July 18, 1933. J. E. AMAND 1,918,886

SHEET PILE

Filed Dec. 29, 1926

Fig. 1

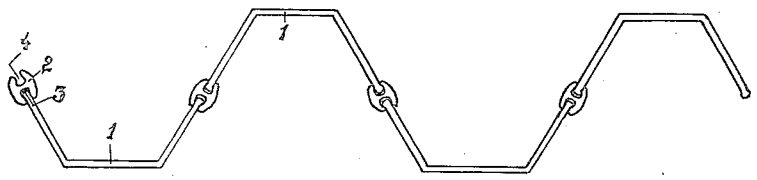
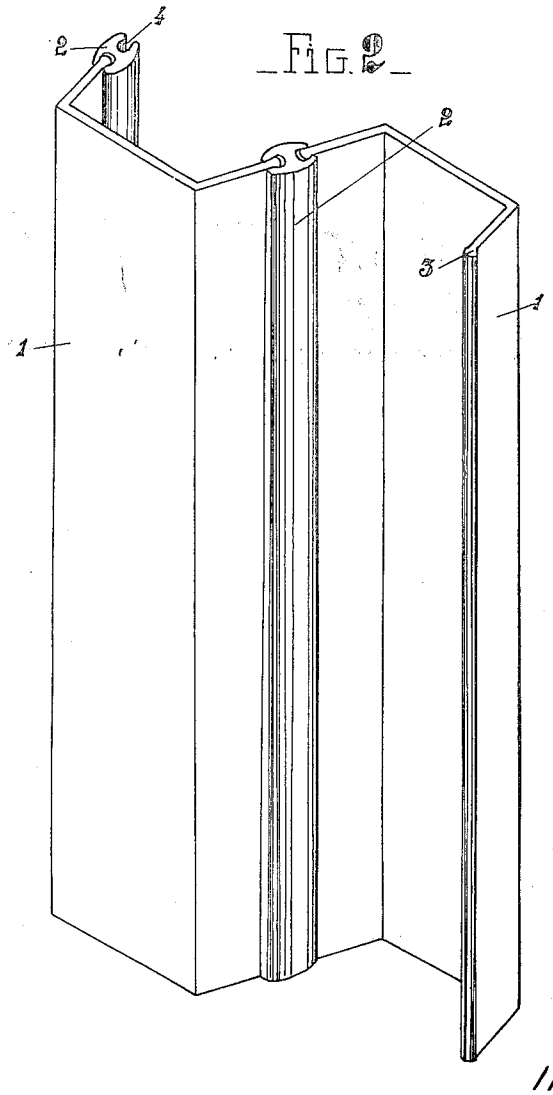


Fig. 2



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UNITED STATES PATENT OFFICE

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SHEET PILE

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The increased use of metallic sheet piling in construction work has caused considerable activity in the art directed towards the production of profiles or shapes having a larger moment of inertia than would the simple sheet piles which were first employed.

The shapes or sections, or the means for joining such sections have hitherto had the extreme disadvantage from a practical standpoint that they were expensive to produce. The assemblage of such prior art sections was difficult and detrimental strains were introduced which diminished the value of such sections for making coffer dams or retaining walls of great height and also for supporting constructions such as the modern buildings. A still further disadvantage was due to the fact that when the prior art sheet piles, or the sections from which they were made up, were joined together, it often resulted that the adjacent sides of the sections were not collinear, thus giving rise to torsional stresses and strains, oftentimes of considerable magnitude and invariably materially diminishing the resistance of the assembled sheet piling.

My invention is directed to the construction of a sheet pile and assemblage thereof, avoiding the above mentioned disadvantages.

To this end, sections of simple profile are employed, which can be easily rolled from rolls of the usual size, which sections, when assembled according to my invention, nevertheless have a moment of inertia very much greater than that of the present day constructions. These sections are disposed alternately on different sides of the neutral axis of the row of sheet piles and are joined together through the intermediary of an assembled H-shaped element maintaining the adjacent legs of two adjacent first-mentioned or U-shaped element substantially collinear. As suggested above the first-mentioned elements or sections are substantially U-shaped in cross section, preferably with their arms slightly inclined outwardly.

According to one form of my invention, the ends of the said arms to be joined together have enlarged heads or clutches, non-circular in cross section, which heads or clutches are slidable in a corresponding groove in the intermediate H-shaped element, which, as shown in Fig. 2, has two grooves juxtaposed along the longitudinal axis of the cross section thereof. Thus, with my construction there is produced an absolutely rigid assemblage of two U-shaped elements and either one or two H-shaped intermediate elements, whereby the neutral axis of the composite structure is shifted from lines closely adjacent the web or yoke of the U-shaped elements to a line through the H-shaped intermediate elements. In constructing a composite assemblage the U-shaped elements are first slid along the H-shaped elements, whereby they are rigidly secured in position as by keying, riveting, spot welding or the like.

One form of my invention is shown by way of example in the accompanying drawing wherein

Figure 1 is a plan view of a row of sheet piles following my invention, while

Figure 2 is a perspective view corresponding to Fig. 1.

