J. R. WEMLINGER.

METALLIC SHEET PILING.

APPLICATION FILED OCT. 1, 1912.

1,166,563.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

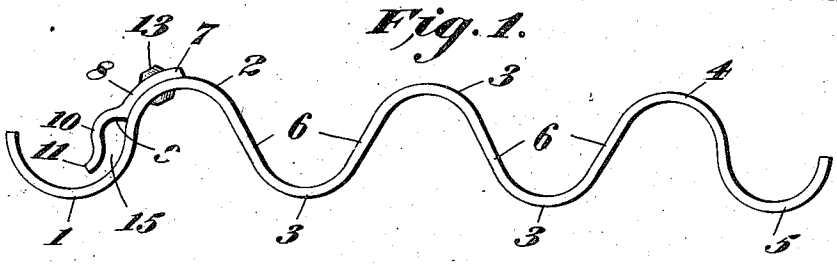


Fig. 2.

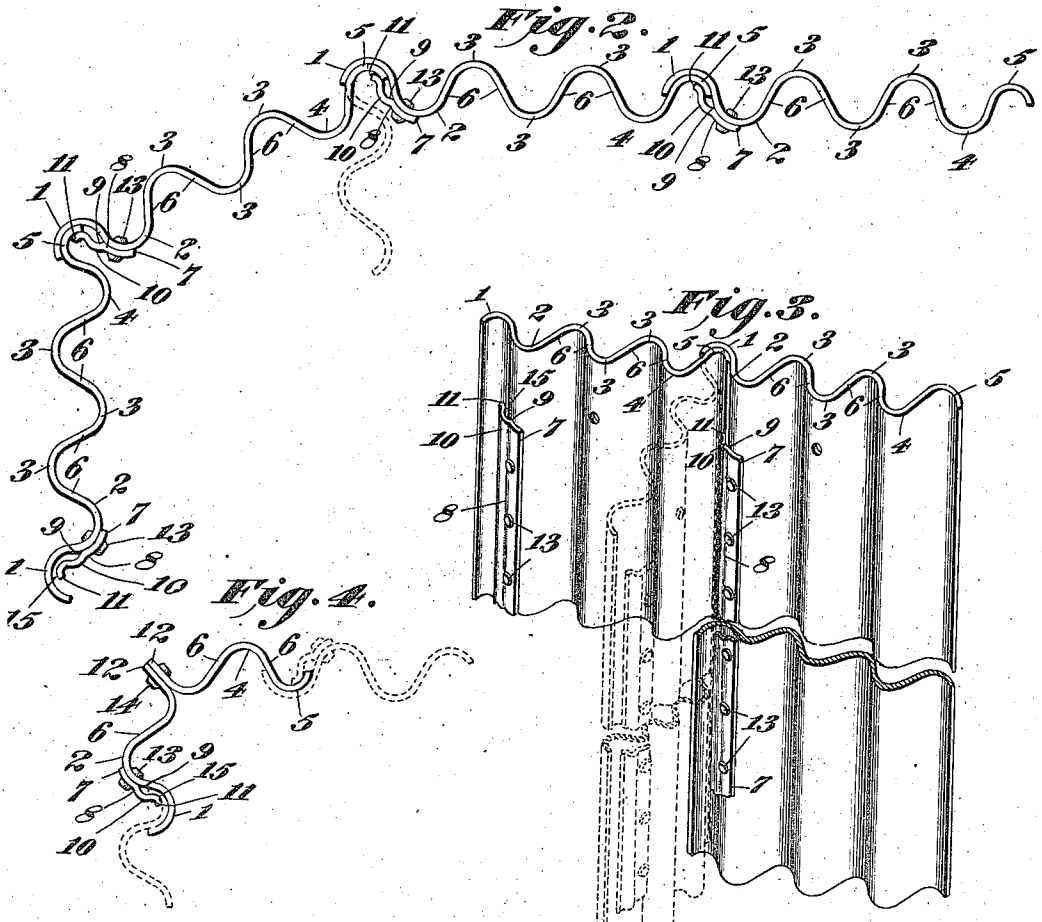
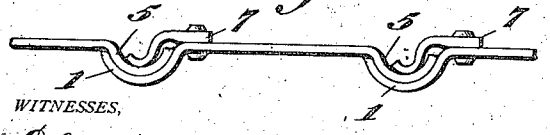


Fig. 3.

Fig. 4.

Fig. 5.



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Robert A. Beers

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2 SHEETS—SHEET 2.

Fig. 6.

