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(54) **Device for inserting a screen into the ground, and use of such a device**

Einrichtung zum Einschieben eines Schirms in den Boden, und Anwendung der Einrichtung

Appareil pour insérer un écran dans le sol, et utilisation d'un tel appareil

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US-A- 4 927 297

- **PATENT ABSTRACTS OF JAPAN vol. 8, no. 284 (M-348)(1721) 26 December 1984**

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Description

The invention relates to a combination comprising a device for inserting an essentially vertical screen into a trench dug in the ground and filled with a mixture such as a bentonite-water mixture or a bentonite-cement-water mixture, and a screen composed of sheeting panels, which device has an insertion element with a width corresponding approximately to the width of a panel, and means by which said insertion panel can be connected to the bottom edge of each panel, which bottom edge is to be placed in the bottom of the trench, in such a way that the panel concerned can be pulled into the trench under the influence of the weight of the insertion element. The invention further relates to the use of the combination.

Such a combination is known from US-A-4927297, which represents the prior art as referred to in the preamble of claim 1. In the case of this known combination the insertion element is in the form of a weight of which the height is an order of magnitude smaller than the width of a panel.

Apart from the fact that these weights are accommodated loose in the fold of the double sheet, these weights again do not provide any guide whatsoever. On the contrary, owing to their shape, they could even jam in the trench should they go askew.

The object of the invention is therefore to provide an arrangement of the above-mentioned type which does not have these disadvantages. This is achieved by the features of the characterising portion of claim 1, especially wherein the height of the insertion element is of the same order of magnitude as the width of a panel fitted in the ground. Such an insertion element is still relative insensitive as regards the wind, as a result of which its movements can be controlled much better. This means that in the case of such an insertion element the risk of the occurrence of damage to the trench and the panels is considerably smaller. On the other hand, the insertion element still provides a guiding action, with the result that the insertion of the panel is facilitated compared with the weights used in US-A-4,927,297. The insertion element can be, for example, just as high as it is wide or, for example, twice as high as it is wide.

Thanks to the dimensions of the insertion element, the device according to the invention has the advantage of a good guidance of the screen in the trench. This advantage is seen first of all in the avoidance of hitches during lowering into the trench. The height of the insertion element is such that it cannot dig into the trench wall or jam as a result of going out of alignment. On the other hand, the insertion element is readily controllable as a result of its dimensions, and is not sensitive to wind influences. The insertion element can also adapt better to the position of the panels, so that the lock of the panels are not overloaded during the insertion. It is also possible to work with the insertion element according to the invention where there is a different shape of trench, for example as a result of non-veritical walls.

As already mentioned, the panel has to be pulled into the trench under the influence of gravity acting on the insertion element. In view of the fairly small dimensions of the insertion element, and its consequent fairly low weight, the panel must be introduced in such a way that excessive friction forces acting against the driving force do not occur here. According to a preferred embodiment of the invention, supporting means for a rolled-up sheeting panel are provided for this purpose, which supporting means have a supporting surface with a low coefficient of friction for unrolling the roll of sheeting panel on said supporting surface, and for feeding it to the trench. In the case of the known device the panel is fed from a so-called humpback, where the whole panel surface is in friction contact with a supporting surface. In the process relatively great friction forces occur while, on the other hand, in the case of the supporting means according to the invention a considerably lower friction force occurs.

In a preferred embodiment, the insertion element has remote-controlled blocking means near its bottom edge, for blocking the means by which the panel can be connected to the insertion element. In this way the insertion element can be detached and raised out of the trench as soon as the panel has reached the bottom of the trench with its bottom edge.

For this purpose, the insertion element can be provided with a strip which can be inserted into an undercut slot of a ground anchor for a panel with a thickened bottom edge, in such a way that the bottom edge of the panel is held in place in the slot when the strip of the insertion element is also in it, the blocking means blocking the insertion element and preventing the strip from moving out of the slot. The use of a ground anchor with an undercut slot, which ground anchor can interact in the above-mentioned manner, is described in Dutch Patent Applications 9,000,874 and 9,000,875, which are not prior publications.

The blocking means by means of which the insertion element is prevented from being removed from the slot can be designed in various ways. According to a preferred embodiment, provision is made for at least one hook which is movable between a position in which it grips round the ground anchor in the position in which the strip of the insertion element is inserted in the slot of the ground anchor and a position in which it releases the ground anchor in such a way that the strip can be removed from the slot of the ground anchor.

