

Feb. 13, 1934.

W. G. CAPLES

1,947,151

SHEET METAL PILING WALL STRUCTURE

Filed Dec. 27, 1932

3 Sheets-Sheet 1

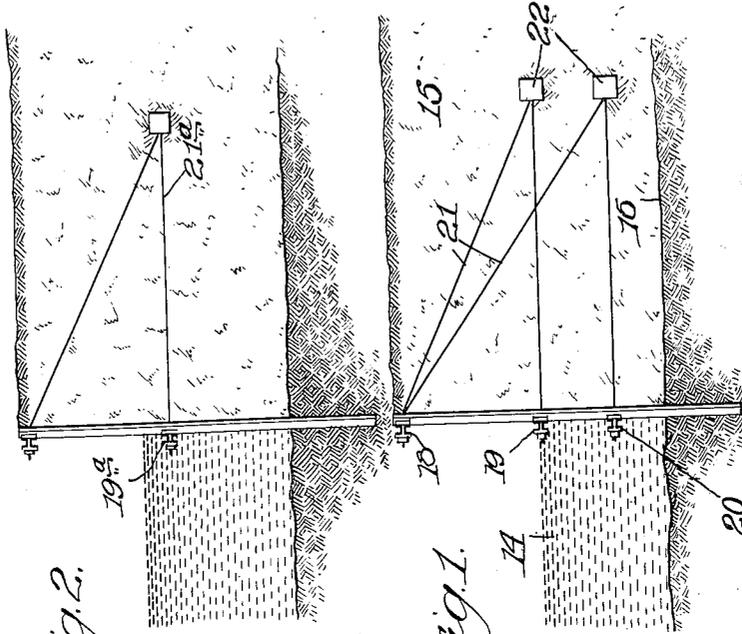
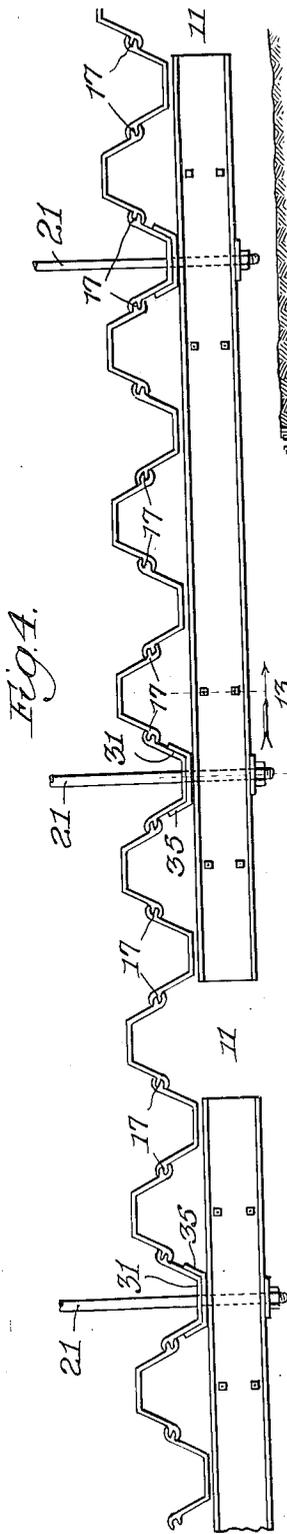


Fig. 2.

Fig. 1.

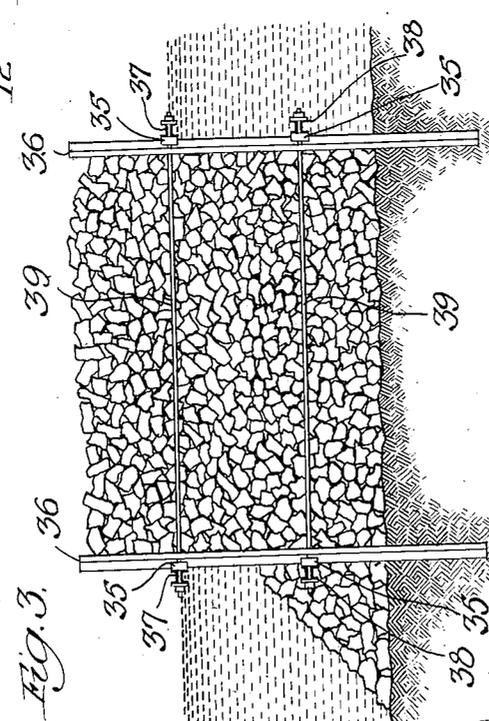


Fig. 3.

