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(54) **Machine for use underwater**

Unterwasservorrichtung

Machine sous-marine

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- **PATENT ABSTRACTS OF JAPAN vol. 009, no. 252, 9 October 1985 (1985-10-09) & JP 60 104474 A (NIPPON KOKAN KK), 8 June 1985 (1985-06-08)**

EP 1 544 358 B1

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Description

[0001] The invention relates to an under water operating 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 supporting 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.

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

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

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

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

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

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

[0015] 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.

[0016] 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.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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.

[0023] 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.

[0024] 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. Under water operating 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.

8. Machine according to Claim 7, wherein the supporting surfaces (5) are made of stainless steel.

9. Machine according to Claim 6 or 7, wherein the bearing surfaces (4) are made of polyethylene.

10. Machine according to one of the preceding claims, wherein the legs (6) of the bottom frame (2) are fixed.

11. Machine according to one of the preceding claims, wherein both frames (1, 2) are provided with three legs (3, 6).

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.

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).

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.

15. Machine according to Claim 14, wherein the supporting surfaces (5) are close to the free ends of the beams (10).

16. Machine according to Claim 14 or 15, wherein the pin (7) is fixed to the core of the bottom frame (2).

17. Machine according to one of the preceding claims, wherein a dredging device is mounted on the top frame (1).

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.

Patentansprüche

1. Unter Wasser arbeitende Maschine, wie z.B. ein Nassbagger, zum Aufstellen auf einem Substrat, wie z.B. dem Bett eines Gewässers, umfassend einen oberen Rahmen (1) und einen unteren Rahmen (2), die jeweils mit Beinen (3, 6) versehen sind, um den betreffenden Rahmen (1, 2) auf dem Substrat zu tragen, welche Beine (3) des oberen Rahmens (1) eine variable Länge aufweisen, Auflageeinrichtungen, die Rotations- und Translationsbewegungen des oberen Rahmens (1) und unteren Rahmens (2) übereinander ermöglichen, sowie Antriebseinrichtungen zur Rotations- und/oder Translationsbewegung des oberen Rahmens (1) und des unteren Rahmens (2) übereinander, **dadurch gekennzeichnet, dass** einer (2) der Rahmen (1, 2) einen Bolzen (7) aufweist und der andere Rahmen (1) eine Langbahn (8) aufweist, entlang welcher der Bolzen (7) verschoben werden kann und in Bezug zu welcher der Bolzen (7) gedreht werden kann.

2. Maschine nach Anspruch 1, bei der die Bahn eine schlitzförmige Öffnung (8) in einem (1) der Rahmen (1, 2) umfasst und der Bolzen (7) in Bezug zu dem anderen Rahmen (2) vorsteht und daran befestigt ist, in welchem Schlitz (8) der Bolzen (7) so aufgenommen ist, dass er verschoben und gedreht werden kann.

3. Maschine nach Anspruch 2, bei der der Schlitz (8) zwischen zwei Längselementen begrenzt ist, die dauerhaft mit einem (1) der Rahmen (1, 2) verbunden sind, und der Bolzen (7) einen Kragen (18) aufweist, der sich über die Längselemente auf der Seite derselben erstreckt, die von dem Rahmen (2), der den Bolzen (7) aufweist, abgewandt ist.

4. Maschine nach Anspruch 3, bei der die Längselemente als Konstruktionsbalken, wie z.B. ein I-Träger oder ein T-Träger, konstruiert sind.

5. Maschine nach einem der vorangehenden Ansprüche, bei der der Bolzen (7) am unteren Rahmen (2) befestigt ist und die Bahn auf dem oberen Rahmen (1) aufgenommen ist.

6. Maschine nach einem der vorangehenden Ansprüche, bei der die Auflageeinrichtungen mindestens Gleitauflageeinrichtungen (4, 5) umfassen.

7. Maschine nach Anspruch 6, bei der der untere Rah-

men (2) tragende Flächen (5) aufweist, die aufwärts ausgerichtet sind, wenn die Maschine in Gebrauch ist, und der obere Rahmen (1) Auflageflächen (4) aufweist, die abwärts ausgerichtet sind und auf den tragenden Flächen (5) aufliegen, wenn die Maschine in Gebrauch ist.

