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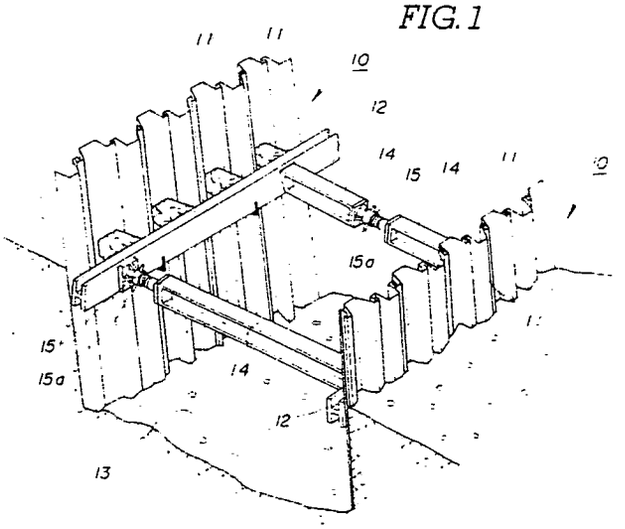
(54) Shore strut assembly for supporting sheathing wall.

(57) A strut assembly (20, 60, 70) for supporting a sheathing wall (10) is provided. The strut assembly includes a plurality of blocks (21, 22, 23, 61, 62) each connected in series to form a parallelepiped as a whole. At least one (21, 62) of the blocks is fastened to one end of a shore strut (14) for forming an extension of the shore strut and for receiving pressure acting on the sheathing wall (10) together with the shore strut (14). At least one end face (21d, 62c) of one block (21, 62) abuts against one end face (22c, 61c) of the adjacent block (22, 61) at an angle inclined relative to a plane (y) normal to a longitudinal axis (x) of the shore strut and the shore strut assembly so that when disassembling the shore strut assembly (20, 60, 70) after use, the one block (21, 62) slides along with the inclined angle by the action of the pressure along the longitudinal axis of the shore strut and the shore strut assembly so as to be disengaged from the adjacent block (22, 61).

FIG. 1



EP 0 249 654 A2

Shore Strut Assembly for Supporting Sheathing Wall

BACKGROUND OF THE INVENTIUON:

Field of the Invention;

This invention relates to a shore strut assembly for supporting a sheathing wall and more particularly to a shore strut assembly for supporting a sheathing wall that can be assembled and disassembled easily.

Related Art Statement;

In the construction of various construction works such as buildings, roads, railroads, water ducts or dams, soil and sand or rock are first excavated to form a pit within which various construction works are carried out. For such excavation, a sheathing wall is formed to prevent the surrounding soil and sand or rock from collapsing.

Referring to Fig.1, for the formation of a sheathig wall 10, a plurality of sheet piles 11 are driven to predetermined depth into the ground in neighboring relation to one another. Then, after digging each sheet pile 11 into the ground to the extent that the sheet piles 11 are not tilted under the soil pressure, wales 12 for supporting the sheet piles 11 are attached to the sheet piles in a direction substantially at right angles with the driving direction of the sheet piles 11. Then, in order to prevent the sheet piles from tilting towards a pit 13 under the soil pressure, a shore strut 14 is installed between a pair of opposing wales 12, 12 mounted to the sheet piles 11 constituting opposing sheating wall sections 10, 10. In order to adjust the length of the shore strut to the distance between the wales 12, 12, a jack 15 is attached to the shore strut 14 so that the shore strut 14 will be correctly mounted in position between the wales by the extension and retraction of the jack 15. It is noted that the jack 15 may be mounted between the wale 12 and the shore strut 14 or between the opposing shore struts 14, 14.

However, since the jack 15 is extended by manually turning a handle 15a, the manual force of operations is sometimes insufficient to properly secure the shore strut 14 between the wales 12, 12 so that the shore strut 14 are likely to drop under small impact. Moreover, the shaft of the jack 15 is apt to be broken in case of elevated soil pressure. In addition, when the handle 15a is turned manually after the end of the predetermined construction operations and is gradually retracted the jack 15 for detaching the shore strut 14, it frequently occurs that the sheet piles 11 are inclined towards the pit 13 under the soil pressure such that the jack 15 is pinched between the wale 12 and the shore strut 14 or between the opposing shore struts so that it becomes impossible to detach the shore struts 14. In this case, it becomes necessary to dismount the jack 15 by striking it with a hammer or the like with considerable labor, while the expensive jack may be occasionally destroyed.

