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(54) Supply transfer apparatus

(57) An apparatus for use in transferring supplies between two vessels at sea is adapted for location on a vessel and comprises a mounting (12) adapted to be affixed to or formed in the structure of a vessel, and a support arm (14) depending from the mounting (12). The support arm (14) is movable between a retracted position and an extended position above a deck area (16). The arm (14) provides an anchor point (30) for a cable (32) extending outboard from the vessel. With the support arm (14) in the retracted position, the deck area (16) below and forward of the anchor point (30) is accessible from inboard.

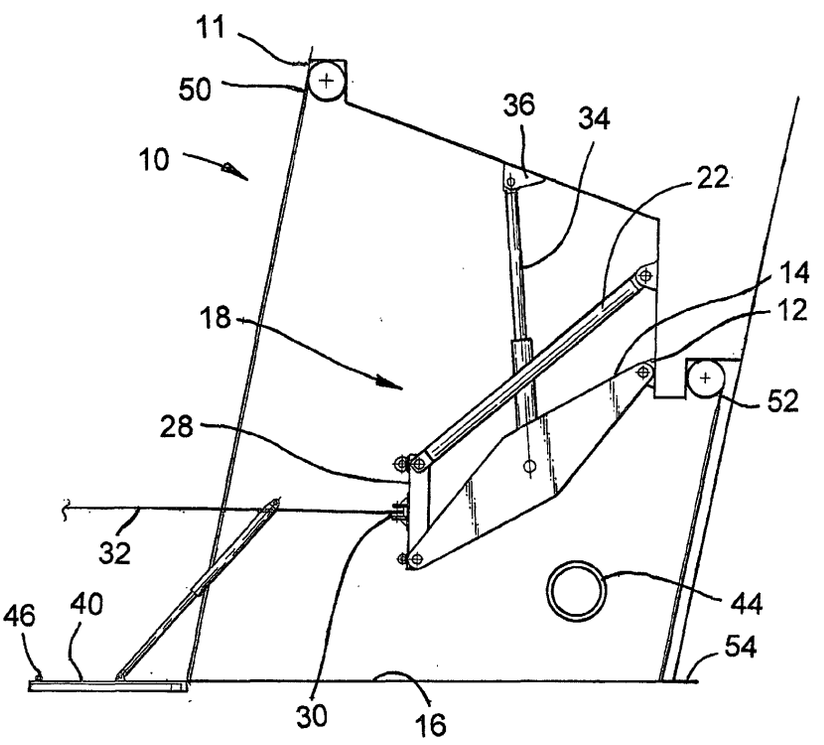

Fig.1

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Description

[0001] The present invention relates to an apparatus for use in the transfer of supplies and the like between two vessels travelling at sea, which transfer process is generally known as replenishment at sea (RAS), and utilises RAS stations provided on the vessels.

[0002] At present, when a naval vessel requires fresh supplies of, for example, food and ammunition, and does not have convenient or safe access to a friendly port to obtain these supplies, the supplies will be brought to the vessel by an auxiliary vessel, and transferred between the vessels at sea. Whilst the two vessels travel adjacent one another at the same speed on the same heading, a light pilot line is passed from one vessel to the other, this line then being used to pull a heavier cable across the gap between the vessels. One end of the cable may be connected to a fixed anchor point on one vessel, while the anchor point on the other vessel may be movable to maintain a desired tension on the cable. Once the cable has been secured, a test load is sent across between the vessels, typically on a pulley suspended from the cable, and all being well the appropriate supplies are then transferred between the vessels.

[0003] The anchor points are provided at appropriate replenishment at sea (RAS) stations on the vessels. As will be appreciated, the weight and configuration of the loads to be transferred will vary and hence the rigging used to support the load from the cable may have to be varied for each traverse. It is therefore often necessary to adjust the height of the cable relative to the adjacent deck area to accommodate an outgoing or incoming load. This may be achieved by the provision of a RAS station in which the cable anchor point may be raised and lowered on a mechanism affixed to a purpose built mast or other support structure on the vessel. This also allows for loads to be raised and lowered to facilitate traverse between the two vessels, and for rigging and de-rigging of loads.

