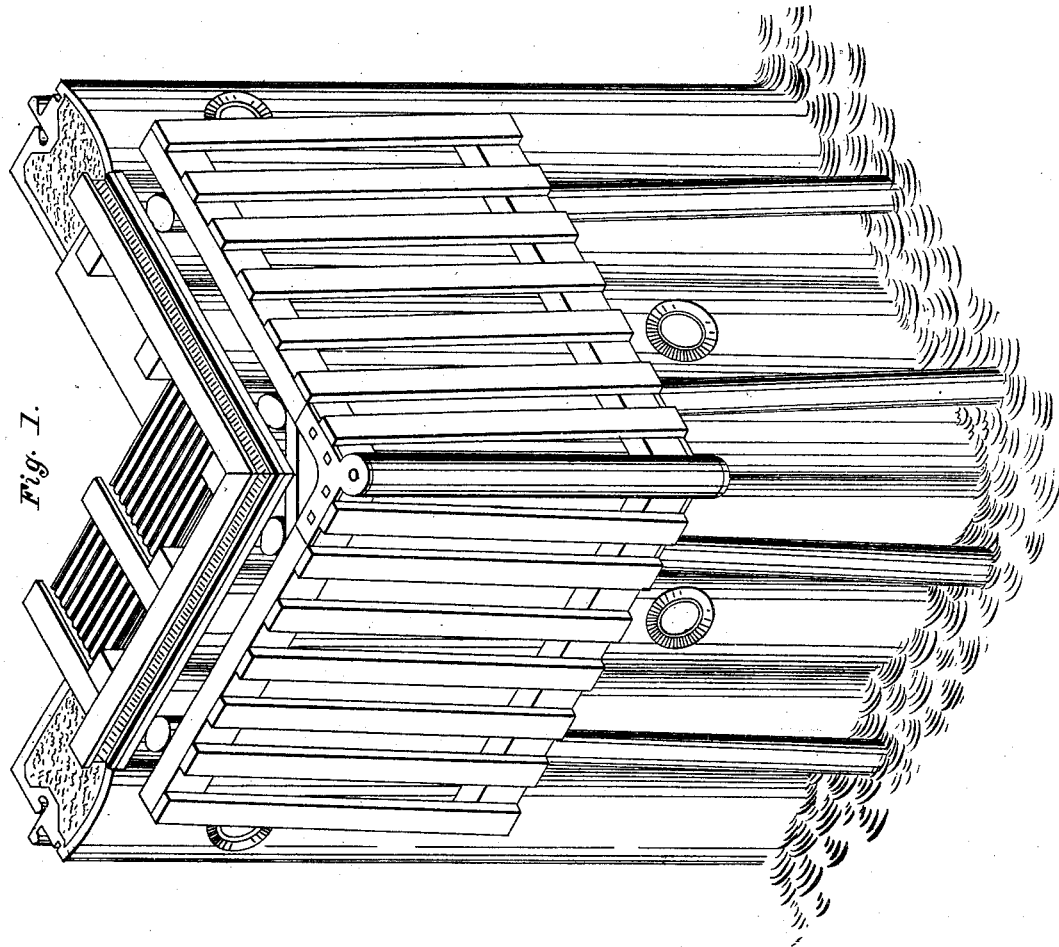


S. J. Seely,
Pier.

No. 46,144.

Patented Jan. 31, 1865.



