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(54) A method for applying a sheet pile wall, and auxiliary profile to be used therewith.

(57) A method for applying a sheet pile wall by successively driving sheet piles (1) of steel into the ground and causing the longitudinal edges of said sheet piles to interlock and guide each other. Each time a (following) sheet pile is driven an auxiliary profile (4) is inserted, whereby a complementarily formed longitudinal edge of said profile is caused to engage the free longitudinal edge of said sheet pile, said profile functioning as a support for at least one nozzle (6, 8), through which an hydraulic liquid, such as water, is injected adjacent the free longitudinal edge of said sheet pile, and said auxiliary profile (4) being retracted from the ground prior to driving a following sheet pile.

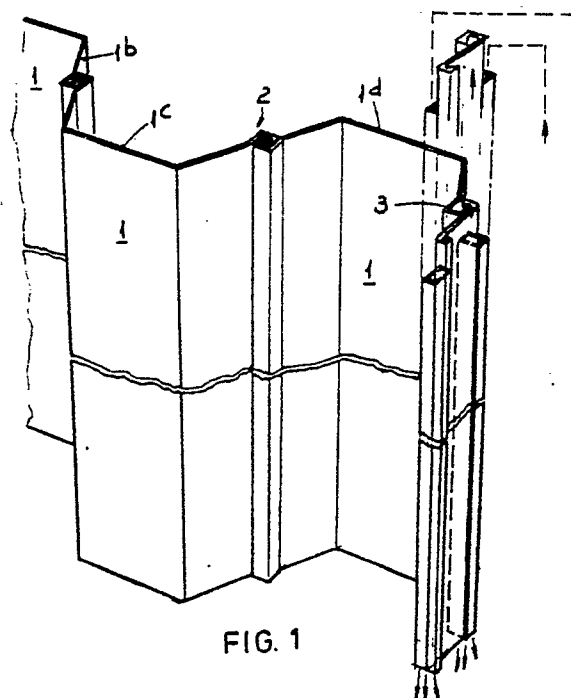


FIG. 1

EP 0 348 012 A1

A method for applying a sheet pile wall, and auxiliary profile to be used therewith.

The invention relates to a method for applying a sheet pile wall by successively driving sheet piles of steel into the ground and causing the longitudinal edges of said sheet piles to interlock and guide each other.

Such a method, with which sheet piles of steel are driven into the ground as by hammering or vibration, is commonly known. In general the sheet piles have a trapezoidal or Z-shaped cross-section and are successively driven into the ground, either one by one, or in sets of two sheet piles which have been connected in advance. The result is a sheet pile wall having a corrugated cross-section. Such a sheet pile wall is generally thought to be sufficiently water-tight.

Especially in case of large sheet pile lengths (for example a length of 30 m), however, the water-tightness may leave much to be desired. According to the lengths of the sheet piles to be driven into the ground becoming larger, the resistance to be overcome may substantially increase, whereas also the danger for deformation of the sheet piles will increase. As a result of this the sheet piles may interengage in an incorrect and consequently unsufficiently water-tight manner.

For some applications the degree of water-tightness to be achieved with this traditional method, is even very insufficient.

As an example of such applications the attention may be drawn to polluted soil areas which have to be isolated from the surroundings by driving a sheet pile wall around it.

The invention aims at improving the well-known method in such a way, that the driving of the sheet piles is lightened and improved conditions for a better water-tightness of the sheet pile wall are created.

According to the invention this aim is achieved in that each time a (following) sheet pile is driven an auxiliary profile is inserted, whereby a complementarily formed longitudinal edge of said profile is caused to engage the free longitudinal edge of said sheet pile, said profile functioning as a support for at least one nozzle, through which an hydraulic liquid, such as water, is injected adjacent the free longitudinal edge of said sheet pile, and said auxiliary profile being retracted from the ground prior to driving a following sheet pile.

In a practical embodiment of the method of the invention the insertion and retraction of the auxiliary profile is carried out in an intermediary phase between the insertion of two successive sheet piles of sheet pile pairs. The effect of the auxiliary profile is to be seen in that the soil in the area around the free longitudinal edge of the last driven sheet pile

is loosened up and pressed away, so that a next sheet pile (pair) may "smoothly" run into the key-way of the last driven sheet pile. The advantage of the effect of the auxiliary profile may be taken of even in an earlier stage by driving it each time simultaneously with a sheet pile (pair) into the ground.