Inventor:
 William G. Caples,
 By J. J. Penforth, Sec., Crittton & Niles,
 Attys.

Feb. 13, 1934.

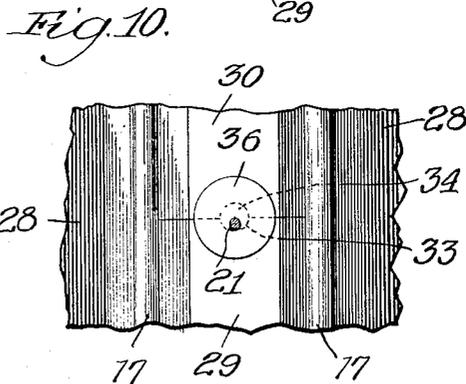
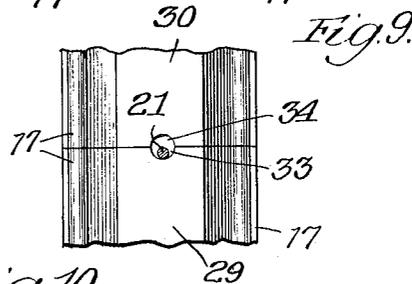
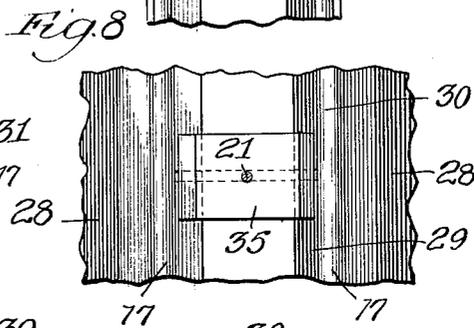
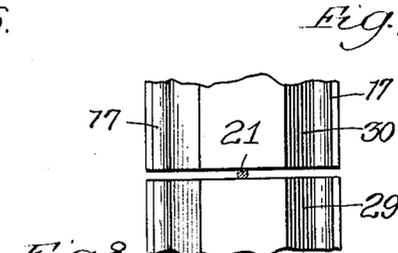
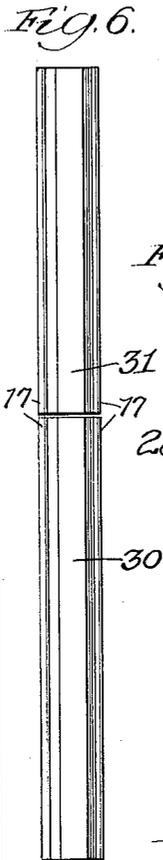
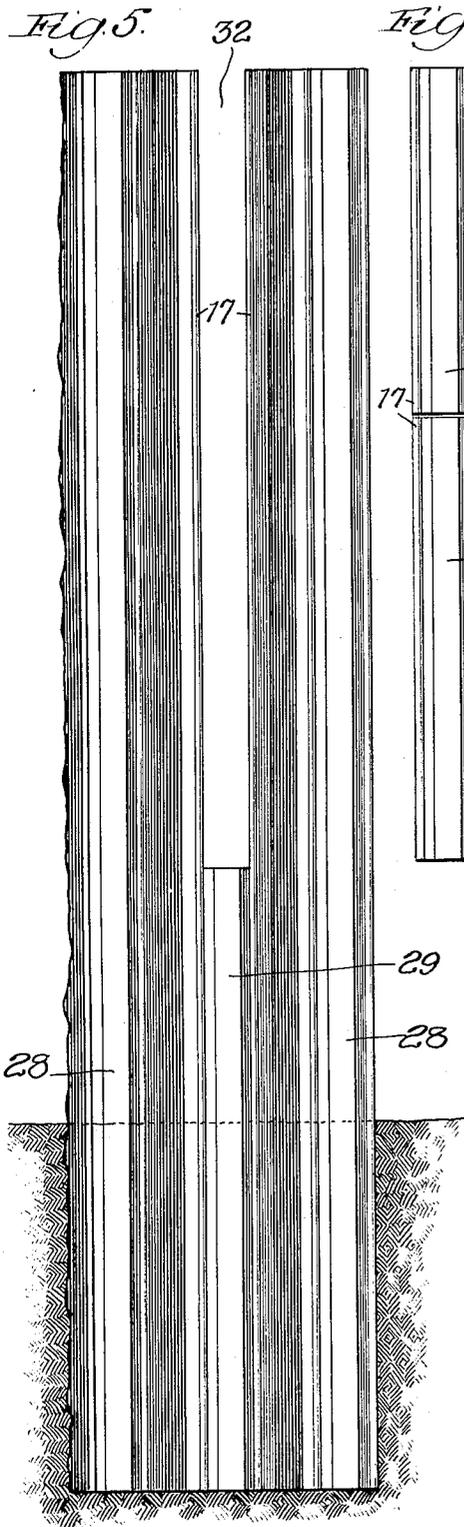
W. G. CAPLES