8. Maschine nach Anspruch 7, bei der die tragenden Flächen (5) aus Rostfreistahl hergestellt sind.

9. Maschine nach Anspruch 6 oder 7, bei der die Auflageflächen (4) aus Polyethylen hergestellt sind.

10. Maschine nach einem der vorangehenden Ansprüche, bei der die Beine (6) des unteren Rahmens (2) fest angebracht sind.

11. Maschine nach einem der vorangehenden Ansprüche, bei der beide Rahmen (1, 2) mit drei Beinen (3, 6) versehen sind.

12. Maschine nach einem der vorangehenden Ansprüche, bei der der obere Rahmen (1) drei Balken (9) umfasst, die eine gleichschenklige oder im wesentlichen gleichseitige Dreiecksform begrenzen.

13. Maschine nach Anspruch 12 in Kombination mit einem der Ansprüche 7-9, bei der die Auflageflächen (4) nahe bei den Ecken des oberen Rahmens (1) angeordnet sind.

14. Maschine nach Anspruch 12 oder 13, bei der der untere Rahmen (2) umfasst: drei Träger (10), deren eines Ende in jedem Fall mit einem Kern verbunden ist und deren anderes freies Ende weg vom Kern ausgerichtet ist, welche freien Enden im Wesentlichen gleichweit voneinander entfernt sind.

15. Maschine nach Anspruch 14, bei der die tragenden Flächen (5) nahe bei den freien Enden der Träger (10) angeordnet sind.

16. Maschine nach Anspruch 14 oder 15, bei der der Bolzen (7) am Kern des unteren Rahmens (2) befestigt ist.

17. Maschine nach einem der vorangehenden Ansprüche, bei der eine Nassbaggervorrichtung auf dem oberen Rahmen (1) montiert ist.

18. Maschine nach Anspruch 17, bei der die Nassbaggervorrichtung eine Leiter umfasst, die an einem Ende auf eine bewegliche Weise mit dem oberen Rahmen (1) gekoppelt ist und die am anderen Ende Nassbaggereinrichtungen, wie z.B. ein Nassbaggerrad (14), aufweist.

19. Maschine nach Anspruch 18, bei der die Leiter mit dem oberen Rahmen (1) über ein Universalgelenk verbunden ist.

20. Maschine nach einem der vorangehenden Ansprüche, bei der der obere Rahmen (1) und der untere Rahmen (2) durch mindestens zwei hydraulische Kolben/Zylinder-Vorrichtungen zur Ausführung der wechselseitigen Translations- und Rotationsbewegungen der Rahmen miteinander verbunden sind.

Revendications

1. Machine de travaux sous-marins telle qu'une drague, destinée à être mise en place sur un substrat, tel que le lit d'une entité aquatique, comprenant un châssis supérieur (1) et un châssis inférieur (2), chacun d'entre eux étant muni de pattes (3, 6) pour supporter le châssis (1, 2) concerné sur le substrat, les pattes (3) du châssis supérieur (1) ayant une longueur variable, des moyens d'appui permettant des mouvements de rotation et de translation du châssis supérieur (1) et du châssis inférieur (2) l'un au-dessus de l'autre, ainsi que des moyens d'entraînement pour un mouvement de rotation et/ou de translation du châssis supérieur (1) et du châssis inférieur (2) l'un au-dessus de l'autre, **caractérisée en ce que** l'un (2) des châssis (1, 2) comporte une tige (7) et l'autre châssis (1) comporte une piste allongée (8) le long de laquelle on peut faire coulisser la tige (7) et par rapport à laquelle on peut faire tourner la tige (7).

2. Machine selon la revendication 1, dans laquelle la piste comprend une ouverture en forme de fente (8) dans l'un (1) des châssis (1, 2) et la tige (7) fait saillie par rapport à l'autre châssis (2) et est fixée à celui-ci, fente (8) dans laquelle est reçue la tige (7) de façon à pouvoir la faire coulisser et tourner.

3. Machine selon la revendication 2, dans laquelle la fente (8) est définie entre deux éléments longitudinaux reliés de façon permanente à l'un (1) des châssis (1, 2) et la tige (7) comporte un collier (18) se prolongeant au-dessus desdits éléments longitudinaux sur son côté qui est tourné à l'opposé du châssis (2) qui comporte la tige (7).

4. Machine selon la revendication 3, dans laquelle les éléments longitudinaux sont construits sous la forme de poutrelles structurelles, telles qu'une poutre en I ou une poutre en T.

