No. 707,837. Patented Aug. 26, 1902.

L. P. FRIESTEDT.

SHEET PILING.

(Application filed Dec. 2, 1901.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.

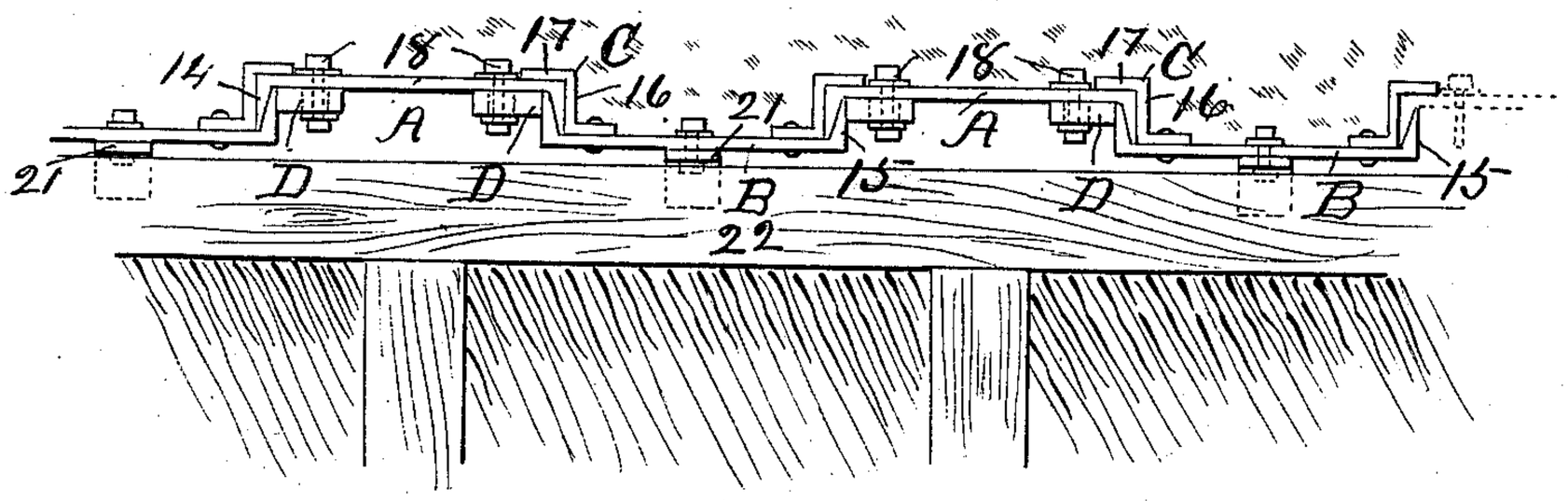


FIG. 2.

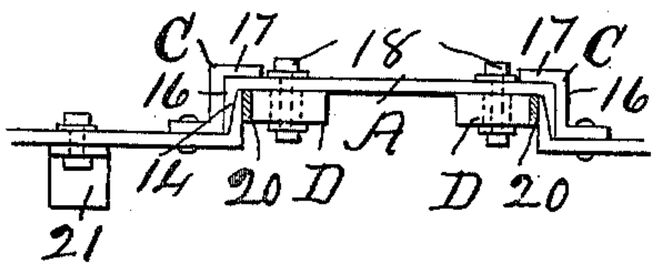


FIG. 3.

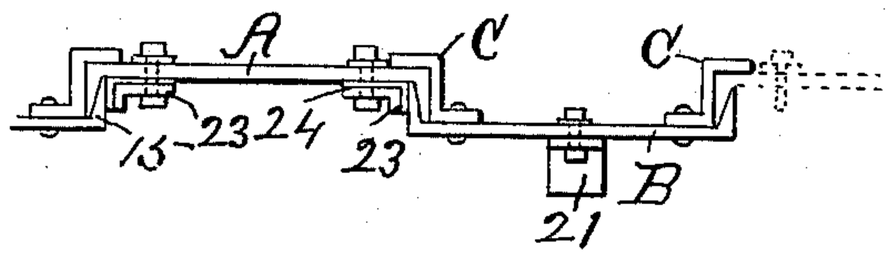


FIG. 4.