Each hook can in this case be pivotable about an axis running parallel to the breadthwise direction of the insertion element and be operable by means of a hydraulic jack which holds each hook in the blocking position, pressed in against a spring force, and on removal of the hydraulic operating pressure is pressed in as a result of the spring force, in such a way that each hook is moved towards the release position. The jack can be operated by means of hydraulic supply lines running towards the

ground surface.

The insertion element preferably used is a rectangular frame composed of round pipe and provided at one short side with suspension means for suspending the frame from a hoisting crane, and at the opposite short side with the strip and the hooks. An insertion element in the form of such a frame has a relatively small frontal surface, and is thereby even less sensitive as regards wind. Since the pipes from which the rectangular frame is made are round, the risk of the frame causing damage in trench or panel is also very small.

In order to provide the insertion element with the desired weight, supporting bars can extend between the edges thereof, on which supporting bars ballast elements are provided.

According to a further possibility, the insertion element has at least one floating element which can be fixed to the frame, in such a way that the centre of gravity of the whole insertion element is below the floating element. The press-in force exerted by the insertion element on a screen can be further regulated by means of such a floating element. In addition, this floating element has a stabilising effect on the insertion element immersed in the bentonite suspension, which further promotes the correct handling of the screens to be inserted.

A supporting table may be provided for supporting a rolled-up sheeting panel, which supporting table has a supporting surface which is hollow curved in one direction and has roller means of which the roller axis in each case runs parallel to the generating line of the hollow curved supporting surface, which supporting surface has at one edge a stripping roller and a discharge roller for correctly unrolling and discharging the panel over said edge into the trench. The roller means can comprise, for example, rings or annular lengths of pipe which are fitted around axes extending parallel to the generating line.

The invention further relates to the use of the combination for fitting a screen into a trench dug into the ground, which screen is composed of elongated sheeting panels (2) extending into the trench over a depth substantially larger than their width.

In this connection, a clamp is fixed to the last panel inserted into the ground, with which an upward directed force can be exerted on said panel, a following panel is then coupled by its lock part to the corresponding lock part of the last panel inserted into the ground, and the panel to be inserted into the ground is pulled into the trench by the insertion element, while an upward force is constantly exerted on the last panel inserted into the ground, in such a way that this panel is not pulled further downwards into the trench. In this way the downward force exerted by the panel to be inserted on the previous panel is prevented from causing the latter to fall over or be pressed further into the ground. Such a state of affairs is advantageous particularly in the case of long panels, where as a panel is placed further into the ground the friction forces in the lock parts constantly increase.

The invention will be explained in greater detail below with reference to an example of an embodiment shown in the figures.

Figure 1 shows a view of a trench with panels containing the device used in the invention.

Figure 2 shows a cross-section through the trench with the device used in the invention.

Figure 3 shows a detail of the device used in the invention relating to the insertion element.

In Fig. 1 a trench wall is indicated by 1, and the panels fitted in the ground are indicated by 2. The panels 2 are interconnected by lock parts 3 which are not shown in any further detail. They can be, for example, a male and a female lock part.

As shown in Figure 1, panel 4 is just being inserted into the ground. For the sake of clarity, the insertion element, indicated in its entirety by 5, is shown by dashed lines. The panel 4 interacts by means of the lock parts 3 with the last panel 2 fitted in the ground. This last panel 2 fitted in the ground is held in place at its top edge close to the relevant lock part 3b by means of a clamp 6 which is suspended from the hoisting crane. By means of the clamp 6 an upward force can be exerted on the last panel 2 fitted in the ground. In this way the panel 2 last fitted in the ground can be prevented from sliding along with panel 4 or falling over as a result of the insertion of the latter panel. The clamp 6 is suspended from a cable 7 connected to the hoisting crane, and the insertion element 5 is also suspended from a cable 8 connected to a hoisting crane.

Figure 2 shows the device with a panel 2 fully fitted in the trench. The insertion element 5 also lies in the bottom of the trench and is about to be detached from the ground anchor 9 which is fixed at the bottom of the panel 2.

As further shown in Figure 2, and also in Figure 1, a supporting means 10 is provided for the roll of panel material 11. The supporting means 10 has a supporting surface comprising rollers 12a, the central axes of which extend parallel to the generating lines of the supporting surface of supporting means 10. A roller 12b which is vertically adjustable is provided at the edge of the supporting means 10 facing the trench, which roller can serve as a stripper for correctly unrolling the panel material 11, and a roller 12c over which the panel 2 can be fed to the trench is provided. The fact that the trench is virtually completely filled with a liquid mixture is not shown.

