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(71) Applicant: **Destia Oy**
00520 Helsinki (FI)

(72) Inventor: **Laakkonen, Martti**
75500 Nurmes (FI)

(74) Representative: **Tanskanen, Jarmo Tapio et al**
PAPULA OY
Mechelininkatu 1 a
00180 Helsinki (FI)

(54) **Extendible scraper blade**

(57) A bottom blade of a working vehicle, comprising a main blade (1) provided with a first cutting edge (2) and slide guides (3) in the direction of the main blade. A slide frame (4) has been directed to move in the direction of the main blade in the guidance of the slide guides (3). An extension blade (5) has been connected to the slide frame (4) to move relative to the main blade between a first position (I) and a second position (II). In the first position (I), the extension blade (5) is protruded outside the end of the main blade (1). In the second position (II), the extension blade (5) is retracted to a position where the extension blade and the main blade are disposed substantially one upon the other. A second cutting edge (6) is provided in the lower part of the extension blade. A power means (7) acts between the slide frame (4) and the main blade (1) to move the extension blade (5) between the first position (I) and the second position (II). The extension blade (5) is jointed to the slide frame (4) by a joint (7) to turn about a pivoting axis (X) in the direction of the main blade (1) so that in the first position (I) of the extension blade when the main blade is pressed against the underlying ground (R) the extension blade (5) turns relative to the main blade to a turned position (A) in which the second cutting edge (6) is aligned with the first cutting edge (2).

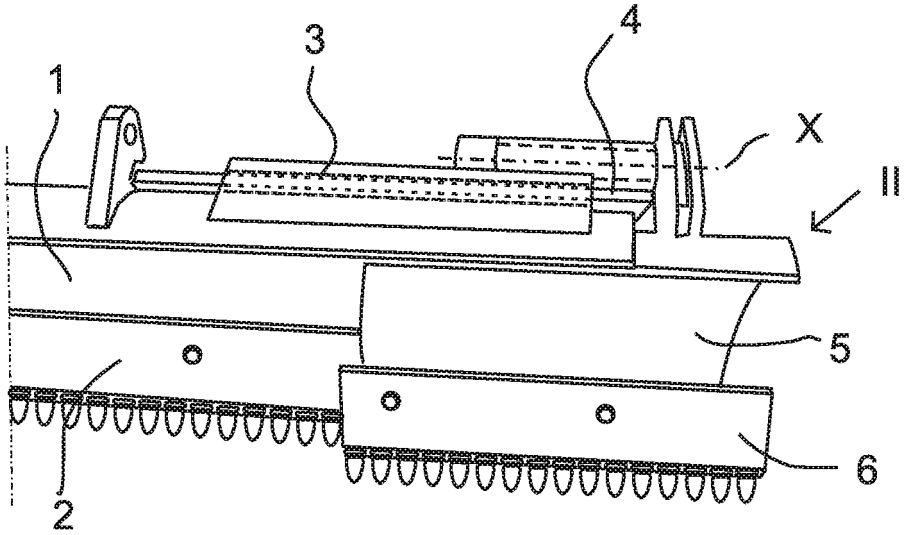

Fig. 2

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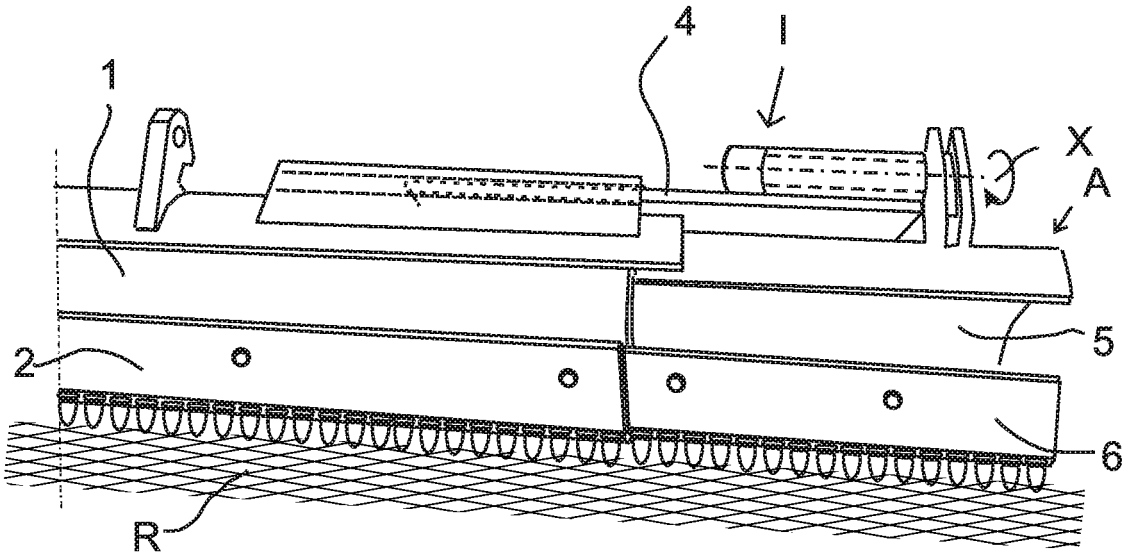

