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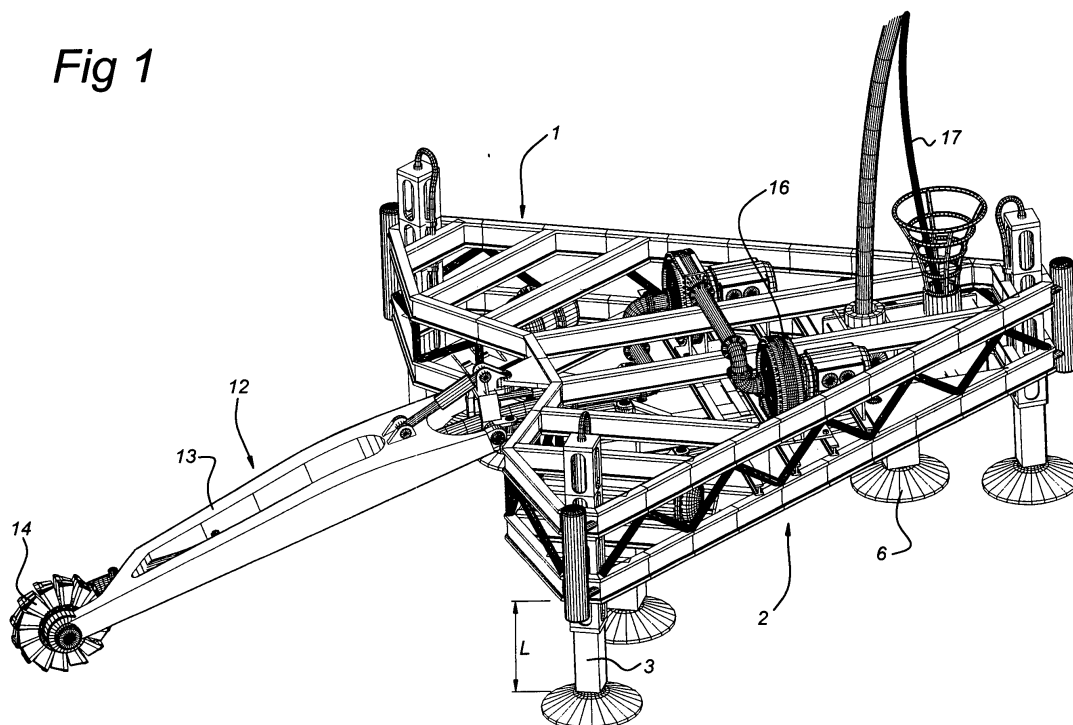
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(54) **Machine for use underwater**

(57) The present invention relates to a machine, such as a dredger for setting up on a substrate, such as the bed of a body of water, comprising a top frame (1) and a bottom frame (2), each of which is provided with legs (3,6) for supporting the frame concerned on the

substrate, which legs of the top frame have a variable length, bearing means (4,5) that allow rotational and translational movements of the top frame and bottom frame over one another, as well as drive means (11) for rotational and/or translational movement of the top frame and the bottom frame over one another.

Fig 1



Description

[0001] The invention relates to a machine, such as a dredger for setting up on a substrate, such as the bed of a body of water, comprising a top frame and a bottom frame, each of which is provided with legs for supporting the frame concerned on the substrate, which legs of the top frame have a variable length, bearing means that allow rotational and translational movements of the top frame and bottom frame over one another, as well as drive means for rotational and/or translational movement of the top frame and the bottom frame over one another.

[0002] Such a machine is disclosed in GB-A 1 328 264. This known machine is constructed as a dredger that has a ladder mounted on the top frame with a cutting head at the free end. This top frame has a live ring, while the bottom frame has a linear roller track. The bottom ring of the live ring joined to the top frame is supported on the roller track, such that the top frame is able to execute both rotational and translational movements with respect to the bottom frame.

[0003] The disadvantage of this known machine is that the construction thereof is complex. The live ring and the roller track, which are operated underwater, are, moreover, vulnerable components that have to be protected well against the ingress of water, in particular sea water.