[0004] While such arrangements are generally effective and have been in wide use for many years, RAS stations are only used periodically, and the mast and associated equipment occupy valuable deck space which is not available for other purposes. Also, the deck area around the mast must be kept clear to provide an area in front of the mast where supplies may be safely landed and handled, and also to allow vehicular access to the deck area in front of the mast; supplies are often carried to and from RAS stations by fork lift vehicles, which must be able to manoeuvre safely into positions where supplies can be unloaded and uplifted.

[0005] It is amongst the objectives of embodiments of the present invention to obviate or mitigate at least one of the foregoing disadvantages.

[0006] According to a first aspect of the present invention there is provided an apparatus for use in transferring supplies between two vessels at sea, the apparatus being adapted for location on a vessel and comprising:

a mounting adapted to be affixed to or formed in the structure of a vessel; and

a support arm depending from the mounting and being movable between a raised position and an extended position above a deck area, the arm providing an anchor point for a cable extending outboard from the vessel and whereby, at least with the support arm in the retracted position, the deck area below and forward of the anchor point is accessible from inboard.

[0007] Thus, in use, the invention provides an apparatus, typically in the form of RAS station apparatus, which permits access to the deck area below and forwards of the anchor point. This offers a number of advantages: when supplies have been landed on the deck in front of or below the anchor point, the arm may be raised to permit the supplies to be retrieved from inboard of the apparatus, such that the deck area to one or both sides of the apparatus is available for other purposes, and when not in use the arm may be retracted such that the deck area directly below the arm is available for other purposes. Clearly this is preferable to the present situation in which it is necessary to, for example, negotiate around a deck-mounted RAS station mast to uplift or deposit supplies, and the station mast remains in place at all times, and thus occupies valuable deck space.

[0008] The apparatus may further comprise means for moving the arm between the retracted and extended positions. The arm moving means may take any appropriate form, including but not limited to a pneumatic or hydraulic piston and cylinder arrangement, a worm and gear arrangement, rack and pinion arrangement, a spool and wire, or the like. The arm moving means may incorporate or form a part of the arm.

[0009] Preferably, the arm extends forwards of the mounting. Most preferably, two vertically spaced mountings are provided, and the arm forms part of a parallelogram frame including a member on which the anchor point is provided, the arrangement being such that the member remains substantially vertical as the arm is raised and lowered. Most preferably, the frame engages laterally spaced mountings, to provide the frame with lateral stability.

[0010] The mounting may be provided on any suitable support structure above the deck area. The structure may be part of the vessel hull or superstructure, reinforced if required, or may be a dedicated structure. The retracted arm may extend upwardly of the mounting when in the retracted position.

[0011] Preferably, the apparatus is provided in combination with an extendable platform that may be extended outboard of the vessel to provide a larger deck area in front of the anchor point on which to deposit, rig and de-rig supplies. At present, a conventional RAS station mast must be set back from the deck edge to allow a sufficiently large working area in front of the mast, resulting in a loss of deck space for other purposes. How-

ever, with this feature of the present invention the anchor point may be located closer to the edge of the deck, the platform being extended when required to provide the necessary additional deck area in front of the anchor point. This feature is particularly useful in aircraft carriers, as it permits the apparatus to be located in a relatively narrow space, and within the width of the carrier island such that the deck remains unobstructed. Similarly, the compact arrangement which this feature makes possible is suited to enclosure within the angular profiles preferred for the radar cross-sections of modern naval vessels. This feature may of course be provided separately, for use with, for example, otherwise conventional RAS station apparatus.

[0012] Preferably, the platform is adapted to be pivotally mounted to the vessel, and is most preferably movable between a position in which the platform extends outboard of the vessel hull, and a retracted position in which the platform lies flush with or within the vessel hull. The retracted platform may form a part of the vessel hull.

[0013] Preferably, the platform is actuated by a piston and cylinder arrangement.

[0014] Conveniently, there is provided a snatch block anchor point on the platform such that a pulley or the like can be attached to the platform to allow a pilot line to be drawn therethrough.

[0015] Conveniently, the apparatus further comprises a warp pulley, for mounting to the vessel, to allow a pilot cable to be drawn from one vessel onto another.