1,947,151

SHEET METAL PILING WALL STRUCTURE

Filed Dec. 27, 1932

3 Sheets-Sheet 2



Inventor:
William G. Caples,
By *Bydrenforth, Dec, Critton & Niles,*
Attys.

Feb. 13, 1934.

W. G. CAPLES

1,947,151

SHEET METAL PILING WALL STRUCTURE

Filed Dec. 27, 1932

3 Sheets-Sheet 3

Fig. 11.

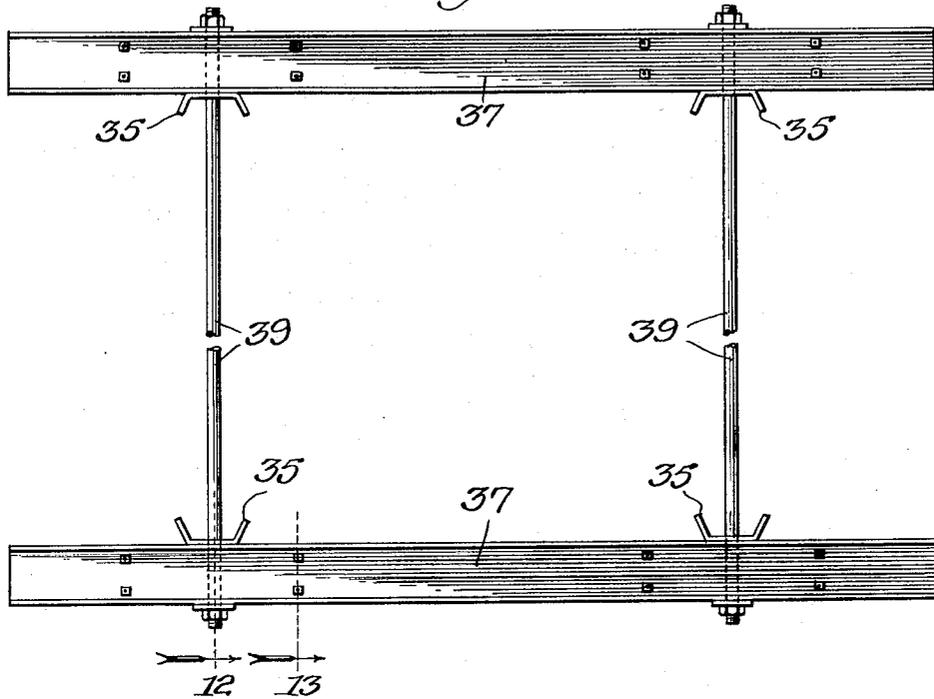


Fig. 12.

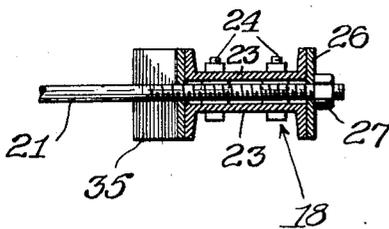
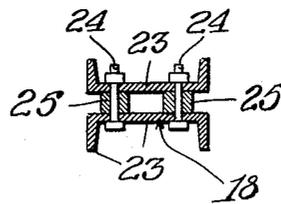


Fig. 13.



Inventor:
William G. Caples,
By Deffenborth, Lee, Chittom & Miles,
Attys.