OBJECTS AND SUMMARY OF THE INVENTION:

It is a principal object of the present invention to provide a shore strut assembly for supporting a sheathing wall which allows the shore strut to be positively secured without the risk of incidental dropping and without requiring manual operation.

It is another object of the present invention to provide a shore strut assembly for supporting a sheathing wall which can be extremely easily assembled and disassembled.

It is a further object of the present invention to provide a shore strut assembly for supporting a sheathing wall which allows the shore strut to be instantly disassemled and dismounted under the prevailing soil pressure.

It is a further object of the present invention to provide a sturdy and inexpensive shore strut assembly for supporting the sheathing wall.

These and other objects of the invention will become clear from the following description.

According to the present invention, there is provided a shore strut assembly for suporting a sheathing wall comprising a plurality of blocks each connected in series to form a parallelepiped as a whole, at least one of the blocks being fastened to one end of a shore strut for forming an extension of the shore strut and for receiving pressure acting on the sheathing wall together with the shore strut, at least one end face of one block abutting against one end face of the adjacent block at an angle inclined relative to a plane normal to a longitudinal axis of the shore strut and the strut assembly so that when disassembling the shore strut assembly after use, the one block slides along with the inclined angle by the action of the pressure along the longitudinal axis of the shore strut and the shore strut assembly so as to be disengaged from the adjacent block.

BRIEF DESCRIPTION OF THE DRAWINGS:

Fig.1 is a perspective view wherein conventional members for supporting the sheathing wall and the site of excavation are schematically shown.

Fig.2 is a perspective view showing an embodiment of a shore strut assembly according to the present invention, and showing the assembly when mounted in position.

Figs.3a, 3b and 3c are perspective views showing blocks that make up the shore strut assembly shown in Fig.2, these blocks being shown so that the inner parts can be seen through from outside;

Fig.4 is a diagrammatic sectional view taken along line IV - IV of Fig.2.

Fig.5 is a side elevational view showing the shore strut assembly of Fig.2 when mounted between two shore struts;

Fig.6 is a sectional view showing a further embodiment of the shore strut assembly of the present invention; and

Fig.7 is a side elevational view showing a further embodiment of the shore strut assembly of the present invention.

PREFERRED EMBODIMENTS OF THE INVENTION:

Reference is made to the accompanying drawings illustrating certain preferred embodiments of the present invention.

Referring to Figs. 2 to 4, an embodiment of the shore strut assembly of the present invention is indicated generally by refererice numeral 20. In these figures, the parts or components same as those shown in Fig.1 are indicated by the same numerals. The shore strut assembly 20 is made up of three blocks 21, 22 and 23 connected together in series. In the present embodiment, the blocks 21 to 23 are connected together by bolts/nuts 24. In the actual construction, one or more shore struts 14 of a predetermined length, H steel beams in the present example, are selected as a function of the size of the pit 13, while the blocks 21 to 23 are selected from among a number of prefabricated blocks of various sizes so that these blocks when connected together in position will approximately fill the gap between the wale 12 and an end plate 14a welded to the end of the shore strut 14. The end plate 14a and the blocks 21 to 23 may be previously connected together at the plant and transported to the site of construction for connecting the block 23 to the wale 12. As an alternative, the block 21 may be previously connected at the plant to the end plate 14a of the shore strut 14 by bolts/nuts 24, similarly at the plant and the block 23 connected to the wale 12 at the site of construction. The block 22 is finally introduced at the construction site between the blocks 21 and 23 and connected by bolts/nuts 24. These bolts/nuts 24 are preferably employed for connecting the blocks, the end plate and the wale. A bolt tightener, not shown, may be used for tightening the bolts in situ. The bolt tightener is provided with an end part for receiving the bolt and being rotated for tightening the bolt. As shown in Fig.2, the shore strut assembly 20 is securely connected in position between the shore strut 14 and the wale 12 so that there is no risk of accidental dropping of the assembly 20.