Fig. 4

Description

FIELD OF THE INVENTION

[0001] The invention relates to a bottom blade as defined in the preamble of claim 1.

BACKGROUND OF THE INVENTION

[0002] Bottom blades are used in working vehicles, such as trucks and tractors, in road maintenance to shape and/or work on the masses.

[0003] The bottom blade is provided under the frame of a vehicle between the axles. The bottom blade may be used both in summer and winter. In winter, plowing the snow, grading thick ice and removing the slush may be performed by a bottom blade simultaneously with the other road maintenance tasks. In summer, working on gravel roads, moving and grading of gravel and other masses can be performed efficiently with a bottom blade.

[0004] Known from the prior art is a bottom blade of a truck comprising a main blade provided with a first cutting edge in the lower part thereof to be contacted with the underlying ground. A slide frame has been directed to move in the direction of the main blade in the guidance of slide guides. An extension blade has been connected to the slide frame to move relative to the main blade between a first position and a second position. In the first position, the extension blade is protruded to a distance outside the end of the main blade. In the second position, it is retracted to a position where the extension blade and the main blade are disposed one upon the other. The extension blade is provided with a second cutting edge in the lower part thereof to be contacted with the underlying ground. An extending/shortening type power means, such as a hydraulic cylinder, has been arranged to act between the slide frame and the main blade to move the extension blade between the first position and the second position.

[0005] A problem with the known bottom blades provided with an extension blade is that when the extension blade is protruded, it is disposed on the front or back side of the main blade during use, depending on which side of the main blade it has been provided on. In this case, the cutting edges of the main and the extension blade are not aligned with to each other. This causes discontinuity in the work result, so that at the extension blade the working depth is different, for example deeper or lower, than at the main blade. In addition, the difference in the working depths varies according to the angle in which the main blade is tilted relative to the underlying ground.

OBJECTIVE OF THE INVENTION

[0006] The objective of the invention is to eliminate the drawbacks referred to above.

[0007] In particular, the objective of the invention is to disclose a bottom blade in which the cutting of the extension blade is always aligned with the cutting edge of the main blade on the same cutting level during use, irrespective of the current angle relative to the underlying ground set for the main blade.

SUMMARY OF THE INVENTION

[0008] The bottom blade according to the invention is characterized by what has been presented in claim 1.

[0009] According to the invention, the extension blade is jointed by a joint to the slide frame to turn about a pivoting axis parallel to the main blade so that in the first position of the extension blade when the main blade is pressed against the underlying ground the extension blade turns relative to the main blade to a turned position in which the second cutting edge is aligned with the first cutting edge.

[0010] The advantage of the invention is that the second cutting edge of the extension blade always works in alignment with the first cutting edge of the main blade on the same cutting level, irrespective of the current angle set for the main blade relative to the underlay so that the extension blade and the main blade always provide the same cutting depth.

[0011] In one embodiment of the bottom blade, the extension blade is on the front side of the main blade and the slide frame is on the back side of the main blade.

[0012] In one embodiment of the bottom blade, a stop is mounted to the main blade and fitted to stop the turning of the extension blade in the position where the first cutting edge and the second cutting edge are aligned with each other.