[0016] Preferably, the apparatus is provided in combination with a roller shutter formed to the profile of the outer hull of the vessel, and the shutter may be opened or closed to provide outboard access to the anchor point. The closed shutter provides protection for the apparatus when not in use, reduces the vessels radar cross-section (RCS), and facilitates use of the deck area below the raised arm for storage. Of course other closure arrangements may be utilised in combination with the apparatus, including hatches, screens and flaps.

[0017] Conveniently, the apparatus is provided in combination with a roller shutter for selectively closing an access opening inboard of the anchor point. Again, this facilitates use of the deck area below the raised arm for storage. Of course, other closure arrangements may be utilised if desired.

[0018] This and other aspects of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a replenishment-at-sea (RAS) station including apparatus in accordance with a preferred embodiment of the present invention, showing the apparatus arm and a RAS station platform extended and ready for use;

Figure 2 is a front view of the RAS station of Figure 1; and

Figure 3 is a side view of a part of the apparatus of Figure 1, showing the apparatus retracted into its stowed position (on the same sheet as Figure 1).

[0019] Referring to the Figures, there is shown a replenishment-at-sea (RAS) station 10 including apparatus for providing a cable anchor in accordance with a preferred embodiment of the present invention. The illustrated RAS station 10 is provided within the island 11 of an aircraft carrier.

[0020] The apparatus for providing a cable anchor comprises a mounting 12 fixed to the structure of the vessel, and a support arm 14 pivotally attached to the mounting 12 and which is moveable between a raised or stowed position (Figure 3) and a lowered or in use position (Figures 1 & 2) above a deck area 16 within the RAS station 10.

[0021] The arm 14 forms part of a parallelogram frame 18 comprising two support members 20 and 22 pivotally mounted to the vessel structure at respective laterally spaced mountings 24, 26 positioned above and to either side of the mounting 12. The ends of the arm 14 and the members 20, 22 are joined by a vertical member 28 providing a cable anchor point 30, such that, in use, a cable 32 can be attached to the anchor point 30 and extend outboard of the vessel from the anchor point 30 to a supply vessel.

[0022] The frame 18 is moved between the retracted and extended positions by an actuator, in the form of a hydraulic ram 34, the upper end of the ram 34 being pivotally coupled to a mounting 36 on the vessel structure which defines the RAS station ceiling, and the lower end of the ram 34 being pivotally coupled to the arm 14. When the RAS station is not in use, the ram 34 may be activated to retract the frame 18 to the a raised, stowed position such that the deck area 16 directly below the arm 14 is available to be utilised for other purposes.

[0023] The RAS station further comprises a retractable deck platform 40 which is moveable between an extended position, as illustrated, and a retracted position, by actuators in the form of hydraulic rams 42. In the retracted position the platform 40 forms part of the exterior hull of the vessel. When the RAS station is in use, the platform 40 is lowered so that it extends outboard of the vessel hull, providing a larger deck area in front of the anchor point 30 which may be utilised to rig, de-rig or land supplies.

[0024] Another feature of the illustrated station 10 is a warp end drive 44 which may be used to draw cable or the like from another vessel. For use in combination with the warp end drive 44 is a snatch block anchor point 46 which is attached to one side of the platform 40; a pulley or the like may be attached to the anchor point 46 and a cable being drawn by the warp end drive 44 may be guided and drawn through the pulley.

[0025] The station 10 also comprises an outer roller shutter 50, formed to the profile of the outer hull of the vessel. When closed the shutter 50 provides a reduced radar cross-section (RCS), and provides protection for

the apparatus, and the area inboard of the shutter 50, from sea spray and the like, thus allowing the deck area 16 to be utilised for storage or other purposes when the RAS station 10 is not in use. In this embodiment it is intended that the station 10 serve as a storage area for a forklift truck.

[0026] A second roller shutter 52, also formed to reduce radar cross-section (RCS), is provided inboard of the deck area 16, and may be closed to isolate the station 10 from the flight deck 54.

[0027] In use, the RAS station 10 is operated when it is required to replenish supplies aboard the vessel. A supply vessel comes along side the carrier, the roller shutters 50 and 52 are raised, and the platform 40 lowered. A light cable is deployed between the two vessels and by use of the warp end drive 44 and a pulley attached to the snatch block anchor point 46, in a similar manner as is presently performed, a heavier support cable is deployed. The ram 34 is then actuated and the frame 18 lowered, and an end of the cable is attached to the anchor point 30.

