



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.01.2004 Bulletin 2004/05

(51) Int Cl.7: **E01C 13/08**

(21) Application number: **03077129.9**

(22) Date of filing: **07.07.2003**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
 HU IE IT LI LU MC NL PT RO SE SI SK TR**
 Designated Extension States:
AL LT LV MK

(72) Inventor: **Van Reyen, Peter**
5401 LZ Uden (NL)

(74) Representative: **Valkonet, Rutger et al**
Algemeen Octrooi- en Merkenbureau
P.O. Box 645
5600 AP Eindhoven (NL)

(30) Priority: **23.07.2002 NL 1021138**

(71) Applicant: **Tapijfabriek H. Desseaux N.V.**
NL-5349 AC Oss (NL)

(54) **Device suitable for inserting elongated fibres into a substratum as well as such a method**

(57) A device and a method suitable for inserting elongated fibres into a substratum. The device comprises a frame which is movable across said substratum and a plurality of fibre insertion pins which are movable with respect to the frame. The device comprises a drum which is rotatable about a horizontally extending axis, which drum comprises a number of feed-through channels extending transversely to the axis, which feed-

through channels extend coaxially with the fibre insertion pins in an inserting position of the drum. In use, fibre material can be helically wound on the drum. The device furthermore comprises means for cutting the fibre material that is wound on the drum, so as to obtain a plurality of fibres. The fibre insertion pins can be moved through the feed-through channels in the insertion position of the drum for inserting the fibres that are wound on the drum into the substratum.

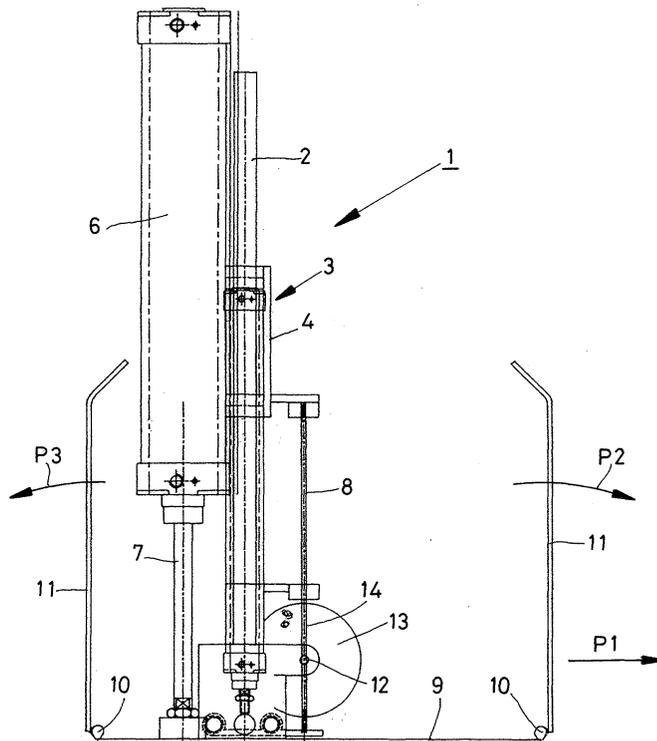


FIG.1

Description

[0001] The invention relates to a device suitable for inserting elongated fibres into a substratum, which device comprises a frame which is movable across said substratum and a plurality of fibre insertion pins which are movable with respect to the frame.

[0002] The invention also relates to a method suitable for inserting elongated fibres into a substratum, wherein fibre material is cut into a plurality of fibres, after which the individual fibres are inserted into a substratum by means of fibre insertion pins.

[0003] With such a method and device, as known from European patent EP-B1-0 610 352, various yams of fibre material are introduced into a number of parallel, horizontally extending guides from a number of reels and moved to insertion positions located under fibre insertion pins. After the fibre material has been cut off to a desired length, the fibres thus obtained are pressed into the substratum by means of the fibre insertion pins. Although this method and device are satisfactory per se, the device is in particular suitable for providing a relatively large area with fibres, on account of the relatively large volume of the device.