The ground anchor 9 is shown by dotted lines in Figure 3. As also shown in Figure 2, said ground anchor has a section with undercut slot 25, and also projecting anchor lips 26. A thickened part 27 which fits into the undercut slot of the section 25 is provided on the bottom edge of the panel 2. A strip 13 which is fixed to the underside of the insertion element is also inserted into the undercut slot. It is possible with this strip to prevent the thickened lower edge 27 of the panel 2 from coming out of the undercut slot of the section 25 again. Hooks 14 are provided in order to prevent the strip 13 from coming

out of the section 25 during the course of inserting the insertion element together with the panel 2 in the bottom of the trench 1. These hooks are each hinged about a pin 15 running in the breadthwise direction of the insertion element 5, and are interconnected by a rod 16. One of the hooks 14 is provided with a lever 17, to the free end of which a jack 18 is coupled. This jack 18 can be operated by means of supply lines (not shown) with a hydraulic and/or pneumatic medium. The piston rod 19 of the jack 18 runs through an eye 20, which is fixed to a supporting bar 21 of the insertion element 5. A ring 22 is also firmly fixed on the piston rod, and a spring 23 extends between ring 22 and eye 20. This spring 23 tries constantly to press in the piston rod, and therefore to push the hooks 14 into their open position. In the situation shown in Figure 3 the hooks 14 are pressed by the jack 18 into the blocked position, in which they grip under the ground anchor 9. In this position the strip 13 cannot come out of the section 25, so that a bottom edge 27 of a panel in the undercut slot of the section 25 cannot come out.

In the position shown in Figure 2 the hooks 14 are, however, in their release position. For the hooks 14 are fitted at the position of the recesses 24 in the ground anchor, so that in the position shown in Figure 2 the insertion element can be pulled freely by means of cable 8 out of the section 25. The panel and the ground anchor 9 in this case remain behind in the trench, in such a way that the insertion element can subsequently be used to place the next panel in the trench.

The insertion element 5 also has guide strips 28, which ensure good guidance of the insertion element relative to the trench wall.

Claims

1. In combination, a device for inserting an essentially vertical screen into a trench dug in the ground and filled with a mixture such as a bentonite-water mixture or a bentonite-cement-water mixture, and a screen composed of sheeting panels (2), which device has an insertion element (5) with a width corresponding approximately to the width of a panel (2), and means (25) by which said insertion panel can be connected to the bottom edge (27) of each panel (2), which bottom edge (27) is to be placed in the bottom of the trench, in such a way that the panel (2) concerned can be pulled into the trench under the influence of the weight of the insertion element (5), characterised in that, the sheeting panels (2) are interconnected by means of lock parts provided at their vertical side edges, and that the height of the insertion element (5) is of the same order of magnitude as the width of a panel (2) fitted in the ground.

2. Combination according to Claim 1, in which supporting means (10) for a rolled-up sheeting panel are provided, which supporting means (10) have a supporting surface (12a) with a low coefficient of friction for unrolling the roll of sheeting panel (11) on said supporting surface, and for feeding (12b, 12c) it to the trench.

3. Combination according to claim 1 or 2, in which the insertion element (5) has remote-controlled blocking means (14) near its bottom edge, for blocking the means (27) by which the panel can (2) be connected to the insertion element (5).

4. Combination according to Claim 3, provided with a strip (13) which can be inserted into an undercut slot of a ground anchor (9) for a panel with a thickened bottom edge (27), in such a way that the bottom edge (27) of the panel (2) is held in place in the slot when the strip (13) of the insertion element (15) is also in it, the blocking means (14) blocking the insertion element (5) and preventing the strip (13) from moving out of the slot.

5. Combination according to Claim 4, in which provision is made for at least one hook (14) which is movable between a position in which it grips round the ground anchor (9) in the position in which the strip (13) of the insertion element (5) is inserted in the slot of the ground anchor (9) and a position in which it releases the ground anchor (9) in such a way that the strip (13) can be moved out of the slot.

6. Combination according to Claim 5, in which each hook (9) is pivotable about an axis (15) running parallel to the breadthwise direction of the insertion element and is operable by means of a hydraulic and/or pneumatic (18) jack which holds each hook (14) in the blocking position, pressed in against a spring (23) force, and on removal of the hydraulic operating pressure is pressed in as a result of the spring (23) force, in such a way that each hook (14) is moved towards the release position.