[0004] The aim of the invention is, therefore, to provide a machine of the abovementioned type that does not have these disadvantages. Said aim is achieved in that one of the frames has a pin and the other frame has an elongated track along which the pin can be slid and with respect to which the pin can be rotated.

[0005] With the machine according to the invention the mutual movements of the frames are made possible by relatively simple means, which can be exposed to water without any problem. In particular, the track can comprise a slot-shaped opening in one of the frames, such that the pin protrudes with respect to, and is fixed to, the other frame, in which slot the pin is accommodated such that it can be slid and rotated.

[0006] The slot can be defined between two longitudinal elements permanently joined to one of the frames. The pin can have a collar that extends over said longitudinal elements on the side thereof that faces away from the frame that has the pin. In this way the relationship between the frames is ensured in a simple manner.

[0007] According to a preferred embodiment the pin is fixed to the bottom frame and the track is accommodated on the top frame.

[0008] A very simple embodiment is obtained if the bearing means comprise at least sliding bearings. In this context the bottom frame can have supporting surfaces that are oriented upwards when the machine is in use, whilst the top frame can have bearing surfaces that are oriented downwards and bear on the supporting surfaces when the machine is in use. Preferably, the support-

ing surfaces are made of stainless steel and the bearing surfaces of polyethylene. The water from the surroundings can then act as lubricant.

[0009] Since the legs of the top frame can already be lengthened and shortened, the legs of the bottom frame can be fixed.

[0010] In one embodiment of the machine according to the invention that can be placed on the substrate in a very stable position, both frames are provided with three legs. The top frame can then, for example, comprise three girders that define an equilateral or essentially equilateral triangular shape. The bearing surfaces are then preferably close to the corners of the top frame.

[0011] Furthermore, the bottom frame can comprise three beams, one end of which, in each case, is joined to a core and the other, free end of which is oriented away from the core, which free ends are essentially equal distances apart. The supporting surfaces are then preferably close to the free ends of the beams.

[0012] A dredging device, such as a ladder that at one end is coupled to the top frame in a movable manner and that has dredging means, such as a dredging wheel, at the other end, can be mounted on the top frame.

[0013] The top frame and the bottom frame can be joined to one another by at least two hydraulic piston/cylinder devices for executing the mutual translational and rotational movements of said frames.

[0014] The invention will be explained in more detail with reference to a few illustrative embodiments shown in the drawing.

[0015] Fig. 1 shows a perspective view of a first embodiment of a machine according to the invention.

[0016] Fig. 2 shows, diagrammatically, a plan view of the machine in Fig. 1.

[0017] Figs 3A-F show, diagrammatically, successive positions when moving the two frames relative to one another in a specific direction.

[0018] Fig. 4 shows a perspective view of a bottom frame of a second embodiment of the machine according to the invention.

[0019] Fig. 5 shows a bottom perspective view of the top frame associated with the bottom frame according to Fig. 4.

[0020] Fig. 6 shows a plan view of the top frame according to Fig. 5.

[0021] The machine shown in the figures comprises a top frame 1 and a bottom frame 2. The top frame 1 is provided with legs 3, the length L of the portion of these legs 3 that extends below the top frame being variable. Movement of the legs 3 can take place with the aid of cylinders containing pressure medium.

[0022] Three bearing surfaces 4 of the top frame 1 are in contact with supporting surfaces 5 of the bottom frame 2, which is provided with the legs 6. The bottom frame 2 is arranged such that it can rotate on a hinge pin 7 that is fixed to a carriage 8 that is supported by the top frame 1 such that it can be moved in the direction indicated by the double-headed arrow P.

[0023] The top frame 1 is made up of three girders 9 serving to support the legs 3 and guides that support the carriage 8. The bottom frame 2 is formed by three beams 10, which extend from the hinge pin 7 and are provided at their ends with the supporting surfaces 5.

[0024] Two cylinders 11 containing pressure medium, the one end of which cylinders is connected to the top frame 1 such that it can pivot and the other end of which is connected to the bottom frame 2, serve for movement of the frames 1 and 2 with respect to one another. The cylinders 11 are symmetrically arranged with respect to the direction of movement P of the carriage 8.

