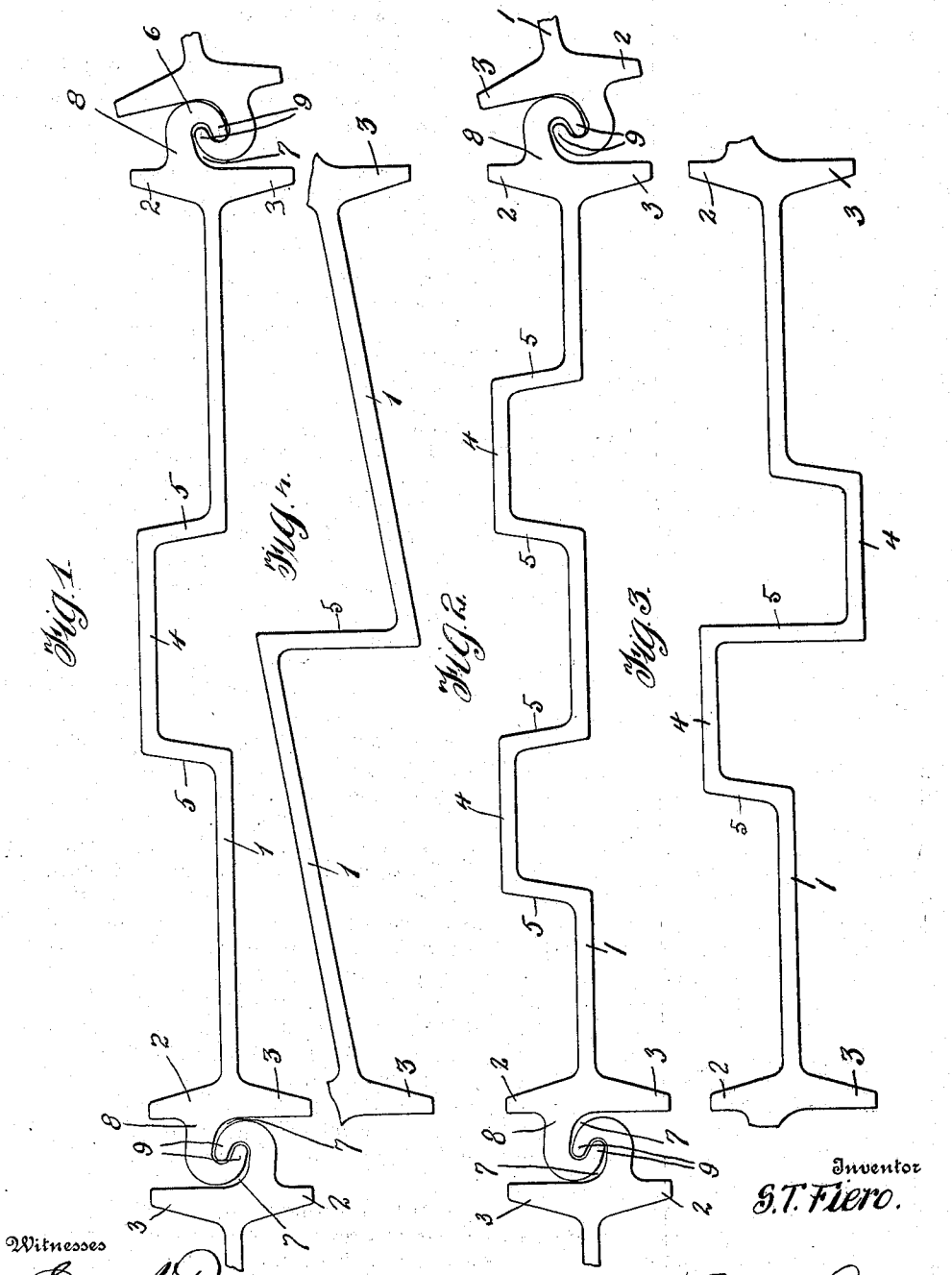
S. T. FIERO.

INTERLOCKING SHEET METAL PILING.

APPLICATION FILED DEC. 10, 1908.

924,442. Patented June 8, 1909.



Witnesses

Samuel Payne

R. A. Butler

Inventor

S. T. Fiero.

By H. C. Court & Co Attorneys.

UNITED STATES PATENT OFFICE.