In Figs. 3a to 3c, the blocks 21 to 23 are shown in perspective so that the inner parts thereof can be seen through from outside. The block 21 is a hollow block formed by an upper plate 21a, a lower plate 21b, a vertically extending lateral plate 21c having unnumbered through-holes for passage of tightening bolts, an inclined lateral plate 21d having unnumbered through-holes for passage of tightening bolts, and an inner reinforcement plate 21e. The block 22 is identically constructed as the block 21 except that the vertically extending lateral plate 21c of the block 21 is replaced by an inclined lateral plate 22c so that the block 22 has two inclined lateral plates 22c, 22d. Thus, the same reference numerals are used and the description of the other components of the block 22 is omitted. The block 23 is also identically constructed as the blocl 21 except that the blocks are symmetrical relative to each other so that the block 23 is indicated by the same reference numerals as the block 21 and the redundant description is similarly omitted.

As can be seen from Figs. 2 to 4, the blocks 21, 22 and 23 when connected together in series will form a parallelepiped as a whole, in the present embodiment, a right-angled parallelepiped, as the extension of the shore strut 14. As shown in Fig.4, the shore strut assembly 20 and the strut 14 are acted upon by pressure from the sheathing wall 10 along the longitudinal axis x in order to prevent the sheet pile 11 from becoming tilted in the direction of the pit 13. The inclined lateral plate 21d of the block 21 and the inclined lateral plate 22c of the block 22 abut to each other at an angle inclined relative to a plane y normal to the longitudinal axis x of the shore strut 14 and the shore strut assembly 20, while the inclined lateral plate 22d of the block 22 and the inclined lateral plate 23c of the block 23 abut to each other at an angle inclined relative to a plane z normal to the axis x. As will be clarified hereafter, it is critical in the present invention that the adjacent blocks abut to each other at an angle inclined relative to a plane normal to the longitudinal axis of the shore strut and the shore strut assembly.

After the predetermined operation in the pit 13 is terminated so that it becomes necessary to dismount the sheathig wall 10, a wire rope, not shown, is attached to the shore strut 14 in order to hoist the shore strut 14 by a crane, not shown, so that the shore strut 14 will not drop by gravity during dismounting. The shore strut assembly 20 is then disassembled. At this time, as shown in Fig.2, the blocks 21, 22 are spot welded to each other along a seamline as at 25, while the blocks 22, 23 are also spot welded to each other along a seamline as at 26 in order to prevent the soil pressure from being applied to the bolts/nuts 24 while also preventing the block 22 from dropping by gravity during dismounting of the assembly 20. The bolts/nuts 24 connecting the blocks 21, 22 to each other and the bolts/nuts 24 connecting the blocks 22, 23 to each other are then loosened, after which the upper surface of the block 22 is struck as with a hammer, not shown, for dismounting. Since the preseure acts on the inclined lateral plates 22c, 22d of the block 22 in a direction along the longitudinal axis x of the shore strut 14 and the shore strut assembly 20, as shown in Fig.4, the block 22 is slid under the operation of the pressure in accordance with the inclined angle such that the block 22 is instantly disengaged from the blocks 21, 23. The blocks 21, 22 may be loosely connected by a rope 27, for example, in order to prevent the block 22 from dropping down.

In case the pit 13 is of a larger widthwise dimension, the shore strut assembly 20 formed by the blocks 21, 22 and 23 may be connected between two shore struts 14, 14, as shown in Fig.5.

Fig.6 shows a shore strut assembly 60 which is modified from the shore strut assembly 20 shown in Figs. 2 to 5. The assembly 20 is made up of two blocks 61, 62. The block 61 is formed by an upper plate 61a, a lower plate 61b, an inclined lateral plate 61c, a vertically extending lateral plate 61d and a central inner reinforcement plate 61e, as in the case of the shore strut assembly 20 of Fig.3. The inclined lateral plate 61c is made up of two inclined sections 61c1, 61c2 and a step or shoulder 61c3 interconnecting the inclined sections 61c1 and 61c2 with an offset along the longitudinal axis of the shore strut 14. The block 61 is secured to the wale 12 by bolts/nuts 24. The block 62 is connected to the shore strut 14 in a topsy-turvied relation to the block 61 and identically constructed as the block 61 so that redundant description is omitted for simplicity.

