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(54) **Lift arrangement for waste compactor and method for operating such waste compactor**

(57) The present invention relates to a lift arrangement for discharging a bale of compressed waste from a waste compactor, wherein the waste compactor comprises a waste container for receiving compressed waste. The lift arrangement comprises a lift band in a first end fixed relative to the waste container and in a second end

attached to a stretch device. The stretch device is adapted to be arranged in the waste container and configured to be worked by hand to stretch the lift band to discharge a bale of compressed waste through the discharge opening. The present invention further relates to a waste compactor comprising such lift arrangement and a method for operating such waste compactor.

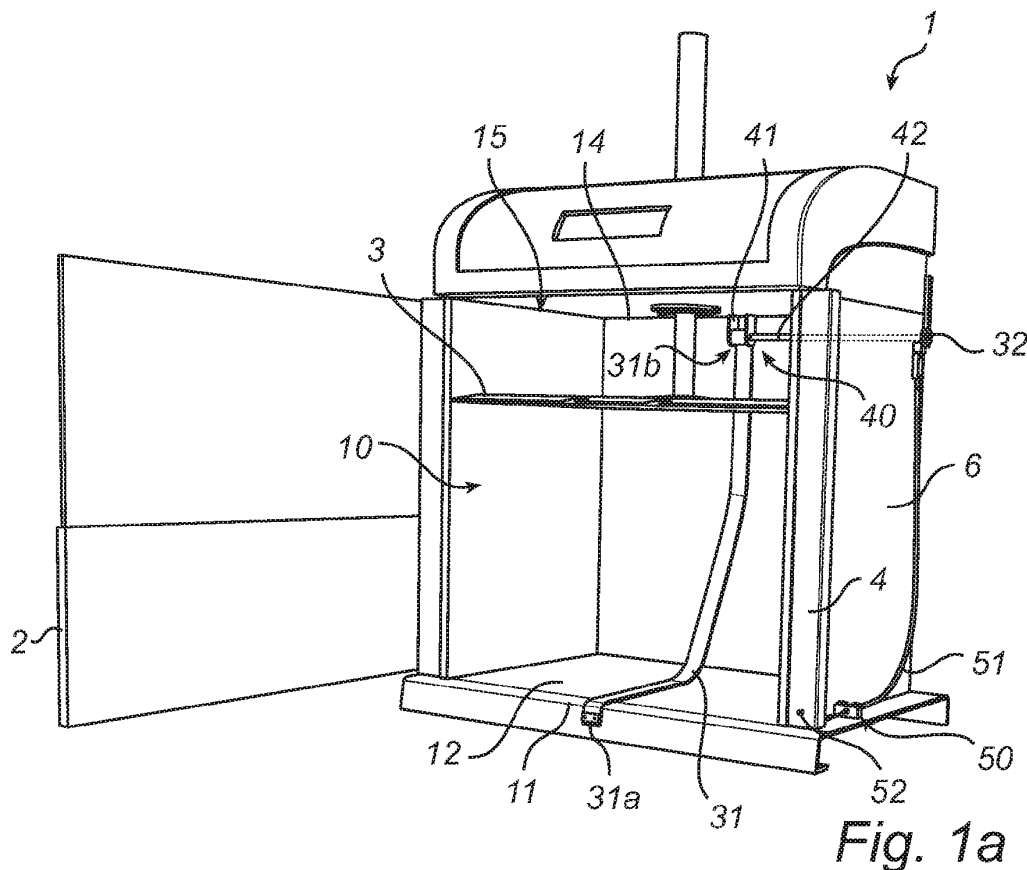


Fig. 1a

Description

Technical Field

[0001] The present disclosure relates to a lift arrangement for discharging a bale of waste from a waste compactor. The present disclosure further relates to a waste compactor comprising such lift arrangement and a method for operating such waste compactor.

Background

[0002] A waste compactor comprises a waste container into which waste is entered. A compression plate presses the waste towards the bottom of the waste container providing a well compressed bale of waste. Such bale may have a significant weight due to the effectiveness of the waste compactor. Depending on the size of the waste compactor, the bale may be discharged from the waste container in different ways.

[0003] For a small size waste compactor, for instance a vertical waste compactor, a user may be expected to open a door to the waste container to remove the bale from the waste container. Due to the compression rate of the bale, it may be very difficult for the user to be able to discharge the bale, unless the user is physically well trained.