[0004] The object of the invention is to provide a device of relatively compact construction, by means of which fibres can be introduced into a substratum in a relatively simple manner.

[0005] This objective is accomplished with the device according to the invention in that the device comprises a drum which is rotatable about a horizontally extending axis, which drum comprises a number of feed-through channels extending transversely to the axis, which feed-through channels extend coaxially with the fibre insertion pins in an inserting position of the drum, wherein fibre material can be helically wound on the drum in use, which device furthermore comprises means for cutting the fibre material that is wound on the drum, so as to obtain a plurality of fibres, wherein the fibre insertion pins can be moved through the feed-through channels in the insertion position of the drum for inserting the fibres that are wound on the drum into the substratum.

[0006] Individual fibres are obtained by winding fibre material on the drum and subsequently cutting the fibre material that is wound on the drum, which fibres can subsequently be inserted or pressed into the substratum by means of the fibre insertion pins.

[0007] Since the fibres are wound on the drum, a relatively compact construction is obtained. Moreover, the fibre material may be obtained from a single reel, which furthermore contributes towards obtaining a compact construction.

[0008] Another object of the invention is to provide a method by means of which fibres can be introduced in a substratum in a relatively simple manner.

[0009] This objective is accomplished with a method according to the invention in that the fibre material is wound on a drum which is rotatable about a horizontally

extending axis, the fibre material being wound on the drum is cut, after which the fibre insertion pins are moved through feed-through channels present in the drum, which extend perpendicularly to said axis, wherein the fibres are inserted into the substratum by means of said fibre insertion pins.

[0010] In this way individual fibres are obtained in a relatively simple manner, which fibres can subsequently be introduced into the substratum by means of the fibre insertion pins.

[0011] The invention will be explained in more detail hereinafter with reference to the drawings, in which:

Figure 1 is a side elevation of a device according to the invention, showing the device in a folded position thereof;

Figure 2 shows the device of Figure 1 in an unfolded, extended position thereof;

Figure 3 is a front view of the device that is shown in Figure 2;

Figure 4 is a side elevation of the device that is shown in Figures 1 and 2, showing the device in an unfolded, telescoped position; and

Figures 5A and 5B are a front view and a sectional view, respectively, of parts of the device that is shown in Figures 1 - 4.

[0012] Like parts are indicated by the same numerals in the Figures.

[0013] Figure 1 shows a device 1 according to the invention, comprising a frame 2 and a frame 3 which is connected to the frame 2 in such manner as to be vertically movable with respect thereto. The frame 3 comprises a horizontally extending beam 4, which is slidably supported on vertical rods 5 of the frame 2 on either side. The frame 3 furthermore comprises a vertically extending cylinder 6, which accommodates a piston rod 7 which can move into and out of the cylinder. The piston rod 7 is connected to the frame 2 on a side remote from the cylinder 6. The frame 3 furthermore comprises a number of parallel, vertically extending fibre insertion pins 8.

[0014] The frame 2 furthermore comprises a horizontally extending baseplate 9, as well as two baseplate members 11 connected to the baseplate 9 via pivots 10.

[0015] The device can be moved in steps according to a predetermined pattern, in a direction indicated by the arrow P1, by means of a mobile chassis (not shown).

[0016] The device 1 furthermore comprises a drum 13 connected to the frame 2, being rotatable about a horizontally extending axis 12. The drum 13 is provided with feed-through channels extending parallel to each other, transversely to the axis 12. The spacing between the feed-through channels 14 equals the spacing between the fibre insertion pins 8. The feed-through channels 14 furthermore extend parallel to the fibre insertion pins 8 in an insertion position of the drum 13. The diameter of the feed-through channels 14 has been selected such

that the fibre insertion pins 8 can readily be moved through the feed-through channels 14.

[0017] As is shown in Figure 5A, the drum 13 is provided with a helical groove 15, whose pitch S equals the spacing between the feed-through channels 14. The feed-through channels 14 cross the groove 15 on at least one side of the drum 13.

[0018] The operation of the device 1 according to the invention will now be briefly explained.