[0013] In one embodiment of the bottom blade, the joint is above the main blade and on the back side thereof.

LIST OF FIGURES

[0014] In the following section, the invention will be described in detail by means of examples of its embodiments and with reference to the accompanying drawing in which

Fig. 1 is a perspective side view of a part of one embodiment of the bottom blade according to the invention as seen obliquely from the back,

Fig. 2 shows the bottom blade of Fig. 1 when the extension blade is in a retracted position,

Fig. 3 shows the bottom blade of Fig. 2 when the extension blade is in a protruded position,

Fig. 4 shows the bottom blade of Fig. 2 and 3 pressed against the ground,

Fig. 5 is a side view of the bottom blade in the position of Fig. 2 or 3,

Fig. 6 is a side view of the bottom blade in the position of Fig. 4, and

Fig. 7 illustrates tilting of the bottom blade of Fig. 6.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Fig. 1 is a view of the left side end of a bottom blade mountable under a working vehicle, such as a truck or a tractor. Fig. 2 to 4 illustrate the bringing of an extension blade 5 of the bottom blade into a service position.

[0016] Referring to Fig. 1 to 4, the bottom blade comprises a main blade 1. The lower part of the main blade 1 is provided with a first cutting edge 2 to be contacted with the underlying ground. Arranged on the back side of the main blade 1 are slide guides 3 in the direction of the main blade to guide a slide frame 4 to move in the direction of the main blade 1. A hydraulic cylinder 7 is connected at one end to the main blade and at the other end to the slide frame 4 to move an extension blade 5 between a first position I and a second position II. The extension blade 5 has been connected to the slide frame 4 to move relative to the main blade 1 between the first position I and the second position II.

[0017] In the first position I presented in Fig. 3 and 4 the extension blade 5 is protruded to a distance 1 outside the end of the main blade 1.

[0018] In the second position II presented in Fig. 1 and 2 the extension blade 5 is retracted to a position where the extension blade 5 and the main blade 1 are disposed substantially one upon the other so that the extension blade 5 is on the front side of the main blade 1. The lower part of the extension blade 5 is provided with a second cutting edge 6 to be contacted with the underlying ground. The figures show that the first cutting edge 2 and the second cutting edge 6 are so-called stud blades, but it is apparent that any cutting edge suitable for the current task, such as a flat blade, perforated blade, serrated blade, is applicable.

[0019] The extension blade 5 has been jointed to the slide frame 4 with a joint 7 to turn about a pivoting axis X in the direction of the main blade 1. The joint 7 is positioned above the main blade 1 on the back side thereof. The joint 7 is formed by a shaft mounted to the extension blade 5 and a bushing mounted to the slide frame 4, the shaft being fitted with a bearing to rotate inside the bushing.

[0020] As seen from Fig. 4, when the extension blade 5 is in the protruded first position I and the main blade is pressed against the underlying ground R, the extension blade 5 turns back relative to the main blade 1 to a turned position A in which the second cutting edge 6 is aligned with the first cutting edge 2.

[0021] As seen from Fig. 1, 5 and 6, mounted to the back side of the main blade 1 is a stop 8 formed by two flanges welded to the main blade. The stop 8 stops the turning of the extension blade 5 so as to not turn further than the position A where the first cutting edge 2 and the second cutting edge 6 are aligned with each other as presented in Fig. 6.

[0022] Fig. 7 shows that when contacted with the underlay, the bottom blade can be turned to different angular positions, and the first cutting edge 2 and the second cutting edge 6 are always aligned with each other so as to have a smooth performance.

[0023] The invention is not limited merely to the examples of its embodiments referred to above; instead, many variations are possible within the scope of the inventive idea defined by the claims.