[0004] One solution to the above mentioned problem is disclosed in US5062358, wherein an elongated flexible band is arranged in the waste container below the bale and attached to the compression plate. When the waste container is opened, the compression plate is operated to stretch the flexible band such that the bale is tilted through the opening of the waste container.

[0005] A problem with such solution is that the compression plate needs to be operated when the waste container is open. In a machine like a waste compactor, it is unwanted to have machine parts moving when for instance a door is open. The user becomes exposed to a risk for injury which may not be allowed due to safety regulations.

[0006] Consequently, there is a need for a discharge arrangement which is safe for the user.

Summary

[0007] It is an object of the present invention to provide an improved arrangement for discharging waste from a waste compactor that alleviates the mentioned drawbacks with present devices. According to a first aspect of the invention, this is achieved by a lift arrangement for discharging a bale of compressed waste from a waste compactor, wherein the waste compactor comprises a waste container for receiving compressed waste. The lift arrangement comprises a lift band in a first end adapted to be fixed relative to the waste container and in a second end attached to a stretch device. The stretch device is adapted to be arranged in the waste container and con-

figured to be worked by hand to stretch the lift band to discharge a bale of compressed waste through the discharge opening.

[0008] By providing a stretch device configured to be worked by hand to stretch the lift band, a waste bale may be discharged through the discharge opening in a safe way by a user. A discharge operation may be controlled by the user and no dangerous moving machine parts are active which may injure the user. Further, since all parts of the lift arrangement are operatively separated from any moving parts of the waste compactor, it may be an easy operation to install such lift arrangement in an available waste compactor. The lift band may in the first end be fixed relative to the waste container by being attached to an edge of the waste container. The first end of the lift band may be attached to a front bottom edge of the waste container. The stretch device may be arranged at a top of the waste container. The stretch device may be arranged at a top rear edge of the waste container.

[0009] In one embodiment, the lift arrangement may comprise a handle adapted to be arranged outside the waste container and may be configured to be worked by hand to operate the stretch device.

[0010] By providing a handle for a user to operate by hand outside the waste container, the risk for injury of a user may be minimized since the user does not need to perform any action inside the waste container. The user may further have complete control of the discharge operation.

[0011] In a further embodiment, the stretch device may be adapted to be arranged at a top rear edge of the waste container.

[0012] By arranging the stretch device at a top rear edge of the waste container, a stretched lift band may be provided in an angle sufficient to tilt a bale of compressed waste through the discharge opening. At the same time, when the lift band loose, it may extend from the attachment at the bottom front edge of the waste container, along a bottom surface of the waste container and further up along a back wall of the waste container to the stretch device. Thereby, it may be completely out of way for the compressed waste and a compression plate operating in the waste container.

[0013] In another embodiment, the stretch device may comprise a roller adapted to be rotated to wind up the lift band to stretch the lift band.

[0014] The roller may wind up the lift band to stretch it such that compressed waste in the waste container may be tilted through the discharge opening. A roller is an easy and cost effective solution for stretching the lift band. The lift band may be an unelastic band.

[0015] In a further embodiment, the handle may comprise a catch wheel adapted to prevent rotation of the handle in a lift band release direction.

[0016] To facilitate the operation of the lift arrangement to discharge the compressed waste, the handle configured to be operated by hand by a user may be provided with a catch wheel. The catch wheel may be configured

to prevent rotational movement of the handle in a direction that may loosen the lift band. The lift band release direction, or lift band loosening direction, may be an opposite rotational direction than the direction in which the handle may be rotated to stretch the lift band. By preventing handle movement in the lift band release direction, a user may turn the handle a little bit at the time during the operation of discharging the compressed waste. The user may not need to hold the handle to prevent it from rotating in the lift band release direction. This may provide a further increased safety to a discharge operation of a waste bale.

[0017] In one embodiment, the waste compactor may further comprise a discharge door for opening and closing a discharge opening, and the lift arrangement may comprise a door detection unit configured to detect whether the discharge door is open or closed, wherein the door detection unit may be coupled to the handle and configured to set the catch wheel in a disengagement position when the discharge door is closed.