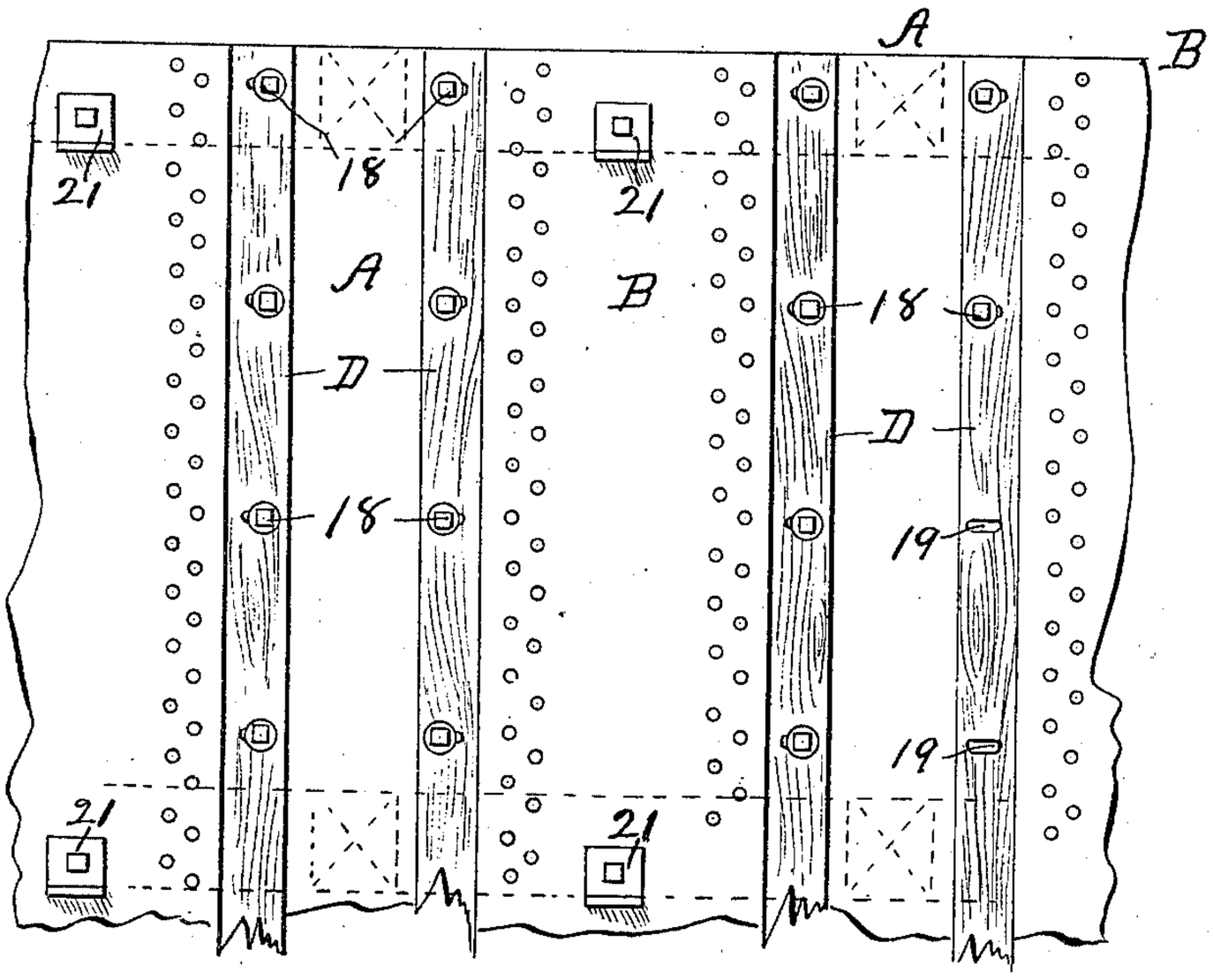
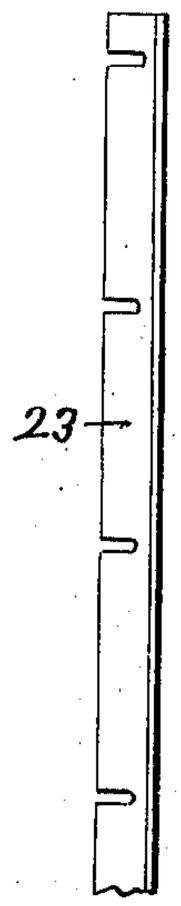


FIG. 5.



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No. 707,837. Patented Aug. 26, 1902.

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(Application filed Dec. 2, 1901.)