Claims

1. A bottom blade of a working vehicle comprising

- a main blade (1) provided with a first cutting edge (2) in the lower part thereof to be contacted with the underlying ground (R) and comprising slide guides (3) in the direction of the main blade,
- a slide frame (4) directed to move in the direction of the main blade in the guidance of the slide guides (3),
- an extension blade (5) connected to the slide frame (4) to move relative to the main blade between a first position (I) and a second position (II), so that in the first position (I) the extension blade (5) is protruded to a distance (1) outside the end of the main blade (1) and in the second position (II) the extension blade (5) is retracted to a position where the extension blade and the main blade are disposed substantially on upon the other, the extension blade being provided with a second cutting edge (6) in the lower part thereof to be contacted with the underlying ground, and
- an extending/shortening type power means (7) arranged to act between the slide frame (4) and the main blade (1) to move the extension blade (5) between the first position (I) and the second position (II), **characterized in that** the extension blade (5) has been jointed to the slide frame (4) with a joint (7) to turn about a pivoting axis (X) in the direction of the main blade (1) so that in the first position (I) of the extension blade when the main blade is pressed against the underlying ground (R) the extension blade (5) turns relative to the main blade to a turned position (A) in which the second cutting edge (6) is aligned with the first cutting edge (2).

2. The bottom blade according to claim 1, **characterized in tha**t the extension blade (5) is on the front side of the main blade (1) and the slide frame (4) is on the back side of the main blade.

3. The bottom blade according to claim 1 or 2, **charac-**

terized in that mounted to the main blade (1) is a stop (8) fitted to stop the turning of the extension blade (5) in the position (A) where the first cutting edge (2) and the second cutting edge (6) are aligned with each other.

4. The bottom blade according to any of claims 1 to 3, **characterized in that** the joint (7) is above the main blade (1) and on the back side thereof.