[0018] The user may open the discharge door for discharging the compressed waste. The lift arrangement may be configured to be operated only when the discharge door is open. The door detection unit may be a mechanical or electrical device that may detect an open or closed position of the discharge door. When the discharge door is closed, the door detection unit may provide that the catch wheel may be disengaged. The catch wheel may thereby no longer prevent movement of the handle in the lift band release direction. A stretched lift band may thereby be released to avoid interference with the compression plate and/or compressed waste. This may further be a safety feature for the waste compactor, reducing the risk of damage to the machine during compression of waste.

[0019] In a further embodiment, the door detection unit may comprise a wire coupled to the handle and configured to be pulled when the discharge door is closed such that the catch wheel may be disengaged.

[0020] The door detection unit may be mechanically coupled to the handle. The mechanical coupling may comprise a wire configured to be pulled when the discharge door is closed. The wire may in one end be connected to the handle. The wire may further be connected to the catch wheel in the handle. Thereby, when the discharge door is closed, the wire may be pulled such that the catch wheel is disengaged. The lift band may thereby be released such that it does not lift or tilt any compressed waste in the waste container.

[0021] In another embodiment, the door detection unit may comprise a door pin configured to be pushed by the discharge door when the discharge door is closed.

[0022] By providing a door pin that may be pushed by the discharge door when closed, a simple and cost effective door detection unit may be provided. The door pin may extend through a door frame such that an inner surface of the discharge door may be configured to abut the door pin and press it through the door frame when the

discharge door is closed. The door pin may then further be configured to pull the wire to disengage the catch wheel in the handle.

[0023] In an alternative embodiment, the door detection unit may comprise a mechanical link system coupled to the handle and configured to be operated when the discharge door is closed such that the catch wheel may be disengaged.

[0024] A mechanical link system may be a solid and robust coupling between the door pin and the handle.

[0025] According to a second aspect of the invention, a waste compactor is provided, wherein the waste compactor comprises a waste container for receiving compressed waste and a lift arrangement as presented above.

[0026] In one embodiment, the waste compactor may further comprise a compression plate arranged in the waste container, and a discharge door for opening and closing a discharge opening. The compression plate may be prevented from movement when the discharge door is open.

[0027] The compression plate may be prevented from movement when the discharge opening is open to prevent injury to a user due to moving machine parts in the waste compactor. The safety for the user may be increased if the compression plate is prevented from movement when the bale of compressed waste is to be discharged. Due to the advantages of the present invention, the user may still have control of the discharge process of the waste bale.

[0028] According to a third aspect of the invention, a method of operating a waste compactor as presented above may be provided. The method may comprise a step of operating the stretch device by hand such that the lift band is stretched and the bale of compressed waste may be discharged from the waste compactor. The method may in a further embodiment comprise a step of opening a discharge door on the waste compactor such that a catch wheel in the handle is engaged, and wherein the step of operating the stretch device may comprise operating the handle. The catch wheel may thereby be disengaged when the door is closed such that the lift band may not interfere with a waste compression procedure.

Brief Description of the Drawings

[0029] The invention will in the following be described in more detail with reference to the enclosed drawings, wherein:

Fig 1 a shows a perspective view of a waste compactor according to an embodiment of the invention. Fig 1 b shows a perspective view of a waste compactor according to an embodiment of the invention. Fig 2 shows a perspective view of a waste compactor according to an embodiment of the invention.

Description of Embodiments

[0030] The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. In the drawings, like numbers refer to like elements.

[0031] Fig 1 a and 1 b illustrates a waste compactor 1 according to an embodiment. The waste compactor 1 comprises a waste container 10. The waste container 10 is on a front side defined by a discharge door 2. The discharge door 2 provides a discharge opening 15 to the waste container 10. The discharge door 2 may comprise two door parts, wherein at least one of the door parts needs to be opened to discharge waste. Inside the waste container 10 is a compression plate 3 arranged. The compression plate 3 is configured to compress waste that is put into the waste compactor 1 by moving vertically towards a bottom surface 12 of the waste container 10. The compression plate 3 is configured to compress waste into a box shaped waste bale 20.

[0032] The waste bale 20 is discharged from the waste compactor 1 by opening the discharge door 2 and discharging the waste bale 20 through the discharge opening 15. To facilitate the discharge operation of the waste bale 20, the waste compactor 1 is provided with a lift arrangement 30.