(No Model.) 3 Sheets—Sheet 2.

FIG. 6.

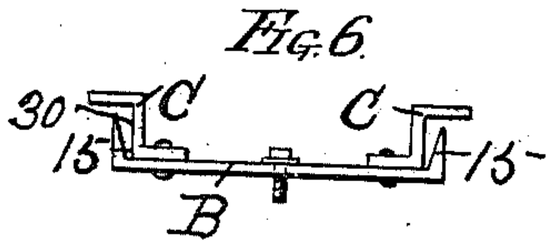


FIG. 7.

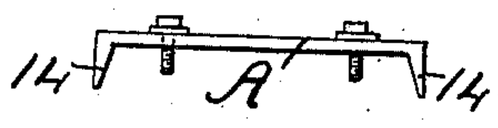


FIG. 8.

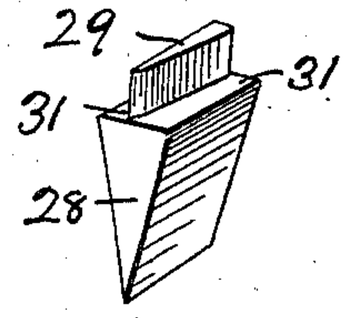
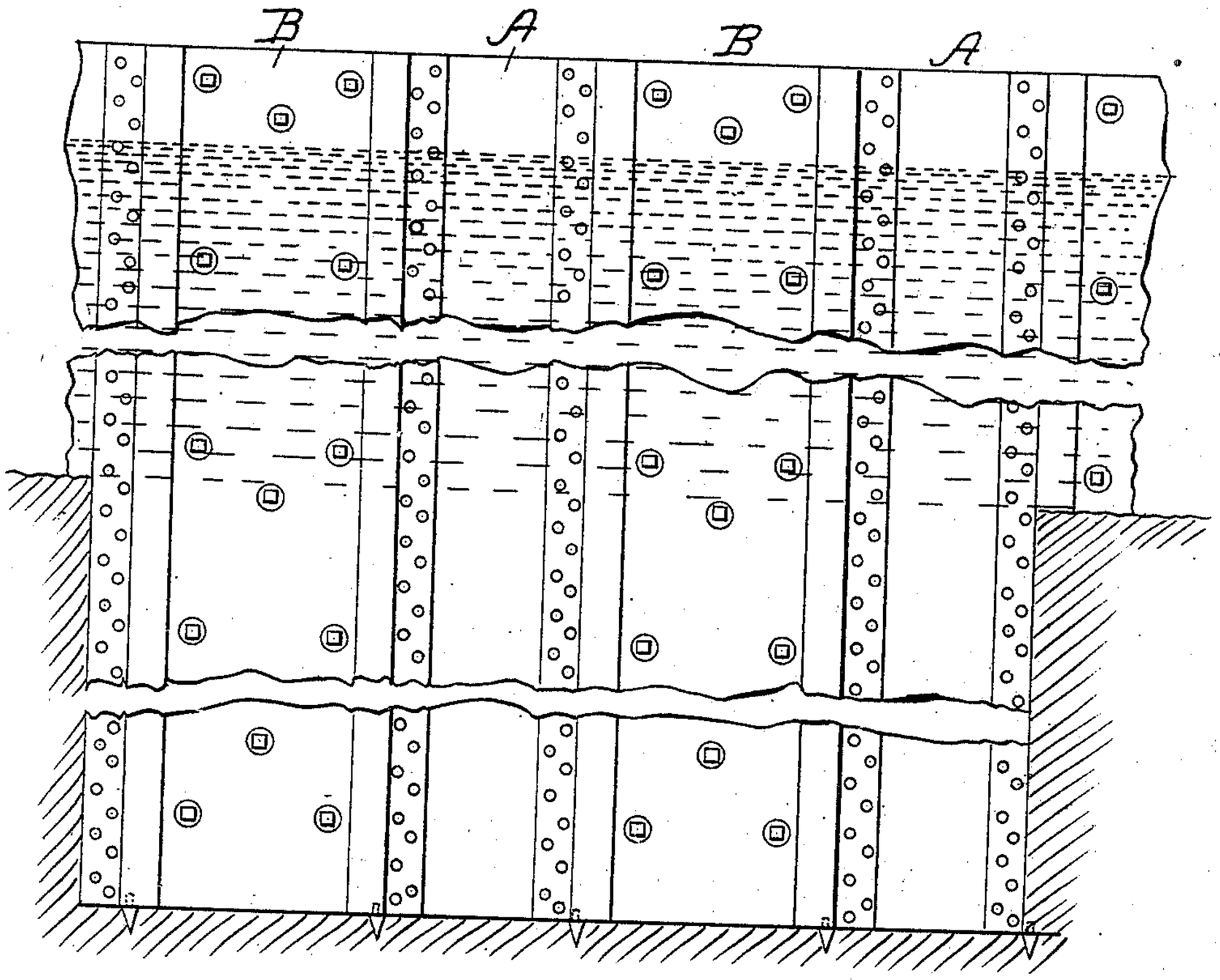