[0025] In the embodiment shown in the drawing the top frame 1 has a dredge 12 that in a known manner is constituted by a ladder 13, which is connected to the top frame 1 such that it can pivot and slew. A dredging wheel 14 that can be driven is fitted at the end of the ladder 13. At the dredging wheel 14 there is a suction line 15 that is connected to two pumps 16 that are supported by the top frame 1. The material sucked up is pumped to a vessel, which is not shown, via a line 17. The machine is lowered down onto the bed, and the entire machine is operated, from this vessel.

[0026] Fig. 3A shows a ladder 13 in the central, operating position. When the ladder 13 has executed its slewing movement, for example through approximately 90°, as indicated in Figure 2, the top frame 1 will be moved, for which purpose the ladder 13 is brought into the position shown in Figure 3B. The legs 3 of the top frame 1 are now retracted, so that this frame comes to bear on the bottom frame 2 as shown in Figure 3C. The top frame 1 is then slid over the bottom frame 2 with the aid of the cylinders 11 into the position in Figure 3D. The legs 3 are pushed downwards again as shown in Figure 3E and further downwards into the position in Figure 3F, in which the bottom frame 2 has been moved again with respect to the top frame 1. The dredge 12 can then be used again.

[0027] When the top frame 1 is moved from the position shown in Figure 3C into the position in Figure 3D, the piston rods of the cylinders 11 are moved over identical distances and the top frame 1 is slid relative to the bottom frame 2 in the direction of the arrow P in Figure 2. When the piston rods are moved over unequal distances, the top frame 1 will slew with respect to the bottom frame 2. As a result of such slewing, the point where the dredge is connected to the top frame is moved sideways as seen in Figure 2. In this way the equipment is thus able to perform a course correction and the dredge can start to work an area of ground that is alongside the previously worked area.

[0028] As already stated above, the legs 6 of the bottom frame 2 can also be made adjustable with respect to this frame. This can be advantageous when the machine has to be moved on a bed that is not uniform.

[0029] Another construction where the hinge pin 7 is now fixed to the top frame 1 as shown in Figures 5 and 6 is shown in the embodiment in Figures 4, 5 and 6. An

elongated track 8 in which the pin 7 can be accommodated has been cut out in the bottom frame 2, as shown in Figure 4. After the pin 7 has been inserted in the track 8, the collar 18 shown in Figure 5 is fixed to the free end of the pin. As a result, the frames 1, 2 are secured with respect to one another, but are able to perform translational and rotational movements.

[0030] It is clear that only a few possible embodiments of a machine according to the invention have been shown in the drawing and described above and that numerous modifications can be made without going beyond the inventive concept as specified in the claims.

Claims

1. Machine, such as a dredger for setting up on a substrate, such as the bed of a body of water, comprising a top frame (1) and a bottom frame (2), each of which is provided with legs (3, 6) for supporting the frame (1, 2) concerned on the substrate, which legs (3) of the top frame (1) have a variable length, bearing means that allow rotational and translational movements of the top frame (1) and bottom frame (2) over one another, as well as drive means for rotational and/or translational movement of the top frame (1) and the bottom frame (2) over one another, **characterised in that** one (2) of the frames (1, 2) has a pin (7) and the other frame (1) has an elongated track (8) along which the pin (7) can be slid and with respect to which the pin (7) can be rotated.
2. Machine according to Claim 1, wherein the track comprises a slot-shaped opening (8) in one (1) of the frames (1, 2), and the pin (7) protrudes with respect to, and is fixed to, the other frame (2), in which slot (8) the pin (7) is accommodated such that it can be slid and rotated.
3. Machine according to Claim 2, wherein the slot (8) is defined between two longitudinal elements permanently joined to one (1) of the frames (1, 2) and the pin (7) has a collar (18) that extends over said longitudinal elements on the side thereof that faces away from the frame (2) that has the pin (7).
4. Machine according to Claim 3, wherein the longitudinal elements are constructed as structural girders, such as an I-beam or a T-beam.
5. Machine according to one of the preceding claims, wherein the pin (7) is fixed to the bottom frame (2) and the track is accommodated on the top frame (1).
6. Machine according to one of the preceding claims, wherein the bearing means comprise at least sliding bearing means (4, 5).