[0033] The lift arrangement 30 comprises a lift band 31 and a stretch device 40. A first end 31 a of the lift band 31 is attached to a bottom front edge 11 of the waste container 10. The stretch device 40 comprises a roller 41. A second end 31 b of the lift band 31 is attached to the roller 41. The roller 41 is arranged at a top rear edge 14 of the waste container 10. The roller 41 is arranged to wind up the lift band 31. Due to the lift band's 31 attachment at the bottom front edge 11 of the waste container 10, when the roller 41 winds up the lift band 31, it will be stretched from the top rear edge 14 to the bottom front edge 11 of the waste container 10. In one embodiment, the arrangement of the roller 41 may switch place with the fixing of the lift band 31 to the waste container 10.

[0034] The waste bale 20 is formed on top of the lift band 31 towards the bottom surface 12 of the waste container 10. Thereby, as seen in fig 1 b, when the lift band 31 is stretched, the waste bale 20 will be lifted and tilted through the discharge opening 15 out of the waste container 10. A user may place a trolley (not shown) or the like at the discharge opening 15 which trolley may receive the waste bale 20 that is discharged from the waste compactor 1.

[0035] For the roller 41 to be rotated to wind up the lift band 31, it is attached to a shaft 42. The shaft 42 is rotationally fixed to the roller 41. Alternatively, the stretch

device 40 may comprise a gear coupling between the roller 41 and the shaft 42. The shaft 42 extends through a side wall 6 of the waste compactor 1. At an end of the shaft 42, at an outside of the waste compactor 1, the shaft 42 is attached to a handle 32. The handle 32 is configured to be worked by hand by a user to rotate the shaft 42 and the roller 41 to wind up the lift band 31. The lift band 31 may in an alternative embodiment be wound up by alternative components operated by the handle 32.

[0036] The handle 32 comprises a catch wheel (not shown). As shown in fig 2, the handle 32 can be rotated in the direction A for winding up and stretch the lift band 31. The catch wheel prevents the handle 32 to be rotated in the direction B. A user can thereby stretch the lift band 31 slowly and bit by bit without the risk of losing the grip of the handle 32 such that the lift band 31 is loosened. In one embodiment, the rotation directions A and B may be switched.

[0037] However, when the waste bale 20 has been discharged and new waste may be received in the waste container 10, the lift band 31 should be loosened not to interfere with the compression operation of the compression plate 3. The lift arrangement 30 therefore further comprises a door detection unit 50. The door detection unit 50 comprises a wire 51 and a door pin 52. The wire 51 is in one end connected to the handle 32 and in another end connected to the door pin 52. The door pin 52 is arranged in a door frame 4 of the waste compactor 1. The door pin 52 extends through the door frame 4 such that it may be pushed by the discharge door 2 when the discharge door 2 is closed. The wire 51 is coupled to the door pin 52 such that the wire is pulled in the direction C when the door pin 52 is pushed by the discharge door 2. The door pin 52 is suspended such that when the door pin 52 is pushed in direction D, the wire 51 is pulled in direction C.

[0038] The wire 51 is connected to the handle 32 such that the catch wheel is disengaged when the wire 51 is pulled. When the catch wheel is disengaged, the rotational movement of the handle 40 in the direction B is no longer prevented. The lift band 31 may thereby be loosened such that it is not stretched through the inner space of the waste container 10.

[0039] This results in the action that when the discharge door 2 is closed, the lift band 31 is loosened. This is a result of the door pin 52 being pushed, the wire 51 being pulled and the catch wheel being disengaged.

[0040] When the discharge door 2 is open, a user may pull the wire 51 in the direction C by hand to disengage the catch wheel such that the lift band 31 is loosened. The user may thereby loosen the lift band 31 even when the discharge door 2 is open.

[0041] In one embodiment, the wire 51 may be replaced by a mechanical link system in one end connected to the door pin 52 and in another end connected to the handle 32 and the catch wheel.