[0028] While supplies are being transferred between the two vessels the frame 18 is raised to a height that will ensure the bottom of the load is above the level of the platform 40. Once the load has reached the carrier and has been positioned in the drop zone, that is above the deck area immediately in front of the anchor point 30, the frame 18 is lowered such that the anchor point 30 and cable 32 are also lowered, until the supplies rest on the deck 16 in the drop zone area, while also ensuring that there is enough slack provided in the rigging to be able to de-rig. Once the load is de-rigged, the arm 14 is raised to a level that enables a mechanical aid, typically a fork lift truck or the like, to move into the station 10 from the flight deck 54 and pick up the supplies, and then reverse out of the station 10 and transport the supplies to their desired destination on the carrier. The frame 14 is then lowered ready for the next load to be transferred from the supply vessel.

[0029] While the station 10 is not in use, the enclosed deck area 16 provides a convenient storage location for the fork lift truck or other equipment used to move supplies to and from the station.

[0030] It will be clear to those of skill in the art that the above-described embodiment is merely exemplary of the present invention and that various modifications and improvements may be made thereto without departing from the scope of the invention.

Claims

1. An apparatus for use in transferring supplies between two vessels at sea, the apparatus being adapted for location on a vessel and comprising:

   a mounting (12) adapted to be affixed to or formed in the structure of a vessel; and

   a support arm (14) depending from the mounting (12) and being movable between a retracted position and an extended position above a deck area (16), the arm (14) providing an anchor point (30) for a cable (32) for extending outboard from the vessel and whereby, at least with the support arm (14) in the retracted position, the deck area (16) below and forward of the anchor point (30) is accessible from inboard.

2. An apparatus as claimed in claim 1, further comprising means for moving the arm between the retracted and extended positions.

3. An apparatus as claimed in claim 2 wherein the arm moving means comprises a piston and cylinder arrangement for coupling between the support arm and a part of the vessel.

4. An apparatus as claimed in claim 3 wherein the piston and cylinder arrangement extends upwardly from the support arm.

5. An apparatus as claimed in any of the preceding claims wherein the support arm extends forwardly of the mounting.

6. An apparatus as claimed in any of the preceding claims wherein vertically spaced mountings are provided, and the arm forms part of a parallelogram frame including a member on which the anchor point is provided, the arrangement being such that the member remains substantially vertical as the arm is retracted and extended.

7. An apparatus as claimed in any preceding claim wherein laterally spaced mountings are provided and the arm forms part of a frame coupled to said mountings.

8. An apparatus as claimed in claim 7 wherein the laterally spaced mountings are provided on a support structure above the deck area.

9. An apparatus as claimed in any of the preceding claims wherein, in the retracted position, the arm extends upwardly of the mounting.

10. An apparatus as claimed in any of the preceding claims in combination with an extendable platform adapted to extend outboard of the vessel to provide an extended deck area in front of the anchor point.

11. An apparatus as claimed in claim 10 wherein the platform is adapted to be pivotally mounted to the vessel.

12. An apparatus as claimed in either of claim 10 or 11, wherein the platform is movable between an extended position in which the platform extends outboard of the vessel hull, and a retracted position in which the platform lies flush with or within the vessel hull.

13. An apparatus as claimed in either of claim 10 or 11 wherein in the retracted position the platform is adapted to form a part of the vessel hull.

14. An apparatus as claimed in any of claims 10 to 13 wherein the platform is actuated by a piston and cylinder arrangement.

15. An apparatus as claimed in any of claims 10 to 14 wherein there is provided a snatch block anchor point on the platform such that a pulley can be attached to the platform to allow a pilot line to be drawn therethrough.

16. An apparatus as claimed in any of the preceding claims wherein the apparatus further comprises a warp pulley, for mounting to the vessel, to allow a pilot cable to be drawn from one vessel onto another.

17. An apparatus as claimed in any one of the preceding claims wherein the apparatus is provided in combination with an outboard closure member formed to the profile of the outer hull of the vessel, the closure member being openable to provide outboard access to the anchor point.

18. An apparatus as claimed in claim 17 wherein the outboard closure member is in the form of a roller shutter.

19. An apparatus as claimed in any of the preceding claims wherein the apparatus is provided in combination with an inboard closure member for selectively closing an access opening inboard of the anchor point.