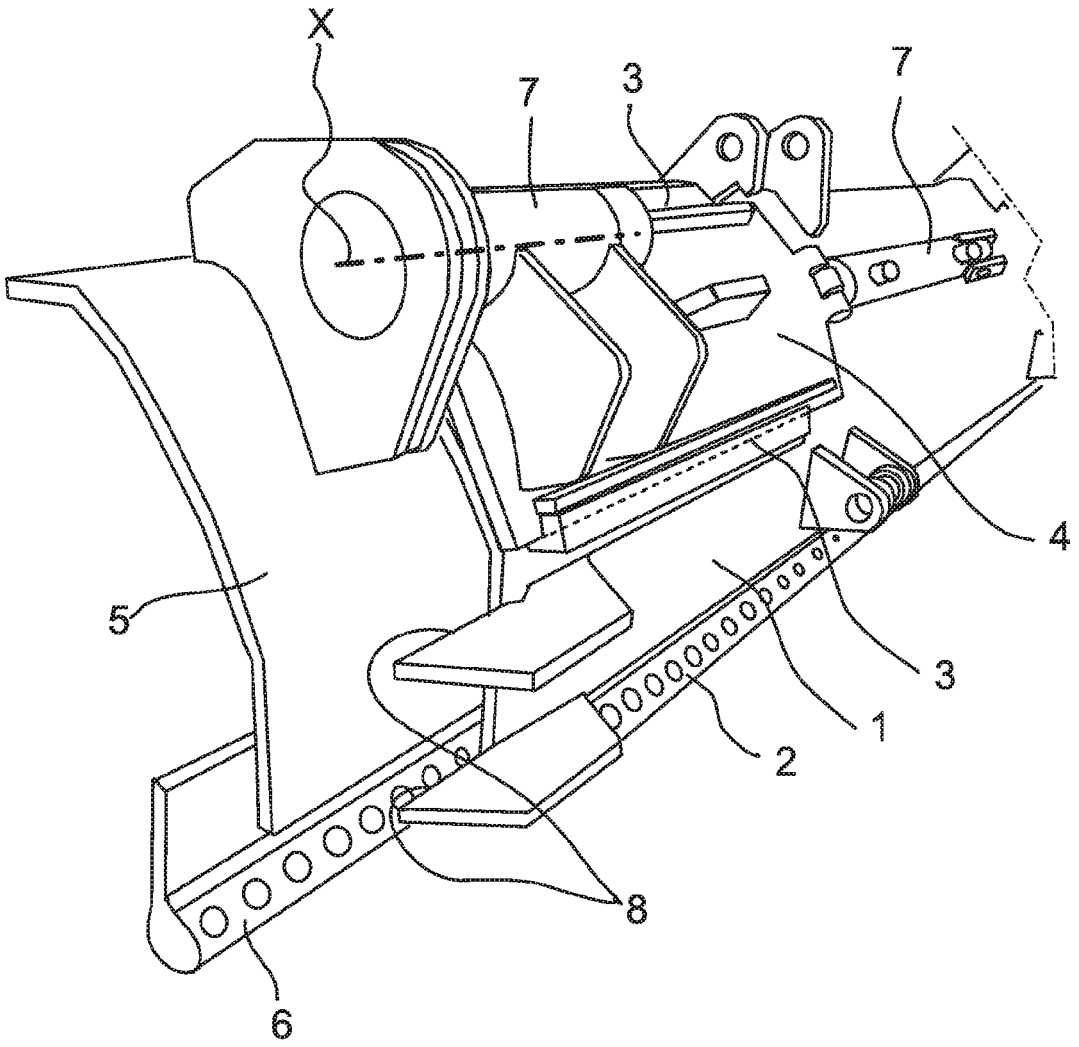

Fig. 1

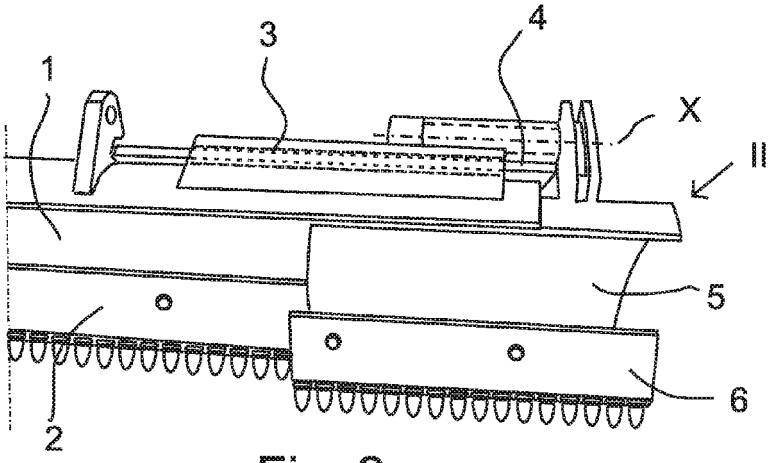

Fig. 2

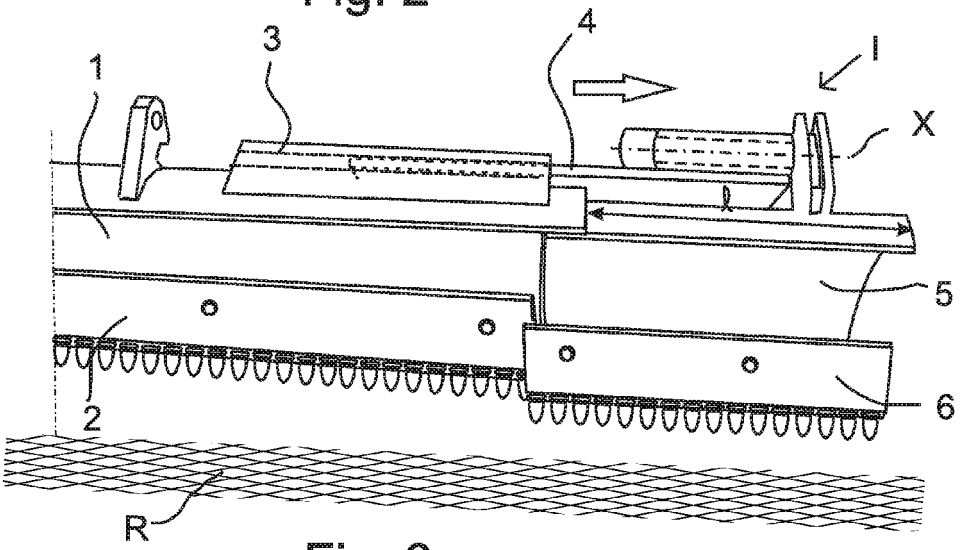

Fig. 3

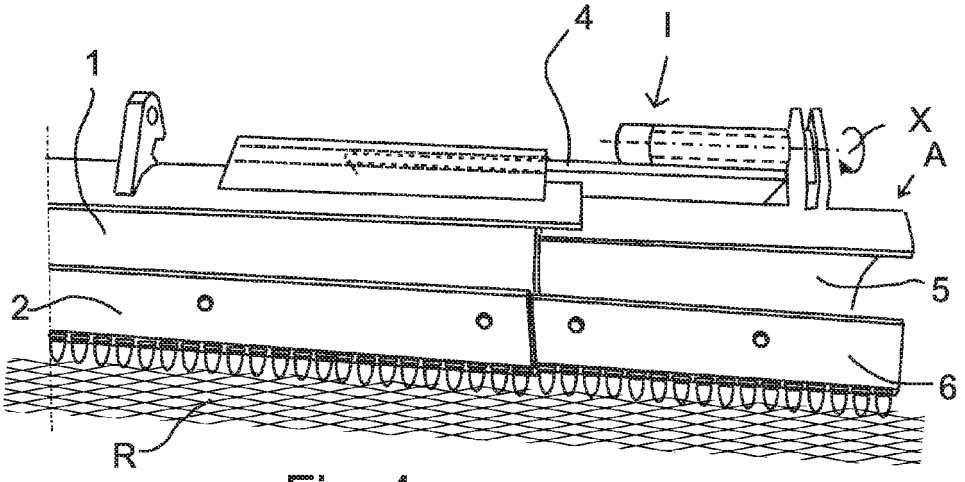

Fig. 4

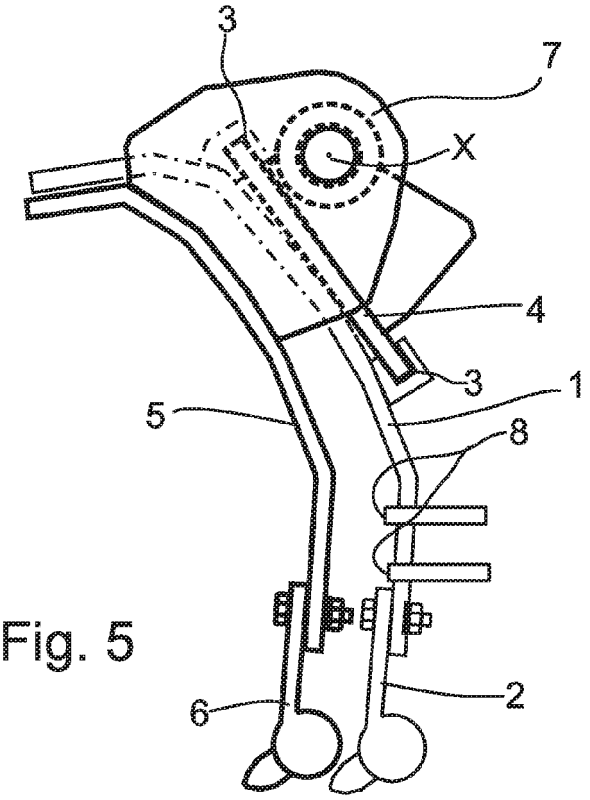

Fig. 5

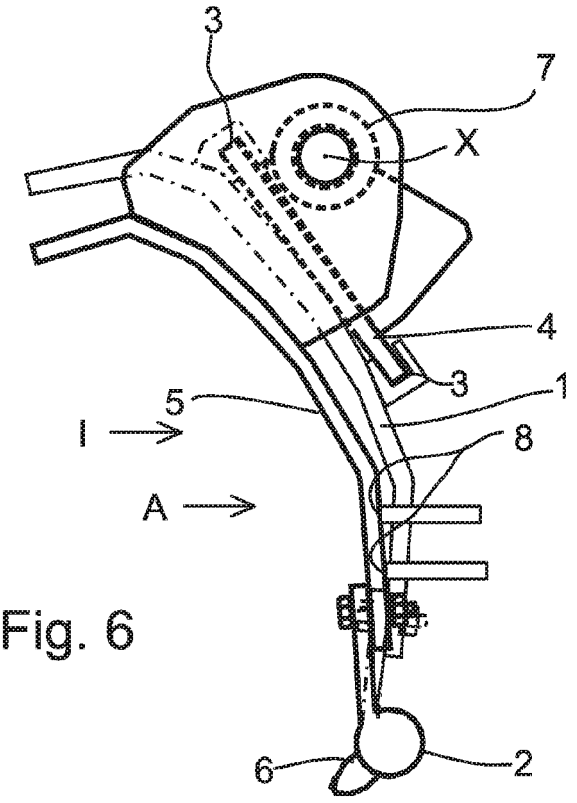

Fig. 6

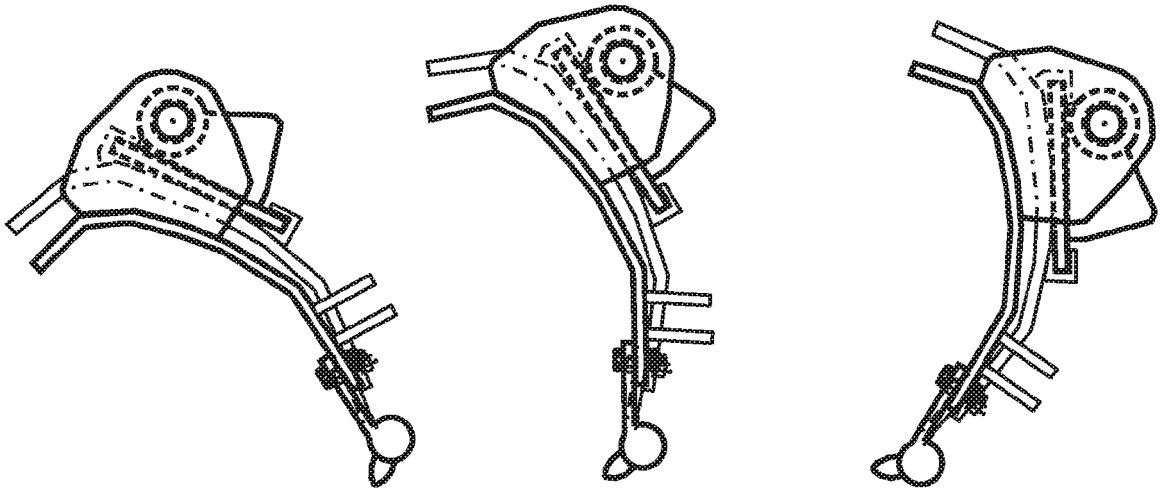

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 09 16 7084

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	JP 04 112942 U (.) 1 October 1992 (1992-10-01) * figures *	1	INV. E02F3/815 E01H5/06
A	US 4 369 847 A (MIZUNUMA WATARU [JP]) 25 January 1983 (1983-01-25) * figures 2-5 *	1	