[0042] In the drawings and specification, there have been disclosed preferred embodiments and examples of

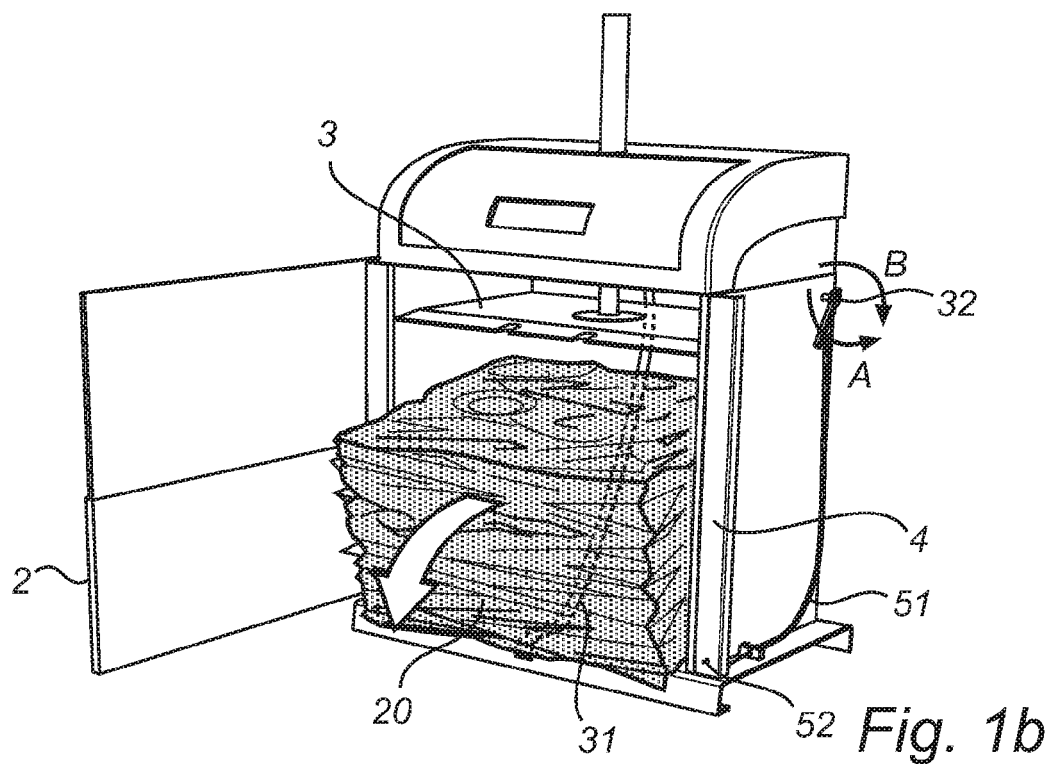
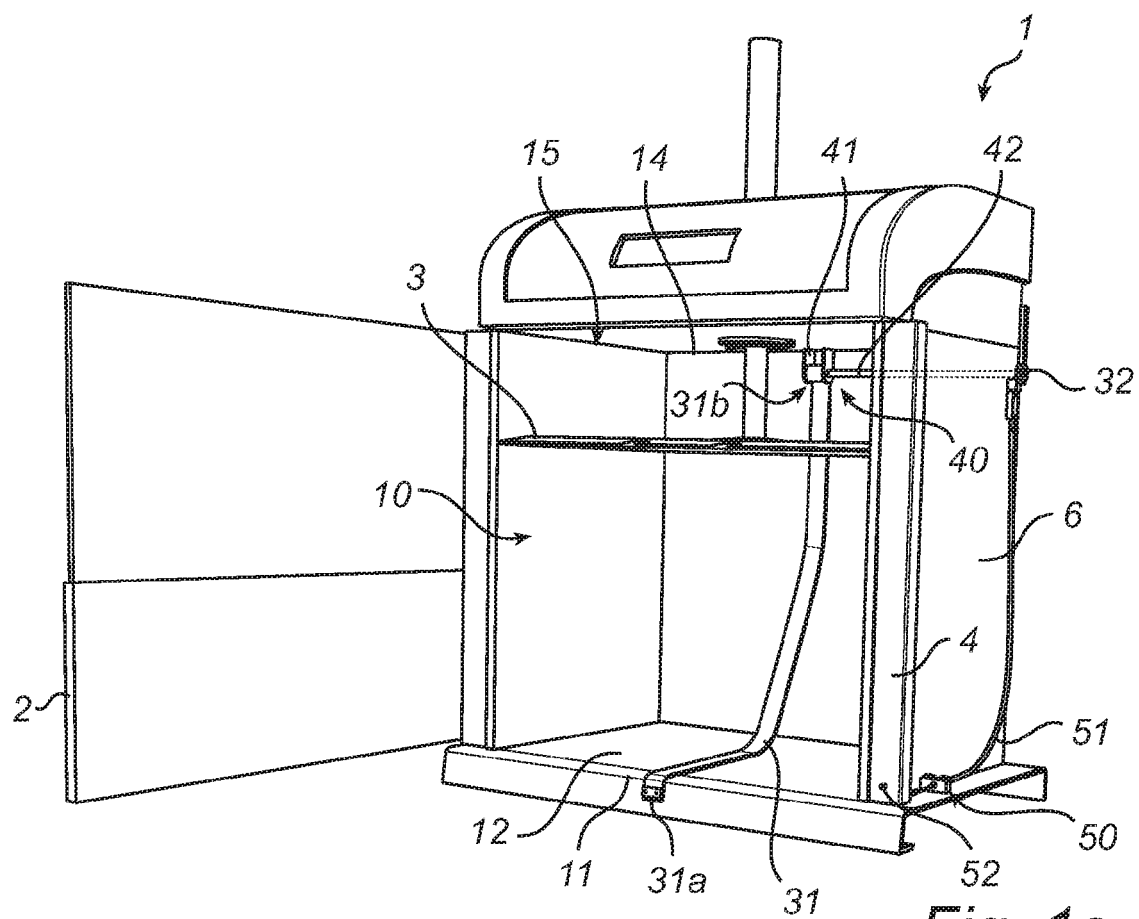
the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation, the scope of the invention being set forth in the following claims.