A particular performance of the method of the invention is achieved by filling the hollow space which is created around the free longitudinal edge of the last driven sheet pile as a result of the retraction of the profile, by a sealing substance, such as bentonit, which is injected under pressure through said nozzle.

This means that upon driving of a next sheet pile a high degree of water-tightness of the connection between the two sheet piles or sheet pile pairs is obtained, because the interconnected edges will become embedded in a column of the said sealing substance.

This manner of performing the method according to the invention is particularly suitable for applications such as those, whereby polluted soil areas have to be isolated. In this case the method according to the invention offers substantial advantages over the method which been used until sofar and according to which at first "bentonit piles" are formed into the ground at locations where - in a later stage - the joints between the individual sheet piles of the future sheet pile wall are expected to be located. With such a method there is a great chance that in the process of drilling said bentonit piles an undesired deviation will take place which may not be simply controllable, while with the subsequent driving of the sheet pile wall horizontal deviations relative to the location of the previously inserted bentonit piles may also easily occur.

The invention also relates to an auxiliary profile to be used with the above described method. This auxiliary profile is mainly characterized by an elongated carrier strip having at at least one longitudinal edge a key-way formed complementarily to the longitudinal edge of a sheet pile, said strip carrying at least one nozzle which has its outlet opening at the lower end adjacent the opening of the key-way.

The invention will be hereinafter explained by way of example with reference to the accompanying drawing.

Fig. 1 is a perspective view of a part of a sheet pile wall of steel, showing the last driven sheet pile in engagement with an auxiliary profile according to this invention;

fig. 2 is a cross-sectional view of a sheet pile and the auxiliary profile in engagement therewith and

fig. 3 is a cross-sectional view on an enlarged scale of the auxiliary profile according to this invention.

The sheet pile wall according to fig. 1 is composed of sheet piles 1 having a trapezoidal cross-section, the longitudinal edges of said piles engaging one another. The sheet piles are e.g. in sets of two previously interconnected sheet piles driven into the ground in a manner known per se, i.e. by hammering or vibrating. In Fig. 1 the sheet piles 1c and 1d constitute a set which is the latest one driven into the ground, while the sheet pile 1b has been driven in in an earlier stage. The key-way connection 2 between the sheet piles 1c and 1d may be easily rendered watertight by applying, beforehand, to the key-way of both of said sheet piles a substance adapted to form a sealing mass when it gets into contact with water. The drawing shows the right hand edge (key-way) 3 of the sheet pile set 1c, 1d in engagement with the auxiliary profile 4 according to the invention. In the example shown use is made of an existing profile, a so-called "delta" profile, which is normally used to connect two sheet piles which are positioned perpendicularly to the other when seen in a horizontal plane. The web 5 of this well-known profile constitutes a strip shaped carrier for a tube 6 which is connected thereto e.g. by welding and which extends substantially along the entire length (= length of the sheet pile) of the profile. Said tube 6 is positioned at a slight distance opposite to the opening of the key-way 7 of the profile which has been formed complementarily to the key-way 3 at the longitudinal edge of the sheet pile 1d. A second tube 8 is connected to the side of the key-way wall 7a turned away from said tube 6. The tubes 6 and 8 have a rectangular cross-section. As a result of this the wall of the tube 6 facing to the opening of the key-way 7 may also function as a guide for the key-way wall 3a (vide fig. 2). To the upper ends of the tubes 6 and 8 conduits (not shown) may be connected, by means of which a liquid under pressure may be supplied. For example water may be supplied when driving profile 4. The water which discharges from the tubes 6 and 8 at the lower ends of the latter will remove the soil from the area of the key-way 3 of the sheet pile 1d, as a result of which a next sheet pile may run easier into the key-way 3 of sheet pile 1d.

The tubes 6 and 8 may be further utilized to inject a sealing substance, such as bentonit, into the space left around the key-way 3 when retracting the profile.

