R. B. PEARSON.

INTERLOCKING METAL SHEET PILING.

APPLICATION FILED AUG. 16, 1910.

999,334. Patented Aug. 1, 1911.

FIG. 1.

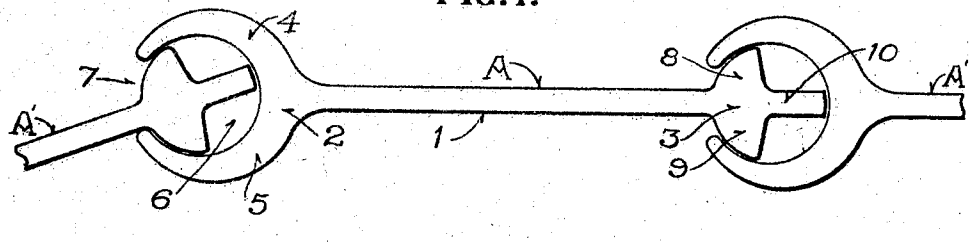


FIG. 2.

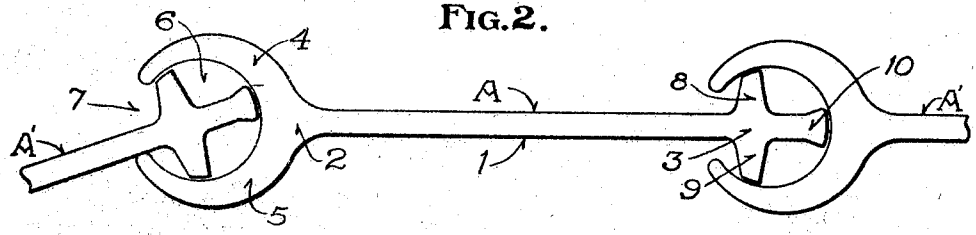


FIG. 3.

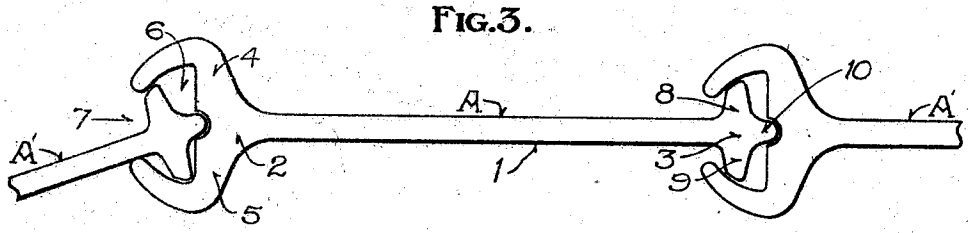
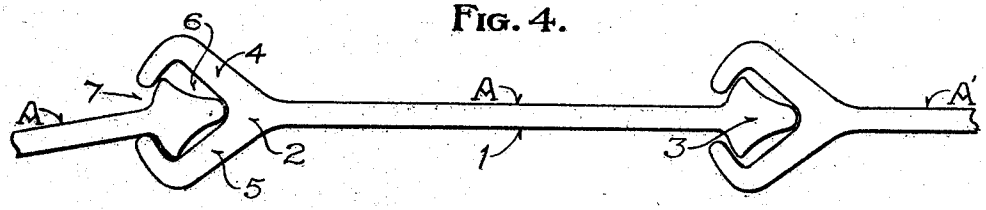


FIG. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

ROBERT BAILLIE PEARSON, OF DULUTH, MINNESOTA.

INTERLOCKING METAL SHEET-PILING.

999,334. Specification of Letters Patent. Patented Aug. 1, 1911.

Application filed August 16, 1910. Serial No. 577,522.

To all whom it may concern:

Be it known that I, ROBERT B. PEARSON, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented a new and useful Improvement in Interlocking Metal Sheet-Piling, of which the following is a specification.

My invention relates to improvements in interlocking metal sheet piling as generally used in the construction of core-walls in dams, coffer-dams, retaining walls, foundation work, caissons, docks, wharves and other similar structures, and comprises a series of interlocking metal piles having a joint combining unusual resistance to the passage of water and other fluid material with great flexibility and strength in the interlock. This piling is so formed that the joints therein will be substantially watertight at all times, without the use of packing, regardless of the relative angle between the adjacent piles.

The particular objects of this invention are: 1st, to increase the watertight qualities of the joint; 2d, to eliminate the necessity for packing, under all conditions, and, 3d, to so restrict the lateral and transverse movement of the adjacent piles relative one to another as to also eliminate the present common fault of some sheet piling of spreading at top or bottom while driving.