When mounting the shore strut assembly 60 in position, the shore strut 14 is set so that the step or shoulder 62c3 of the block 62 rests on the step or shoulder 61c3 of the block 61 as shown. A shim plate 63 is then driven into a space between the soil and the sheathing wall 10 for tilting the sheet pile 11 so as to abut the blocks 61, 62 to each other. Finally, the blocks 61, 62 are secured to one another by bolting. The shore strut assembly 60 is convenient when performing a fine adjustment of the mounting distance. The dismounting of the shore strut assembly 60 shown in Fig.6 is performed by the same sequence of operations as described with reference to Fig.2. In this case, the inclined lateral plate 61c of the block 61 is shifted relative to the inclined lateral plate 62c of the block 62, with the block 62 sliding in the direction of the arrow mark d.

Fig.7 shows a further different shore strut assembly 70 consisting of a combination of the blocks 61, 62 shown in Fig.6. Referring to Fig.7, a left side block 62 is connected to the shore strut 14, a right side block 62 is connected to the wale 12, and intermediate blocks 61, 61 are connected between the blocks 61, 61 with vertically extending lateral plates 61d, 61d thereof in abutting relation to each other. Fine adjustment of the mounting distance can be performed by the shim plate 63 and by taking advantage of the steps 61c3, 62c3. When dismounting the shore strut assembly 70, the blocks 61, 61 can be detached as one from the blocks 62, 62.

Claims

1. A strut assembly (20, 60, 70) for supporting a sheathing wall (10) comprising a plurality of blocks (21, 22, 23, 61, 62) each connected in series to form a parallelepiped as a whole, at least one (21, 62) of said blocks being fastened to one end of a shore strut (14) for forming an extension of said shore strut and for receiving pressure acting on said sheathing wall (10) together with said shore strut (14), at least one end face (21d, 62c) of one block (21, 62) abutting against one end face (22c, 61c) of the adjacent block (22, 61) at an angle inclined relative to a plane (y) normal to a longitudinal axis (x) of said shore strut and said shore strut assembly so that when disassembling the shore strut assembly (20, 60, 70) after use, said one block (21, 62) slides along with said inclined angle by the action of said pressure along the longitudinal axis of said shore strut and the shore strut assembly so as to be disengaged from said adjacent block (22, 61).

2. A shore strut assembly as claimed in claim 1 wherein end faces (23c, 62c) of other blocks (23, 62) abut on the other end faces (22d, 61c) of said adjacent blocks (22, 61) at an angle inclined relative to a plane (z) normal to the longitudinal axis (x).

3. A shore strut assembly as claimed in claim 2 wherein said adjacent blocks (22, 61) include two inclined lateral plates (22c, 22d, 61c) each having a horizontal dimension increasing towards the lower side to permit the assembly (20, 70) to drop by gravity upon disassembling thereof.

4. A shore strut assembly as claimed in claim 1 wherein the inclined lateral plate (62c) of said one block (62) has inclined sections (62c1, 62c2) and a first shoulder (62c3) interconnecting the inclined sections (62c1, 62c2) with an offset along the longitudinal axis of the shore strut, and the inclined lateral plate (61c) of said adjacent block (61) has inclined sections (61c1, 61c2) and a second shoulder (61c3) interconnecting the inclined sections (61c1, 61c2) with an offset along the longitudinal axis of the shore strut, and wherein, for assembling the shore strut assembly (60, 70), said one block (62) and said adjacent block (61) are abutted to each other after said first and second shoulders (62c3, 61c3) are rested one upon the other.

5. A shore strut assembly as claimed in claim 1 wherein said shore strut assembly (20, 60, 70) is mounted between the shore strut (14) and a wale (12) supporting said sheating wall (10).

6. A shore strut assembly as claimed in claim 1 wherein the shore strut assembly (20, 60, 70) is mounted between the shore struts (14, 14).

7. A shore strut assembly as claimed in claim 1 wherein the one block (21, 62) and the adjacent block (22, 61) are connected together by bolts/nuts (24) passed through through-holes.

8. A shore strut assembly as claimed in claim 1 wherein the block (21, 22, 23, 61, 62) is hollow and formed by an upper plate (21a, 22a, 23a, 61a), a lower plate (21b, 22b, 23b, 61b) and two confronting lateral plates (21c, 21d, 22c, 22d, 23c, 23d, 61c, 61d) interconnecting the upper and lower plates.

9. A shore strut assembly as claimed in claim 8 wherein a reinforcement plate (21e, 22e, 23e, 61e) is provided in the hollw block.