Claims

1. A method for applying a sheet pile wall by successively driving sheet piles of steel into the ground and causing the longitudinal edges of said sheet piles to interlock and guide each other, characterized in that each time a (following) sheet pile is driven an auxiliary profile is inserted, whereby a complementarily formed longitudinal edge of said profile is caused to engage the free longitudinal edge of said sheet pile, said profile functional as a support for at least one nozzle, through which an hydraulic liquid, such as water, is injected adjacent the free longitudinal edge of said sheet pile, and said auxiliary profile being retracted from the ground prior to driving a following sheet pile.

2. A method according to claim 1, characterized in that the insertion and retraction of the auxiliary profile is carried out in an intermediary phase between the insertion of two successive sheet piles or sheet pile pairs.

3. A method according to claim 1, characterized in that the auxiliary profile and a sheet pile are simultaneously driven into the ground.

4. A method according to claims 1-3, characterized in that the hollow space - which is created around the free longitudinal edge of the last driven sheet pile as a result of the retraction of the profile - is filled by a sealing substance, such as bentonit, which is injected under pressure through said nozzle.

5. An auxiliary profile to be used with the method according to claims 1-4, characterized by an elongated carrier strip having at at least one longitudinal edge a key-way formed complementarily to the longitudinal edge of a sheet pile, said strip carrying at least one nozzle which has its outlet opening at the lower end adjacent the opening of the key-way.

6. An auxiliary profile according to claim 5, characterized in that the nozzle is formed by a tube connected to the carrier strip at a slight distance opposite to the opening of the slot and extending along substantially the entire length of the profile.

7. An auxiliary profile according to claim 6, characterized by a second tube connected to the side of the key-way wall turned away from said first tube.

8. An auxiliary profile according to claims 5-7, characterized in that the nozzle or tubes have a rectangular cross-section.