Claims

1. A lift arrangement (30) for discharging a bale (20) of compressed waste from a waste compactor (1), wherein said waste compactor comprises a waste container (10) for receiving compressed waste, **characterized in that** the lift arrangement comprises a lift band (31) in a first end (31 a) adapted to be fixed relative to the waste container and in a second end (31 b) attached to a stretch device (40), wherein the stretch device is adapted to be arranged in the waste container (10) and configured to be worked by hand to stretch the lift band (31) to discharge a bale (20) of compressed waste. 10
2. Lift arrangement according to claim 1, wherein the lift arrangement (30) comprises a handle (41) adapted to be arranged outside the waste container (10) and configured to be worked by hand to operate the stretch device (40). 25
3. Lift arrangement according to claim 1 or 2, wherein the stretch device (40) is adapted to be arranged at a top rear edge (14) of the waste container (10). 30
4. Lift arrangement according to any of the preceding claims, wherein the stretch device (40) comprises a roller (41) adapted to be rotated to wind up the lift band (31) to stretch the lift band. 35
5. Lift arrangement according to claim 2, wherein the handle (32) comprises a catch wheel adapted to prevent rotation of the handle in a lift band release direction (B). 40
6. Lift arrangement according to claim 5, wherein the waste compactor further comprises a discharge door (2) for opening and closing a discharge opening (15), and wherein the lift arrangement comprises a door detection unit (50) configured to detect whether the discharge door (2) is open or closed, wherein the door detection unit is coupled to the handle (32) and configured to set the catch wheel in a disengagement position when the discharge door is closed. 45 50
7. Lift arrangement according to claim 6, wherein the door detection unit (50) comprises a wire (51) coupled to the handle (32) and configured to be pulled when the discharge door (2) is closed such that the catch wheel is disengaged. 55
8. Lift arrangement according to claim 6 or 7, wherein

the door detection unit (50) comprises a door pin (52) configured to be pushed by the discharge door (2) when the discharge door is closed.

