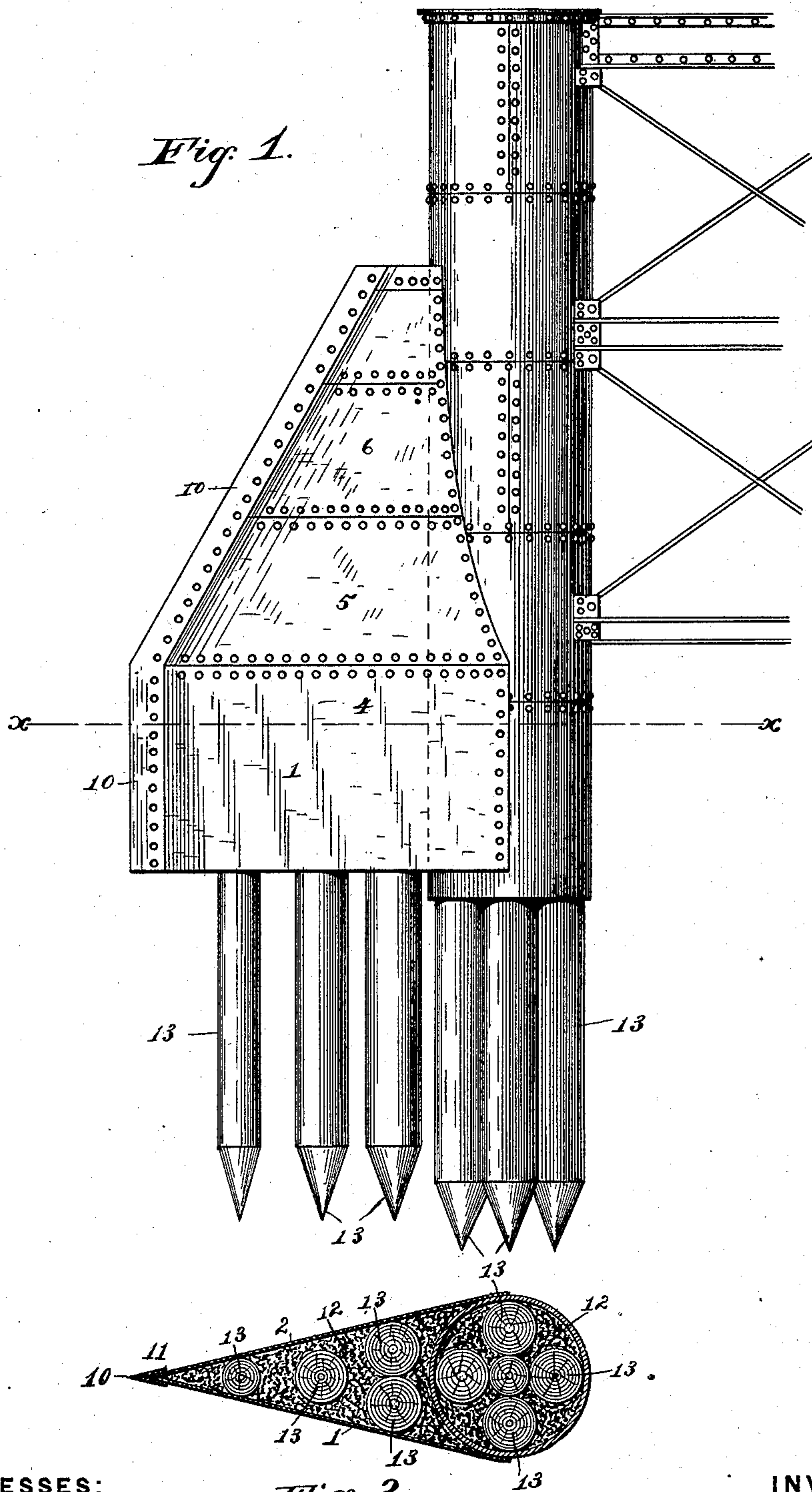


(No Model.)

A. H. AUSTIN.
ICE BREAKER.

No. 406,694.

Patented July 9, 1889.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ALVAH H. AUSTIN, OF WEBSTER CITY, IOWA.

ICE-BREAKER.

SPECIFICATION forming part of Letters Patent No. 406,694, dated July 9, 1889.

Application filed February 28, 1889. Serial No. 301,487. (No model.)

