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(71) Applicant: **Cifa S.P.A.**
20030 Senago, Milano (IT)

(72) Inventors:
- **Cipolla, Davide**
  22070 Intimiano CO (IT)
- **Pizzi, Antonello**
  20038 Seregno MI (IT)

(74) Representative: **Faraggiana, Vittorio**
Ingg. Guzzi & Ravizza S.r.l.
Via Vincenzo Monti 8
I-20123 Milano (IT)

(54) Movable pump for concrete provided with an improved stabilisation system

(57) A movable pump for concrete comprises a vehicle provided with a frame (16) to which a fifth wheel (15) is fixed that is suitable for supporting a distributing arm (40) for distributing concrete, mounted rotatably thereupon, there being present a pair of front legs (17, 18) and a pair of rear legs (19, 20) for stabilising the pump that are movable between an operative position extending from the vehicle and a retracted non-operative position, the front legs being telescopic and diagonally extendible forward on opposite sides of the vehicle and each having a fixed part that is integral with said frame (16), the rear supporting legs being rotatable hinged on said frame (16) on opposite sides of the vehicle. The fixed parts of the telescopic legs are arranged near the fifth wheel (15) and the rear legs (19, 20) are hinged on the frame with hinge (21, 22) near said fifth wheel (15).

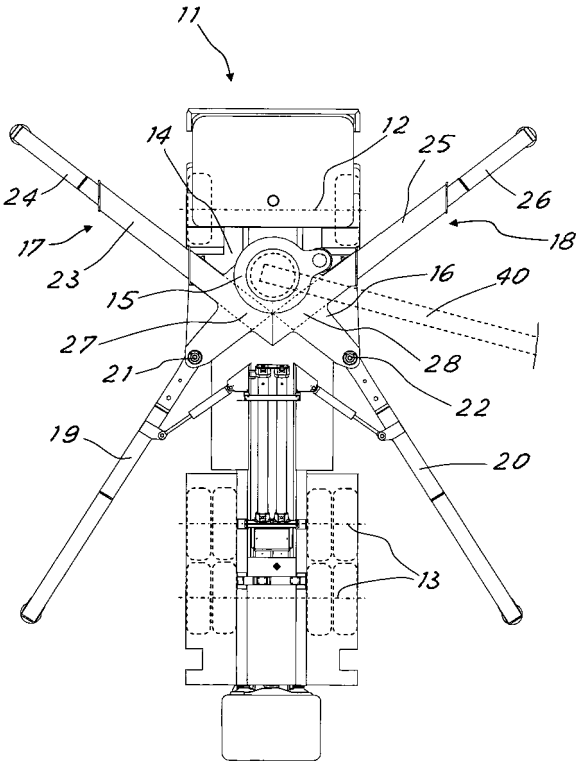

Fig.1

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Description

[0001] The present invention refers to an innovative movable pump for concrete provided with an improved stabilisation system.

[0002] Movable pumps for concrete are known in the prior art, which are made by fitting pumping organs to a vehicle having an articulated arm for distributing the concrete.

[0003] The arm, which can be a few dozen metres long, is rotatably supported on a fifth wheel fixed to the vehicle.

[0004] During pumping, the carrying structure is stabilised by means of a pair of front legs and a pair of rear legs (also called "stabilisers").

[0005] The legs are mounted on a structure that supports the fifth wheel and which is fixed to the frame of the vehicle. The legs can be extractable telescopic or rotatable legs hinged on the structure to move between an operative position extending from the vehicle and a retracted non-operative position.

[0006] In the prior art, the supporting structure on which the stabilisers are mounted is particularly heavy, having dimensions that are such as to withstand the great stress that during pumping is transmitted from the supporting fifth wheel of the distributing arm to the stabilising legs. This frame structure, in addition to being considerably costly due to the considerable use of material, greatly reduces the load capacity of the vehicle due to the overall dimensions and weight thereof.

[0007] In order to overcome the drawback, it has been proposed to make the front legs as telescopic legs having fixed tubular parts that are staggered in height and crossed-over in an X shape and are mounted on a supporting frame of the fifth wheel, whilst the rear legs were made rotatable hinged on the frame at the rear end of the fixed pipes of the front telescopic legs.