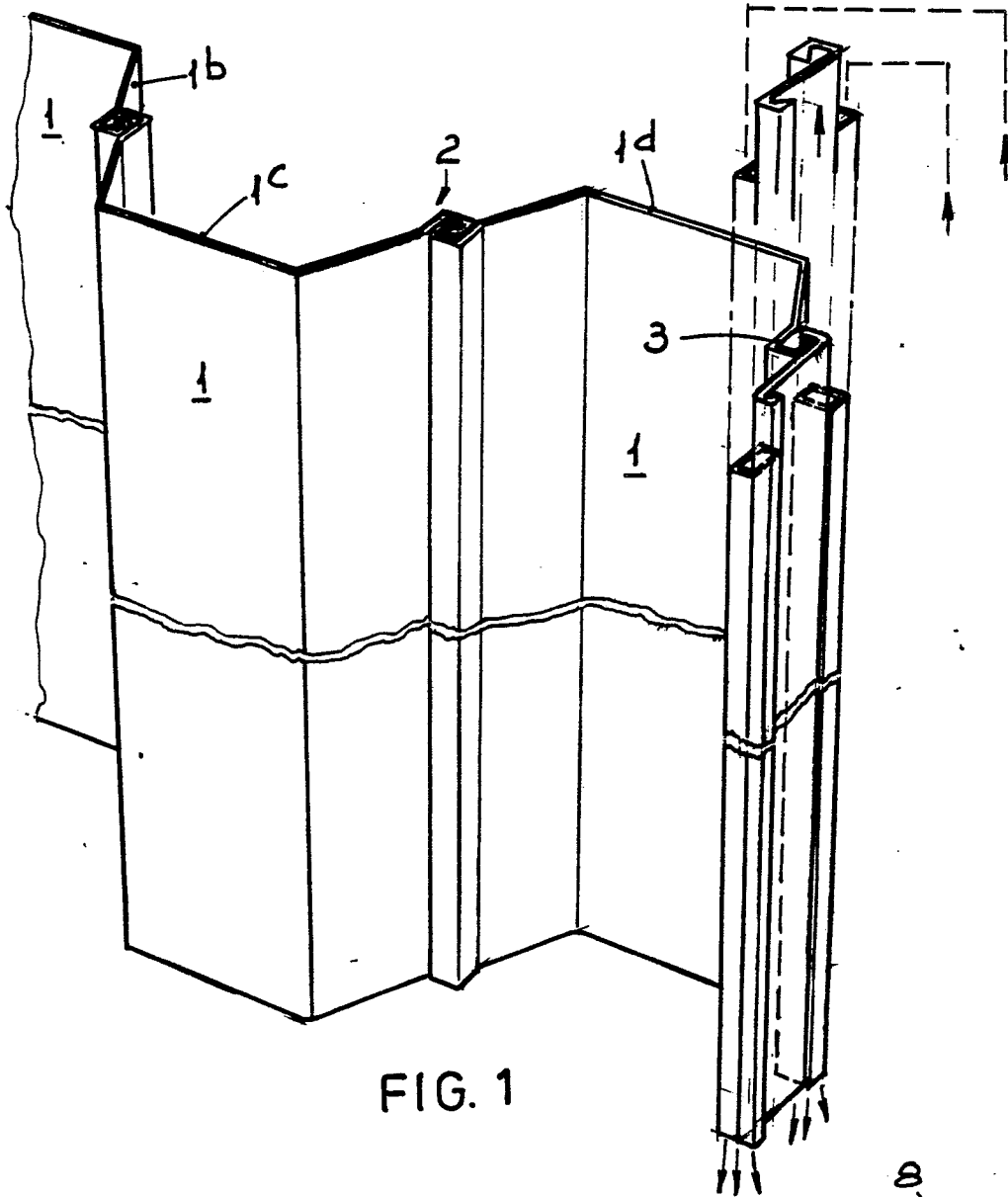


FIG. 1

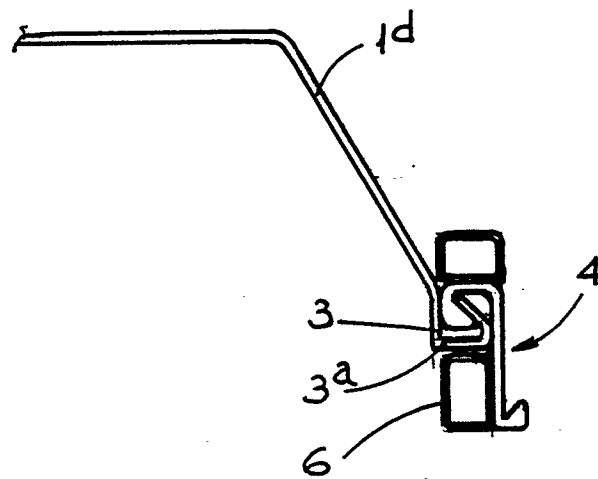


FIG. 2

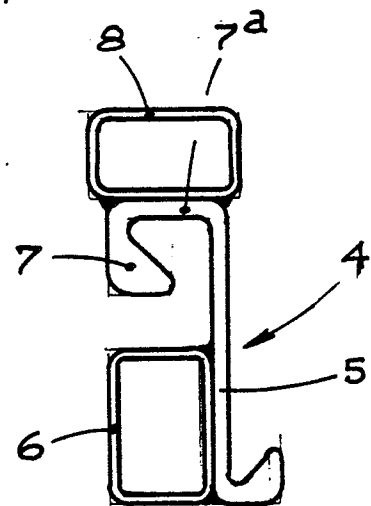


FIG. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-1 847 655 (KNIGHT) * Page 2, lines 32-65; figures 5,6 * ---	1,4-6	E 02 D 7/24 E 02 D 13/02
A	DE-C- 657 158 (NEDDEN) * Page 2, lines 11-50; figures 1-4 * ---	1,6,8	
A	GB-A- 518 727 (DALRYMPLE-HAY) * Page 3, lines 31-78,86-94; figures 1-3 * ---	1,3,4	
A	US-A-2 400 694 (HOOD) * Page 3, left-hand column, lines 20-46; page 3, right-hand column, lines 13-73; page 4, right-hand column, lines 8-11; figure 11 * ---	1,3,4,6	
A	NL-A-6 917 636 (NEDERHORST) * Page 2, lines 1-19; page 3, lines 3-9,14-35; page 4, lines 1-6; figures 1,2 * ---	1,4	
A	NL-A-6 406 159 (VEB TYPENPROJEKTIERUNG DEUTSCHEN BAUAKADEMIE) * Page 5, lines 1-35; page 8, lines 1-14; figures 3,4 * ---	1,3,4	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	DE-C- 446 471 (GUCKES) -----		E 02 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20-09-1989	Examiner RUYMBEKE L.G.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			