7. Machine according to Claim 6, wherein the bottom frame (2) has supporting surfaces (5) that are oriented upwards when the machine is in use, and the top frame (1) has bearing surfaces (4) that are oriented downwards and bear on the supporting surfaces (5) when the machine is in use. 5
8. Machine according to Claim 7, wherein the supporting surfaces (5) are made of stainless steel. 10
9. Machine according to Claim 6 or 7, wherein the bearing surfaces (4) are made of polyethylene. 15
10. Machine according to one of the preceding claims, wherein the legs (6) of the bottom frame (2) are fixed. 20
11. Machine according to one of the preceding claims, wherein both frames (1, 2) are provided with three legs (3, 6). 25
12. Machine according to one of the preceding claims, wherein the top frame (1) comprises three girders (9) that define an isosceles or essentially equilateral triangular shape. 30
13. Machine according to Claim 12 in combination with one of Claims 7 - 9, wherein the bearing surfaces (4) are close to the corners of the top frame (1). 35
14. Machine according to Claim 12 or 13, wherein the bottom frame (2) comprises three beams (10), one end of which, in each case, is joined to a core and the other, free end of which is oriented away from the core, which free ends are essentially equal distances apart. 40
15. Machine according to Claim 14, wherein the supporting surfaces (5) are close to the free ends of the beams (10). 45
16. Machine according to Claim 14 or 15, wherein the pin (7) is fixed to the core of the bottom frame (2). 50
17. Machine according to one of the preceding claims, wherein a dredging device is mounted on the top frame (1). 55
18. Machine according to Claim 17, wherein the dredging device comprises a ladder that at one end is coupled to the top frame (1) in a movable manner and that has dredging means, such as a dredging wheel (14), at the other end.
19. Machine according to Claim 18, wherein the ladder is connected to the top frame (1) via a universal joint.
20. Machine according to one of the preceding claims, wherein the top frame (1) and the bottom frame (2) are connected to one another by at least two hydraulic piston/cylinder devices for executing the mutual translational and rotational movements of said frames.

