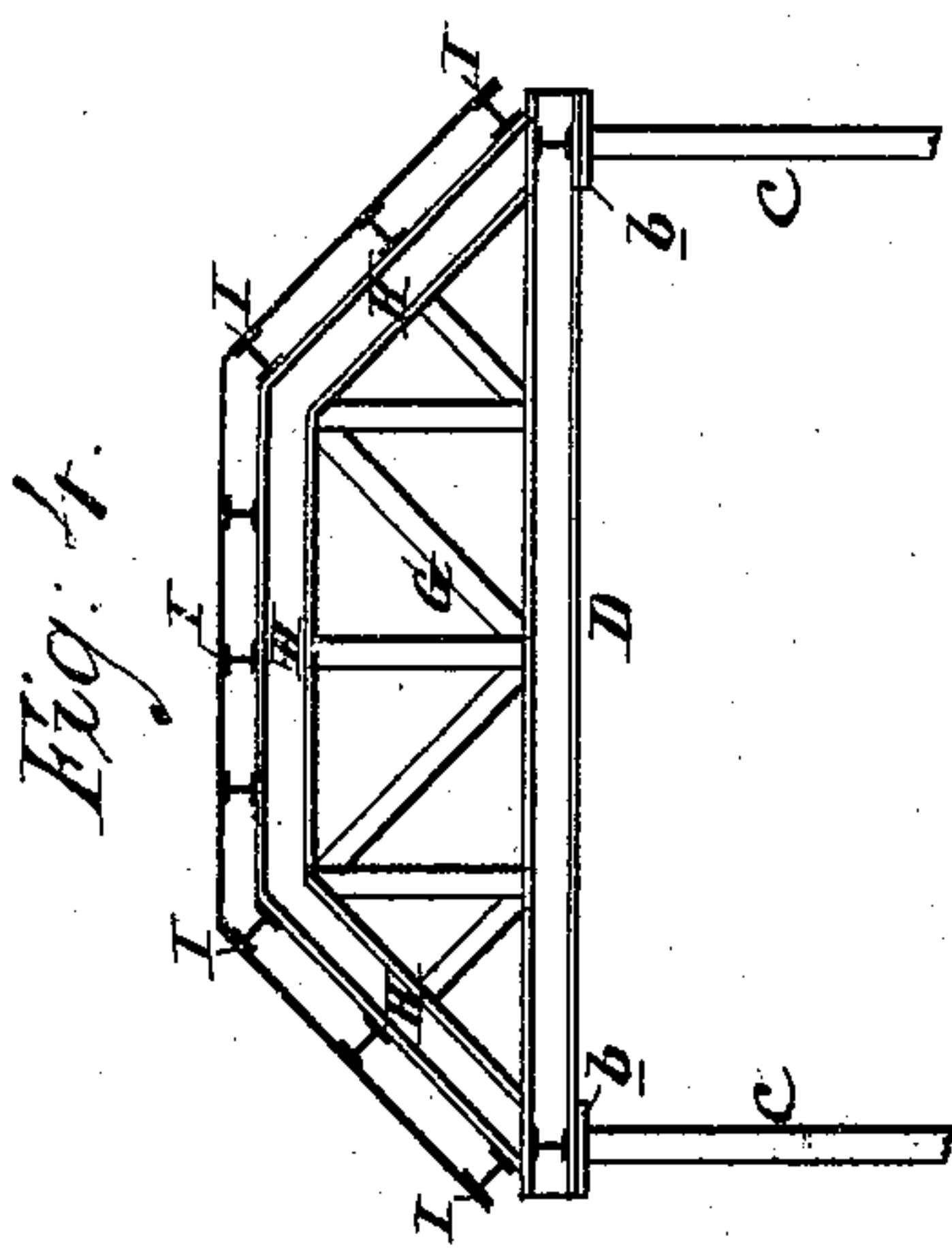
BY

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Mum & Co
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UNITED STATES PATENT OFFICE.

HENRY CASE, OF BROOKLYN, NEW YORK.

BREAKWATER.

SPECIFICATION forming part of Letters Patent No. 227,483, dated May 11, 1880.

Application filed December 1, 1879.

To all whom it may concern:

Be it known that I, HENRY CASE, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Breakwaters, of which the following is a specification.

Figure 1 is a longitudinal elevation of the water-front of a part of my breakwater. Fig. 2 is a plan of the same. Fig. 3 is a transverse sectional elevation of the same. Fig. 4 is a transverse sectional elevation of a modification of the roof of the breakwater. Fig. 5 is a transverse sectional elevation of another modification of the roof of the breakwater. Fig. 6 is a plan of the gratings.

Similar letters of reference indicate corresponding parts.