20. An apparatus as claimed in claim 19, wherein the inboard closure member is in the form of a roller shutter.

21. An apparatus for facilitating transfer of supplies between two vessels at sea, the apparatus being adapted for location on a vessel and comprising an extendable platform adapted to extend outboard of a vessel to provide an extended deck area outboard of a cable anchor point of a replenishment-at-sea station.

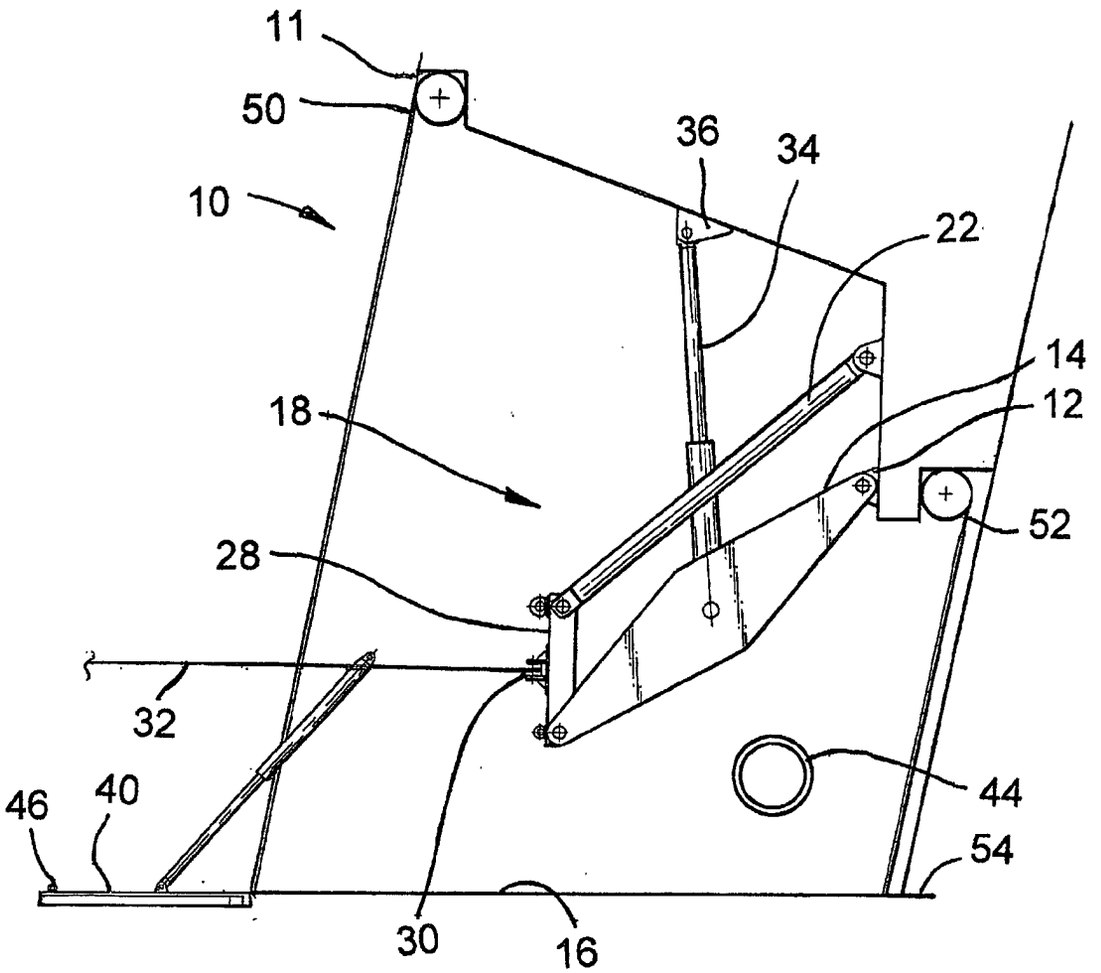
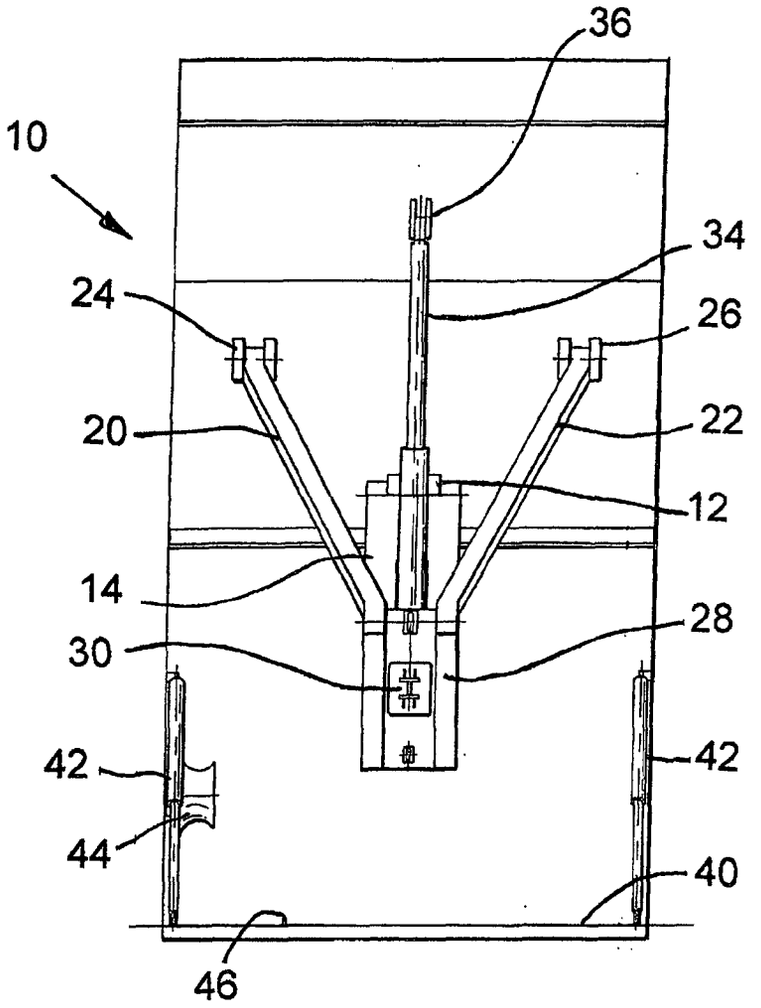