10. A shore strut assembly as claimed in claim 1 wherein said one block (21, 62) and said adjacent block (22, 61) are connected by a connecting member (27) so that the blocks are not allowed to drop during disassembling of the shore strut assembly.

FIG. 1

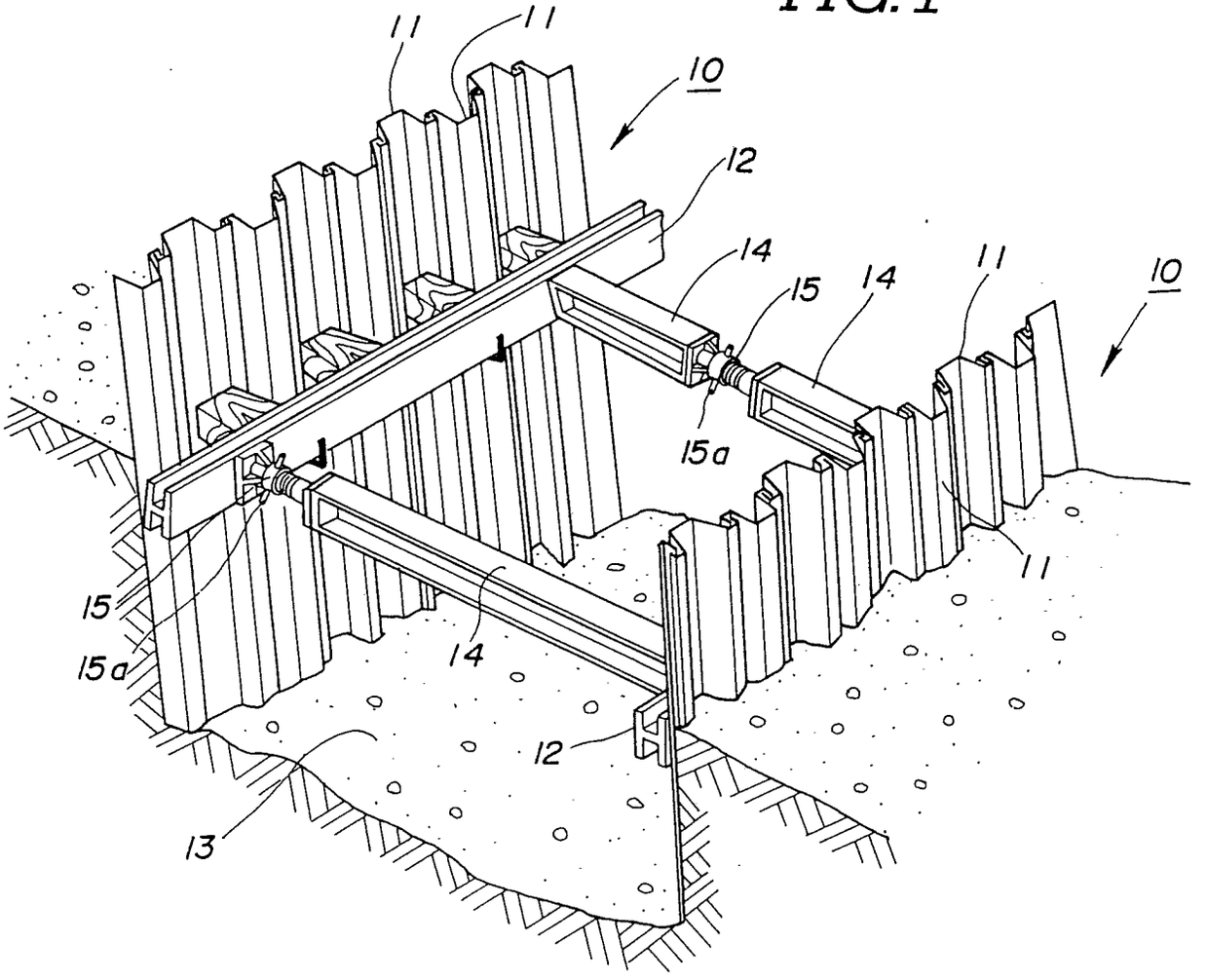


FIG. 3a

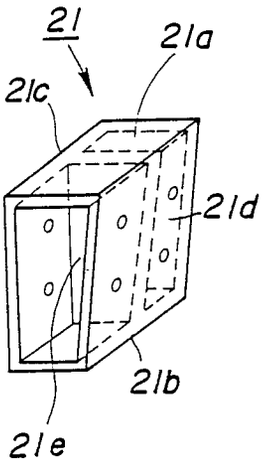


FIG. 3b

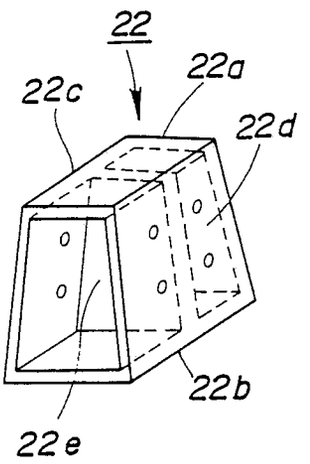


FIG. 3c

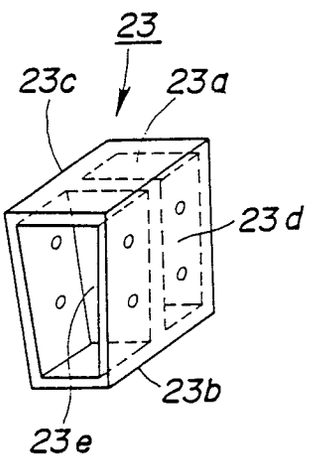


FIG.2

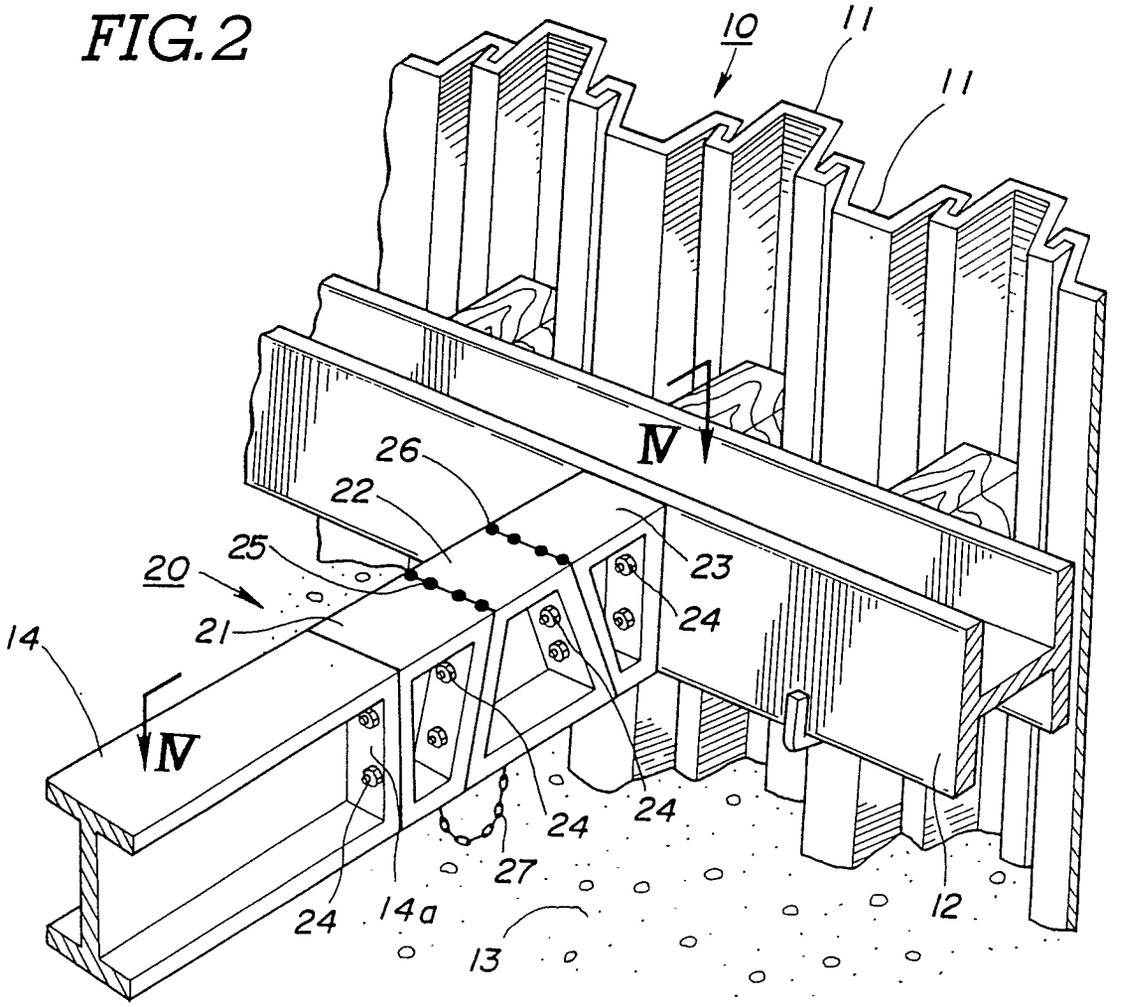

10
11
11
IV
26
22