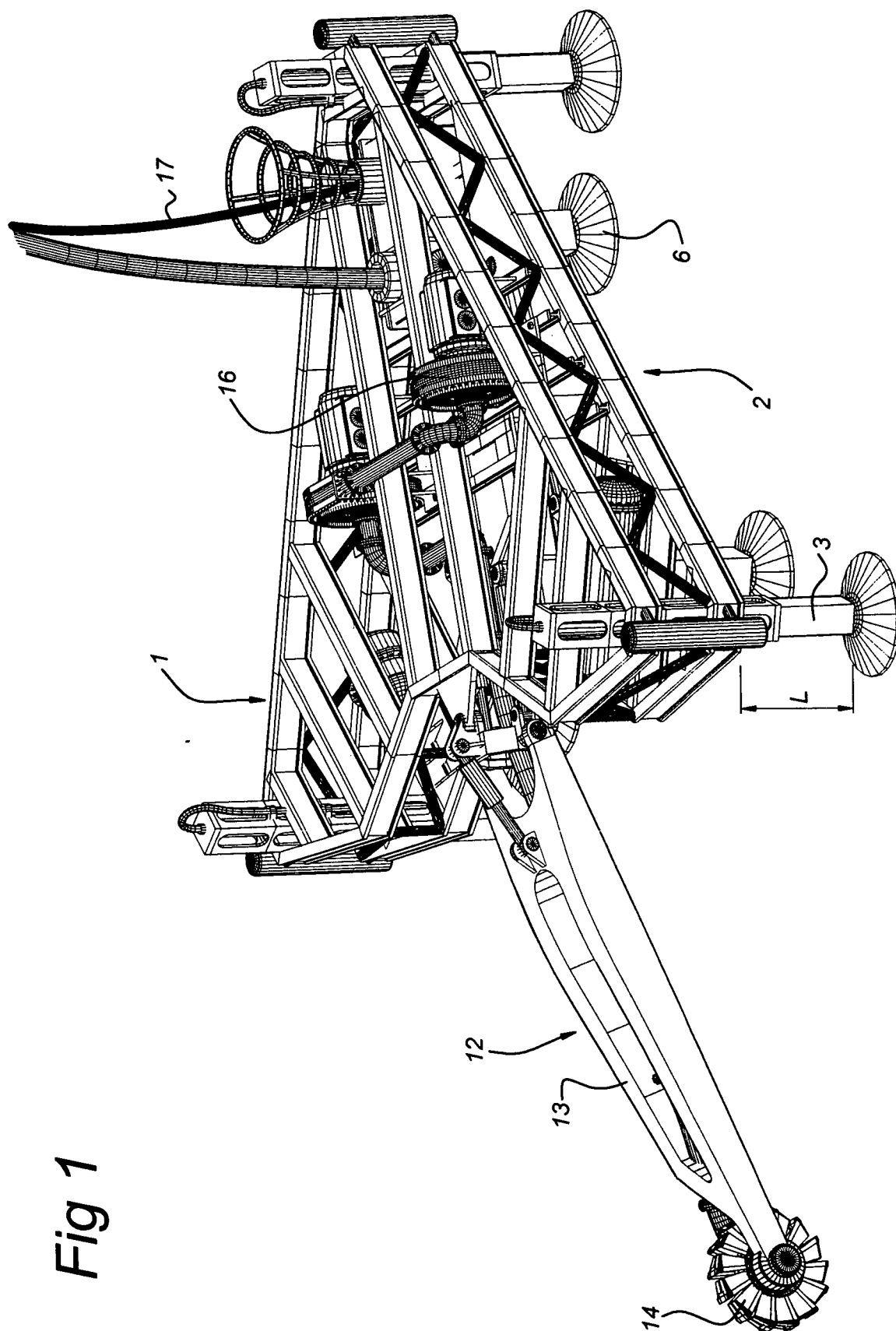


Fig 1

Fig 2

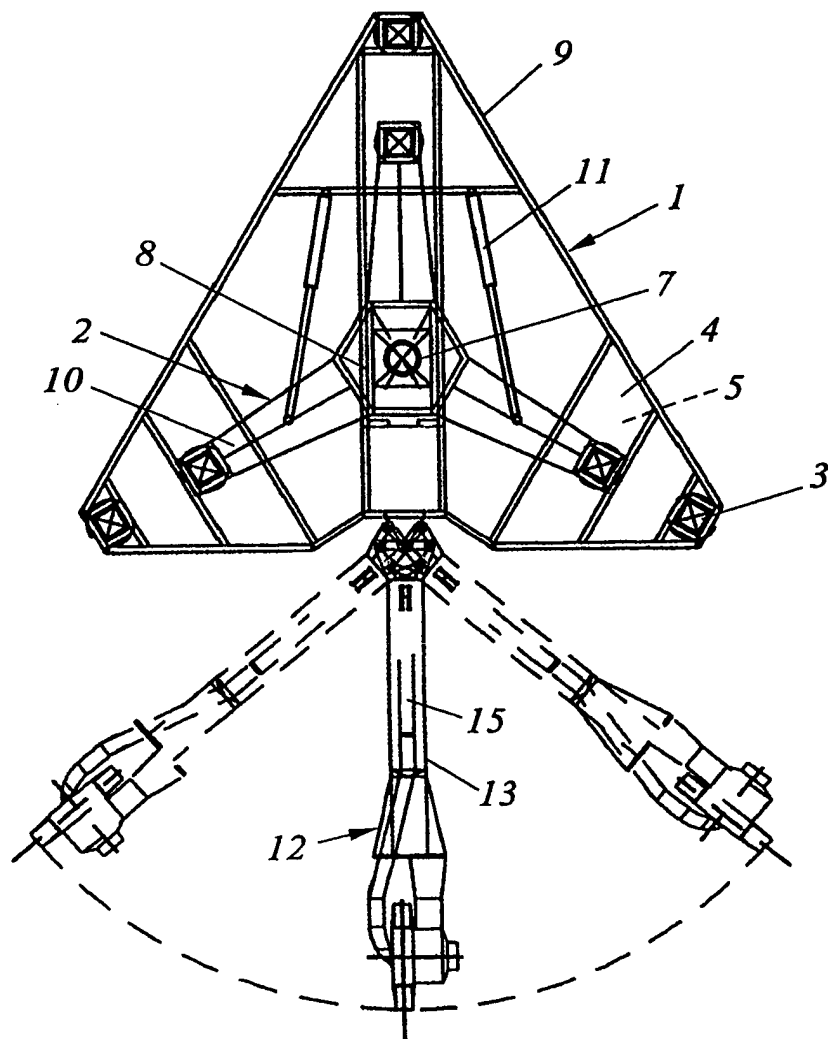


Fig 3a

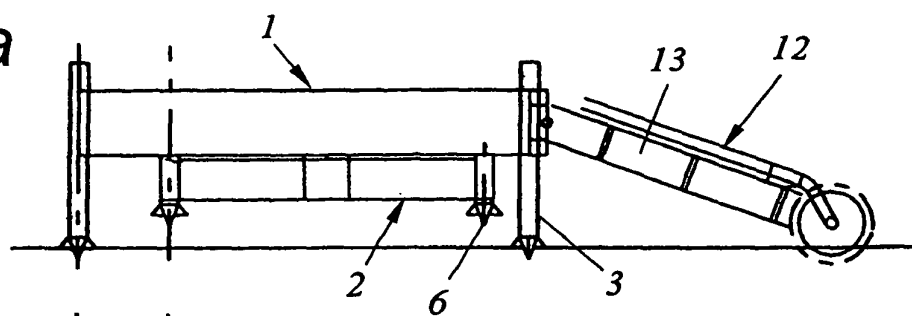


Fig 3b

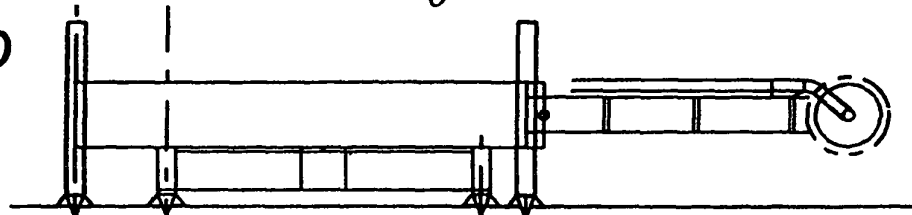


Fig 3c