[0019] The device 1, with the baseplate members 11 in the folded position as shown in Figure 1, is moved to a surface where fibres are to be introduced in the substratum. Then the baseplate members 11 are pivoted about the pivots 10 in the direction indicated by the arrows P2, P3 and fixed in the unfolded position that is shown in Figure 2. The baseplate 9 and the baseplate members 11 connected thereto form a relatively heavy ballast, which functions to provide a counterpressure for the substratum upon insertion of the fibres.

[0020] Then the cylinder 6 is actuated, as a result of which the cylinder 6 is moved in upward direction, causing the frame 3 and the fibre insertion pins 8 connected thereto to be moved in the opposite direction of the arrow P4 to the starting position that is shown in Figure 2. Elongated fibre material 17 is supplied from a reel 16 (only shown in Figure 2) connected to the frame 2, with one end of the fibre material being clamped against the drum 13 on one side. Then the drum 13 is rotated about the axis 12 in the direction indicated by the arrow P5, during which movement the fibre material is introduced into the groove 15 of the drum 13.

[0021] After fibre material has been introduced into the entire helical groove 15, the drum 13 is stopped in the insertion position (Figures 2-4), in which position the feed-through channels 14 extend parallel to the fibre insertion pins 8. Moreover, the ends of the feed-through channels 14 that cross the helical groove 15 are directed away from the baseplate 9. Subsequently, the fibre material is cut by means of a knife 18 (Figure 3) along the entire length of the drum 13 on a side of the drum 13 remote from the fibre insertion pins 8, as a result of which individual fibres will be positioned in the helical groove 15. The individual fibres are now loose on the drum 13, extending over the feed-through channels 14 near the upper side of the drum 13. The length of the fibres is slightly more than πD , D being the diameter of the drum 13.

[0022] After the fibre material has been cut, the frame 3 and the fibre insertion pins 8 connected thereto are moved in the downward direction indicated by the arrow P4 by means of the cylinder 6, during which movement the fibre insertion pins 8 are moved through the feed-through channels 14. Near the end of the feed-through channels 14, the ends of the fibre insertion pins 8 make contact with the fibres extending around the drum 13. When subsequently the fibre insertion pins 8 are moved in the direction indicated by the arrow P4 to the end position that is shown in Figure 4, the fibres extending

around the drum 13 are passed through the feed-through channels 14 by the fibre insertion pins 8 and pressed into the substratum 20 through the baseplate 9.

[0023] The fibre insertion pins 8 are then returned to the starting position that is shown in Figures 2 and 3, after which the device 1 will be moved in the direction indicated by the arrow P1 and further fibres can be introduced into the substratum 20 in the manner as described above. The end of the fibre material, which is now positioned on the other side of the drum 13, seen in axial direction, is connected to the drum 13 at that position. The drum 13 is now rotated in opposite direction so as to introduce fibre material into the helical groove 15.

[0024] Once the insertion of fibres into the substratum is complete, the device 1 can be moved to the relatively compact position that is shown in Figure 1, after which the device 1 can easily be transported to another location.

[0025] It is also possible for the fibre material to be cut by a knife moving over a rack.

[0026] It is also possible to cut the fibre material on a side of the drum 13 facing towards the fibre insertion pins. In that case, however, additional measures must be taken so as to prevent the individual fibres falling from the drum 13. The individual fibres need not be passed through the feed-through channels 14 in that case, however, they will only be engaged by the fibre insertion pins 8 that have been moved through the feed-through channels 14 at a position near the baseplate 8.

Claims

1. A device suitable for inserting elongated fibres into a substratum, which device comprises a frame which is movable across said substratum and a plurality of fibre insertion pins which are movable with respect to the frame, **characterized in that** device comprises a drum which is rotatable about a horizontally extending axis, which drum comprises a number of feed-through channels extending transversely to the axis, which feed-through channels extend coaxially with the fibre insertion pins in an inserting position of the drum, wherein fibre material can be helically wound on the drum in use, which device furthermore comprises means for cutting the fibre material that is wound on the drum, so as to obtain a plurality of fibres, wherein the fibre insertion pins can be moved through the feed-through channels in the insertion position of the drum for inserting the fibres that are wound on the drum into the substratum.
2. A device according to claim 1, **characterized in that** said drum is provided with a helical groove, in which fibre material can be positioned, which helical groove crosses said feed-through channels on one

side of the drum.