FIG. 9.



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SHEET PILING.

(Application filed Dec. 2, 1901.)

(No Model.) 3 Sheets—Sheet 3.

FIG. 10.

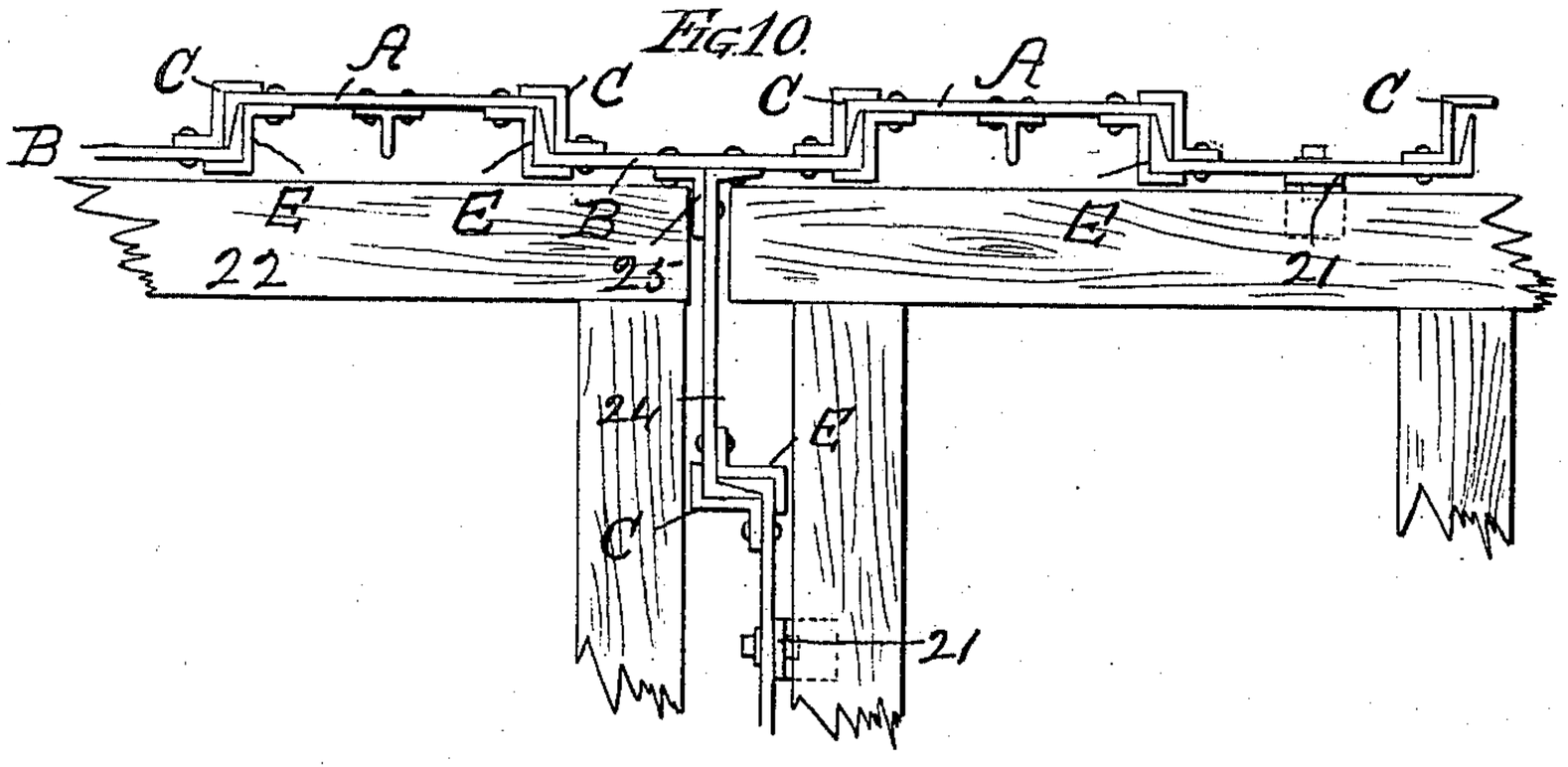


FIG. 11.