7. Combination according to any of the preceding Claims 3 to 6, in which a rectangular frame composed of round pipe is provided, said frame having at one short side suspension means for suspending the frame from a hoisting crane, and at the opposite short side the strip (13) and the hooks (14).

8. Combination according to Claim 7, in which supporting bars extend between the edges of the frame, on which supporting bars ballast elements are mounted.

9. Combination according to any of the preceding Claims 3 to 8, in which guide strips (28) are provided at the side facing away from the side where the panel (2) can be fitted, in such a way that the measurement

of the insertion element (5) at right angles to the panel (2) is a little smaller than the width of the trench.

10. Combination according to Claim 8 or 9, in which at least one floating element can be fixed on the frame, in such a way that the centre of gravity of the whole insertion element (5) is below the floating element.

11. Use of the combination according to claim 1 for fitting a screen into a trench dug into the ground, which screen is composed of elongated sheeting panels (2) extending into the trench over a depth substantially larger than their width.

12. Use according to claim 11, in which a clamp (6) is fixed to the last panel (2) inserted into the ground, with which an upward directed force can be exerted on said panel (2), a following panel (2) is then coupled by its lock part to the corresponding lock part of the last panel (2) inserted into the ground, and the panel (2) to be inserted into the ground is pulled into the trench by the insertion element (5), while an upward force is constantly exerted on the last panel (2) inserted into the ground, in such a way that this panel (2) is not pulled further into the trench.

Patentansprüche

1. In Kombination, eine Vorrichtung zum Einschieben eines im wesentlichen senkrechten Schirms in einen im Boden ausgehobenen Graben, der mit einer Mischung wie zum Beispiel einer Bentonit-Wasser-Mischung oder einer Bentonit-Zement-Wasser-Mischung gefüllt ist, und ein aus Folienabschnitten (2) bestehender Schirm, wobei die Vorrichtung ein Einschiebeelement (5), dessen Breite ungefähr der Breite eines Abschnitts (2) entspricht, und Mittel (25), durch die der Einschiebeabschnitt mit dem unteren Rand (27) jedes Abschnitts (2) verbunden werden kann, aufweist, wobei der untere Rand (27) derart in den Boden des Grabens plaziert werden soll, dass der betreffende Abschnitt (2) unter dem Einfluss des Gewichts des Einschiebeelements (5) in den Graben gezogen werden kann, **dadurch gekennzeichnet, dass** die Folienabschnitte (2) mittels an ihren senkrechten Seitenrändern vorgesehenen Verriegelungsteilen miteinander verbunden sind und dass die Höhe des Einschiebeelements (5) in der gleichen Grössenordnung wie die Breite eines im Boden angebrachten Abschnitts (2) liegt.

2. Kombination nach Anspruch 1, bei der Stützmittel (10) für einen aufgerollten Folienabschnitt vorgesehen sind, die eine Stützfläche (12a) mit einem geringen Reibungskoeffizienten zum Abrollen der Rolle von Folienabschnitt (11) auf der Stützfläche und zu seinem Zuführen (12b, 12c) in den Graben aufweisen.

3. Kombination nach Anspruch 1 oder 2, bei der das Einschiebeelement (5) in der Nähe seines unteren Rands ferngesteuerte Sperrmittel (14) zum Sperren der Mittel (27), durch die der Abschnitt (2) mit dem Einschiebeelement (5) verbunden werden kann, aufweist.

4. Kombination nach Anspruch 3, die mit einer Leiste (13) ausgestattet ist, die in einen hinterschnittenen Schlitz eines Erdankers (9) für einen Abschnitt mit einem verdickten unteren Rand (27) derart eingeschoben werden kann, dass der untere Rand (27) des Abschnitts (2) in dem Schlitz festgehalten wird, wenn sich die Leiste (13) des Einschiebeelements (5) auch darin befindet, wobei die Sperrmittel (14) das Einschiebeelement (5) sperren und verhindern, dass sich die Leiste (13) aus dem Schlitz herausbewegt.

5. Kombination nach Anspruch 4, bei der mindestens ein Haken (14) vorgesehen ist, der zwischen einer Position, in der er den Erdanker (9) umgreift, in der Position, in der die Leiste (13) des Einschiebeelements (5) in den Schlitz des Erdankers (9) eingeschoben ist, und einer Position, in der er den Erdanker (9) derart freigibt, dass die Leiste (13) aus dem Schlitz herausbewegt werden kann, bewegt werden kann.