[0008] This type of arrangement of the stabilisers has not, however, satisfactorily solved the problems mentioned previously regarding the overall dimensions of the frame, the cost thereof and the considerable weight thereof.

[0009] In fact, the telescopic front legs and also the rear ones are fixed to the frame in a position that is relatively distant from the supporting fifth wheel of the distributing arm. The structure that connects the fifth wheel and stabilisers thus still has a considerable longitudinal extent, still having to be given dimensions for supporting the great stress that may occur during the pumping phase.

[0010] Thus the structure necessary for stabilising the pump is costly, has great overall dimensions, entails a great load on the vehicle, the transporting capacity of which is still limited in an unsatisfactory manner.

[0011] The general object of the present invention is to overcome the aforementioned drawbacks by providing a movable pump for concrete provided with a stabilising structure with small overall dimensions that is compact, cheap and light as well as such as to create effective stabilisation of the vehicle in all operative conditions.

[0012] In view of this object, it was decided to make, according to the invention, a movable pump for concrete comprising a vehicle provided with a frame to which a fifth wheel is fixed that is suitable for supporting a distributing arm of the concrete mounted rotatably thereupon, there being a pair of front legs and a pair of rear legs for stabilising the pump that are movable between an operative position extending from the vehicle and a retracted non-operative position, the front legs being telescopic and diagonally extendible forwards on opposite sides of the vehicle and each having a fixed part that is integral with said frame, the rear supporting legs being rotatable hinged on said frame on opposite sides of the vehicle, characterised in that the fixed parts of the telescopic legs are arranged near the fifth wheel and in that the rear legs are hinged on the frame with hinge near said fifth wheel.

[0013] In order to make clearer the explanation of the innovative principles of the present invention and the advantages thereof over the prior art a possible embodiment applying these principles will be disclosed below. In the drawings:

- figure 1 is an overall view from above of a movable pump for concrete according to the invention with the stabilising legs in the operative position,
- figure 2 is a view from above of the frame on which the stabilising legs are mounted, with the latter in the retracted non-operative position,
- figure 3 is a frontal view of the frame and of the fifth wheel intended for supporting the distributing arm, with the stabilising legs extended.

[0014] With reference to figures, in figure 1 there is shown a pump for concrete 11 comprising a vehicle 14 on which are housed the pumping organs (not shown in the figure and per se made according to prior-art techniques).

[0015] The vehicle 14 has a distributing arm for distributing the concrete 40 (shown schematically by a dotted line in the figure).

[0016] The arm 40, made, for example of several articulated trunks according to known techniques, may also be a few dozen metres long and is rotatably supported on a fifth wheel 15.

[0017] The fifth wheel 15 is arranged near a front axis 12 of the vehicle, which may count one or more rear axes 13 (in the figure two are given as an example thereof).

[0018] The fifth wheel 15 is fixed to a frame 16 of the pump, on which four stabilising legs of the vehicle 17-20 are mounted, two front and two rear legs. The frame 16 is fixed to a frame of the vehicle 14, made according to *per se* known techniques.

[0019] The legs are movably mounted between an operative position extending from the vehicle to stabilise the pump and a retracted non-operative position, for example for vehicle movement.

[0020] The two front legs 17, 18 are telescopic legs

facing diagonally forwards.

[0021] Each telescoping leg 17, 18 has a fixed part that forms a sliding channel respectively 27 and 28 inside which the movable part of the leg is extendible.

[0022] In the embodiment shown in the figures, the telescopic legs consist of three trunks (or parts), two of which are movable and one of which is fixed. The leg 17 is formed by two movable parts 23, 24 that are extendible from the channel 27, whilst the leg 18 comprises the two trunks 25, 26 that are extendible from the channel 28.

[0023] The end movable portions 24 and 26 are slideable respectively inside the intermediate trunks 23 and 25, between the position extended for stabilisation of figure 1 and the retracted non-operative position of figure 2.

[0024] The two channels 27 and 28 that receive the movable parts of the telescopic legs have a V arrangement if viewed from above. They are positioned almost tangentially with respect to the perimeter of the fifth wheel 15, below the latter. The fifth wheel 15 is positioned forwards with respect to channels 27, 28.