5. Machine selon l'une des revendications précédentes, dans laquelle la tige (7) est fixée au châssis inférieur (2) et la piste est reçue sur le châssis supérieur (1).

6. Machine selon l'une des revendications précédentes, dans laquelle les moyens d'appui comprennent au moins des moyens d'appui coulissants (4, 5).

7. Machine selon la revendication 6, dans laquelle le châssis inférieur (2) comporte des surfaces de support (5) qui sont orientées vers le haut lorsque la machine est utilisée et le châssis supérieur (1) comporte des surfaces d'appui (4) qui sont orientées vers le bas et qui reposent sur les surfaces de support (5) lorsque la machine est utilisée.

8. Machine selon la revendication 7, dans laquelle les surfaces de support (5) sont faites en acier inoxydable.

9. Machine selon la revendication 6 ou 7, dans laquelle les surfaces d'appui (4) sont faites en polyéthylène.

10. Machine selon l'une des revendications précédentes, dans laquelle les pattes (6) du châssis inférieur (2) sont fixes.

11. Machine selon l'une des revendications précédentes, dans laquelle les deux châssis (1, 2) sont munis de trois pattes (3, 6).

12. Machine selon l'une des revendications précédentes, dans laquelle le châssis supérieur (1) comprend trois poutrelles (9) qui définissent une forme triangulaire isocèle ou sensiblement équilatérale.

13. Machine selon la revendication 12, en combinaison avec l'une des revendications 7 à 9, dans laquelle les surfaces d'appui (4) sont proches des coins du châssis supérieur (1).

14. Machine selon la revendication 12 ou 13, dans laquelle le châssis inférieur (2) comprend trois poutres (10) dont une extrémité, dans chaque cas, est raccordée à un coeur et dont l'autre extrémité libre est orientée à l'opposé du coeur, extrémités libres qui sont espacées de distances sensiblement égales.

15. Machine selon la revendication 14, dans laquelle les surfaces de support (5) sont proches des extrémités libres des poutres (10).

16. Machine selon la revendication 14 ou 15, dans laquelle la tige (7) est fixée au coeur du châssis inférieur (2).

17. Machine selon l'une des revendications précédentes, dans laquelle un dispositif de dragage est monté sur le châssis supérieur (1).

18. Machine selon la revendication 17, dans laquelle le dispositif de dragage comprend une échelle qui est couplée de façon mobile à une extrémité au châssis supérieur (1) et qui comporte des moyens de dragage, tels qu'une roue de dragage (14) à l'autre extrémité.

19. Machine selon la revendication 18, dans laquelle l'échelle est reliée au châssis supérieur (1) par l'intermédiaire d'un cardan.

20. Machine selon l'une des revendications précédentes, dans laquelle le châssis supérieur (1) et le châssis inférieur (2) sont reliés l'un à l'autre par au moins deux dispositifs hydrauliques à piston/cylindre pour exécuter les mouvements mutuels de translation et de rotation desdits châssis.