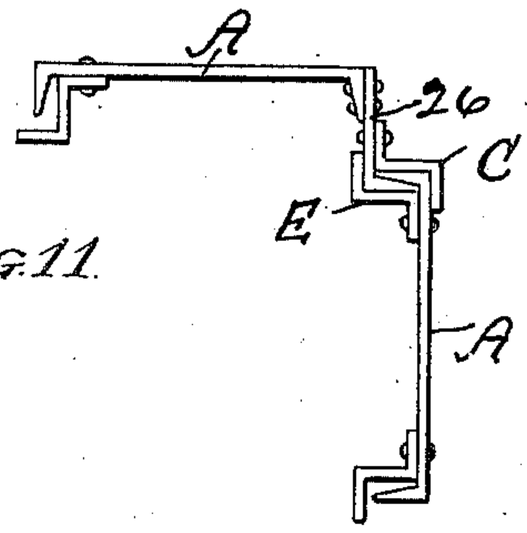


FIG. 12.

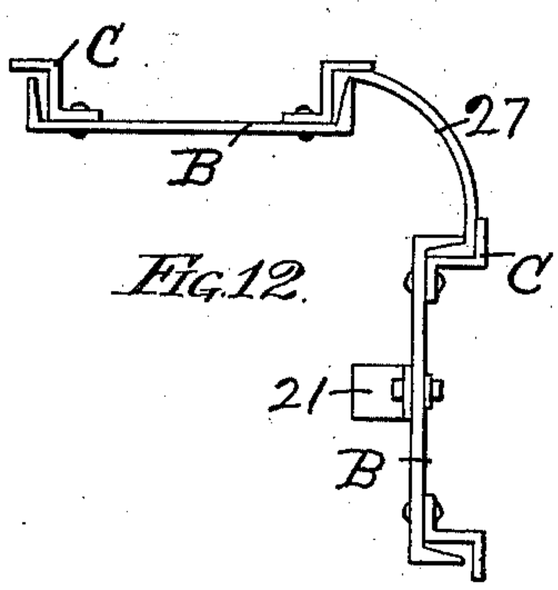
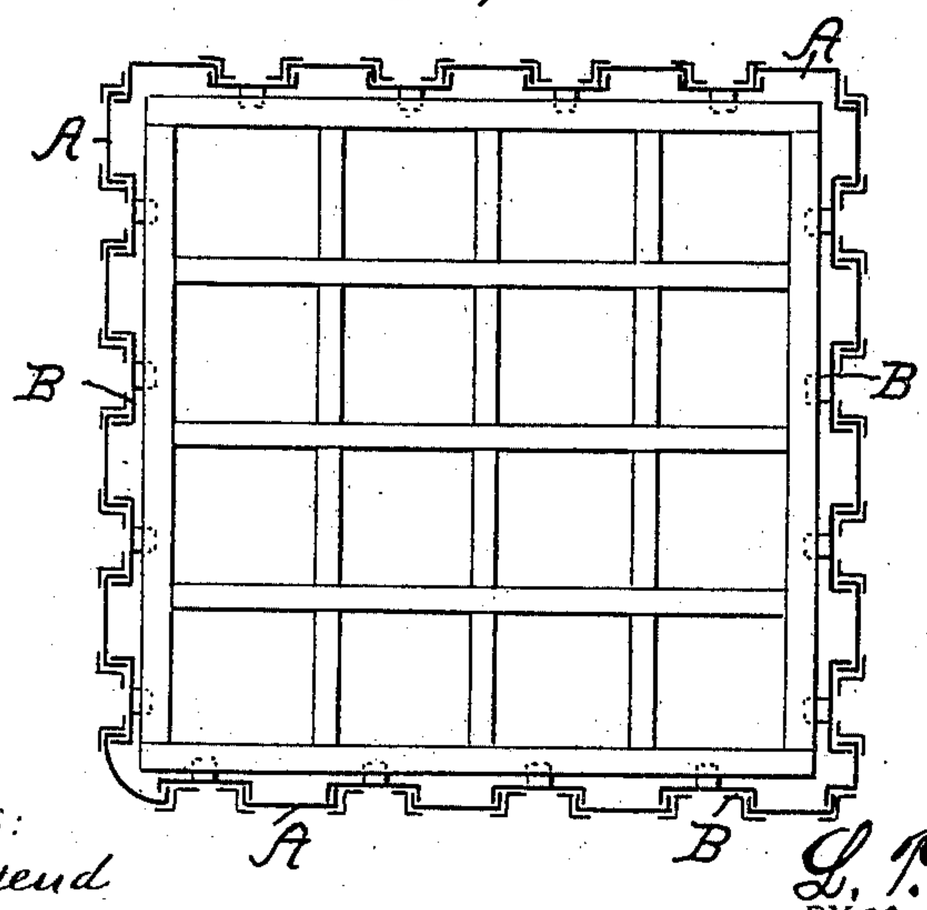