3. A device according to claim 1 or 2, **characterized in that** the means for cutting fibre material being wound on said drum comprise a knife. 5
4. A device according to any one of the preceding claims, **characterized in that** the spacing between two feed-through channels arranged adjacently to each other equals the pitch of the helical windings in which the fibre material can be wound on the drum. 10
5. A method for inserting elongated fibres into a substratum, wherein the fibre material is wound on a drum which is rotatable about a horizontally extending axis, the fibre material being wound on the drum is cut, after which the fibre insertion pins are moved through feed-through channels present in the drum, which extend perpendicularly to said axis, wherein the fibres are inserted into the substratum by means of said fibre insertion pins. 15
20
25
30
35
40
45
50
55

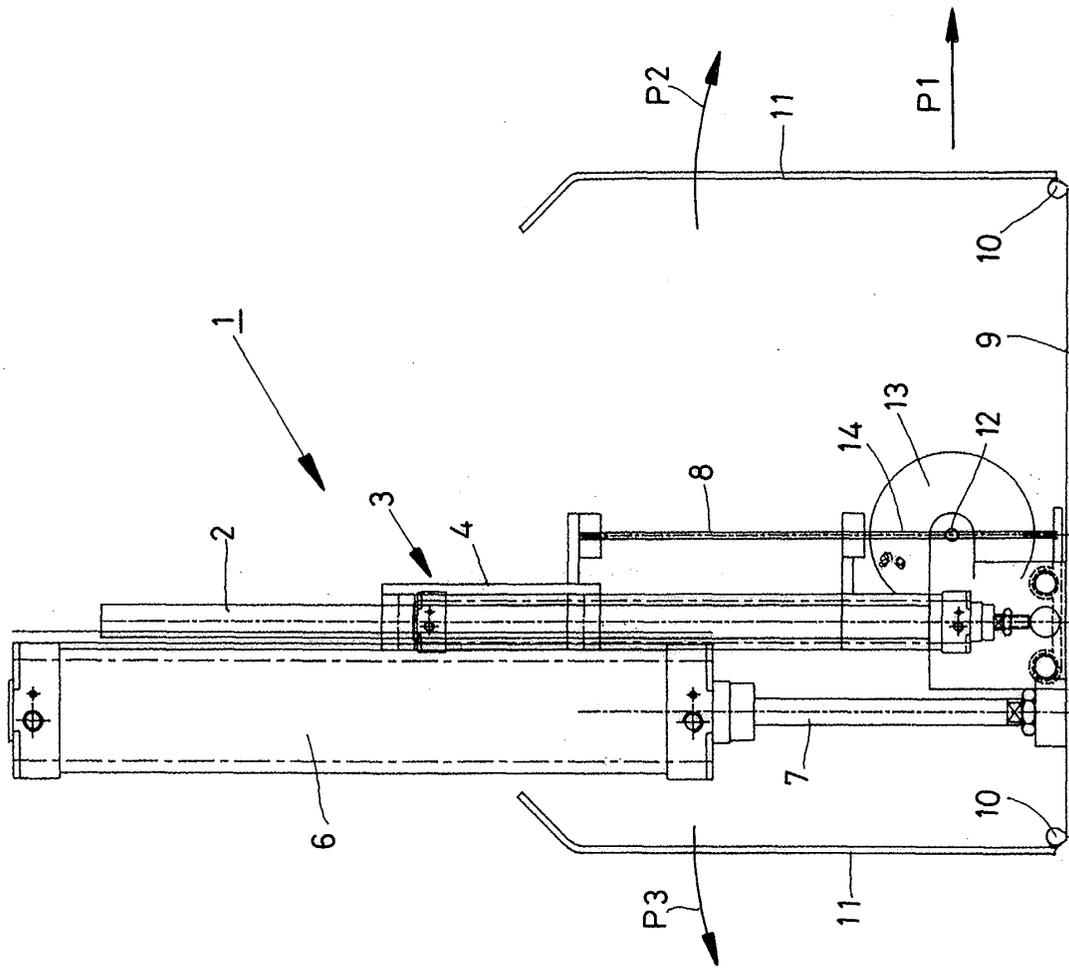
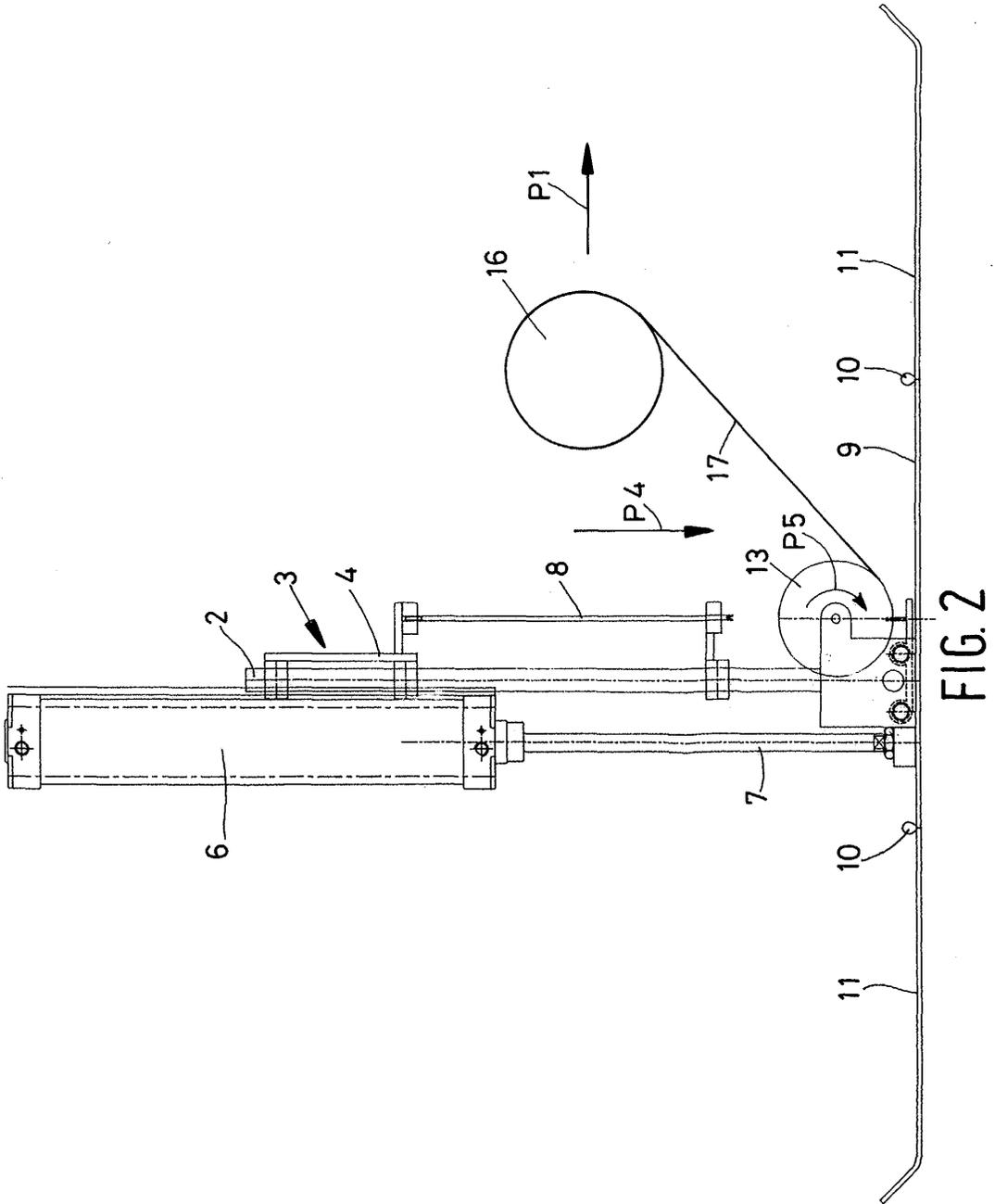