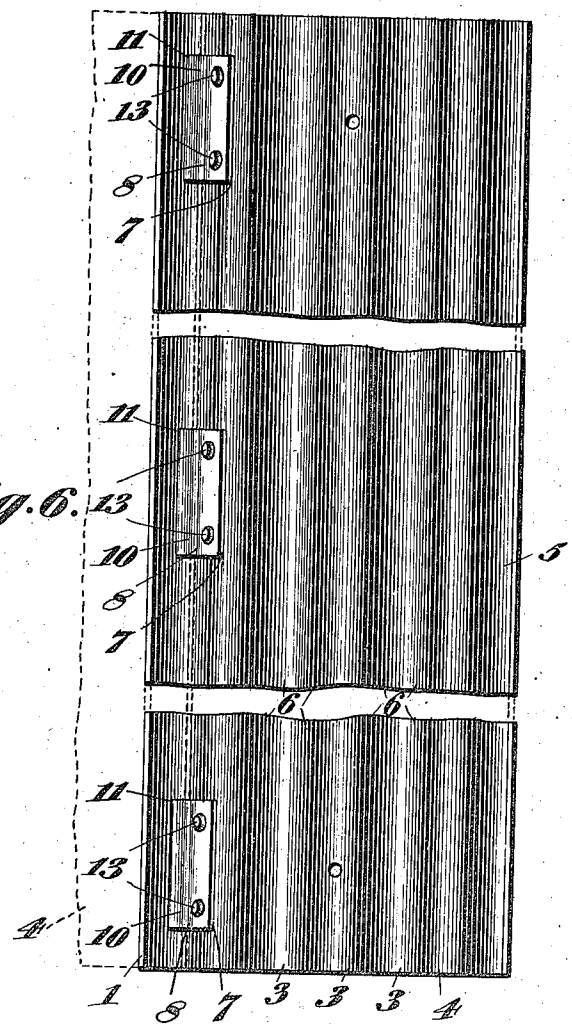

Fig. 7.

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UNITED STATES PATENT OFFICE.

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METALLIC SHEET-PILING.

1,166,563. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed October 1, 1912. Serial No. 723,306.

To all whom it may concern:

Be it known that I, JULIUS R. WEMLINGER, a citizen of the United States, residing in the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful improvements in Metallic 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.

My invention relates to certain improvements in metallic sheet piling with particular reference to the arrangement and construction of interlocking at the adjoining edges thereof.

One of the objects of my invention is to provide a metal sheet piling, the respective pieces or sections of which may be locked together by lateral movement; instead of entering the end of the edge of one piece into the end of the edge of the other piece and then moving or driving the entering piece longitudinally as customary with other forms of interlocking sheet piling.

My invention also resides in certain and various details of construction to accomplish the purposes desired, as will hereinafter appear.

Referring now to the accompanying sheet of drawings which forms a part of this specification:—Figure 1 is a plan view of one piece or section of my improved metal sheet piling; Fig. 2 is a plan view of a number of my improved sheet piles locked together, the two upper sections being in straight alinement, and those at the left-hand side of the view being assembled at different angles of alinement, showing the adaptability of my construction to various forms or outlines, as may be desired to inclose any given space. Fig. 3 is a perspective view showing, in full lines, two of the sections of my improved sheet piling in place in a vertical position and in this view the dotted lines indicate the preliminary position of the left-hand section prior to swinging it into space laterally into its final position as shown by full lines. Fig. 4 is a plan view of a corner section of my improved piling which is adapted to make a right angle connection. Fig. 5 is a plan view of another form of my piling, the edges of which are corrugated or curved, as shown, to form joints in the same manner as those of the fully corrugated sections. This style embodies my lateral joint construction, but without the intermediate corrugations. Fig. 6 is a front elevation of my metallic sheet piling, the clip members of which are made in separate pieces secured at intervals to the main body of the piling section and alined longitudinally thereon, as shown, this construction being especially well adapted for lateral joining as described herein. Fig. 7 is a plan view of the construction shown in Fig. 6.

Referring now to the single piece of sheet piling illustrated in plan in Fig. 1:—this is composed of a corrugated metal plate which, in cross section or plan as shown, is formed with a curved end arc 1, the adjoining curved arc 2, the intermediate arcs 3, the other end arc 5 and its adjoining arc 4. These arcs are of circular form, either segmental or semi-circular, as shown, the intermediate ones being joined by straight portions or tangents 6. The inner radius of the arc 1 is made substantially the same as the exterior radius of the arc 5, so that when the pieces are joined together they will fit closely, as indicated in Fig. 2, and be substantially tight to hold earth, sand or other materials, either dry or wet.

The thickness of the sheet piling as shown on the drawings is somewhat exaggerated, as compared with the other dimensions, for the sake of clearness of illustration, and I wish it understood that these sheets may be proportionally thinner, or of any thickness that may be commercially or practically desired.