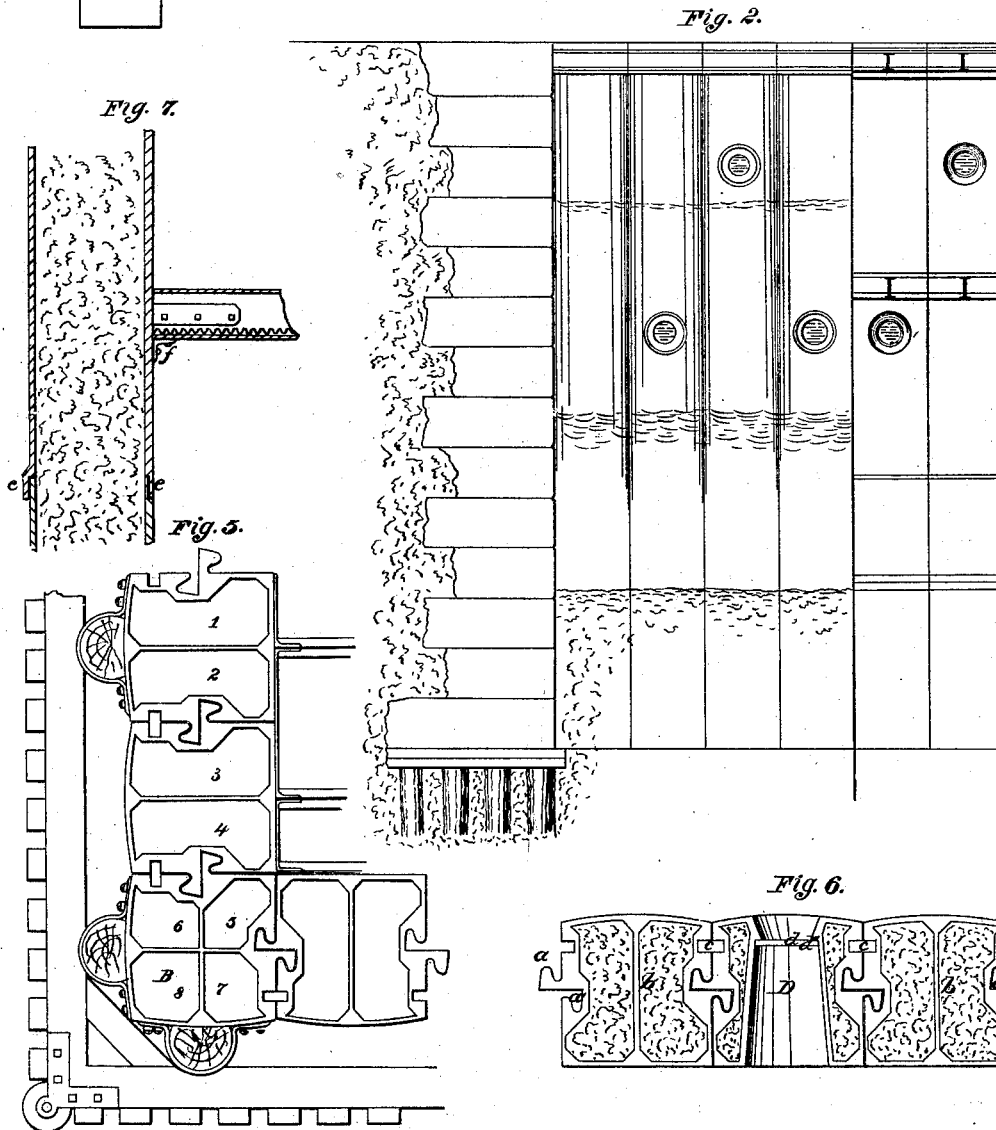
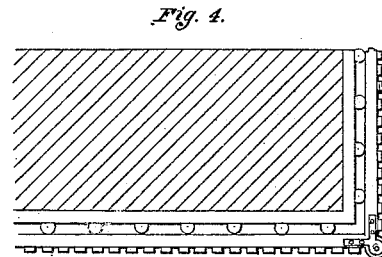
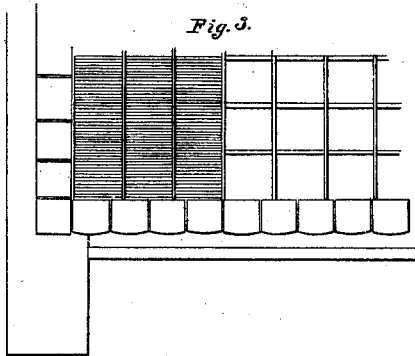
witnesses,
Wm. D. Baldwin
John. Migs

Inventor,
Saml. J. Seely

S. J. Seely,
Pier.

No. 46,144.

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Witnesses,
W. D. Baldwin
John Seely.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

Inventor,
Saml. J. Seely

UNITED STATES PATENT OFFICE.

SAMUEL J. SEELY, OF NEW YORK, N. Y.

IMPROVEMENT IN PIERS AND BULKHEADS.

Specification forming part of Letters Patent No. **46,144**, dated January 31, 1865.