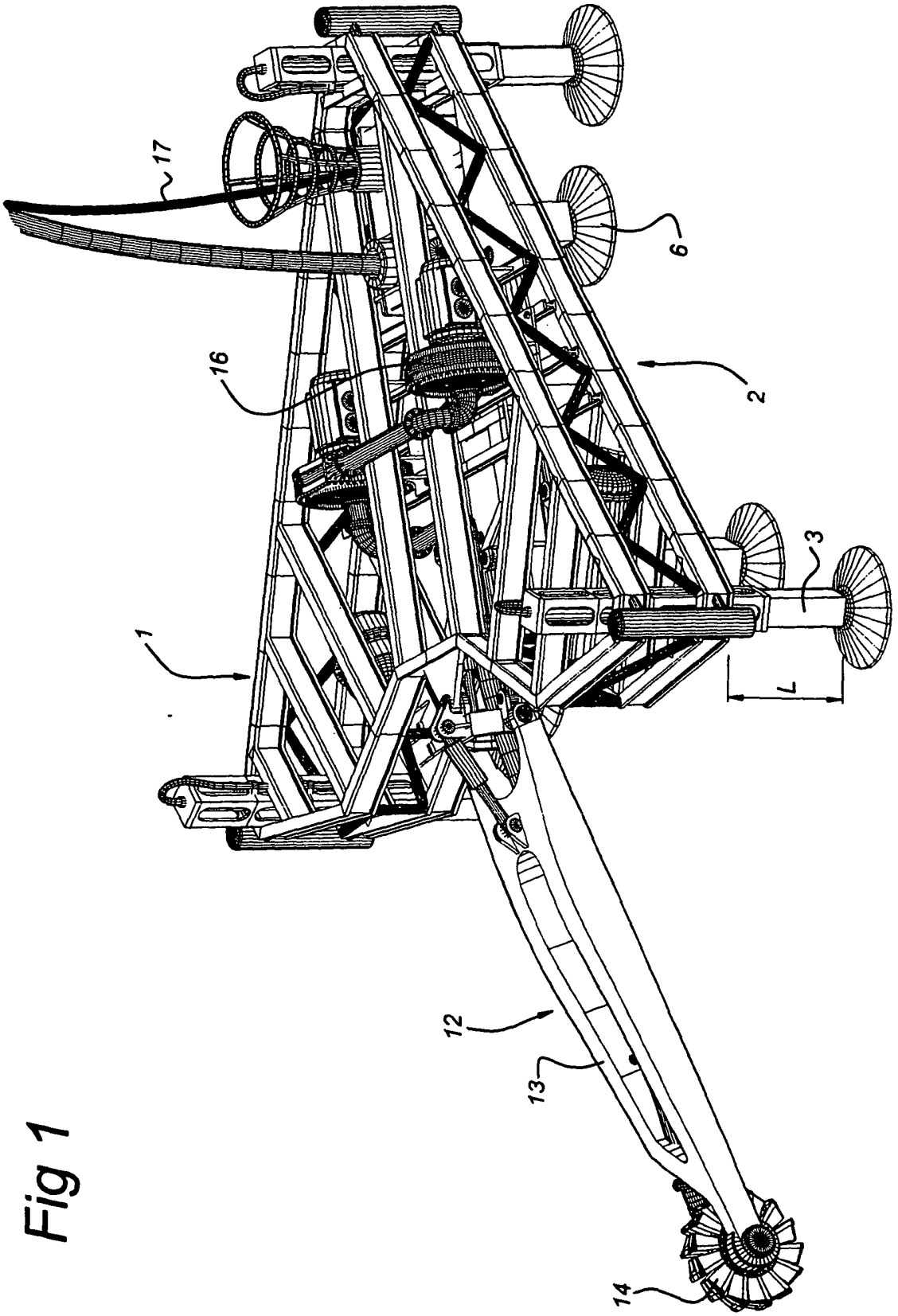


Fig 1

Fig 2

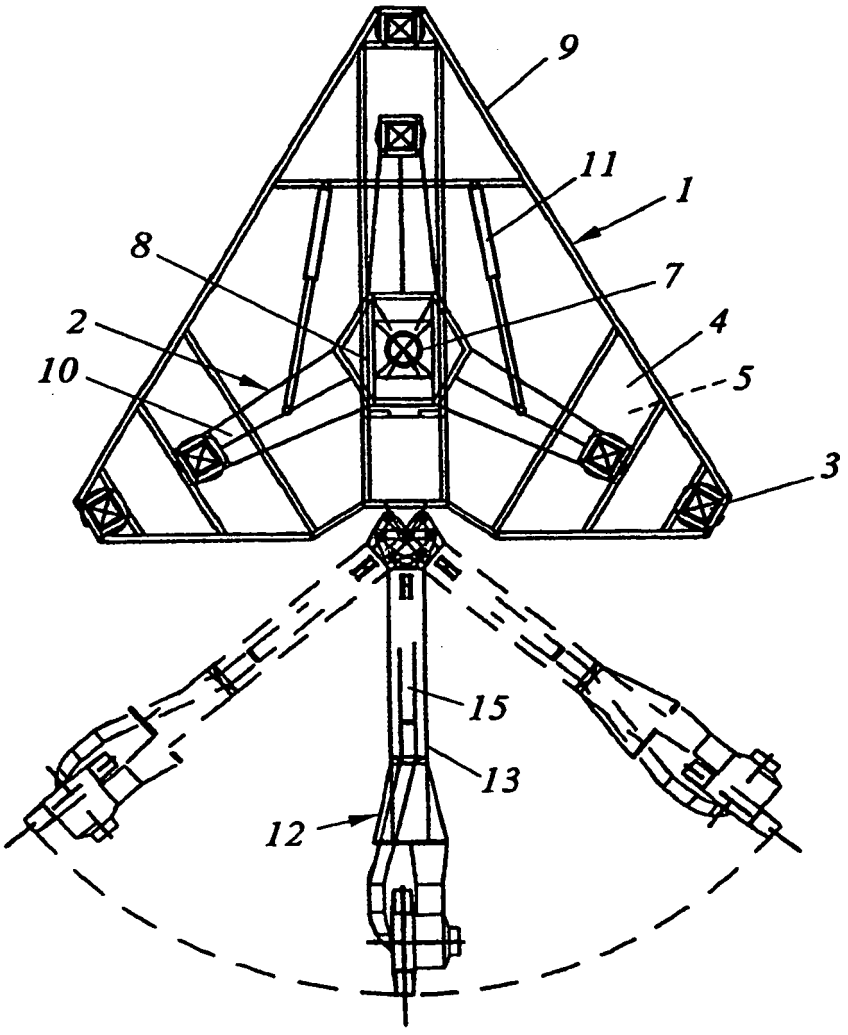


Fig 3a

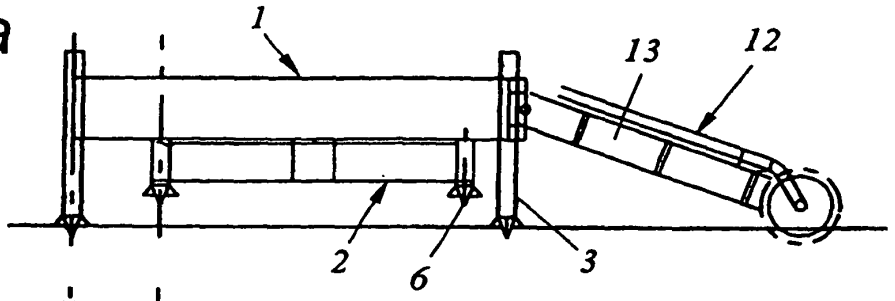


Fig 3b