The object of this invention is to construct a breakwater that shall combine lightness, durability, inexpensiveness, and effectiveness.

The invention consists of a latticed or perforated sloping roof supported on piles that project above the water-line, and of gratings fixed between the piles and extending above and below the water-line on the sea-front of the breakwater, the said structure being protected from injury from floating ice and other objects by spring-piles, and further protected and secured by chains that, on the sea-front, are loosely stretched from the structure itself down to supplementary piles that are sunk entirely below the water-line, the said spring-piles and supplementary piles and chains forming part of the device.

In the drawings, A represents the bed of the sea, and B the water. CC are piles, preferably hollow iron piles, provided with shoes *a a*, that they may offer more resistance to motion. *b b* are the capitals of the piles or columns CC, provided with tenons that project downward six inches, or thereabout, inside of the said columns or piles CC, and are held therein by bolts passing through them.

DD are the tie-beams, and EE are the plates on top of the capitals *b b*. FF are the under trusses that support the roof; GG, the struts; HH, the truss-rafters, and II the purlins.

In Figs. 1, 2, and 3 a roof of triangular shape is shown, in Fig. 4 a trapezoidal roof, and in Fig. 5 an arched roof, either of which

will serve the purpose in view. KK are the diagonal braces, swiveled to the rings or clamps *d d*, so that their ends can enter the water vertically with the pile, for convenience of manipulation. *f f* are swivels on the diagonal braces KK, that serve to set and straighten the structure.

The covering of the roof may consist of straight tubes or bars L, preferably about four inches in diameter and about four inches apart, bolted or otherwise fastened firmly to the purlins II; or the roof may be covered with bars or rods M, set diagonally about six inches apart from each other; or the roof may be covered with perforated plates N, having holes preferably six inches in diameter and six inches apart.

It is a well-settled fact that solid stone or iron walls are less durable and offer less effective resistance against a heavy sea than a cellular mass of wood or iron into which the waves can play and by which their force is divided and broken. In recognition of this fact I construct the breakwater herein shown, that resembles a sieve-like roof. Waves rushing against this roof will partly slide over it, but mostly pass down through the openings in it, thereby losing their momentum and falling down in innumerable streamlets on the water beneath, on which they produce a calming effect.

To render the breakwater more effective in certain positions, to prevent the waves from passing unbroken underneath the roof or covering, a series of gratings, O, are fixed between the piles on the sea-front. These gratings O are composed of the horizontal upper and lower ties, *g h*, respectively, to which are fastened the vertical rods or tubes *i*. On the ends of the ties *g h* the jaws *k* are bolted or clamped. The gratings O are then slipped down between the piles CC until the lower jaws rest upon the collars or rings *l*, that are firmly fixed upon the said piles.

From each truss-rafter HH a heavy chain, P, extends, on the sea-front, to the piles Q, that are sunk below the water-level, and by these means the structure is anchored firmly, while the chains P serve to arrest many floating objects, and prevent their being dashed upon or against the breakwater.

As a further protection of the breakwater from injury, the spring or fender piles R are driven all around the structure, and held together by a strong whaling-piece, S.

5 Clusters T of piles are set at the corners of the structure, and may be distributed along the fronts. This structure, having a roof of triangular, trapezoidal, or arched form, and covered either with perforated plates, lattice-
10 work, or rafters, may be erected either as an independent structure or as a part of a pier, dock, or other marine building.

From their apexes the roofs slope downward alike on both sides, so that waves dashing over
15 the sea-front of the roof and reaching the top shall be broken and their force destroyed by falling on the face of the inner slope. As shown in Figs. 1 and 2, the roofs are provided with ends E, constructed in the same manner
20 as the rest of the roof, and designed to afford like protection against wind and waves and to greatly strengthen the structures.

What I claim as new and of my invention is—

1. A breakwater consisting of a latticed,
25 grated, or perforated roof of trapezoidal, curved,

or peaked form, that presents like slopes or curves seaward and landward, said roof being supported on fixed piles, as set forth.

2. In a breakwater, the gratings O, consisting of ties *g h*, jaws *k*, and vertical tubes or
30 rods *i*, in combination with the piles or columns C C, substantially as and for the purpose described.

3. In combination with a breakwater supported on fixed piles and having a perforated,
35 grated, or latticed trapezoidal, curved, or peaked roof, the chains P and sunken piles Q, as and for the purpose specified.

4. In combination with the breakwater constructed as herein described, and with the
40 chains P and sunken piles Q, the spring or fender piles R, arranged substantially as and for the purpose described, whereby the said breakwater may be protected from injury by floating objects.

HENRY CASE.

Witnesses:

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C. SEDGWICK.