A further object is to provide a construction economical to manufacture and one that will drive and pull easily, under the conditions met in practice, in all soils.

In the accompanying drawing, Figures 1, 2, 3 and 4 represent transverse sections of four different modifications of my form of sheet piling; however, it is understood that various other forms similar to these can be made without departing from my invention, as shown and described, which, broadly speaking, comprises the formation of a joint, wherein the smaller head is approximately triangular in cross-section or trisected into three divergent, longitudinally extending, flanges, the extremities of which approach the inner surface of the groove of the larger head of the adjacent pile at such divergent points and so closely as to prevent any great transverse movement in the joint and substantially prevent the passage of water or other fluids, as hereinafter shown and described, the groove in the larger head of said pile being of such form as to allow a rotational or angular movement of one pile in relation to another with a freely sliding longitudinal movement but a closely restricted transverse or lateral movement.

In Fig. 1, the letter A represents one section of my pile, which is composed of the web, of suitable proportions marked 1, having on its respective longitudinal edges interlocking heads marked 2 and 3, as shown, preferably integral therewith. The larger interlocking head 2 comprises two oppositely extending and inwardly curving jaws marked 4 and 5, inclosing a cylindrical groove 6 and having an opening 7 between the ends of said jaws. This opening 7 and groove 6, being adapted to receive and interlock with the smaller head 3 of the adjacent pile, form a strong and flexible joint therewith. The smaller head 3 is composed of three divergent flanges marked 8, 9 and 10 which are so formed that the extremities of these three flanges will closely approach the interior surface of the groove 6 at such divergent points as to hold the head 3 concentrically within the groove 6 with very little lateral or transverse movement, regardless of the relative angle between the two webs of adjoining piles. The small amount of clearance between head 3 and interior of head 2 of the adjacent pile at these three points will greatly restrict the amount of water flowing through the joint, and, under the ordinary strains of service, one or more flanges of head 3 will be in continuous contact with the interior of the groove 6, thus entirely stopping the passage of water.

Fig. 2 shows a modification of the form used in Fig. 1, in which the flanges 8 and 9 of head 3 are reduced in thickness, the contact surfaces between piles being thereby reduced, as is also the weight of the pile somewhat and the friction in driving and pulling same, which is the paramount reason for the change. In order to protect and stiffen the flange 10, it is increased in size by forming a small longitudinal bulb or enlargement on the edge thereof, which strengthens and protects same in driving, said enlargement not being a necessary part of the invention and may be used or omitted at the option of those manufacturing same. The other head marked 2, together with the groove 6 thereof, remains substantially the same as described and shown in Fig. 1.

Fig. 3 is a modification of my invention

wherein the interior groove 6 of the larger head 2 is flattened on the edge toward the web, a small groove being left to center the edge of the next pile, thus increasing the relative amount of metal in the base of the jaws 4 and 5, thereby stiffening and strengthening said jaws. The flange 10 of head 2 is also reduced in height proportionately to the depth of groove 6 in order that head 3 will enter and interlock with the head 2 substantially as shown and described. In this form of joint, the changes made in head 3 increase the lateral strength of the joint, the flexibility and water-tightness of the joint remaining substantially the same as in the previous forms.

Fig. 4 is another modification of my invention, wherein the interior groove 6 of the larger head 2 has approximately the form of a sector of a circle with the apex or center toward the web and a restricted opening 7 at the outer edge, said head being adapted to receive and retain the smaller head 3 which is also shaped somewhat similarly to a sector of a circle but, in this case, with the center or vertex extending outwardly and the arc or circular side toward and attached to the web, the sector being so proportioned as to slide within groove 6 and of less included angle than said groove in order to allow for angular movement about the vertex or edge thereof. This form of interlocking metal sheet piling permits an unusual degree of angular flexibility about the joint and freedom of movement longitudinally therein, combined with great water retaining qualities which are due to the fact that water passing through the joint will have to pass three different points of restriction, one of which is almost always certain to close sufficiently, under the conditions met in driving or the strains met in service, to prevent the passage of water through the joint without the use of any packing material whatever.

The basis of my invention is the provision of an approximately triangular head—or a head composed of three widely divergent flanges—interlocking with a larger head containing a groove of such shape as to closely restrict the transverse and lateral movement therein of said smaller triangular or trifurcated head, but allowing some angular deflection and free longitudinal sliding movement between adjacent piles. Contact between the extremities of the smaller head and the interior of the groove of the larger head will, in practice, practically prevent the passage of water.