[0025] Channels 27 and 28 are obtained directly in the frame 16 and, as shown in figure 3, are positioned at different heights to enable the movable parts of the telescopic legs to cross that protrude from the rear when the stabilisers are in a non-operative state (see the configuration in figure 2). The crossing occurs in a median position with respect to the lateral sides of the vehicle.

[0026] The pump 11 also comprises a pair of rear stabilising legs 19 and 20, one for each side of the vehicle.

[0027] The rear legs 19, 20 are rotatable and hinged to the frame 16 near the fifth wheel 15, respectively with hinge 21 and 22.

[0028] The two hinges 21, 22 are arranged on opposite sides of the vehicle 14 in the two spaces 43, 44 comprised between the two axes 41, 42 of the front telescopic legs facing opposite lateral sides of the vehicle, i.e. not in the spaces facing forwards or backwards with respect to the vehicle. Each hinge 21, 22 is thus in an advanced position with respect to the axis of the front leg protruding on the opposite side of the vehicle, and is arranged at the rear with respect to the axis of the other front leg.

[0029] This arrangement enables the frame 16 to be made particularly compact.

[0030] In an embodiment of the invention, the hinges 21, 22 are less than 2 m far from the perimeter of the fifth wheel 15.

[0031] The distance between the hinges 21, 22 and the perimeter of the fifth wheel 15 is advantageously two times less than the diameter of the fifth wheel.

[0032] The legs 19 and 20 are rotatable between a non-operative movement position in which they are parallel to the extent of the vehicle and a stabilising operative position in which they face diagonally, as shown in figure 1.

[0033] Advantageously, the frame 16 comprises a central body 29 directly connected to the fifth wheel 15, from which there extend backwards diagonally on opposite sides of the vehicle two wings 30, 31 at the top of which are hinged the rear legs 19, 20. The two wings 30, 31 are arranged in the two spaces 43, 44 comprised between the two axes of the front telescopic legs facing opposite sides of the vehicle.

[0034] The wings 30, 31 can be made with two horizontal parallel plates, between which the hinge pin of the rear legs is arranged.

[0035] From the body 29 also a pair of tubular bodies 32 and 33 extends facing diagonally forwards on opposite sides of the vehicle, which form part of the sliding channels of the front telescopic legs.

[0036] Owing to the solution of positioning the hinge of the rear legs near the fifth wheel 15 it was possible to reduce greatly the weight and the overall dimensions of the frame 16 on which the fifth wheel is fixed. In fact, the frame 16 has an extremely cheap and compact structure, especially in the direction that is longitudinal to the vehicle.

[0037] In the embodiment shown in the figures, the movable parts, respectively 23, 24 and 25, 26, of the two telescopic legs have lengths that are almost equal to one another, greater than the length of the channels 27, 28 formed in the frame 16.

[0038] The front ends of the channels 27, 28 from which in an operative condition the movable trunks of the telescopic legs emerge that are arranged almost flush with the opposite sides of the vehicle. Also the hinges 20, 21 are positioned at the lateral profiles of the vehicle.

[0039] In the retracted position of figure 2, the movable parts of the telescopic legs protrude backwards out of the frame 16, with ends at the level of the hinges 21, 22 internally with respect thereto.

[0040] Advantageously, each fixed part of a telescoping leg (or channels 27, 28) is arranged between the fifth wheel 15 and one of the two hinges 21, 22.

[0041] The movement of the rear and front legs from the non-operative position to the stabilising position and vice versa is performed with actuators (for example hydraulic cylinders) made according to any prior-art technique.

[0042] At the terminal ends of each leg there is provided an extendible leg intended for resting on the ground in the operative stabilising configuration. The feet are moved with drives according to known prior-art techniques.

[0043] At this point it is clear how the objects of the present invention are achieved.

[0044] In particular, a movable pump for concrete is provided that is an effective stabilization system that is made with a compact, cheap and light structure.

[0045] This has enabled the use of material to be reduced that is necessary for making the supporting frame of the fifth wheel, thus reducing the overall costs of the product and increasing the load-bearing capacity of the vehicle.

[0046] Further, by carrying the connections of the front and rear stabilisers as near as possible to one another and to the fifth-wheel turret, it is possible to discharge

better the forces coming from the arm to the stabilisers, thus minimising the twisting and flexing effects on the frame.