SLATER T. FIERO, OF PITTSBURG, PENNSYLVANIA.

INTERLOCKING SHEET-METAL PILING.

No. 924,442. Specification of Letters Patent. Patented June 8, 1909.

Application filed December 10, 1908. Serial No. 466,792.

To all whom it may concern:

Be it known that I, SLATER T. FIERO, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Interlocking Sheet-Metal Piling, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in sheet metal piling, preferably of the type having the longitudinal edges formed to provide interlocking engagement between adjacent sheets, and commonly used in the construction of retaining walls, piers, abutments, wells, foundation and submarine structures, and work requiring the use of metallic reinforcing structures, the present invention residing particularly in the form and construction of the body-portion of the piling intermediate the interlocking-edge structure.

Sheet-metal piling when in position for use, is subjected to strains exerted in various directions, and the value of the piling resides in its ability to resist such strains. Where piling sheets are interlockably connected together along their edges, the interlocking structure in itself forms strain-resisting means of a character which will practically prevent bending or breaking of the piling along its edges; the intermediate or body-portion of the sheets, however, being generally in the form of a flat sheet and unsupported by a sheet in superposed relation thereto, does not possess such strain-resisting qualities as the edges and hence forms the weakest portion of the sheet. To remedy this weakness, various methods have been employed. For instance, the thickness of the sheet has been increased, thereby increasing the weight of the body-portion per square foot and necessarily increasing the cost of the sheet; another form provides laterally-extending ribs, but these simply form anchoring structures to prevent movement of the sheet laterally in the plane of its faces without providing an increased strain-resistance on the sheet proper; still another form of construction consists in bending the sheet to provide portions extending in parallel planes, the portions being connected by curved portions, but in these forms the strain-resistance is not increased to any material extent since the curved portion of the sheet does not offer any material resistance against movements of the sheet in directions extending at right angles to the plane of the sheet, nor do they provide any material resistance against movements extending laterally in the plane of the sheet. The present invention aims to overcome these objections without increasing the thickness of the sheet and without breaking the continuity of the sheet, and yet provide a structure in which a maximum strain-resistance is produced against strains exerted both in the plane of the sheet and at right angles to such plane, such strain-resistance being provided by the use of a strength-reinforcing structure formed within the body-portion and at the same time retaining the continuity of such body-portion.

The principal object of my invention is, therefore, to provide the piling body-portion with one or more strength-reinforcing elements intermediate of and extending parallel with the interlockable edge portions of the sheet.

A further object is to provide a construction in which the thickness of the material of the sheet is not increased intermediate its edges.

A further object is to provide a construction which can be readily formed by the well-known rolling process.

A further object of the invention is to provide a construction which will prevent bending, buckling or a longitudinal deflection or a distorting of the body-portion of the sheet during the driving operation which would injure the initial strength of the sheet for retaining or supporting purposes.

To these and other ends, the nature of which will be understood as the invention is hereinafter disclosed, said invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views,—Figures 1, 2, 3 and 4 illustrate end views of various forms of sheet piling embodying my invention.

The principal feature of the present invention is the strength-reinforce, and this consists in placing within the normal plane of the sheet (the plane of a line connecting the edge-portions) one or more portions which extend at approximate right angles to the plane of the sheet, these portions being

formed in continuity with the body-portion of the sheet. The provision of these portions places within the body of the sheet one or more portions whose length, in cross-section, extends at a direct angle to the length of the body portions with which they are connected, and as these angularly extending portions are connected to the body-portions at both ends of their length, they provide a strain-resisting element which prevents any bending, buckling or distortion of the body-portion either when the sheet is being driven or when it is in position for use. Various forms for providing this element are illustrated in the drawings. For the purpose of more clearly illustrating the construction and relation of this feature to the sheet, I have shown the configuration of a complete sheet, and in Figs. 1 and 2 have illustrated one of many different ways in which adjacent sheets may be interlocked, that shown in the drawing being a structure and arrangement of parts forming the subject-matter of my co-pending application filed April 7, 1908, Serial No. 425,668.

In the accompanying drawings, 1 designates the body-portion of the piling sheet and having the laterally-extending and oppositely-projecting flanges 2 and 3, thereby providing what may be termed an I-beam structure. The longitudinal edges of the sheet provide the interlocking edges, and in the present instance are shown as in the form of a hook 6 connected to the flange 2 by the portion 8, and terminating in a bill 9, the construction providing an open groove 7 within which the hook of the adjacent member extends. This construction of the sheet-connecting means is preferred, but, as heretofore stated, the present invention may be employed with other forms of interlocking edges.