To all whom it may concern :

Be it known that I, SAMUEL J. SEELY, of the city, county, and State of New York, have invented a new and useful Improvement in Hollow Piers and Bulkheads; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making apart of this specification, in which—

Figure 1 is a perspective view of one corner of a pier and fender involving my improvement, with a portion of the floor laid and two of its sections uncovered. Fig. 2 is a side elevation of the same abutted against masonry and supported on piles. Fig. 3 is a section of the frame-work to secure the flooring. Fig. 4 is a section of the floor laid. Fig. 5 is a transverse view of the sections, showing the mode of uniting the same before being permanently filled, with part of a fender attached. Fig. 6 is a top view of these sections in place and fitted permanently, and Fig. 7 is a vertical section showing the angle-irons and joints.

It is the object of my invention to utilize valuable water-fronts where piers and bulkheads are necessary for marine purposes, by so constructing them that while they shall effectually answer those purposes, they shall at the same time secure a large storage accommodation, to which end my invention consists in building hollow piers of metallic tubular sections, so formed that each tube or section shall be firmly locked between two tubes or sections when arranged in lines or angles to form the pier of any desired shape, adapted to its location; and when two or more sections are set in place, my invention further consists in filling the tubes with rubble, grouting, cement, or plaster, to wholly exclude water therefrom, and in forming a chamber partly in each tube, which, when two tubes are united together, shall truly register throughout the entire length of the tubes, and be filled with wood, plaster, or cement to wholly prevent the passage of water between them when in position; and my invention further consists in introducing into the separate sections or tubes, whether above or below the water-line, lateral openings in which to place some transparent medium, that light may be admitted to the interior of the pier,

or to any room, chamber, or division, into which the whole structure may be divided, when these openings are protected by suitable fenders, in order to utilize the interior space within the walls of the pier for the purpose in part hereinafter specified.

Like letters refer to like parts in the several figures of the drawings.

In placing my pier, I ascertain with proper care the character of the foundation, which must be rendered secure by the best known modes. If necessary, excavations, fillings, or pilings may be resorted to, and when it is to jut against the shore it may be connected to masonry or wood-work. Each metallic tubular section is made in a plane on the inside and convex on the outside, having a key, *a*, secured to each edge, with a corresponding groove, *a'*, or rabbet, as seen at *a a* in Fig. 6, or a wrought-iron key may be inserted in the grooves, and the section may be divided by a cross-brace, *b*, from front to rear, and carry square slots or rabbets near the front of each side, so placed as to register truly with each other, as at *c c*, in the same figure. At proper intervals a transverse opening, *D*, is introduced into the section to receive a dead-light, *d*, to admit light. These openings may taper so as to be larger on the inside of the section than at the point where the dead-light is located, and should taper rapidly outwardly from the dead-light to prevent the accumulation of sediment when the opening may be placed under water. The dead-light may be inserted from the inside of the opening and rest against a flange or shoulder, *d''*, therein, to which it can be secured properly by any preferred mode of fastening. The sections, whether cast or formed in any other way, it is obvious, may be joined one to another longitudinally until the length required is attained for any situation, as at *e*, Fig. 7. At proper intervals in the length of each tube, suitable angle-irons, brackets, or knees, *f*, Fig. 7, are attached to secure and sustain the flooring-beams for the separate compartments into which the interior of the pier may be divided.

A different form will be required for corner sections, as *B* in Fig. 5, with the key *a* and grooves *a'* and *c c* differently placed, so that walls of sections may project at right angles from two sides of those corner sections,

and where middle walls are required, it is obvious that the abutting section must have its grooves and keys on three sides, or ordinary iron bulkheads may be used for divisions. These sections I prefer to make of cast-iron in lengths to match the height of stories required within the pier, but wrought-iron tubes and fastenings may be used, when desired, or even a cheaper mode of construction might be adopted by making the section of solid timber and facing its connecting sides with iron plates having keys and grooves to secure them together in line, and the outside of the timber portion can be sheathed with some non-corrosive metal to protect it from decay. These two latter modes of construction, however, would be but modifications of my invention.