6. Kombination nach Anspruch 5, bei der jeder Haken (9) um eine parallel zur Querrichtung des Einschiebeelements verlaufende Achse (15) geschwenkt werden kann und mittels eines hydraulischen und/oder pneumatischen Zylinders (18) betrieben werden kann, der jeden Haken (14) in Sperrposition, gegen die Kraft einer Feder (23) hineingedrückt, hält und bei Entfernen des hydraulischen Betriebsdrucks infolge der Kraft der Feder (23) derart hineingedrückt wird, dass jeder Haken (14) zur Freigabeposition hin bewegt wird.

7. Kombination nach einem der vorhergehenden Ansprüche 3 bis 6, bei der ein aus einem runden Rohr bestehender rechteckiger Rahmen vorgesehen ist, wobei der Rahmen an einer kurzen Seite Aufhängemittel zum Aufhängen des Rahmens an einem Hebekran und an der gegenüberliegenden kurzen Seite die Leiste (13) und die Haken (14) aufweist.

8. Kombination nach Anspruch 7, bei der sich Stützstäbe zwischen den Rändern des Rahmens erstrekken und an diesen Stützstäben Ballastelemente befestigt sind.

9. Kombination nach einem der vorhergehenden Ansprüche 3 bis 8, bei der Führungsleisten (28) an der Seite, die von der Seite, an welcher der Abschnitt (2) angebracht werden kann, wegweist, derart angebracht sind, dass die Abmessung des Einschiebeelements (5) im rechten Winkel zum Abschnitt (2) etwas geringer ist als die Breite des Grabens.

10. Kombination nach Anspruch 8 oder 9, bei der mindestens ein Schwimmelement derart an dem Rahmen befestigt werden kann, dass der Schwerpunkt des gesamten Einschiebeelements (5) unter dem Schwimmelement liegt.

11. Verwendung der Kombination nach Anspruch 1 zum Anbringen eines Schirms in einem im Boden ausgehobenen Graben, wobei der Schirm aus länglichen Folienabschnitten (2) besteht, die sich über eine Tiefe, die wesentlich grösser als ihre Breite ist, in den Graben erstrecken.

12. Verwendung nach Anspruch 11, bei der eine Klemme (6) an dem letzten in den Boden eingeschobenen Abschnitt (2) befestigt wird, mit der eine nach oben gerichtete Kraft auf den Abschnitt (2) ausgeübt werden kann, dann ein folgender Abschnitt (2) durch seinen Verriegelungsteil mit dem entsprechenden Verriegelungsteil des letzten in den Boden eingeschobenen Abschnitts (2) verbunden wird und der in den Boden einzuschiebende Abschnitt (2) durch das Einschiebeelement (5) in den Graben gezogen wird, während fortwährend eine nach oben gerichtete Kraft derart auf den letzten in den Boden eingeschobenen Abschnitt (2) ausgeübt wird, dass dieser Abschnitt (2) nicht weiter in den Graben gezogen wird.

Revendications

1. En combinaison, un dispositif pour insérer un écran essentiellement vertical dans une tranchée creusée dans le sol et remplie d'un mélange tel qu'un mélange de bentonite-eau ou un mélange de bentonite-ciment-eau, et un écran composé de panneaux (2) en forme de feuilles, ledit dispositif possédant un élément d'insertion (5) dont la largeur correspond approximativement à la largeur d'un panneau (2), ainsi qu'un moyen (25) par lequel ledit panneau d'insertion peut être relié au bord inférieur (27) de chaque panneau (2), ledit bord inférieur (27) devant être placé au fond de la tranchée, de telle sorte que le panneau (2) concerné peut être tiré dans la tranchée sous l'influence du poids de l'élément d'insertion (5), caractérisé en ce que les panneaux (2) en forme de feuilles sont reliés l'un à l'autre au moyen d'éléments de verrouillage prévus sur leurs bords latéraux verticaux et en ce que la hauteur de l'élément d'insertion (5) est du même ordre de grandeur que la largeur d'un panneau (2) inséré dans le sol.

2. Combinaison selon la revendication 1, dans laquelle on prévoit des moyens de support (10) pour un panneau enroulé en forme de feuille, lesdits moyens de support (10) possédant une surface de support (12a) possédant un faible coefficient de friction pour dérouler le rouleau de panneau (11) en forme de feuille sur ladite surface de support et pour l'introduire (12b, 12c) dans la tranchée.