FIG.1



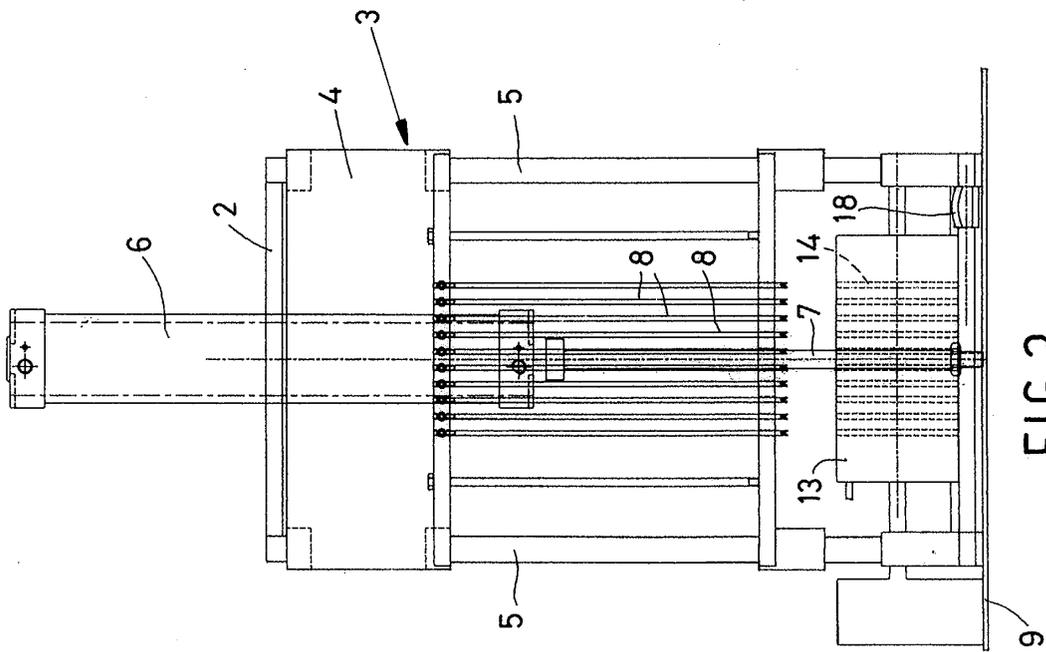


FIG. 3