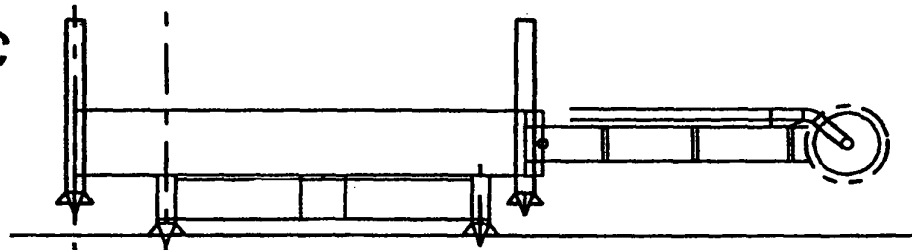


Fig 3d

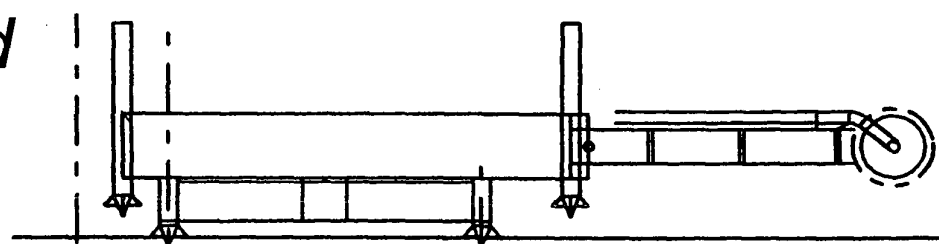


Fig 3e

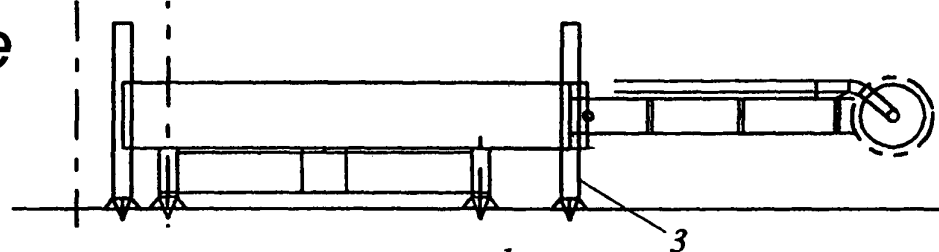


Fig 3f

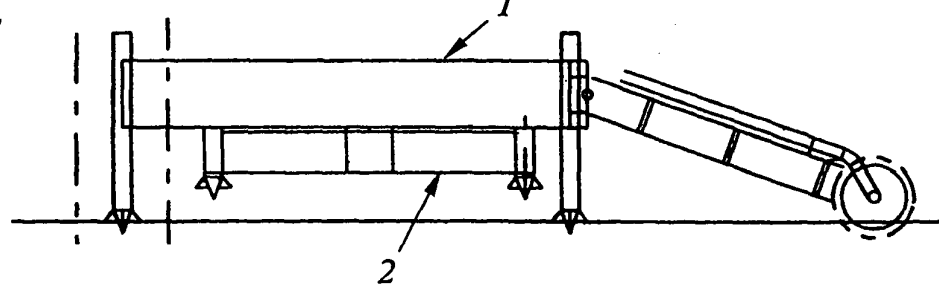


Fig 4

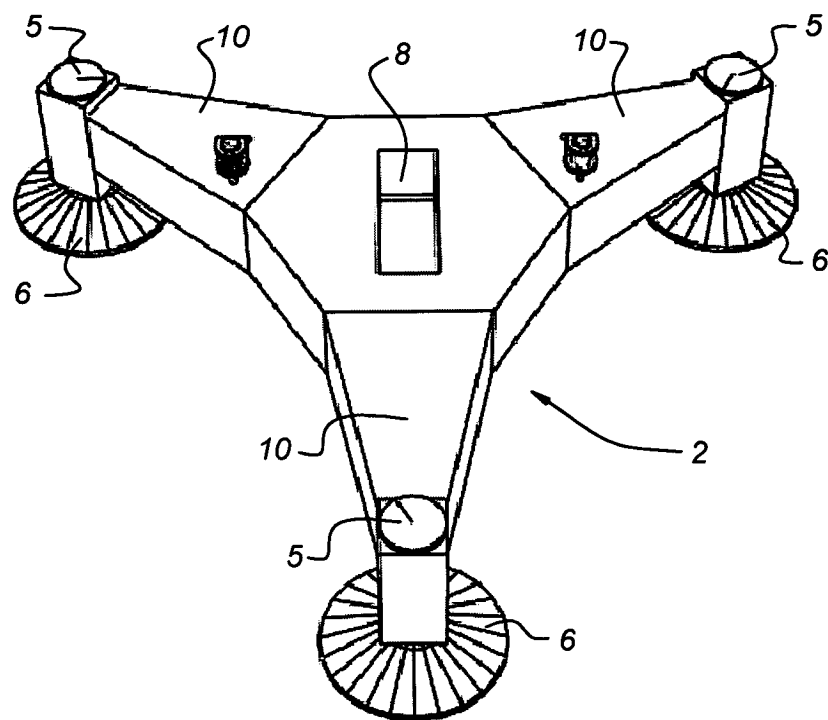