Having provided in sufficient number sections substantially so constructed, the constructing of the pier may progress with ease and rapidity, and without the use of expensive coffer-dams. Starting at the shore-wall A, for example, the inner end of the pier will be formed by inserting a single section at its center and adding section to section by inserting the key of one section into the corresponding groove of its adjoining section until the desired width of the pier is attained, when the corner sections are placed in position and the line of sections is securely anchored to the shore, care only being required to keep the angle-irons of the sections in a truly horizontal plane, for it is manifest that as the key of one section is secured in its corresponding groove of the next section that the grooves *cc* will truly register. The pier now progresses to the length desired by extending the sections longitudinally from the corner section, as at B in Fig. 5, and the side walls may project together by setting section for section from each corner section, and when one or more of the opposite sections in the side walls are placed, the cross-beams for the support of the flooring may be placed on their respective angle-irons or brackets, as at *f*, Fig. 7, and be secured by bolts permanently in place, and thus hold securely the sides of the unfinished walls. When the length of the pier is determined, corner sections are again placed in position, and these are connected by the required number of intermediate sections, as in the front wall of the pier, which will then have its line-walls determined, care having been taken to introduce those sections carrying dead-lights in the proper number and position required that the compartments into which the space within the walls of the pier is to be divided may each receive the quantity of light required.

The walls thus formed are now to be rendered water-tight as well as the bottom of the space they inclose, to do which I fill the open spaces in the sections 1 2 3 4 5 6 7 8 of Fig. 6, with grouting, plaster, or cement, from bottom to top, when they will present in cross-section the appearance of Fig. 6, and the grooves *cc* may be filled with either of these composi-

tions, or suitably-shaped slips of wood to fit them so tight as to exclude water. I now insert the dead-lights in the sections prepared for them, if not previously inserted, and secure them perfectly against the passage of any water between them and the flange by which they are supported. In filling the spaces in the body of the sections, I employ a small tapering plug, which is withdrawn as the filling sets, and thus leave an opening to receive any water of condensation within the filling, which may be pumped out and thus avoid all danger of fracturing the sections from freezing.

The walls of the pier being in place and rendered water-tight, the water in the inclosed area is pumped out and the bottom leveled and covered with two or more thicknesses of cross-planking to give a secure foundation for a sufficient thickness of grouting or cement to make a solid dry floor. The space between the floor and first tier of beams can then be finished in any manner desired, and may, like any other wareroom, be supplied with gas, water, and heating-pipes or ventilating-flues. Though this room may be ten feet or more under water, the light admitted in the daytime through the dead-lights will be found sufficient for all business purposes.

The first tier of beams now receive upon their flanges a course of corrugated iron plates, which may be fastened by bolts and covered with cement to a depth necessary to form a fire-proof ceiling. Thus the subaqueous chamber is completed, and may be used for any of the purposes hereinafter enumerated.

The floor on the first line of beams may be laid of wood or any material desired, and a second story finished in the same manner as the first between it and the second tier of beams, and in the portion above high-water mark suitable side openings may be introduced to receive and pass freight from and to vessels alongside of the pier.

The top floor of the pier may be paved or covered with any suitable flooring for the support of wheeled vehicles, cranes, or other engines used in transporting or moving freight, and the several stories can be rendered accessible from above for all purposes by suitably placed and properly-guarded hatches or stairways.

The exposed portions of the pier, and particularly those sections containing dead-lights, may be protected from injury from floating ice or the collision of vessels by suitable fenders, of which one example is shown in Fig. 1.

It is manifest that piers thus constructed will be as strong as required for roadways or freight, and that the space inclosed with their walls will utilize valuable areas on water-fronts of cities that now are useless from being made solid. Among the uses to which the chambers secured by my pier may be appropriated, it is obvious that they will be peculiarly valuable as magazines for explosive compounds, store-rooms for merchan-

dise that give off offensive or noxious vapors, government store-rooms or work-shops, being as store-rooms for heavy freight or explosive or noxious materials preferable to those situated more inland from the saving of freight, ease of transshipment, and from being fire and water proof, and the pier is constructed, moreover, at no expense for coffer-dam, and what, in a state of war, may be of even greater importance, my pier can be easily rendered shot-proof, and may readily be converted into a casemated battery sufficient to keep the enemy's ships from approaching the city shore, while the gunners will have perfect protection.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. Forming water-tight walls, partly sub-aqueous, for piers or similar structures, of in-

terlocked sections to utilize the area they inclose, substantially in the manner described.

2. Forming sections for the construction of piers, substantially in the manner described, so that one will firmly interlock with another and exclude the passage of water between them, as set forth.

3. The combination, in piers or similar structures, of sections that will permit the entrance of light to the area they inclose, with suitable fenders to protect them, arranged substantially in the manner and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

SAML. J. SEELY.

Witnesses:

EDM. F. BROWN,
WM. D. BALDWIN.