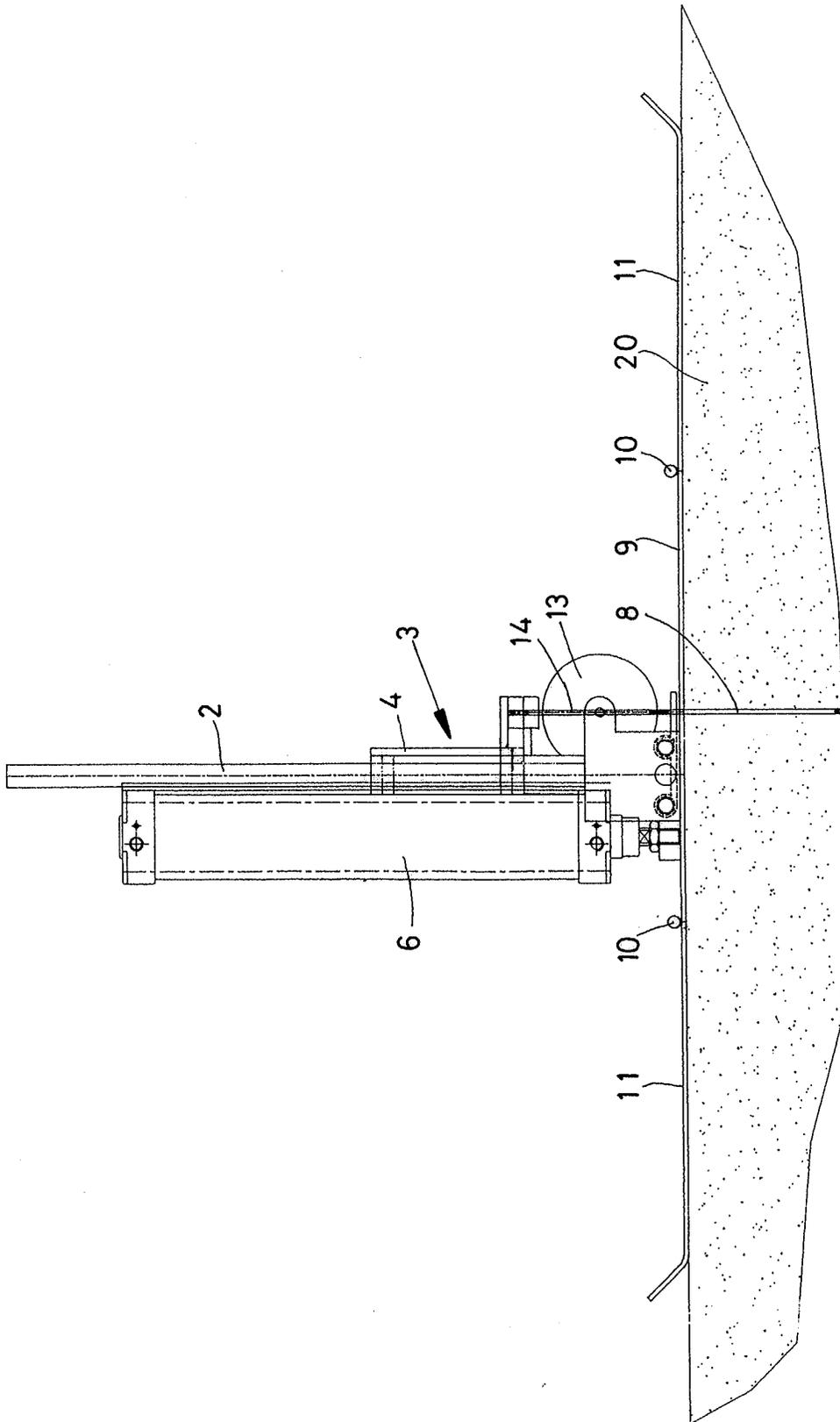
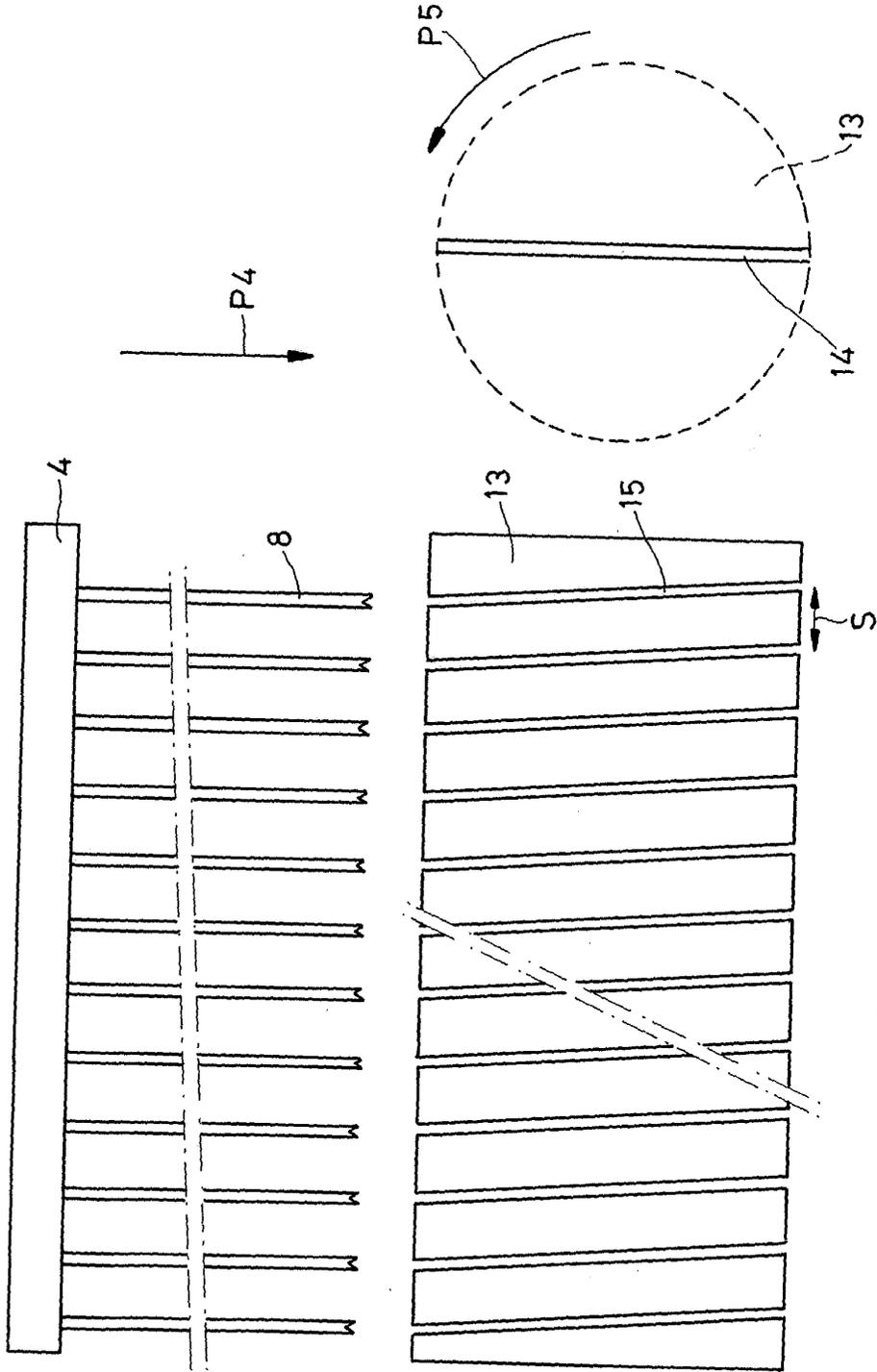