UNITED STATES PATENT OFFICE

1,947,151

SHEET-METAL-PILING WALL STRUCTURE

William G. Caples, Chicago, Ill.

Application December 27, 1932

Serial No. 649,057

7 Claims. (Cl. 61—39)

My invention relates to sheet-metal-piling wall structures comprising sheet metal piles and associated wales and anchor rods for stiffening and anchoring the piles.

5 My object, generally stated, is to provide for the assembling with the sheet metal piles, the wales and anchor rods, regardless of their location above or below the water line, at less expense and more rapidly than in the case of structures as hitherto provided.

10 The invention presents its greatest advantage, however, in the locating of the wales under water.

15 In the designing of wall structures of the kind referred to to the end of providing for the use of the minimum amount of metal to resist all of the stresses to which the structure will be subjected in use, the wales are oftentimes required to be positioned below the water line.

20 However, in practice it has not been commercially feasible to build the walls in accordance with such economical designs due to the fact that in structures as hitherto provided the application of the wales and the fastening means for the wall when below the water line require the use of divers resulting in prohibitive expense, making it necessary to employ more expensive types of structures or providing under-water braces for the sheet piles which not only greatly add to the expense for the materials required but also labor and oftentimes are an inconvenience.

Referring to the accompanying drawings:

25 Figure 1 is a broken sectional view of a retaining wall structure constructed in accordance with my invention and involving in its design three rows of wales the intermediate row being located substantially at the water line and the lower row at a considerable depth below.

40 Figure 2 is a similar view of another design of retaining wall structure embodying my invention and involving in its design the use of two rows of wales the lower row only of which is located below the water line.

45 Figure 3 is a similar view of a break-water constructed in accordance with my invention and shown as of a design involving the use of wales below the water line.

50 Figure 4 is an enlarged broken plan view of the wall structure of Figs. 1, 2 and 3.

55 Figure 5 is a face view of a portion of the sheet metal piling wall of Fig. 1 showing it in the process of construction, this view showing the part of the wall one of the sheet metal piles of which is formed of three sections arranged

in a vertical series, the two uppermost sections being removed.

Figure 6 is a similar view of the two upper sections of the pile illustrated in Fig. 5 as removed from the wall.

60 Figure 7 is a face view of the adjacent portions of two of the sections of the sectional pile shown in Figs. 5 and 6, with an anchor rod, shown in section, interposed therebetween.

65 Figure 8 is a similar view of the completed structure at the portion thereof shown in Fig. 7 and illustrating the full length piles at each side of the sectional pile.

70 Figures 9 and 10 are views like Figs. 7 and 8, respectively, illustrating a modification of the structure.

75 Figure 11 is a plan view of a section of the structure comprising wales and anchor rods for bracing and stiffening the retaining walls (the latter being omitted in this figure) of the break-water construction shown in Fig. 3.

Figure 12 is an enlarged sectional view taken at the lines 12 on Figs. 4 and 11 and viewed in the direction of the respective arrows; and

80 Figure 13, an enlarged sectional view taken at the lines 13 on Figs. 4 and 11 and viewed in the direction of the respective arrows.

85 Referring first to the construction shown in Fig. 1 it comprises, generally stated, a wall structure formed of sheet metal piles driven into the ground to extend in edge-to-edge relation to form the wall at one side of which the body of water, represented at 14, extends, and at the opposite, land, side of which filling represented at 15 would be positioned on the ground indicated at 16, as for example to the level shown.

90 The sheet piles may be of any desirable form. As shown they are of the well-known channel form alternate ones of which are reversely disposed as shown and connected together by interlocking slip-joint forming portions 17 which in this construction, are located midway between the plane occupied by the web portions of the piles.

95 The construction of Fig. 1 also comprises wales 18, 19 and 20 each of which may be discontinuous across the face of the wall as by providing the wale in sections as shown in Fig. 4, or continuous, if desired; the upper wale 18 being positioned adjacent the upper edge of the wall, the intermediate wale 19 at an elevation substantially at the water level and the lowermost wale 20 considerably below the water level.

100 At intervals the wales are engaged with the ends of anchor rods 21 the inner ends of which

60

65

70

75

80

85

90

95

100

105

110

are secured to anchor logs 22 embedded in the filling 15.