25
20
21
23
24
14
IV
24
24
27
24
14a
13
12

FIG.4

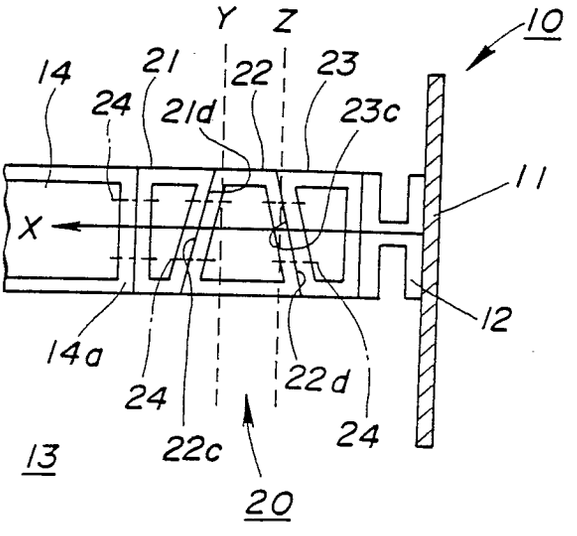

Y
Z
10
14
21
22
23
24
21d
23c
11
X
12
14a
24
22d
24
13
22c
20

FIG. 5

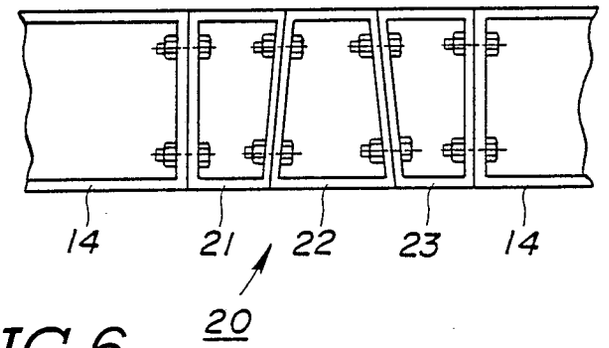


FIG. 6

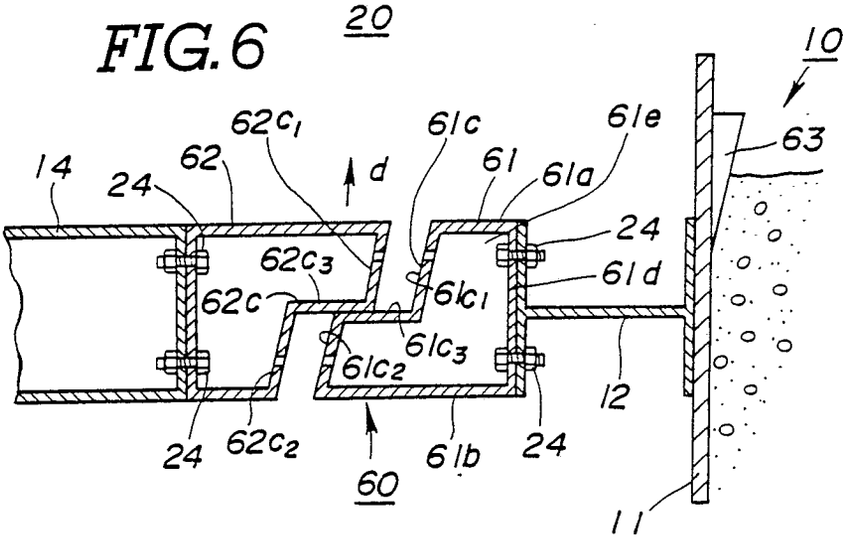


FIG. 7