The subdivision of the smaller head into three widely divergent flanges closely approaching the interior of the groove, as hereinbefore described and shown, also so restricts the transverse or lateral movement of each pile in relation to the one previously driven as to practically force the heads of the last pile in the series to drive into place parallel to the head of the first pile driven, thus making the space to be filled by a closing pile practically the same width the full length of the piling. Some of the most prominent forms of interlocking sheet piling now on the market have so much transverse or lateral movement in the interlock as to allow a following pile to deflect an inch or more transversely or laterally from the course of the adjacent one previously driven, an error which may be accumulative and usually causes considerable difficulty in driving the closing pile into place. It is intended that this form of sheet piling be formed of steel or other suitable material and that the heads be rolled integrally with the web thereof, but it is understood that it may, if desired, be built up of two or more members of such form as will preserve the principal idea shown herein and attain the same results in a satisfactory manner.

Having illustrated and described my invention as above, I claim therefor:

1. A pile section for metal sheet piling having in combination a web, a pair of short flanges extending along, parallel to, and a short distance from one edge of said web, forming in connection therewith a three-pronged or trifurcated head, and, on the opposite edge of said web, two larger curved flanges inclosing a groove having a mouth of less width than the internal width of the groove, said groove being adapted to receive and interlock with the aforementioned trifurcated head of the adjoining pile with sufficient clearance to permit longitudinal movement and angular deflection between the adjacent piles.

2. A metal sheet pile having interlocking members along each edge, one of which contains a groove of approximately cylindrical or other suitable form, and the other member of which consists of an approximately triangular bulb or head—or three or more divergent flanges extending longitudinally thereof—adapted to slide within the aforementioned groove and of such size as to nearly close it at the extremities of said flanges or said triangular head.

3. An interlocking metal sheet pile having an enlargement or head extending longitudinally along each edge thereof, one of which contains a groove having a restricted mouth, said groove being adapted to receive the smaller head of the adjoining pile, said smaller head being so formed as to closely approach the interior surface of aforesaid groove at three or more points as widely divergent from each other as may be, said interlocking heads of adjacent piles being adapted to slide longitudinally and deflect angularly in relation one to the other.

4. An interlocking metal sheet pile hav-

ing on one edge thereof an approximately triangularly shaped head extending longitudinally thereof and, on the opposite edge, a larger head containing a groove adapted to receive and interlock with said triangular head, said groove being so formed as to closely inclose the extremities of said triangular head but having sufficient clearance to permit the longitudinal movement and angular deflection of one pile in relation to the adjoining one.

5. A metal sheet piling composed of interlocking sections, each section comprising a web having on one edge thereof a head comprising three short divergent flanges extending longitudinally thereof and, on the opposite edge of said pile, a larger head containing a groove adapted to receive said trifurcated head, said groove being so formed as to closely approach the extremities of said trifurcated head but having sufficient clearance to permit the longitudinal movement and angular deflection of one pile in relation to the adjoining one.

6. A series of piles having interlocking and sliding relation with each other, wherein the joint is so formed as to have three divergent points or extremities of the head of one pile closely approach the interior surface of the groove of the adjacent pile in such manner as to closely restrict the transverse and lateral movement of one head within the other but permitting free longitudinal movement and angular deflection within the joint.

7. An interlocking metal sheet piling wherein a section or pile comprises a web, a pair of oppositely extending curved flanges along one edge thereof, said flanges inclosing between them a longitudinal groove having a mouth of less width than the internal width of said groove, and, along the opposite edge of said web, three short divergent flanges, said flanges being adapted to fit within and interlock with the aforementioned groove of adjoining pile with sufficient clearance to permit of longitudinal movement and angular deflection between the adjacent piles.

8. An interlocking metal sheet piling wherein a section or pile comprises a web, a pair of oppositely extending flanges along one edge thereof, said flanges inclosing between them a longitudinal groove having a cross-section similar to a sector of a circle with the narrow point or apex toward the web, said groove having a mouth of less width than the internal width of the groove, and, along the opposite edge of said web, a head having a cross-section similar to the sector of a circle of less included angle than that of the aforementioned groove—with the apex out and adapted to fit within the aforementioned groove of the adjoining pile with sufficient clearance to permit longitudinal movement and angular deflection between the adjacent piles.

Witness my hand this 13th day of August, 1910.

ROBERT BAILLIE PEARSON.

Witnesses:
WALLACE R. LAWRIE,
JEAN A. ARAS.