3. Combinaison selon la revendication 1 ou 2, dans laquelle l'élément d'insertion (5) possède des moyens de verrouillage (14) commandés à distance à proximité de son bord inférieur pour verrouiller le moyen (27) par lequel le panneau (2) peut être relié à l'élément d'insertion (5).

4. Combinaison selon la revendication 3, munie d'une bande (13) qui peut être insérée dans une fente découpée d'une ancre de sol (9) pour un panneau à bord inférieur épais (27) de telle sorte que le bord inférieur (27) du panneau (2) est maintenu en place dans la fente lorsque la bande (13) de l'élément d'insertion (5) s'y trouve également, le moyen de verrouillage (14) verrouillant l'élément d'insertion (5) et empêchant le ruban (13) de sortir de la fente.

5. Combinaison selon la revendication 4, dans laquelle on prévoit au moins un crochet (14) mobile entre une position dans laquelle il enserre l'ancre de sol (9), dans la position dans laquelle le ruban (13) de l'élément d'insertion (5) est insérée dans la fente de l'ancre de sol (9) et une position dans laquelle il relâche l'ancre de sol (9) de telle sorte que la bande (13) peut être retirée de la fente.

6. Combinaison selon la revendication 5, dans laquelle chaque crochet (9) pivote autour d'un axe (15) s'étendant parallèlement à la direction en largeur de l'élément d'insertion et peut être mis en service au moyen d'un vérin hydraulique et/ou pneumatique (18) qui maintient chaque crochet (14) dans la position de verrouillage, inséré par pression à l'encontre de la force exercée par un ressort (23), et lors du relâchement de la pression hydraulique de mise en service, est pressé vers l'intérieur de par la force exercée par le ressort (23) de telle sorte que chaque crochet (14) se déplace pour prendre sa position de relâchement.

7. Combinaison selon l'une quelconque des revendications 3 à 6, dans laquelle on procure un cadre rectangulaire composé d'un tuyau rond, ledit cadre comportant, sur un de ses petits côtés, un moyen

de suspension pour suspendre le cadre à une grue de levage et, sur le petit côté opposé, la bande (13) et les crochets (14).

8. Combinaison selon la revendication 7, dans laquelle des barres de support s'étendent entre les bords du cadre, des éléments de ballast étant montés sur lesdites barres de support.

9. Combinaison selon l'une quelconque des revendications 3 à 8, dans laquelle on prévoit des bandes de guidage (28) sur le côté se détournant du côté concerné par l'insertion du panneau (2), de telle sorte que la mesure de l'angle droit formé par l'élément d'insertion (5) par rapport au panneau (2) est légèrement inférieure à celle de la largeur de la tranchée.

10. Combinaison selon la revendication 8 ou 9, dans laquelle on peut fixer au moins un élément de flottement sur le cadre de telle sorte que le centre de gravité de l'élément d'insertion global (5) se trouve en dessous de l'élément de flottement.

11. Utilisation de la combinaison selon la revendication 1 pour insérer un écran dans une tranchée creusée dans le sol, ledit écran étant composé de panneaux allongés (2) en forme de feuilles s'étendant dans la tranchée sur une profondeur essentiellement supérieure à leur largeur.

12. Utilisation selon la revendication 11, dans laquelle une pince (6) est fixée au dernier panneau (2) inséré dans le sol, avec laquelle on peut exercer une force ascendante sur ledit panneau (2), un panneau suivant (2) est alors accouplé par sa partie de verrouillage à la partie de verrouillage correspondante du dernier panneau (2) inséré dans le sol et le panneau (2) à insérer dans le sol est tiré dans la tranchée par l'élément d'insertion (5), tandis qu'une force ascendante s'exerce constamment sur le dernier panneau (2) inséré dans le sol de telle sorte que ce panneau (2) n'est pas tiré davantage dans la tranchée.