A	US 2004/025380 A1 (FREY OSCAR [CA]) 12 February 2004 (2004-02-12) * figures *	1	
A	US 6 442 877 B1 (QUENZI PHILIP J [US] ET AL) 3 September 2002 (2002-09-03) * figures *	1	
A	JP 55 061623 A (TOYO UMPANKI CO LTD) 9 May 1980 (1980-05-09) * figures *	1	
A	US 5 638 908 A (MASUMOTO MASAO [JP] ET AL) 17 June 1997 (1997-06-17) * figures *	1	TECHNICAL FIELDS SEARCHED (IPC) E01H E02F
A	SU 1 170 063 A1 (SRED AZ TS OK T B GVNII REMONT [SU]) 30 July 1985 (1985-07-30) * figures *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 November 2009	Laurer, Michael

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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17-11-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 4112942 U	01-10-1992	NONE	
US 4369847 A	25-01-1983	JP 56116461 U	07-09-1981
		JP 60019164 Y2	10-06-1985
US 2004025380 A1	12-02-2004	CA 2397309 A1	09-02-2004
US 6442877 B1	03-09-2002	CA 2358359 A1	12-04-2002
JP 55061623 A	09-05-1980	JP 1227882 C	19-09-1984
		JP 59001855 B	14-01-1984
US 5638908 A	17-06-1997	DE 69513927 D1	20-01-2000
		DE 69513927 T2	18-05-2000
		EP 0705944 A1	10-04-1996
SU 1170063 A1	30-07-1985	NONE	

EPO FORM P0459

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