Referring now more particularly to the strength-reinforce, the sheet 1 is bent, at one or more points intermediate the flanges 2 and 3, at a direct angle to the plane of the sheet, forming a portion or portions 5 which extend at approximately right angles to the plane of the sheet. In the form shown in Fig. 1, two such bent portions 5 are shown spaced apart and projecting from the same side of the sheet, said portions being connected at their opposite ends by a connecting portion 4. This construction provides a channel within the plane of the sheet, within which the material in which the piling is placed is located and thereby providing material on each side of the sheet 1 and its parts 4 and 5. In this form, two strength-reinforcing elements are provided. In Fig. 2, the channel of Fig. 1 is duplicated, thereby providing four elements 5, each of which is connected at its opposite ends with the body-portion of the sheet, although the latter is not continuous within a single plane. In Fig. 3 the channels are located on opposite sides of the plane of the sheet and are arranged close together, thereby providing two elements 5 of equal length and an intermediate element of a length substantially equal to the combined length of the two outer elements.

In each of the forms shown in Figs. 1, 2 and 3, the plane of the sheet is approximately that of a line connecting the edges of the sheet; it is obvious, however, that this uniformity may be varied. For instance, in Fig. 4, the sheet does not extend in a plane corresponding with the plane of such line but is angular thereto and having at a point intermediate its length the element 5, the sheet in this case extending in two parallel planes none of which coincide with the plane of such line. This construction, however, provides what may be termed a channel on opposite sides of the element 5.

As will be readily understood, the constructions herein set forth not only provide a structure having the strength of the I-beam, but in addition thereto place within the web of the I-beam the strengthening qualities of the channel-bar structure produced by the elements 5 and their connecting portions, so that there is provided a strain-resisting structure of maximum capacity, this result being obtained without destroying the continuity of the body-portion, increasing the thickness of the material, or making use of projecting portions such as ribs, and yet obtaining all of the advantages of the rib structure with respect to preventing creeping of the sheets.

While I have herein disclosed several forms for carrying my invention into effect, it will be readily understood that the same may be varied as by changing the configuration of the channels and their walls, and I reserve the right to make any and all such changes and modifications therein as may fall within the spirit and scope of my invention as expressed in the accompanying claims.

Having thus described my invention, what I claim as new is:

1. A sheet-metal piling comprising an I-beam having central longitudinal channel-shaped strength-reinforcing structures upon each side thereof.

2. A sheet-metal piling comprising an I-beam having longitudinal channel-shaped strength-reinforcing structures spaced equally relative to the longitudinal edges of said piling.

3. A sheet-metal piling comprising an I-beam having a longitudinal channel-shaped strengthening structure.

4. Interlocking sheet-metal piling comprising an I-beam, a central channel-shaped strengthening-structure, and locking members carried by the flanges of the beam and

providing open grooves adapted to receive adjoining members.

5. A sheet-metal piling comprising a combined I-beam and channel-bar, said channel-bar being arranged intermediate the longitudinal edges of the I-beam.

6. Interlocking sheet-metal piling comprising a beam having a central channel-shaped strength-reinforcing structure, said beam also having a longitudinal open groove formed therein for an adjoining piling.

7. A sheet-metal piling comprising a beam having longitudinal strength-reinforcing elements arranged at right angles to said beam, said elements being connected together.

8. In sheet-metal piling, a sheet body-portion having an intermediate angular strength-reinforcing structure.

9. In sheet-metal piling, a sheet body-portion of uniform thickness and having a strength-reinforce element extending angular with respect to the plane of the sheet and extending in continuity with the sheet.

10. In sheet-metal piling, a sheet body-portion of uniform thickness and having one or more elements extending angular with respect to the plane of and in continuity with the sheet.

11. In sheet-metal piling, a sheet body-portion of uniform thickness and having one or more elements extending angular with respect to the plane of and in continuity with the sheet, said elements forming spaced channels on opposite sides of the sheet.

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

SLATER T. FIERO.

Witnesses:

MAX H. SROLOVITZ,

K. H. BUTLER.