In order to practically produce my sheet piling, I prefer to press the same, as under present conditions, I can thereby obtain a greater variety of sizes and of less, though sufficient, thickness than could be obtained by rolling the same to the finished cross section. I have also discovered that if it be attempted to press a sheet with continuous or adjoining semi-circular arcs throughout, such as 1 and 2, that there is a greater amount of resistance to be overcome than if the intermediate arcs are joined by tangents or straight portions such as 6 arranged at angles of approximately sixty degrees, more or less. This matter of the ease of pressing the form shown in Figs. 1 and 2,

together with the fact that this form provides a greater lateral strength and stiffness, due to the disposition of the material as compared with circular corrugations of less depth, makes my section both practical and economical. I do, however, form approximately semi-circular arcs at, and adjoining, the edges of the section, as shown, in order to allow a certain amount of angular change in the line of sheet piling without breaking the continuity of the joints, as may be seen on reference to Fig. 2. If the marginal arcs 1 and 5 were not substantially semi-circular or circular segments, the interlocking edges would not fit closely when the sections are assembled at an angle, whereas with the cross section composed of circular arcs near the edges, the joint between the sections remains tight during a considerable angular movement during which the margin of one sheet is held under the tongue 10 of the clip 7 as shown in Fig. 2. It should therefore be noted that a considerable amount of angular deflection is possible without separating the locked edges of the adjoining sheets, and meanwhile the joint remains tight. In order to lock the adjoining sheets together, each unit or section is provided with a longitudinal strip or clip 7, riveted or otherwise secured along the arc or corrugation 2, but at a considerable distance from the extreme edge thereof. If the clip 7 is riveted, I prefer to use flat headed rivets such as 13, as these offer less resistance to driving and pulling. The clip 7 is formed as shown with a portion 8 adapted to fit the curve 2 of the pile and is also provided with a shoulder 9 fitting closely to the piling section, and has a curved tongue 10 ending in an outwardly curved lip 11. The joint is thus seen to be composed of a curved tongue comprising the outer portion of the circular arc 5, which fits in the groove or space 15 between the tongue 10 and the corresponding circular arc 1 of larger radius than the arc 5. This, therefore, forms a curved tongue and groove joint, whereby the adjoining pile sections may be connected by laterally placing the edge of one against the edge of the other and then swinging or rotating the free portion around the junction, thereby locking the joint. This joint will hold firmly against all usual pressures, although in certain cases where desired, waling strips and braces may be used temporarily to hold the line of piling in position.

The clip 7 is preferably formed of a metal section rolled longitudinally to the shape shown, but if more convenient or economical, it may be formed of a plate pressed closely to the same shape, except that in this case, the shoulder 9 will not have such a sharp corner as shown in the drawings. This latter, however, is not a serious objection, if there is no void or angular opening between the clip 7 and the corrugation 2 of the steel pile into which the free edge of the adjoining sheet pile might wedge itself in the process of placing or in use.

The construction shown in Figs. 6 and 7 is similar to that illustrated in Figs. 1, 2 and 3, with the single exception that the clips 7 and their integral portions 8, shoulders 9, curved tongues 10 and upwardly curved lips 11 are made in shorter pieces or sections, as shown, and secured at intervals in longitudinal alinement by means of the rivets 13.

As shown clearly in Fig. 2 the tongue 10 of the clip attached to one sheet pile projects over the circular edge of the next sheet pile, thus locking the two together when in place. The tongue 10 is curved and so formed that there is an ample clearance space 15 between the same and the adjoining surface of the pile to which it is attached, so that any irregularities in this or the adjoining sheets will not cause trouble or delay. The open space around the interlocking edges may be filled with packing material, if desired, but this is ordinarily unnecessary.

Referring now to Fig. 3, it will be seen that the arrangement of circular segmental corrugations and the locking clip hereinbefore described, makes it possible to assemble the sheets together laterally by inserting the edge of one sheet under the tongue 10 of the locking clip 7 of the adjoining sheet when these are in angular relation with each other, after which the sheet is swung to the required angle or alinement, as shown by the full lines; the preliminary position when entering the sheet being indicated by the dotted lines.

In Fig. 2 one method of assembling the sheets is indicated, whereas, instead of assembling them in this way, they may, of course, be joined in the reverse manner, that is, by slipping the clip of one sheet over the edge of the other sheet and then swinging the sheet laterally into the position desired. This form of construction permitting lateral placement and interlocking is a novel feature of my invention, as in all other forms of interlocking sheet piling, it is only possible to assemble the adjoining sheets by sliding them together lengthwise.

While under certain conditions it is possible to join sheets endwise, when the head room and the hoisting apparatus are both sufficient to permit this, still it requires extra time and labor which are obviated by means of my invention.