fig-1

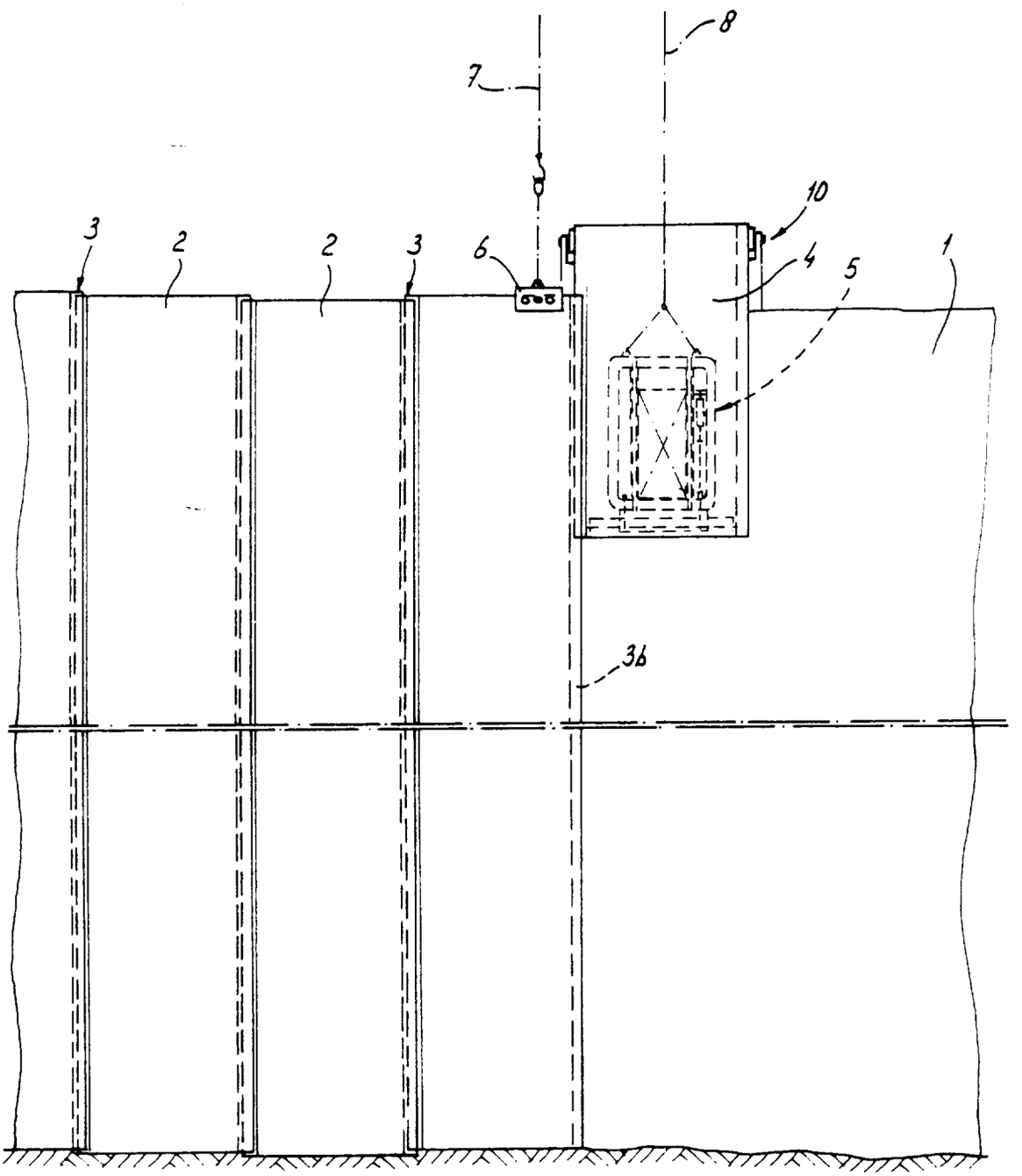
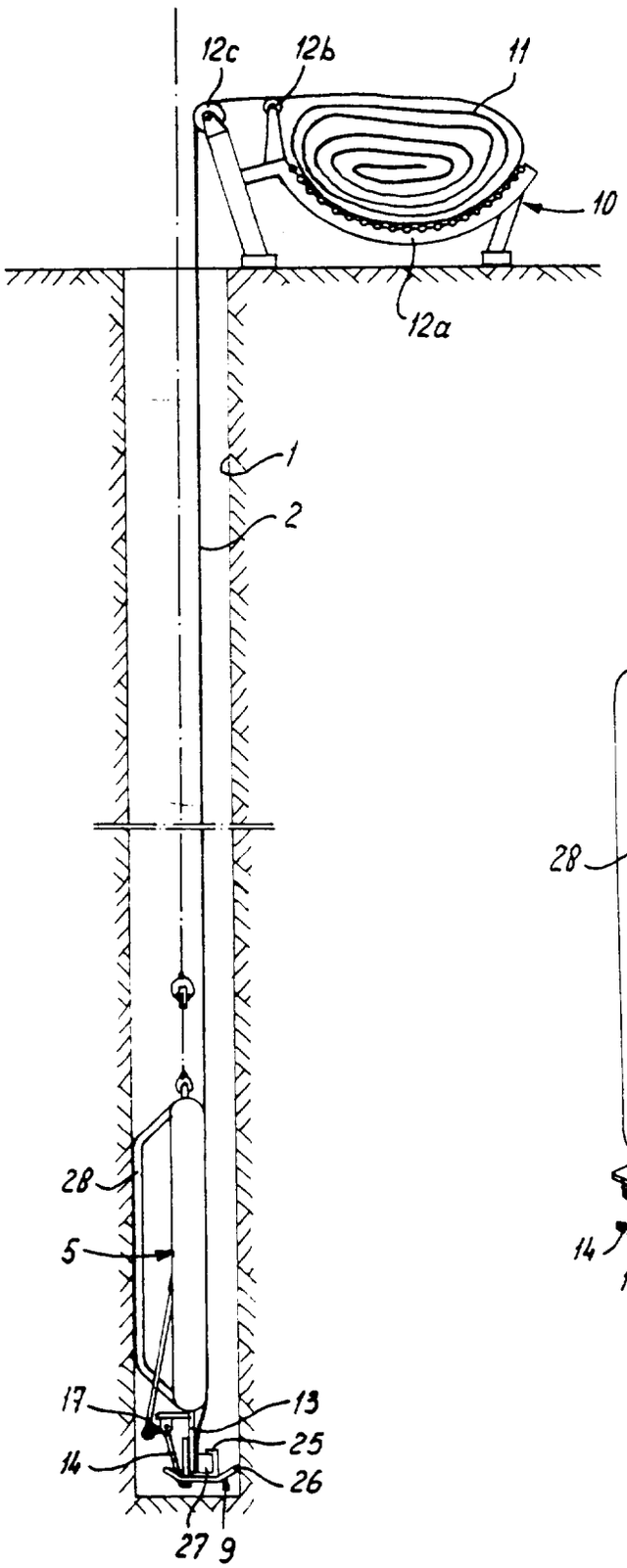