Each wale is shown as formed of a pair of channel irons 23 with their webs opposed and secured together by bolts 24 which extend through spacer-sleeves 25 for holding the channel irons in spaced apart relation. The anchor rods extend through the spaces between the channel irons 23 and are provided with washers 26 bearing against the outer faces of the wales and held in place by nuts 27 screwed on the rods 21.

The sheet piles for forming the wall comprise preferably full length piles 28 except at the portions of the wall at which the anchor rods for the wales 19 and 20 are to be located the piles at these anchor rods being each formed of three sections 29, 30 and 31 which, in the completed structure and preferably during the driving operation, are disposed in vertical series, the sections 29 being of such length that the seating portions thereof, hereinafter referred to, for the anchor rods 21, will extend at the elevation to be occupied by the lower row of anchor rods when these sections are driven the desired distance into the ground; the sections 30 being of such length that the seating surfaces thereof, also hereinafter referred to, for the intermediate row of anchor rods will, when the sections 30 are applied to position on the lower sections 29, extend at the elevation desired to be occupied by these anchor rods; and the upper sections 31 being of such length that, when applied to the sections 30, their upper edges will extend substantially flush with the upper edges of the piles located between the sectional piles.

The sheet piles may be driven in the usual manner, and when the building of the wall progresses to the point where one of the sectional piles is to be located the sections 29, 30 and 31 of the pile are positioned one above the other to form the vertical series thereof and then driven as a unitary pile to position, temporary splices (not shown) being placed on the lower ends of the sections 30 and 31 if necessary to maintain the alinement of the sections in driving.

The operation of building the wall by continuing to drive the piles, utilizing the sectional piles at the desired locations for registry with the anchor rods to be assembled with the wall, as hereinafter described, is continued until a convenient length of wall has been erected and then the sections 30 and 31 of the sectional driven piles are lifted out of position in the wall which causes the wall to present slots, one being shown at 32, the upper ends of which are open.

Where the wales are formed in sections, as shown, an assembly of a section of the lower wale 20, its anchor rods and log 22 is applied to the wall, the anchor rods being lowered to the lower sections 29 through the slots 32, if necessary a temporary support (not shown) being provided for the anchor rods and log.

The sections 30 are then re-driven to seated position above the sections 29 and the assembly of a section of the intermediate wale 19, its anchor rods and anchor log then applied to the wall, its anchor rods being lowered through the portions of the slots in the wall above the sections 30, (the anchor rods and log being temporarily supported if necessary); and the upper sections 31 then driven to place.

The upper wale 18 would be assembled with

the wall in any suitable way, as for example in accordance with common practice.

The anchor rods for the wales 19 and 20 are thus located between the adjacent ends of the sections 29, 30 and 31 forming the sectional piles which sections may be cut off straight across as shown in Figs. 7 and 8, in which case the straight upper edges of the pile-sections below the anchor rods would form seats for these rods; or recessed as represented in Figs. 9 and 10 at 33 to form seats for the rods, and, if desired, the lower edges of the sections at the rods recessed as represented at 34 in registry with the recesses 33, the ends of the sections, when recessed to receive the rods, fitting endwise together as shown.

In the case of constructions like those shown in Figs. 7-10, inclusive, wherein, in the one case space is provided between the straight end edges of the sections and, in the other, spaces are provided around the anchor rods, closure means for these spaces are preferably provided. In the construction shown in Figs. 7 and 8 the closure means comprises channel shaped members 35 positioned against the outer channel portions of the pile-sections at the spaces to be closed and interposed between the piles and the wale. In the construction shown in Figs. 9 and 10 these closure means are in the form of disks 36 positioned between the front faces of the sectional piles and the wale. In both of these constructions the closure means referred to would be assembled with the anchor rods 21 before the wale and anchor-rod assembly is applied to position in the wall as above described, and preferably by screwing these closure means upon the outer-threaded ends of the anchor rods, it furthermore being desirable in the case of the construction shown in Figs. 7 and 8 that the member 35 be tack-welded to the wale to hold the member 35 in proper position and to fit and re-drive the pile section above it while the wale assembly is being lowered into place, thereby avoiding underwater adjustments.

Where provision should be made for correcting differences in elevations of the anchor-rod-seating portions of the pile-sections, as for example where there is uncertainty as to the depth to which the piles may be driven into the ground, the lower pile sections are intentionally made shorter than they otherwise would be, and after they are driven to place short pieces of pile applied to their upper ends to cause them to extend to the desired elevation.