My improved sheet piling is particularly applicable in cases where a construction of sheet piles for cofferdams, caissons or similar structures is assembled above the ground in order to make a closure to complete the

same before any of the piles are driven. In such cases, my piles can be joined together laterally without lifting each section above each adjoining section, which reduces the handling, labor, plant, time and expense. If the piles are of such a construction that they have to be joined endwise, each section must then be lifted above each adjoining one and slid endwise into place and this will occasion a waste of power and require hoisting apparatus almost twice as high, while the expense and time would be very much greater than with my lateral joint construction. In addition to this, in confined situations and without overhead clearances, it is impossible to place interlocking steel piling which is joined endwise, because a clearance twice the length of the longest pile must be provided, whereas with my improved construction it is possible to work within a space only very little higher than the maximum length of the piling.

Fig. 4 indicates a plan or cross sectional view of a style of corner piece adapted to form a right angle corner, this being composed of two corrugated sections having parallel projecting edges 12 which are secured together by flat headed rivets 14, the outstanding curved portion 1 being provided with a locking strip 7 and the other outstanding portion 5 being substantially semi-circular and adapted to engage with the adjoining section as indicated. In this view the corner piece is shown in full lines, while the adjoining sections are shown in dotted lines, to clearly show their respective positions when assembled.

Although I have shown my sheet piling as composed of corrugated sections, I do not wish to be limited to this construction, as it is equally applicable to other forms, provided the lateral positioning and locking feature is maintained.

Although I have shown and described my improvements in considerable detail, I do not wish to be limited to the exact and specific details shown and described, but may use such substitutions, modifications or equivalents thereof, as are embraced within the scope of my invention, or as pointed out in the claims.

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

1. A sheet pile formed of a metallic plate having edge corrugations of substantially semi-circular cross section, and intermediate corrugations composed of segmental curves joined by straight portions arranged diagonally of the median plane of the pile, a longitudinally extending hook, the end portion of which is spaced apart from, and curves substantially parallel to the edge corrugation of the piling.

2. A metallic sheet piling section composed of a plate, one edge of which is formed into a curved tongue and the other edge of which is curved and provided with a clip, the end spaced apart therefrom, and substantially parallel thereto, thereby forming a corresponding curved groove.

3. A metallic pile formed of a plate provided with a pair of oppositely disposed semi-circular corrugations at each edge, one of the extreme edge corrugations being of a radius less than the other by the thickness of said plate, a clip secured to the convex portion adjoining the edge corrugation of larger radius, spaced apart therefrom and adapted to overlap a considerable length of the inner concave surface thereof.

4. Sheet metal piling formed in sections and having longitudinal interlocking edges comprising a flange on the edge of one section, and a plurality of hooks in the edge of the adjacent section, the ends spaced apart therefrom and substantially parallel thereto and inclosing a longitudinal channel adapted to receive said flange, said interlocking edges adapted to be engaged by a lateral entrance.

5. Sheet metal piling formed in sections and having longitudinal interlocking edges adapted to engage by lateral entrance, said interlocking edges comprising engaging locking flanges on the mating edges of adjacent sections, and one of said edges in each joint having a retaining hook having its edge projecting inwardly toward the edge of the locking flange but separated therefrom sufficiently to permit the entrance of the opposite flange, and said retaining hook being curved in substantially the arc describing the opposite locking flange in entering so as to form a tight joint.

6. Sheet metal piling formed in sections and having longitudinal interlocking edges comprising a flange on the edge of one section and a corresponding locking hook on the adjacent section and a retaining hook having its edge outside of the edge of said locking hook and separated therefrom to provide an entrance for said flange, and said retaining hook being curved substantially to conform to the arc described by said flange so as to form a tight joint, and said piling sections adapted to be engaged by a lateral entrance.

7. Sheet metal piling formed in sections and having longitudinal interlocking edges, said interlocking edges adapted to engage by a lateral entrance comprising corresponding locking flanges on adjacent edges and a retaining hook on one of said edges opening toward its flange and having its end located outside of the end of said flange a sufficient distance to provide an entrance for the interlocking flange, the end of said retaining hook having its inner face curved substantially in the arc described by the interlocking hook

in assembling and being adapted to abut against the body of the adjacent section when assembled and prevent lateral movement.

8. Sheet metal piling formed in sections and having longitudinal interlocking edges, said interlocking edges adapted to engage by a lateral entrance comprising corresponding locking flanges on adjacent edges and a retaining hook on one of said edges opening toward its flange and having its end located outside of the end of said flange a sufficient distance to provide an entrance for the interlocking flange, the end of said retaining hook having its inner face curved substantially in the arc described by the interlocking hook in assembling, and the end of one of said locking flanges being adapted to abut against the adjacent section, and the end of said retaining hook being adapted to abut against the body of the adjacent section when assembled, whereby lateral movement is prevented and a tight joint is obtained.

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

JULIUS R. WEMLINGER.

Witnesses:

J. HOWARD AUSTIN,

CHAS. G. ROBERTSON.