fig - 2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12a
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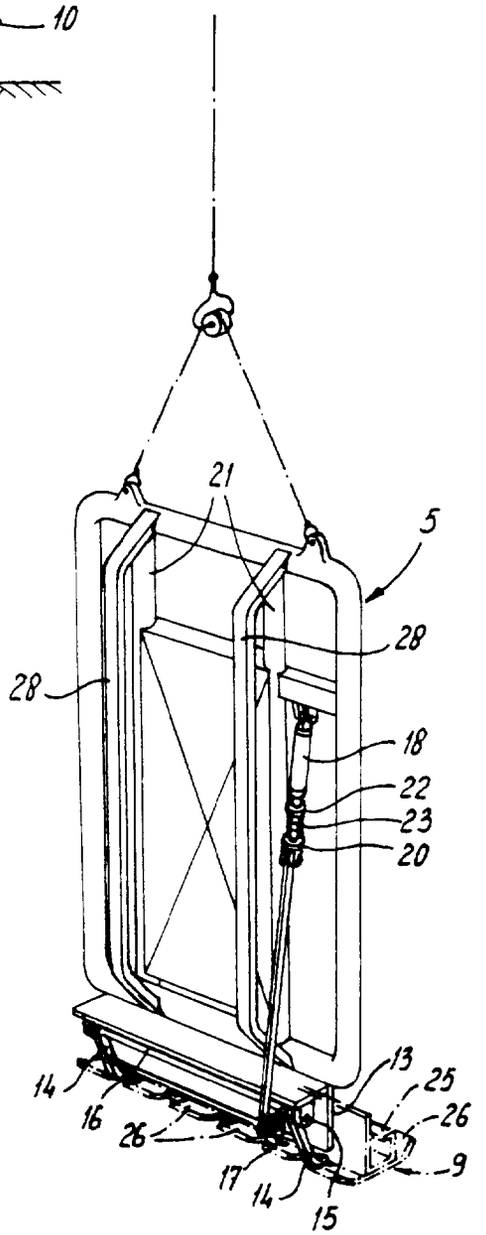
fig - 3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