Fig 5

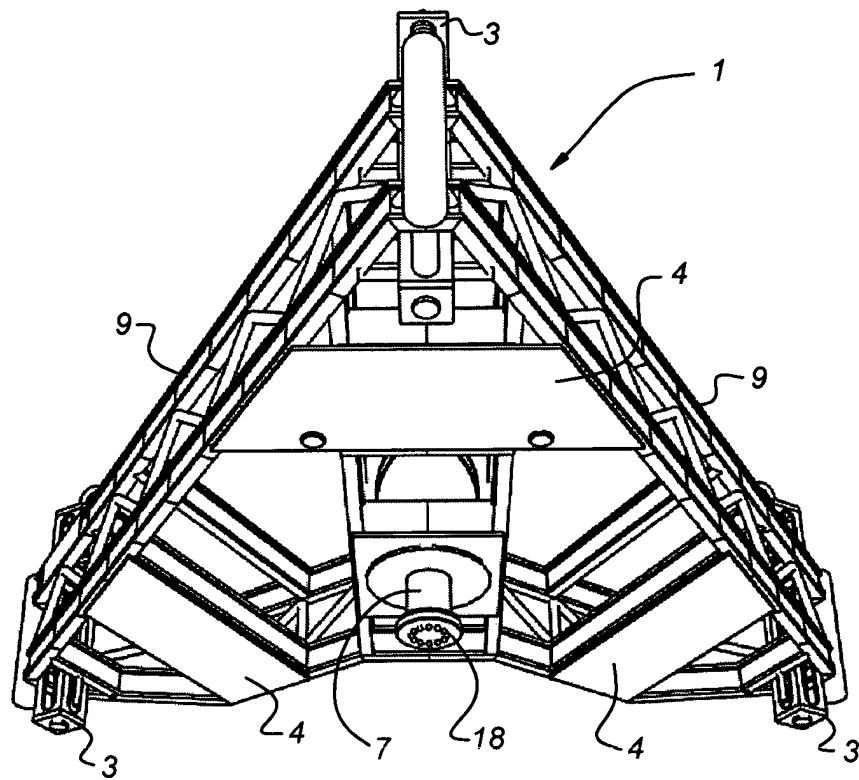
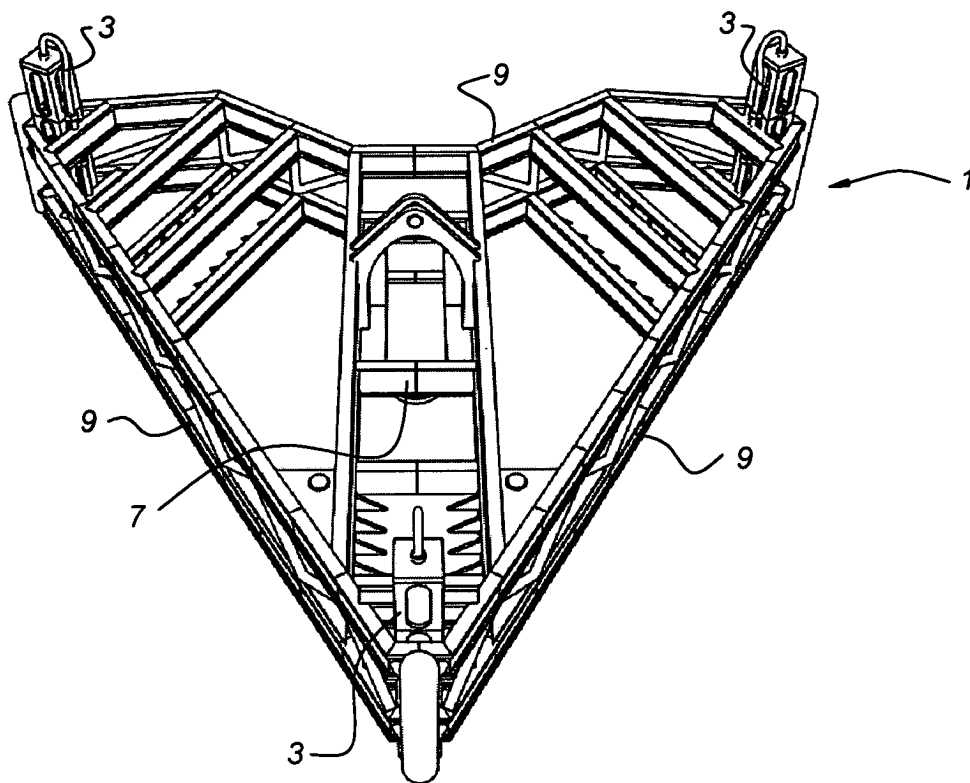


Fig 6





European Patent
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Application Number
EP 04 07 7662

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Place of search The Hague		Date of completion of the search 2 March 2005	Examiner Sheppard, B
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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