FIG. 4





European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 07 7129

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.7)
D,A	EP 0 610 352 B (DESSEAUX H TAPIJTFAB) 15 January 1997 (1997-01-15) * the whole document *	1,5	E01C13/08
A	WO 01 79611 A (GEERTS JAN FRANS MARIE ;DESSEAUX H TAPIJTFAB (NL); SON JOSEF JOHAN) 25 October 2001 (2001-10-25) * the whole document *	1,5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E01C
Place of search	Date of completion of the search	Examiner	
The Hague	21 October 2003	Dijkstra, G.	
CATEGORY OF CITED DOCUMENTS		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	
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			

EPO FORM 1503 03/02 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 03 07 7129

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-10-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0610352	B	17-08-1994	AU 660736 B2	06-07-1995
			DE 69216848 D1	27-02-1997
			EP 0610352 A1	17-08-1994
			FI 935930 A	30-12-1993
			JP 2912015 B2	28-06-1999
			JP 7500156 T	05-01-1995
			NO 934367 A ,B,	09-03-1994
			US 5481991 A	09-01-1996
			AT 147812 T	15-02-1997
			AU 2890292 A	21-05-1993
			CA 2113262 A1	29-04-1993
			DK 610352 T3	03-02-1997
			ES 2096776 T3	16-03-1997
			WO 9308332 A1	29-04-1993
			NZ 244708 A	27-11-1995
WO 0179611	A	25-10-2001	NL 1014978 C2	24-10-2001
			AU 9336501 A	30-10-2001
			CA 2414560 A1	25-10-2001
			EP 1276935 A1	22-01-2003
			WO 0179611 A1	25-10-2001