FIG. 13.



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UNITED STATES PATENT OFFICE.

LUTHER P. FRIESTEDT, OF CHICAGO, ILLINOIS.

SHEET-PILING.

SPECIFICATION forming part of Letters Patent No. 707,837, dated August 26, 1902.

Application filed December 2, 1901. Serial No. 84,400. (No model.)

To all whom it may concern:

Be it known that I, LUTHER P. FRIESTEDT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sheet-Piling; 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.

This invention relates to improvements in the construction of docks, wharves, sea-walls, the facing of sea-walls, caissons, coffer-dams, bulkheads, and other submarine work of the same general character, and has for its object to provide an improved system and arrangement whereby such structures may be conveniently, rapidly, and durably placed in position.

The improvement comprises a metal sheet-piling built up in sections and composed of channel-beams interlocking and joined together by means of angle plates or bars in forming a continuous structure.

In the drawings, Figure 1 is a broken-away plan of the sheet-piling, showing the relative position of the timber backing. Fig. 2 is a similar view, the backing being omitted. Fig. 3 is a like view showing minor modifications as to details. Fig. 4 is a broken-away elevation looking at the inner side of the sheeting structure, the relative position of the timbers forming the wood backing-frame shown in Fig. 1 being indicated in dotted lines. Fig. 5 is a detached detail of angle-binding plate. Figs. 6 and 7 are details of construction. Fig. 8 is a detached detail of a driving point or wedge. Fig. 9 is a broken-away elevation looking from the outer or water side. Fig. 10 is a plan showing modifications of construction. Figs. 11 and 12 are details of construction in conforming to square or rounding corners; and Fig. 13 is a plan of a caisson structure, showing the sheet-piling and its continuous inclosing position.

The driving channel-beams may be of any desired dimensions, in accordance with the particular form of the structure or application and the facility with which the parts or sections may be assembled. The beams will be arranged in the alternate position shown—that is, the beam A is set with its flanges 14 extending inwardly and the companion joining-beam B with its flanges 15 extending outwardly. The inner meeting faces of these flanges are beveled, and when the sections are assembled the beveled surfaces draw together with a wedging action and form a close solid joint or bond. The outer corner of the joint is further strengthened and firmly bound together by an angle Z-bar C, one flange 16 of which is rigidly secured to the bottom side of the channel-beam B and the other flange 17 overlaps and has a close bearing on the back of the beam-sections, as more particularly shown in Figs. 1, 2, and 3. It will be noted that this arrangement brings the concave and convex sides of the beams into the relative alternate position shown and forms a continuous unbroken lineal sheeting, and thereby gives the additional advantage and strength of a corrugated structure.

A number of plates D, Figs. 1, 2, and 4, are placed on the inner side of the sheeting, two being secured to the inner side of the beam A by bolts 18. The outer edges of the plates D bear against the straight outer sides of flanges 15 on the channel-beam B. The plates D will usually be of wood and the bolt-holes 19, Fig. 4, therethrough are elongated to allow for a lateral expansion when wet and guard against warping the sheeting structure in swelling. These plates may be set to a close bearing against the flanges of the beams B, or a packing or corking 20 may be interposed, as shown in Fig. 2, in forming a water-tight joint, which is one of the objects of this improvement. The beams B will be provided at required intervals with angle-brackets 21, which provide a step-rest for the longitudinal frame-backing timbers 22.