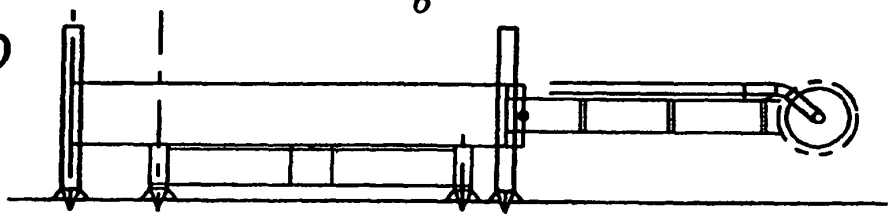


Fig 3c

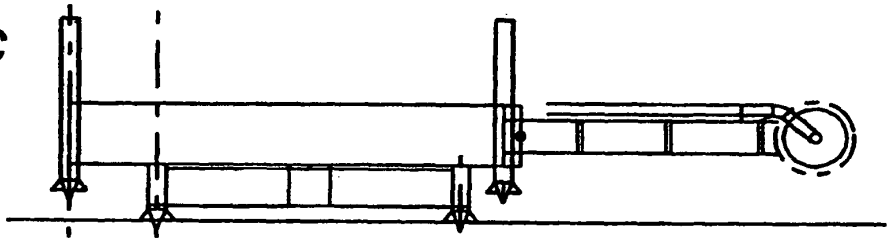


Fig 3d

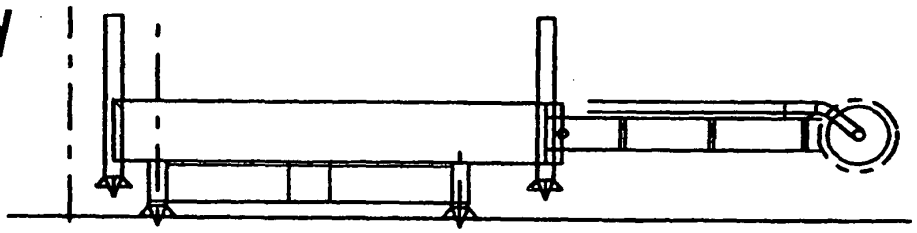


Fig 3e

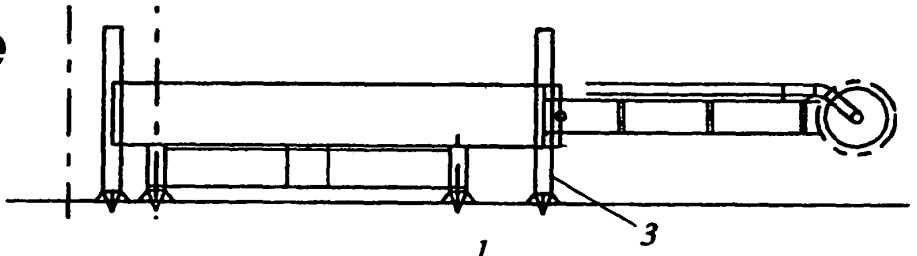