The structure of Fig. 2 is constructed in the same way as that above described except that, as will be understood, the sectional piles for registry with the anchor rods shown at 21^a and engaging the lower underwater wale 19^a would be provided in two sections disposed in vertical series instead of three, as only one wale is located below the water level.

The structure shown in Fig. 3 would be built in accordance with the above description of the construction shown in Fig. 1, and the manner of erecting the wall and applying the wales and anchor rods except that in this particular construction two spaced apart walls represented at 36 and formed of full length piles and sectional piles instead of a single wall as in the case of Fig. 1, are provided with upper and lower wales 37 and 38, respectively, at their outer surfaces held in place by anchor rods 39 certain of which connect together the upper

wales 37 and others thereof the lower wales 38 as shown.

In the erecting of such a structure opposed wale-sections and anchor rods forming an assembly as shown in Fig. 11 and comprising wale sections for each wall, would be lowered to position in the slots in the walls and corresponding to the slot 32 of Fig. 5 and produced by the withdrawing of certain of the upper sections of the sectional piles of each wall, and these sections then replaced in the walls as described in connection with Fig. 1.

It will thus be understood that the wales and their securing means may be placed at any desired elevation on the wall, or walls, as the case may be, and regardless of the water level; without requiring the service of divers.

While I have illustrated and described certain particular constructions embodying my invention and described certain procedures in the erecting thereof, I do not wish to be understood as intending to limit the invention thereto, as the invention may be provided in other forms of structure and the procedure varied without departing from the spirit of the invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. In a structure of the character set forth, the combination of a wall formed of sheet piles, wales and anchor elements engaging said wales, those of said piles which are located at said anchor elements being formed of separate sections arranged in vertical series, with the anchor elements located between adjacent ends of said sections.

2. In a structure of the character set forth, the combination of a wall formed of sheet piles, wales and anchor elements engaging said wales, those of said piles which are located at said anchor elements being formed of separate sections arranged in vertical series, with the anchor elements located between adjacent ends of said sections, portions of adjacent edges of said sections being spaced apart and closure means between the wales and piles for the spaces between said sections.

3. The method of constructing a wall structure formed of sheet piles arranged edge to edge, wales and anchor elements portions of which latter extend through the wall formed of said piles, which comprises providing those of the piles at which the anchor elements are to be

located, in sections comprising vertical series, driving the piles, lowering the anchor elements, with the wales assembled therewith, to position on lower sections of said sectional piles and installing in place in the wall the pile sections to extend next above said anchor elements.

4. The method of constructing a wall structure formed of sheet piles arranged edge to edge, wales and anchor elements portions of which latter extend through the wall formed of said piles, which comprises providing those of the piles at which the anchor elements are to be located, in sections comprising vertical series, driving the piles, each sectional pile being driven as a unit with its sections assembled in vertical series, removing upper ones of said pile sections, lowering the anchor elements, with the wales assembled therewith, to position on the pile sections in the wall and thereafter reinstalling in the wall the pile sections removed therefrom.

5. In a structure of the character set forth: a plurality of sheet piles; longitudinally sectional piles interspersed at intervals between individuals of the first named piles to form a complete wall of piling; anchor elements passing between spaced individuals of said first named piles and between the sections of the sectional piles; and means engaging the ends of said elements and the exterior of said wall to anchor the elements to the wall.

6. In a structure of the character set forth, the combination of spaced walls formed of sheet piling, a wale placed exterior of each wall, anchor elements engaged at their opposite ends to said wales, those of said piles which are located at said anchor elements being formed of separate sections arranged in vertical series with the anchor elements located between adjacent ends of said sections.

7. The method of constructing a structure comprising spaced walls each formed of sheet piles, wales and anchor elements, portions of which latter extend through the walls, which comprises: providing those of the piles in each wall at which the anchor elements are to be located, in sections comprising vertical series; driving the piles; lowering the anchor elements with a wale assembled with each end of each anchor element to positions on lower sections of sectional piles in each wall; and installing in place in the wall the pile sections to extend next above said anchor elements.

WILLIAM G. CAPLES.

55	180
60	185
65	140
70	145
75	150