[0047] Naturally, the description made above of an embodiment applying the innovative principles of the present invention is given as an example of these principles and must not therefore be taken to limit the protective scope of what is claimed herein.

[0048] For example, the front stabilising legs could also be formed with a single movable part instead of with two extendible telescoping parts, as shown in the figures.

Claims

1. Movable pump for concrete comprising a vehicle provided with a frame (16) to which a fifth wheel (15) is fixed that is suitable for supporting a distributing arm (40) of the concrete mounted rotatably on the fifth wheel (15), there being a pair of front legs (17, 18) and a pair of rear legs (19, 20) for stabilising the pump that are movable between an operative position extending from the vehicle and a retracted non-operative position, the front legs being telescopic and diagonally extendible forwards on opposite sides of the vehicle and each having a fixed part that is integral with said frame (16), the rear supporting legs being rotatable hinged on said frame (16) on opposite sides of the vehicle, **characterised in that** the fixed parts of the telescopic legs are arranged near the fifth wheel (15) and **in that** the rear legs (19, 20) are hinged on the frame with a hinge (21, 22) near said fifth wheel (15).

2. Pump according to claim 1, **characterised in that** the two hinges (21, 22) are arranged in the two spaces (43, 44) comprised between the two axes (41, 42) of the front telescopic legs facing opposite lateral sides of the vehicle.

3. Pump according to claim 1, **characterised in that** the hinge (21, 22) of the rear legs (19, 20) is less than 2 metres from the perimeter of the fifth wheel (15).

4. Pump according to claim 1, **characterised in that** the distance between the hinges (21, 22) of the rear legs (19, 20) and the perimeter of the fifth wheel (15) is about two times less than the diameter of the fifth wheel.

5. Pump according to claim 1, **characterised in that** the fifth wheel (15) is situated near a front axis (12) of the vehicle.

6. Pump according to claim 1, **characterised in that** the fixed parts of the telescopic legs are formed integrally inside said frame.

7. Pump according to claim 1, **characterised in that** the fixed parts of the telescopic legs define sliding channels (27, 28) inside which corresponding movable parts (23-26) of the telescopic legs are extendible.

8. Pump according to claim 7, **characterised in that** said channels (27, 28), if seen from above, are arranged in a V.

9. Pump according to claim 7, **characterised in that** the movable parts (23-26) of the telescopic legs are longer than the length of the sliding channels (27, 28).

10. Pump according to claim 7, **characterised in that** in the retracted position the movable parts (23-26) of the telescopic legs cross at X at the rear with respect to the sliding channels (27, 28).

11. Pump according to claim 7, **characterised in that** the frame comprises a central body (29) directly connected to the fifth wheel (15), a pair of tubular bodies (32, 33) protruding from the body that face diagonally forwards on opposite sides, the pair of tubular bodies (32, 33) forming part of the sliding channels of the front telescopic legs (17, 18).

12. Pump according to claim 1, **characterised in that** the frame comprises a central body (29) directly connected to the fifth wheel (15), protruding from the body at the back diagonally on sides opposite two wings (30, 31) at the tops of which the rear legs (19, 20) are hinged.

13. Pump according to claim 12, **characterised in that** said wings (30, 31) are arranged in the two spaces (43, 44) comprised between the two axes (41, 42) of the telescopic front legs facing lateral opposite sides of the vehicle.

14. Pump according to claim 1, **characterised in that** the front telescopic legs are arranged almost tangentially to the perimeter of the fifth wheel (15).

15. Pump according to claim 1, **characterised in that** the front telescopic legs are arranged behind the fifth wheel (15).

16. Pump according to claim 1, **characterised in that** the front legs (17, 18) are formed telescopically in three parts, two movable parts (23-26) and a fixed part that is integral with the frame (16) of the pump.

17. Pump according to claim 16, **characterised in that** the two movable parts (23-26) of each leg are almost equally long as one another.

18. Pump according to claim 1, **characterised in that** each fixed part of a telescopic leg is arranged between the fifth wheel (15) and a hinge (20, 21) of one of the rear legs.