Referring to the drawing each sheet pile comprises two substantially simple and easily rolled U-shaped elements 1, which can be readily produced from rolling mills of the usual size and which in themselves do not have a particularly large moment of inertia with respect to its neutral axis. For the sake of simplicity all of the U-shaped elements are exactly alike. Two U-shaped elements disposed adjacent to each other in the manner of Figure 2 are permanently and rigidly joined to each other by an intermediate H-shaped element 2, having two grooves 4 disposed longitudinally along the said element and having a contour substantially complemental to that of the enlarged heads 3 of the U-shaped elements, the said enlarged heads 3 being non-circular in section. A "sheet-pile" as referred to hereinabove comprises an assemblage of two U-shaped elements 1 and either one or two intermediate H-shaped elements 2. The first of these two H-shaped elements is disposed between the two U-shaped elements, and is rigidly joined to the U-shaped elements in any suitable manner, as by pressing, riveting, keying,

welding or other well-known means. Where a second H-shaped element is employed, this is rigidly secured in similar manner to the free or outer end of one of the U-shaped elements. Thus, the neutral axis of the assemblage is shifted from a line closely adjacent the web of one of the U-shaped elements, where the moment of inertia would be small, to a line bisecting the H-shaped elements, resulting in a very great moment of inertia. This increased moment of inertia is due primarily to the rigid connection between the intermediate element 2 and the U-shaped element 1.

Because of the non-circular contour of the heads 3 and cooperating grooves 4, it is substantially impossible to move the U-shaped elements out of alignment about the H-shaped element 2 as an axis, so that no torsional strains arise.

I prefer that the three or four element sheet piles be assembled at the factory before shipping, the three element construction being adapted as the central or "key" member, and any desired number of four element assemblages being disposed at each side thereof, the second of said H-shaped elements facilitating such connection. While the adjacent sheet piles of either three or four elements can be fitted in position with respect to each other through relative longitudinal movement, the desired large moment of inertia is insured because of the rigid interconnection between the H-shaped element 2 and the U-shaped element 1 of each sheet pile. Because of the width of the material of the H-shaped element 2 intermediate the grooves 4, the total moment of inertia of the assemblage is increased over that which would result if two of the U-shaped elements were juxtaposed without the intermediary of such H-shaped element.

It is readily evident from the foregoing that once the broad idea of my invention is disclosed numerous modifications and adaptations will occur to those skilled in the art falling within the spirit of my invention. Accordingly I intend that my invention be limited only by the scope of the appended claims.

What I claim is:—

1. An assembled Z-shaped sheet pile formed by the connection of two single and symmetrical U-shaped elements having flanges diverging exteriorly and provided each with a massive extremity the connected flanges being arranged in rectilinear relation in such a way that the median flange of the thus formed Z-shaped sheet pile lies in a plane, a symmetrical H-shaped beam connecting said two U-shaped elements in the two depressions of which the edges of the flanges of the elements are rigidly embedded, before the ramming, thus forming a Z-shaped sheet pile constituted by three elements.

2. An assembled Z-shaped sheet pile formed by the connection of two single and symmetrical U-shaped elements having flanges diverging exteriorly and provided each with a massive extremity the connected flanges being arranged in rectilinear relation in such a way that the median flange of the thus formed Z-shaped sheet pile lies in place, a symmetrical H-shaped beam connecting said two U-shaped elements in the two depressions of which the edges of the flanges of the elements are rigidly embedded before the ramming, a second H-shaped beam rigidly adapted at the free extremity of one of the U-shaped elements, in such a way that a depression is formed in the prolongation of the external flange of said U-shaped element, the Z-shaped sheet pile thus formed being constituted by four elements and comprising on one side a massive extremity and at the other a depression allowing the connection with another sheet pile.

3. An assembled Z-shaped sheet pile formed by the connection of two single and symmetrical U-shaped elements having flanges diverging exteriorly, and provided each with a massive extremity non-circular in section, the connected flanges being arranged in rectilinear relation in such a way that the median flange of the thus formed Z-shaped sheet pile lies in a plane, a symmetrical H-shaped beam connecting said two U-shaped elements, in the two depressions of which the edges of the flanges of the elements are rigidly embedded before the ramming, the said depressions being non-circular in section, so that the internal faces of said depressions are in contact along a surface with the external faces of the massive extremities of the U-shaped elements.

4. An assembled Z-shaped sheet pile formed by the connection of two single and symmetrical U-shaped elements having flanges diverging exteriorly, and provided each with a massive extremity non-circular in section, the connected flanges being arranged in rectilinear relation in such a way that the median flange of the thus formed Z-shaped sheet pile lies in a plane, a symmetrical H-shaped beam connecting said two U-shaped elements, in the two depressions of which the edges of the flanges of the elements are rigidly embedded before the ramming, the said depressions being non-circular in section, so that the internal faces of said depressions are in contact along a surface with the external faces of the massive extremities of the U-shaped element, a second H-shaped beam with an analogous section being adapted at the free extremity of one of the U-shaped elements.

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