To all whom it may concern:

Be it known that I, ALVAH H. AUSTIN, a citizen of the United States, residing at Webster City, in the county of Hamilton and State of Iowa, have invented certain new and useful Improvements in Ice-Breakers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in ice-breakers; and it has for its object to protect a pier or other exposed part of a bridge or similar structure from injury by ice, and to secure economy, great strength, durability, and simplicity in construction as well as efficiency in service.

With these ends in view my invention contemplates an ice-breaker consisting of two sides, each constructed of sheet metal and placed at an acute angle to each other and arranged in front of a pier, a concrete filling placed in the chamber formed by and between the metallic sides of the structure, and a series of vertical piles which are extended vertically into the space between the inclined sides and embedded in the concrete filling to impart the necessary strength and solidity to the structure to resist the great pressure which may be brought to bear thereon by the ice. The sides of the ice-breaker are made of sheets or plates of metal, either iron or steel, and are suitably joined together, preferably by riveting, and the meeting edges of the sides of the structure are likewise joined or secured by means of a protecting strip or plate, which laps the edges of the two sides and is riveted through the same. In cross-section the structure is wedge-shaped, with its broad base partly surrounding and firmly united to the pier, and the vertical front edge of the breaker, which is most exposed to the ice, is inclined at a suitable angle from a point at or near the lower end to a suitable point near its upper end. By thus constructing the ice-breaker it is best adapted for warding off and deflecting the ice from the pier or other structure to which it is applied, and it is also capable of withstanding a very great pressure without damage.

To enable others to understand my inven-

tion, I will now proceed to describe it in connection with the accompanying drawings, which represent my improved ice-breaker applied to a metallic pier.

Figure 1 is a side elevation, and Fig. 2 is a horizontal sectional view through the pier and the ice-breaker attached thereto on the line *x x* of Fig. 1.

Like numerals of reference denote corresponding parts in both figures of the drawings, referring to which 1 2 designate the inclined sides of my improved ice-breaker, especially adapted for protecting piers and other parts of a bridge or like structure exposed to danger from ice. These two sides 1 2 are each constructed of a series of sheets or plates of sheet metal 4 5 6, which are securely riveted together, and the sides are arranged at an acute angle to each other to give the structure a wedge or tapering shape in cross-section, thus bringing one of the vertical edges of each side into close proximity or actual contact. The meeting edges of the sides, which form the apex of the wedge-shaped ice-breaker, are united together by a strip or angle-plate 10, which laps the meeting edges of said sides and is riveted to the same, as shown at 11 in Fig. 2. This strip or angle-plate extends the entire length of the sides, and it serves to protect the edges thereof from injury and to increase the strength of the sides of the structure at the point where it is most liable to first receive the shock of a passing mass of ice. The inclined metallic sides of the ice-breaker are arranged partly around the pier, and the ice-breaker projects beyond the pier on that side from whence the ice is liable to descend and do injury to the pier.

To impart strength and solidity to the metallic structure, so as to withstand the great strain and pressure which may at times be exerted by the ice on the structure, I completely fill in the space between the inclined metallic sides, the apex thereof, and the pier with a concrete filling 12, which, when it solidifies, makes the structure thoroughly homogeneous and solid.

The vertical front edge of the wedge-shaped ice-breaker is inclined rearwardly, as shown in Fig. 1, and to secure this inclination the plates or sheets of metal of which the sides 1

2 of the structure are composed are shaped and proportioned according to the position they occupy with relation to each other.

5 The number of plates or sheets of metal employed in each side of the structure is immaterial and can be varied at pleasure or according to the size of the structure, and other slight changes in the form and proportion of parts can be made without departing from the
10 principle or sacrificing the advantages of my invention.

I have shown my invention as applied to an iron or composite pier, in which piles 13 are used in constructing the pier and the ice-
15 breaker to impart great strength to the ice-breaker and pier, and these piles are extended up into the space or chamber between the inclined sides of the ice-breaker and the concrete is filled in around the piles.

20 When my improved ice-breaker is applied

to a pier erected on a rocky bottom, the lower part of the breaker may be bolted in any suitable manner to the bottom, as is obvious.

Having thus fully described my invention, what I claim as new, and desire to secure by 25 Letters Patent, is—

A composite ice-breaker for piers and the like, consisting of two metallic sides inclined laterally with respect to each other and partly surrounding the pier, a concrete filling, and 30 piles extended vertically between the sides of the structure and embedded in said filling, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALVAH H. AUSTIN.

Witnesses:

J. V. KEARNS,

J. W. SNEESBY.