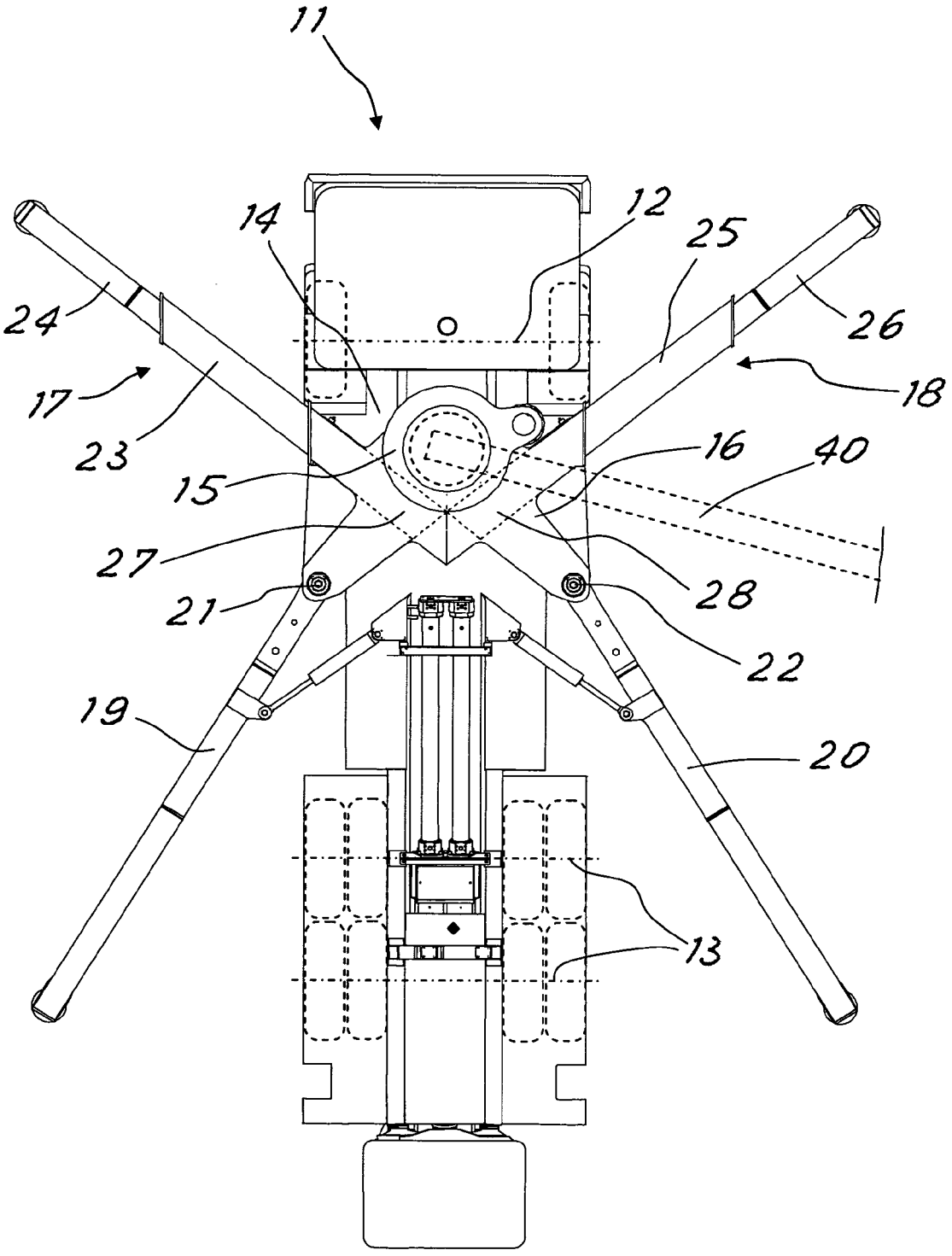

Fig.1

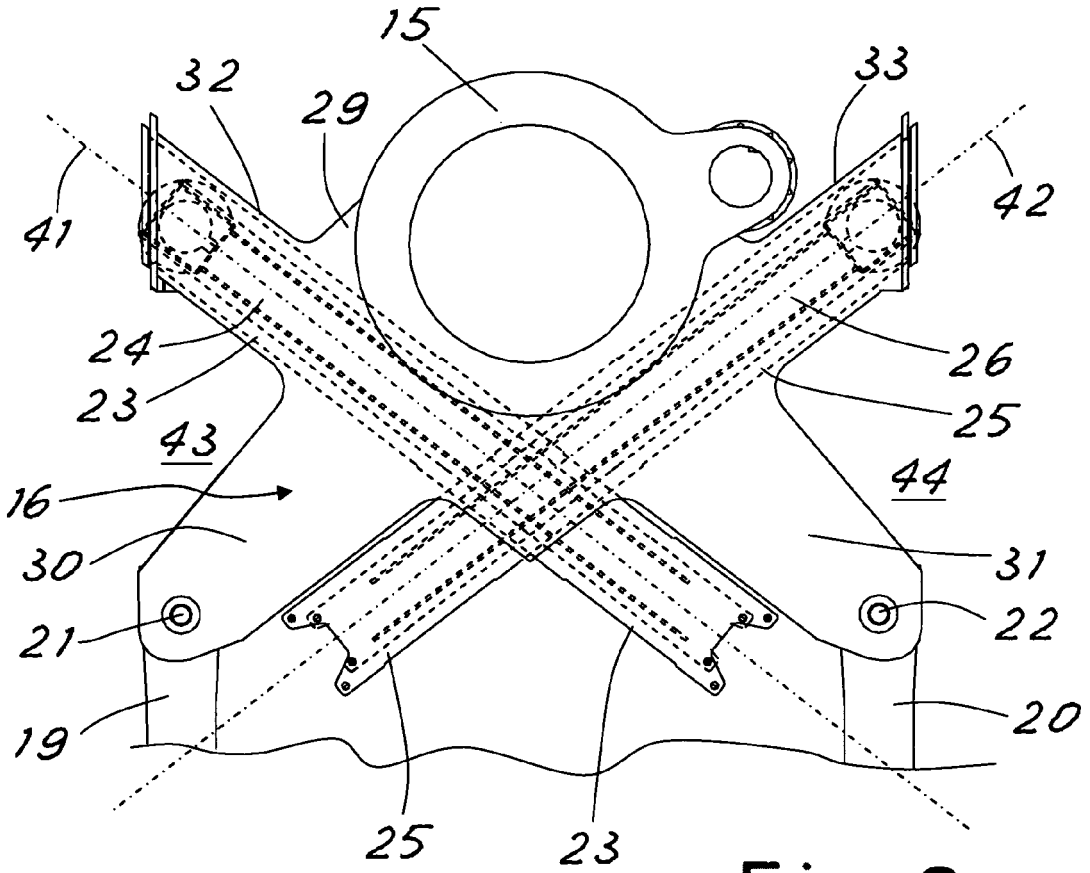
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