In some structures to which this sheet-piling may be applied, such as caissons and coffer-dams, it is desirable to have substantially a water-tight joint in the meeting corners of the sections. This feature is provided for in the modification shown in Fig. 3. In this figure a metal angle-plate 23, Fig. 5, is substituted for the wood plates D. An angle packing-strip 24 is inserted between the plate 23 and the adjacent surfaces of the channel-beams, and when these parts are drawn tightly it is not possible for any interfering volume of water to leak through.

In Fig. 10 the inside corners of the joining sections are strengthened by a companion angle Z-bar E, corresponding to the bar C. This double Z-bracing is only necessary in the heavier structures where great strength and greater resistance are required. A driven sheet-backing or partition is shown in Fig. 10. In forming this backing one edge of the channel-beam 24 is secured to the adjacent beam of the facing front and is in turn strengthened by an angle-plate 25. The continuation of this form of backing is the same order of construction as that followed in the sheet-piling front. This feature is especially advantageous for backing and partitions in bulkheads and coffer-dam structures in dividing a large space into lesser compartments.

Fig. 11 shows the form of a square structure, a half channel-beam 26 being used on the corners. The other parts are the same as that of the lineal sheet-piling. The square form is more especially intended in sinking the foundations for buildings, as it may be driven into the earth to any desired depth in the construction of pier-work.

Fig. 12 shows a rounded corner construction, the corners being formed of a curved channel-beam 27. It is also possible to use this sheet-piling in circular work, such as cylindrical piers or excavations for foundations and tunnels. It is obvious that this form of sheeting may be used in many different kinds of work, either submarine or subterranean, as the channel-beams, braces, and tie-plates can be produced in any desired shape required. The interlocking flanges of the channel-beams also form guides for the different joining-sections in the operation of driving and present a completed structure having a single wall at all points. In using this sheeting for the facing front of a sea-wall any form of framing-timbers may be used, together with a filling of earth, stones, concrete, or other suitable material, in providing the usual backing.

Fig. 13 illustrates one form of a caisson structure, showing the sheet-piling in a solid unbroken exterior wall and one form of bracing-timbers in position. This sheet-piling is driven into place by means of the ordinary pile-driver, a "swage-block" fitting on top of the structure and having a head to receive the impact of the driver.

The wedge-point 28, Figs. 8 and 9, is provided with a triangular-shaped neck 29, which is adapted to fit into and temporarily fill the space 30, Fig. 6, and prevent the earth from being forced up through in the operation of driving and interfering with the next succeeding section in making a tight-joint. When the succeeding section is drawn into place, the flange on the channel-beam contacts the neck 29 and forces the wedge-point out of its temporary position into the earth. The shoulders 31 prevent the wedge from being forced upwardly and at the same time provide a bearing for the contacting channel-beams in pushing the same out of the way. The channel-beams may be provided with any shaped flange edges from those shown, in accordance with the kind of work. The ordinary beam with straight right-angled edges may be used for certain kinds of work, as the interlocking feature will be present, but not the water-tight feature necessary in submarine work.

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

1. A metal sheet-piling, comprising a series of beams having interlocking flanged edges and joined together in the relative alternating position shown, and presenting a single wall at all points, substantially as set forth.

2. A metal sheet-piling, comprising a series of channel-beams having engaging interlocking flanged edges, the joining faces of said flanges being beveled and which draw together with a wedging action as the beams are assembled in their alternating position in forming a structure presenting a single wall at all points, substantially as set forth.

3. A metal sheet-piling, composed of channel-beams joined edgewise and having the back and face sides thereof positioned alternately with reference to each other, and presenting a wall structure of a single thickness at all points, substantially as set forth.

4. A metal sheet-piling, composed of beam-sections assembled edgewise and presenting a single wall at all points, and means for locking said beams together, substantially as set forth.

5. In metal sheet-piling, the combination with a series of channel-beams positioned alternately and interlocked along their flanged edges in continuous order of succession, of an angle Z-bar joining and bracing the beam-sections, substantially as set forth.

6. In metal sheet-piling, the combination with a series of channel-beams joined together in a continuous unbroken sheet, by having the respective flanged edges interlock, of the double angle-bars, and the angle-plates positioned opposite to said bars and providing a space for the insertion of a packing substance, substantially as set forth.

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

LUTHER P. FRIESTEDT.

Witnesses:
L. M. FREEMAN,
L. B. COUPLAND.