9. Lift arrangement according to claim 6, wherein the door detection unit (50) comprises a mechanical link system coupled to the handle (32) and configured to be operated when the discharge door (2) is closed such that the catch wheel is disengaged. 10
10. Waste compactor (1) comprising a waste container (10) for receiving compressed waste and a lift arrangement (30) according to any of the claims 1-9. 15
11. Waste compactor according to claim 10, wherein the waste compactor (1) further comprises a compression plate (3) arranged in the waste container (10) and a discharge door (2) for opening and closing a discharge opening (15), wherein the compression plate (3) is prevented from movement when the discharge opening (15) is open. 20
12. Method of operating a waste compactor according claim 10 or 11 comprising the step of operating the stretch device (40) by hand such that the lift band (31) is stretched and the bale (20) of compressed waste is discharged from the waste compactor (1). 25 30 35 40 45 50 55



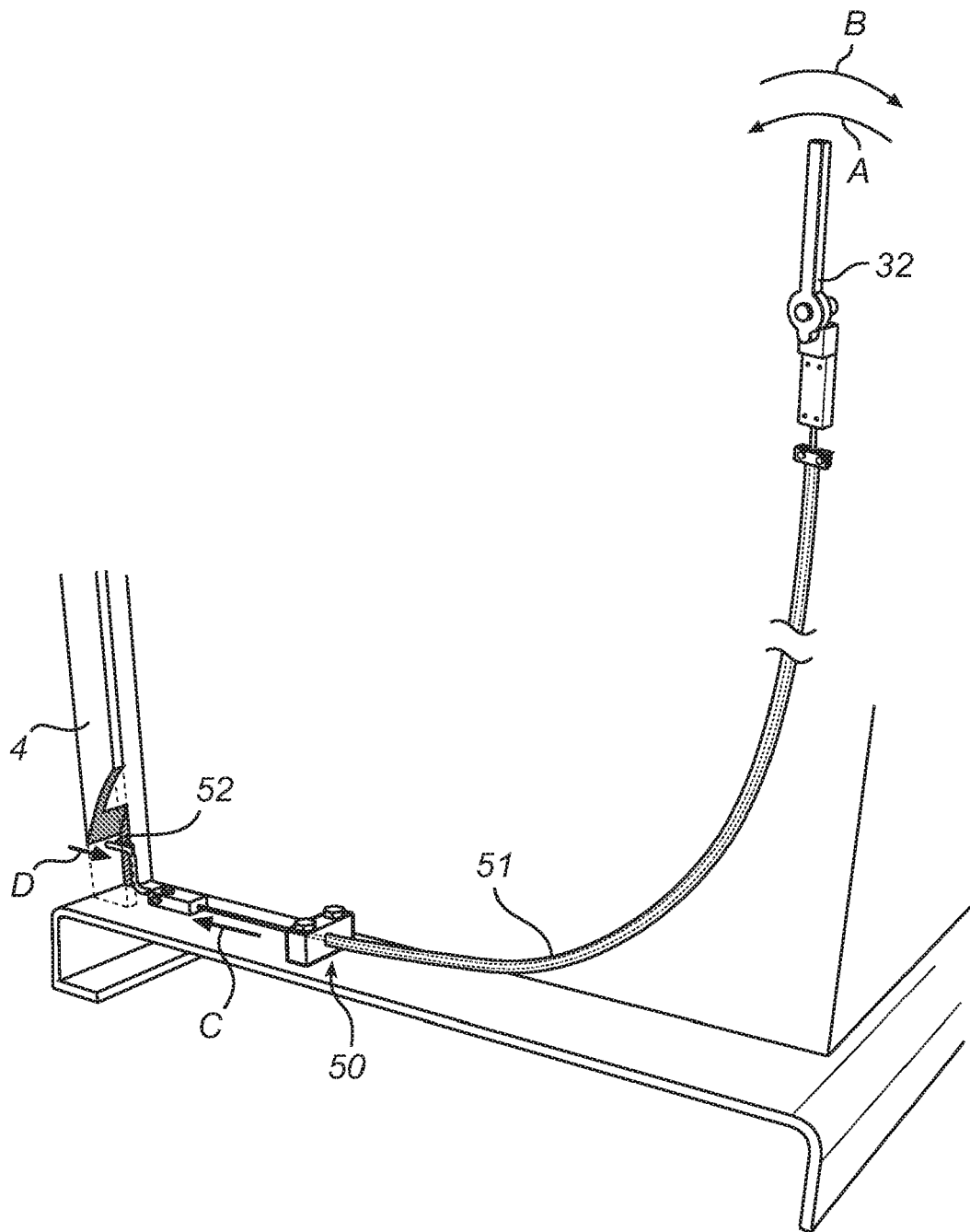


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 11 17 9598

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 January 2012	Examiner Baradat, Jean-Luc
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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