Fig. 2

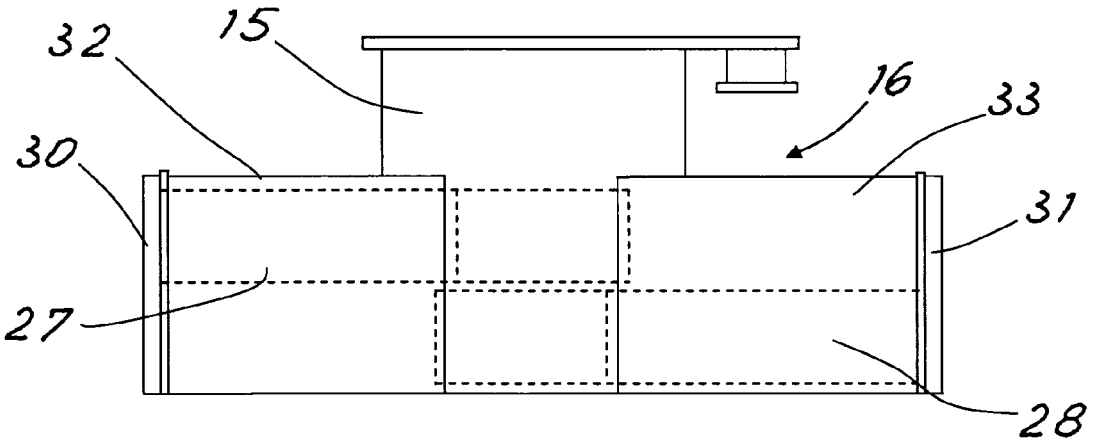
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Fig. 3