Fig 3f

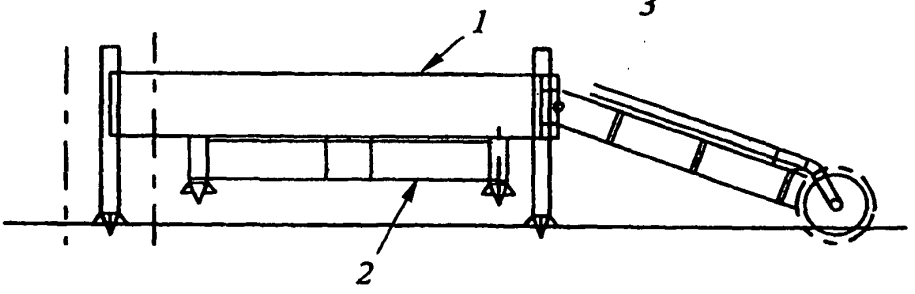


Fig 4

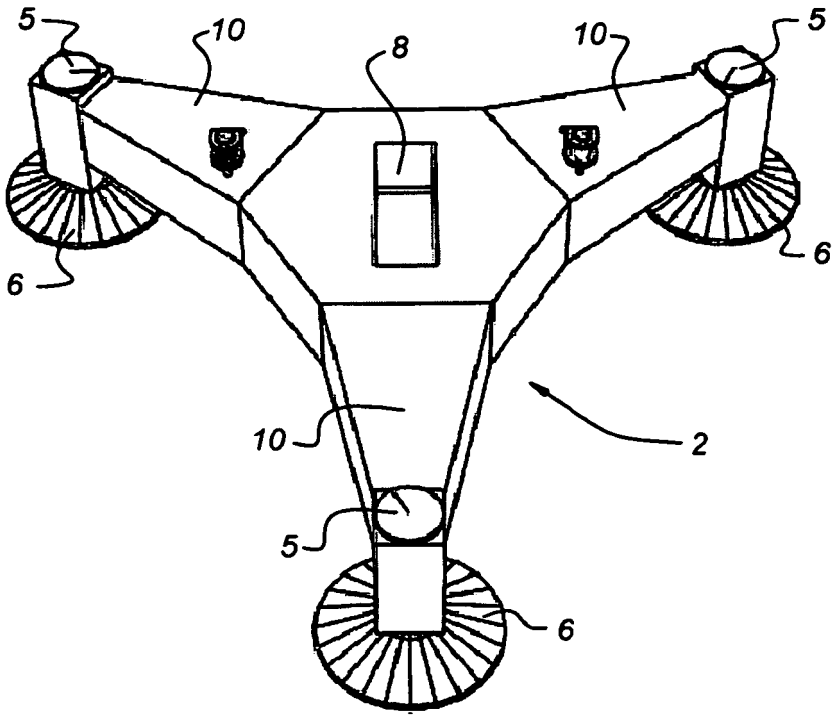


Fig 5

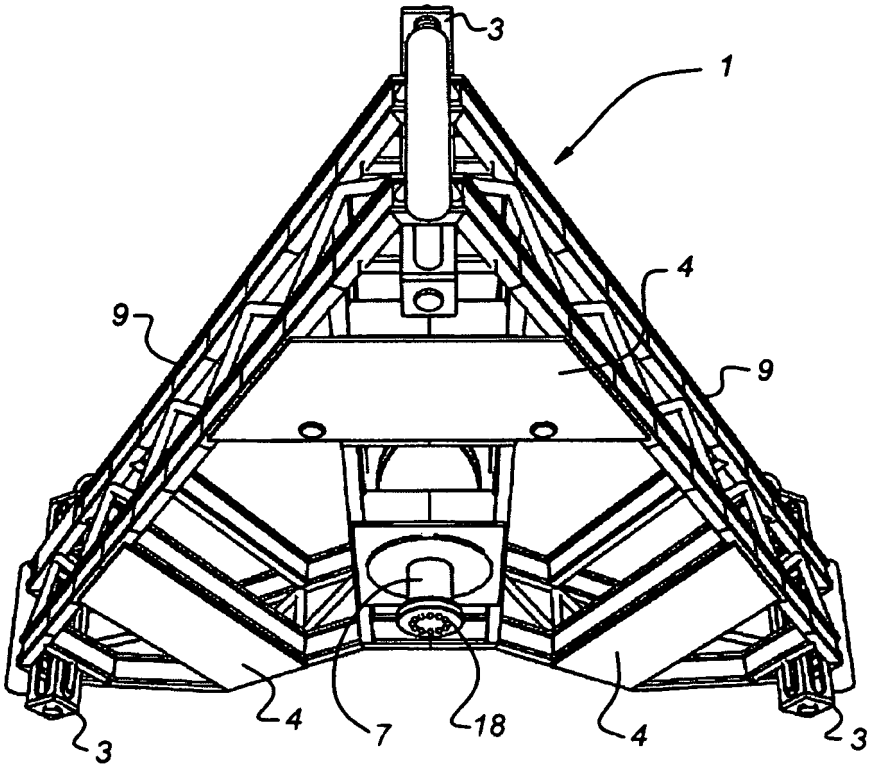
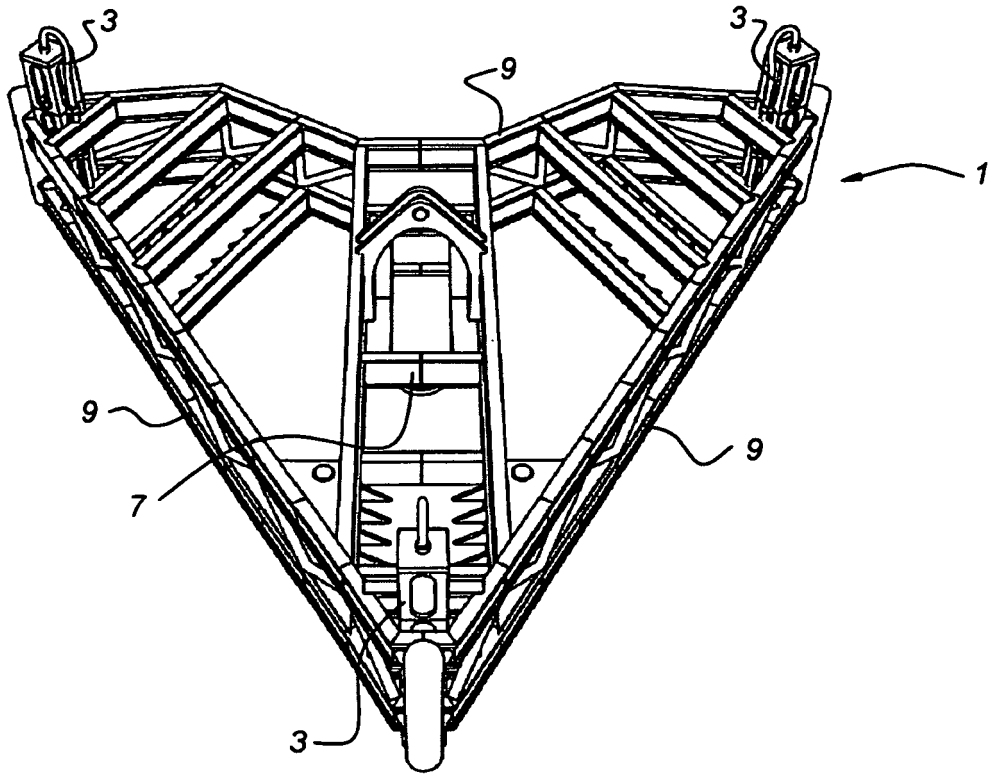


Fig 6



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Patent documents cited in the description

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