Fig.1

Fig.2



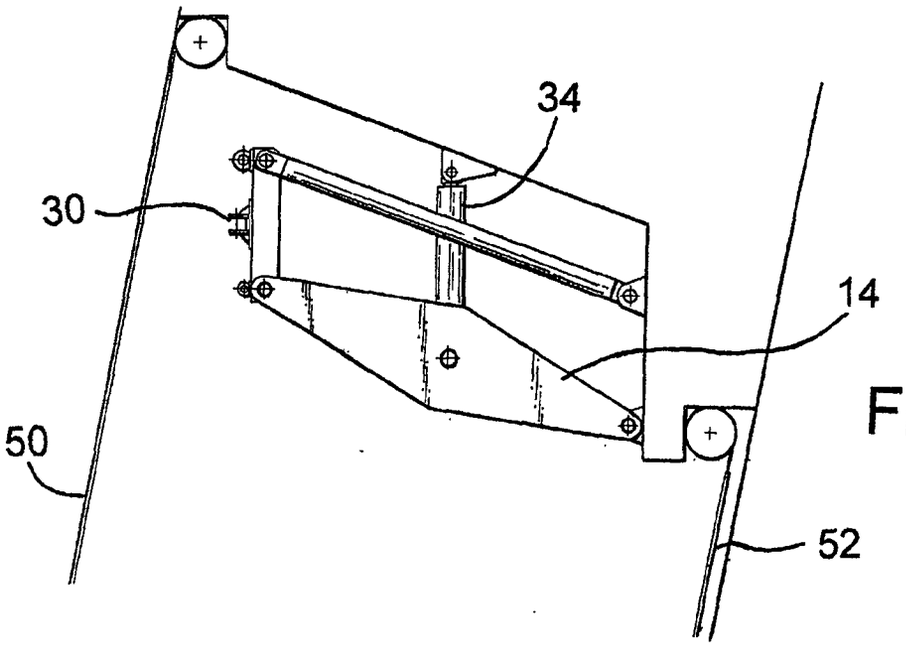


Fig.3